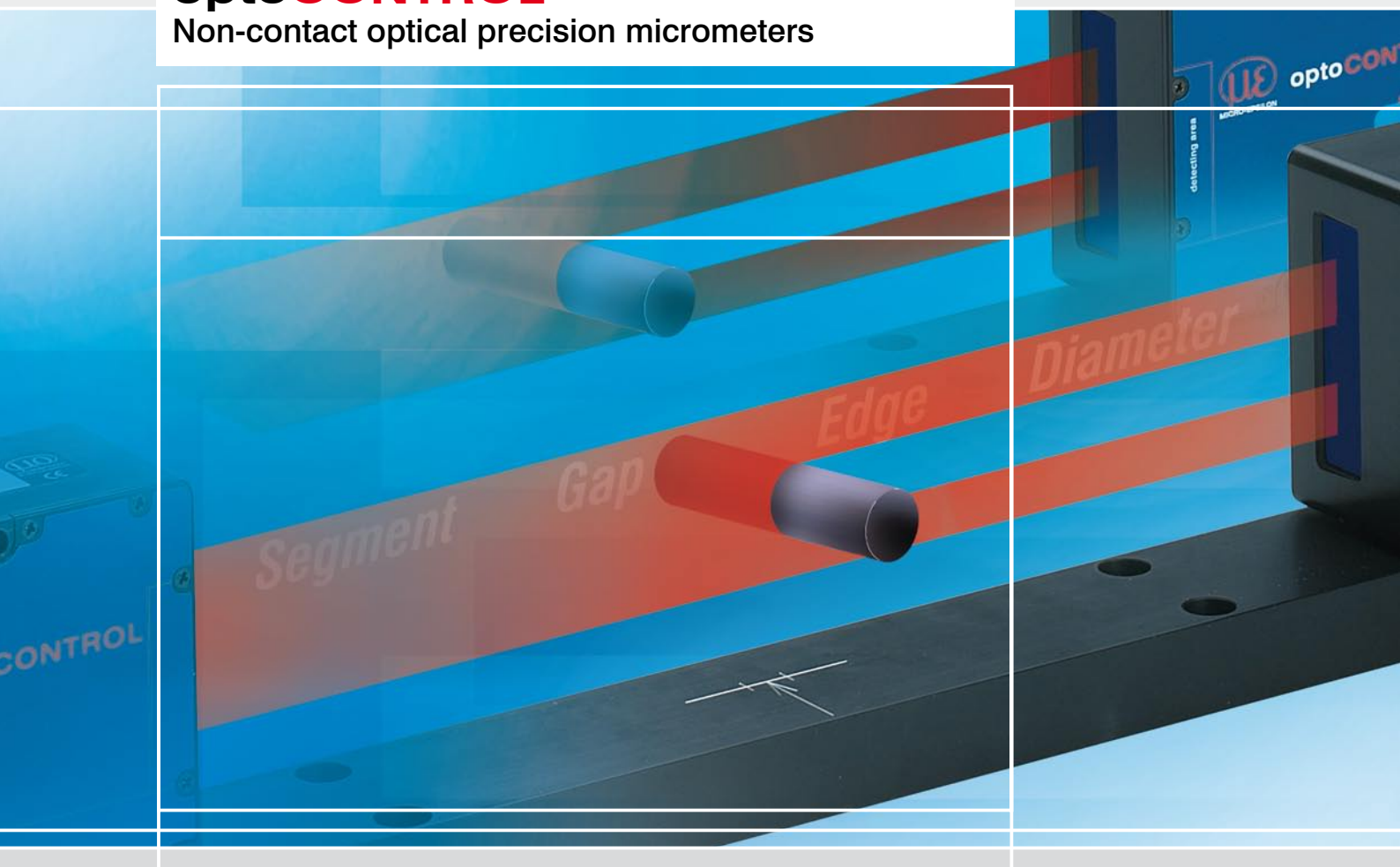
MICRO-EPSILON

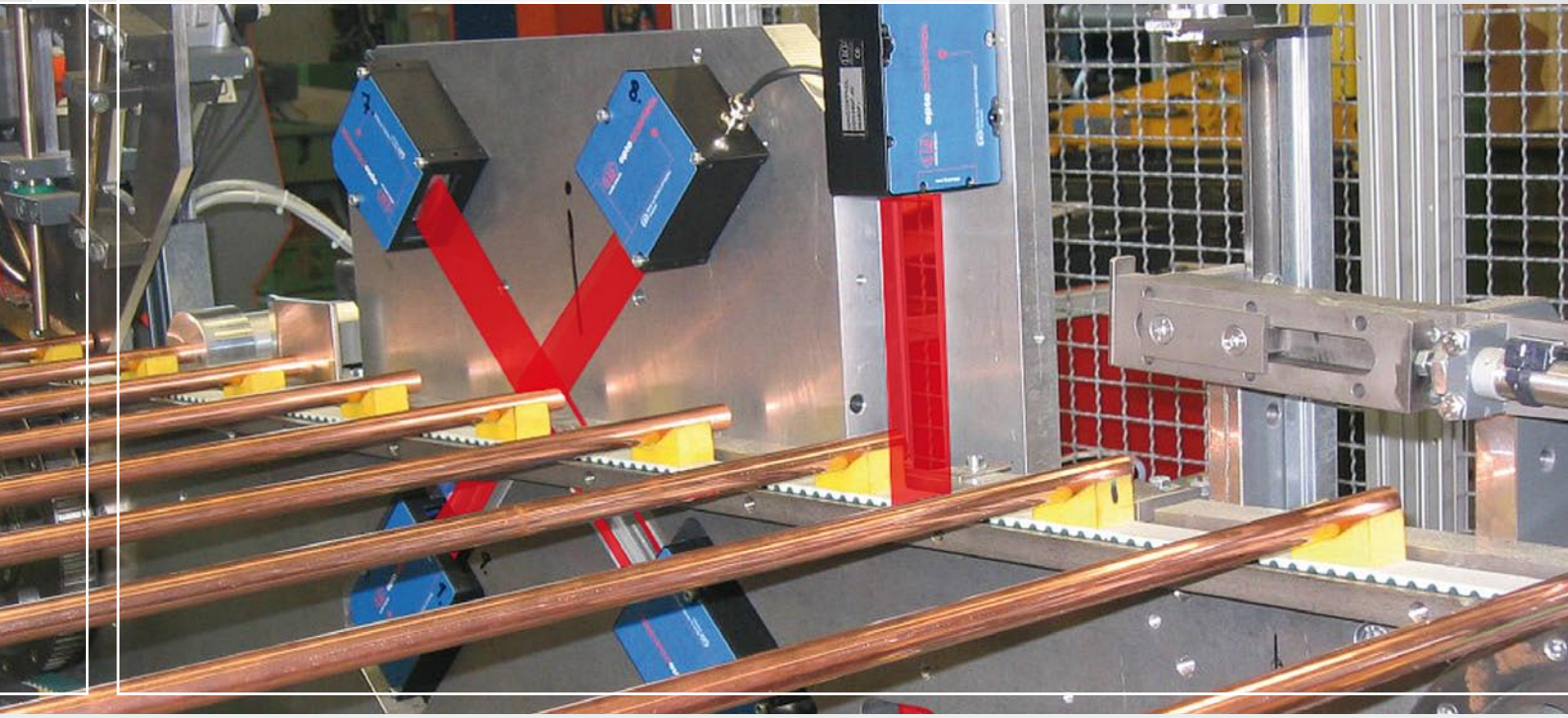
More Precision.

optoCONTROL

Non-contact optical precision micrometers



Optical micrometers for precision applications



Optical precision micrometers

Micrometers from Micro-Epsilon operate according to the ThruBeam principle. A transmitter unit emits a visible parallel light curtain which is aimed at an opposing receiver unit. The object to be measured is positioned between the two heads breaking the optical light path. This creates a shadow image, which is detected by the receiving optical system than processed and output as a geometric value. Various ThruBeam technologies are implemented in the four models made available by Micro-Epsilon to offer the best solution for each individual application problem.

Non contact optical micrometers are usually used for dimensional measurements in production and quality control, research and development as well as for service in test and measurement. Dimensions such as diameter, gap, height, position, edge, thickness and multiple segments can be easily measured stationary or while moving at high speed without touching the target. Customers world wide appreciate the various Micro-Epsilon ThruBeam models, which offer each unique features to solve the individual application problem.

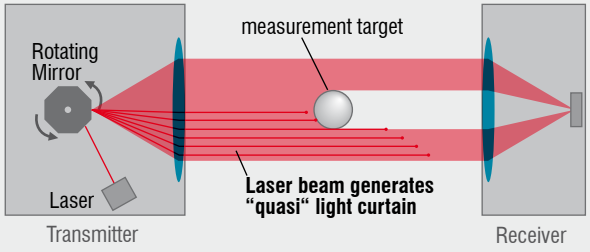
- **Excellent accuracy**
- **Extreme fast real time measurement**
- **Absolute non contact, wear-free measurement**
- **Solid state technology**

Wear-free and long life time due to solid state technology:

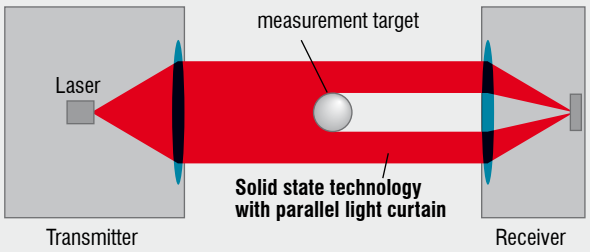
All optoCONTROL models function without a rotating mirror and are therefore completely wear-free. No moving state of the art high tech components guarantee accuracy over a long period of life. There is no performance deterioration over time.

Precision measurements even for fast moving targets:

Traditional scanning micrometers will generate a false reading for moving parts and distort a dynamic profile. All optoCONTROL models delivery precision accuracy and real time profiles due to their high speed solid state receiver technology.



Common micrometers with rotating mirror:
No true real time profile can be generated due to scanning light beam, moving object will deliver false reading.



optoCONTROL wear free thrubeam micrometers:
High speed real time consistent data enables true precision profile without distortion

	Measuring ranges	Measurement mode
Page 4 - 5 optoCONTROL 1200/1201 Most compact, 100kHz PSD; For tight spaces 90° version; integrated controller	Measuring range up to 30mm	
Page 6 - 7 optoCONTROL 1202 Large beam with CCD camera Integrated controller	Measuring range up to 98mm	
Page 8 - 9 optoCONTROL 2500 High accuracy CCD camera with sophisticated controller	Measuring range up to 34mm	
Page 10 - 11 optoCONTROL 2600 Most precise CCD ThruBeam measurement system	Measuring range up to 40mm	

Useful for many applications

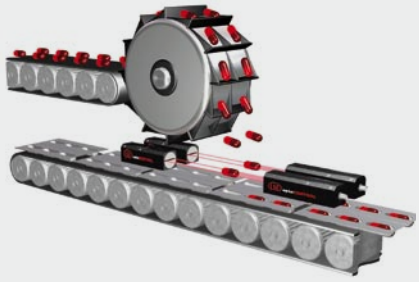
Non contact ThruBeam micrometers offer economic solutions for a variety of measurement applications. They are ideal for any dimensional gauging application such as gap, diameter, width, thickness and height. Since the measurement is performed without contacting the target, a reliable measurement is achieved even if the part is being moved, making this the perfect sensor for inline production control. The high speed measurement capability in conjunction with the high resolution opens the door for any profiling application. Several sensors can be synchronized to derive more complex measurement readings.

OEM and custom sensor design

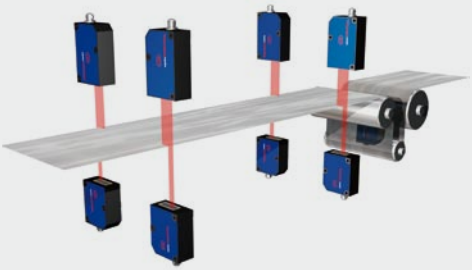
Micro-Epsilon offers custom design and modifications of the standard catalog models (e.g):

- Cable length and cable exit
- Dimensional changes
- Filters or mirror for beam redirection
- Custom software

Contact Micro Epsilon for OEM assistance.

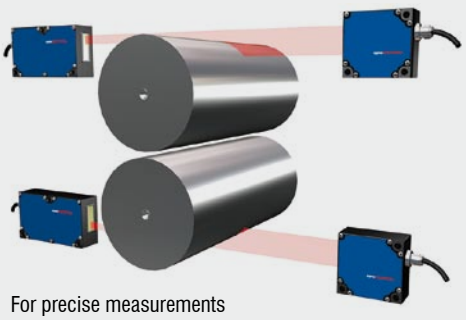


Miniature version for restricted installation space

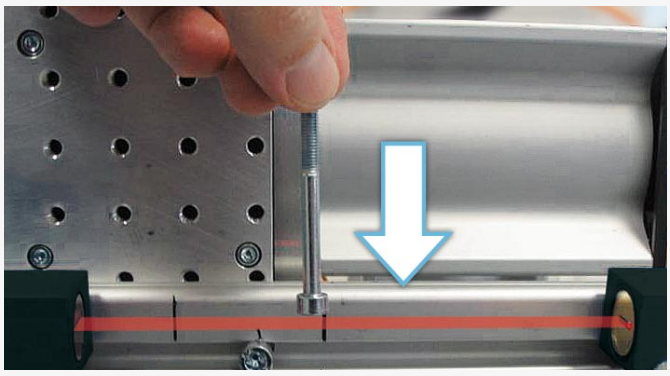


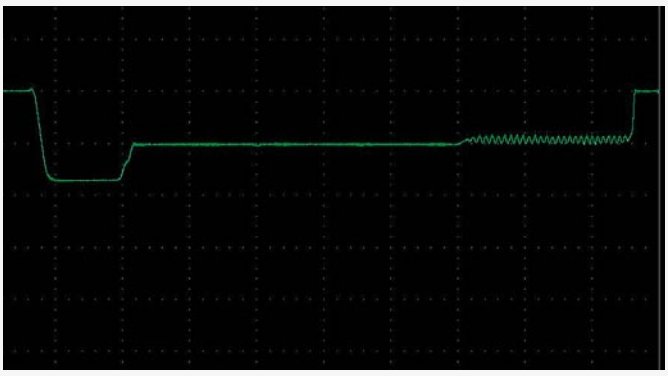
Synchronous measurement applications

Large targets up to 100 mm



For precise measurements





Accuracy and true real time capability

The optoCONTROL non contact micrometer delivers accurate profile data for moving objects with amazing spatial resolution and consistency.

Measuring principle

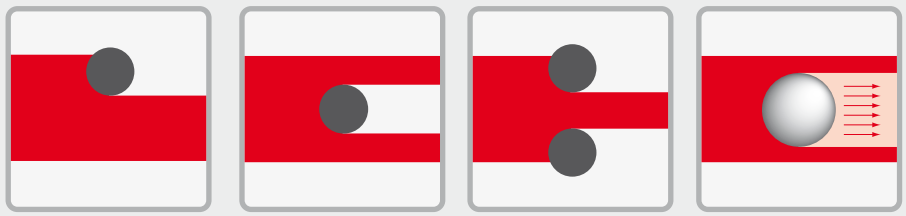
The optoCONTROL 1200 is based on the principle of light quantity measurement. The light of a red laser diode is spread out by a lens to a parallel light curtain which is aimed at the receiving unit. In the receiving unit, the light is guided via various filters and lenses through a precision shutter to a light-sensitive detector. The amount of the detected light is than output via a proportional analog signal with a frequency response of 100 kHz.

System design

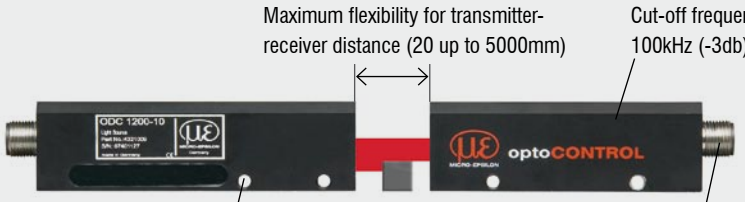
optoCONTROL consists of a light source (transmitter) and a receiving unit. The complete signal conditioning electronics are integrated in the receiver and transmitter heads, no external controller is required. The light source and receiver can be installed at any distance up to 5 meters from each other, mounted either upright or horizontally. The extreme compact design of 90° scope version, allows installation in the most restricted spaces.

The analog voltage signal output is gain adjustable. A limit switch is also available as PNP and NPN output. Via a voltage control input the transmitter laser power can be varied.

Measurement mode



*For the most accurate results, the target should be presented in a fixed location of the beam. Smallest diameter 0.3mm



optoCONTROL 1200/90:
Version with 90° beam path for mounting in cramped spaces

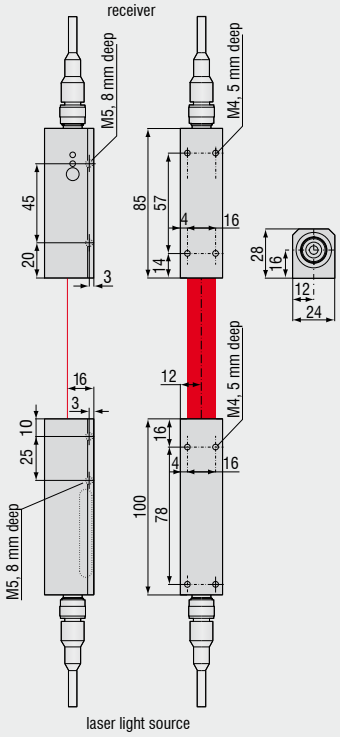
Special features

- ➔ High quality glass lenses
- ➔ Extremely fast: 100kHz (-3dB)
- ➔ Robust and compact design with integrated controller
- ➔ Limit switch with up to 25kHz switching frequency
- ➔ Axial and radial 90 deg set up

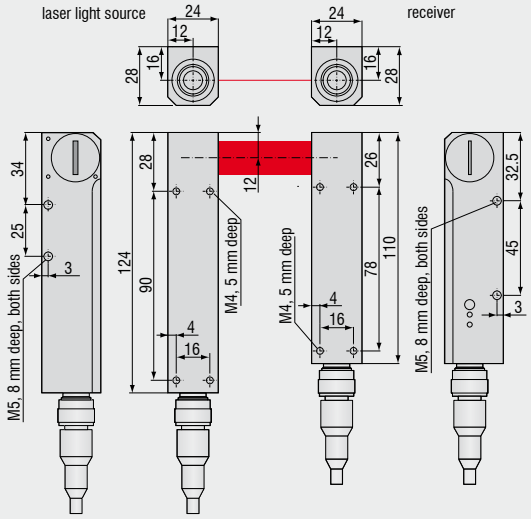
Model		ODC 1200 (axial model)				ODC 1200/90 (90° model)				ODC 1201	
Measuring range		2mm	5mm	10mm	16mm	2mm	5mm	10mm	16mm	20mm	30mm
Distance transmitter - receiver		min. 20mm to max. 5m									
Linearity		<2% FSO		<3.5% FSO		<2% FSO		<3.5% FSO			
Resolution (dynamic)		10µm	25µm	50µm	80µm	10µm	25µm	50µm	80µm	100µm	150µm
Frequency response		100kHz (-3dB)									
Light source		semiconductor laser <1mW, 670nm (red, laser class 2)									
Permissble ambient light		≤ 5000lx									
Analog output		0 ... 10VDC (gain adjustable)									
Switching output	(max switching frequency 25kHz)	PNP active if light quantity below limit; NPN active if light quantity above limit									
Operation temperature		0 to 50°C									
Storage temperature		-20 to 70°C									
Power supply		12 ... 32VDC, reverse polarity protection, max. 100 mA									
Control input		open: 66% of laser power; 5 ... 24V laser off; 0 ... 5V for laser power control									
Shock		15g / 6ms (IEC 68-2-29)									
Vibration		15g / 10Hz…1kHz									
Mounting holes	straight up	M4 x 5mm								ø4.1mm	
	horizontal	M5 x 8mm								M4 x 6mm	
Weight (without cable)	transmitter	appr. 150g				appr. 170g				appr. 260g	
	receiver	appr. 120g				appr. 160g				appr. 220g	
Protection class		IP 67									

FSO = Full Scale Output
The quoted data apply for a constant room temperature of 20°C after a warm-up period of 30 min,
in the range 10 ... 90% of the analog output at a distance between transmitter and receiver of 0.5 m.
Analogdrift 0.12 V at constant temperature; If laser beam is covered (without ambient light): analog offset <0.05 V

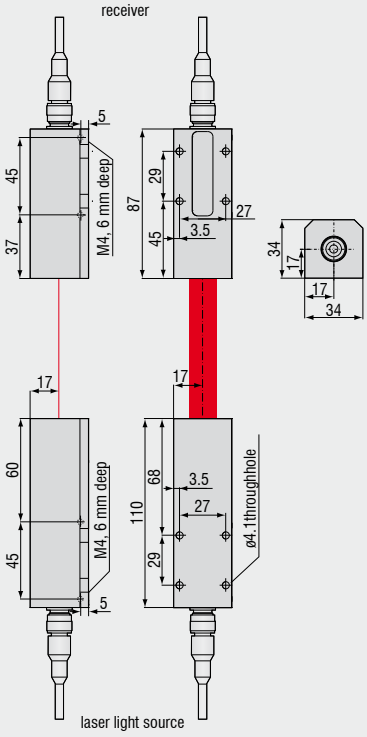
optoCONTROL 1200



optoCONTROL 1200/90



optoCONTROL 1201



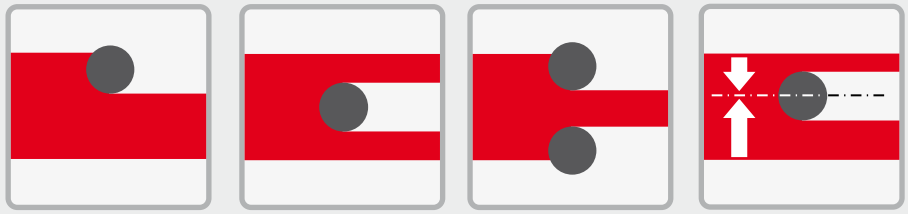
Measuring principle

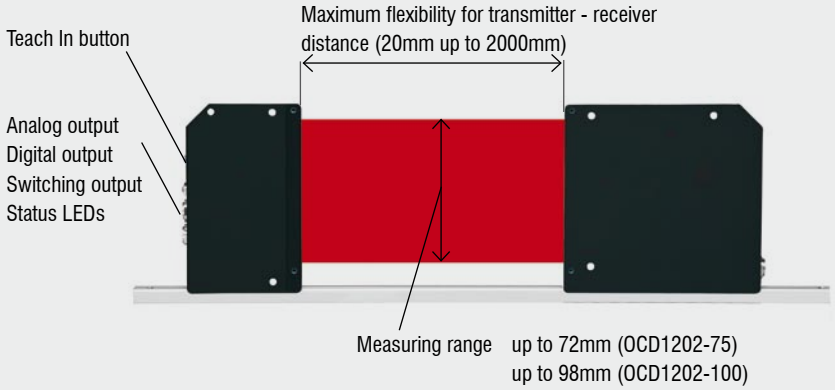
The transmitter unit of the optoCONTROL 1202 generates a continuous parallel laser beam by means of a solid state optical lens system. The receiver unit, which houses the signal condition electronic as well as the optical imaging components, is positioned opposite of the transmitter. The separation can be anywhere between 20mm and 2000mm, as long as the aperture of the receiver is properly aligned with the transmitter beam. The measuring object is brought into the beam and creates through the aperture and optical lens system a shadow image onto the CCD camera. This image is than process and evaluated by the signal conditioning electronic, which is embedded inside the receiver head. Further processing of that signal results in an accurate dimensional measurement made available via an analog and digital interface.

System design

optoCONTROL consists of a light source (transmitter) and a digital camera (receiver) unit. The complete signal conditioning electronics is integrated inside the receiver housing, no external signal controller is necessary. The light source and receiver can be installed at any distance up to 2 meters from each other, mounted either upright or horizontally. The measurement signal is output via a 0...10V analog voltage and via a RS232 digital interface. Three digital switch outputs with programmable threshold and two control inputs (trigger and tech in) are available.

Measurement mode





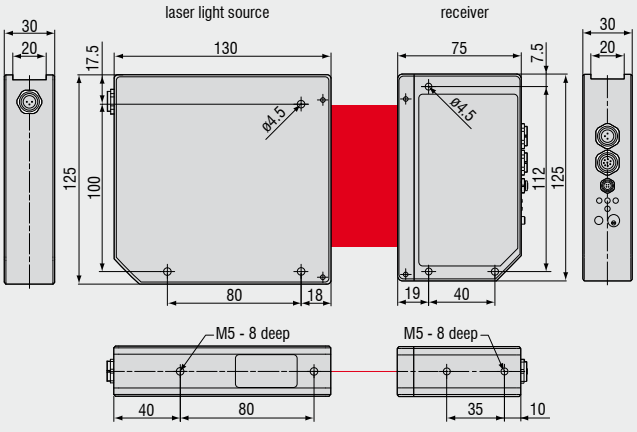
Special features

- ➔ High resolution CCD image detector with integrated controller
- ➔ Measuring range up to 100mm
- ➔ Head separation up to 2000mm
- ➔ Integrated polarization / interference filter
- ➔ Analog and digital output with serial interface

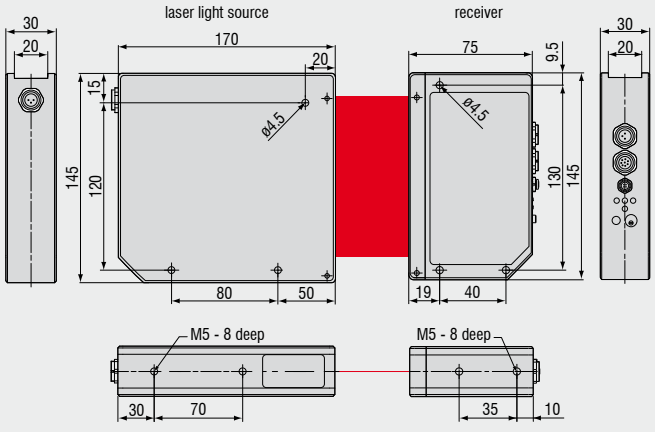
Model		optoCONTROL 1202-75	optoCONTROL 1202-100
Measuring range		typ. 72mm	typ. 98mm
Distance transmitter - receiver		Minimal 20mm, maximal 2000mm	
Resolution		typ. 30µm	typ. 50µm
Linearity		<0.2% FSO	<0.2% FSO
Measuring rate		max. 350Hz / 800Hz	max. 250Hz / 600Hz
Max. switching current		100mA, short-circuit proof	
Interface		RS232, software tool included	
Laser		semiconductor laser, 670nm, DC-operation, 1mW max. opt. power, laser class 2 acc. DIN EN 60825 The use of these laser sensors therefore requires no additional protective measures.	
Optical filter		interference filter, red light filter RG630, polarisation filter	
Housing material		aluminium, anodized in black	
Connector receiver		8-pin female connector type binder series 712 (Analog/Power) 4-pin female connector type binder series 707 (PC/RS232) 3-pin female connector binder series 712 (connection to the transmitter)	
Connector transmitter		3-pin female connector type binder 712 (connection to receiver)	
Interface cable		Connection serial interfaces: SCD1202-2; connection analog SCA1202-2; 5m connection cable transmitter/receiver: CE1202-2, 5m	
Output polarity		Edge direction positive-/negative-transition, programmable	
Teach button		teach button at the housing for limit value teaching	
LED- indication		LED red (+): measured value > upper tolerance threshold LED green: measured value lies within tolerance window LED red (-): measured value < lower tolerance threshold LED yellow: multifunction	
EMC		EN 60947-5-2	
Shock		15g / 6ms (IEC 68-2-29)	
Vibration		15g / 10Hz…1kHz	
Protection class		electronics: IP 54, optics: IP 67	
Operation temperature		-10°C to +50°C	
Storage temperature		-20°C to +85°C	
Output	analog	0 … +10V	
	digital	(OUT0, OUT1, OUT2): pnp positive-transition/npn negative-transition or pnp negative-transition/npn positive-transition, programmable, 100mA, short-circuit proof	
Digital input	IN0	external trigger, Input voltage +Ub/0V with reverse polarity	
	IN1	teach/reset, Input voltage +Ub/0V with reverse polarity protection	
Power supply		+12VDC …+ 30VDC, typ. 200 mA	
Power consumption		typ. 200mA / 24V	
Scaling and calibration		via set up software (PC /Windows based)	
Laser power control		via set up software (PC /Windows based)	

The quoted technical data apply for a displacement transmitter to receiver about 800 mm and a temperature of 20 °C (+68 °F).

optoCONTROL 1202-75



optoCONTROL 1202-100



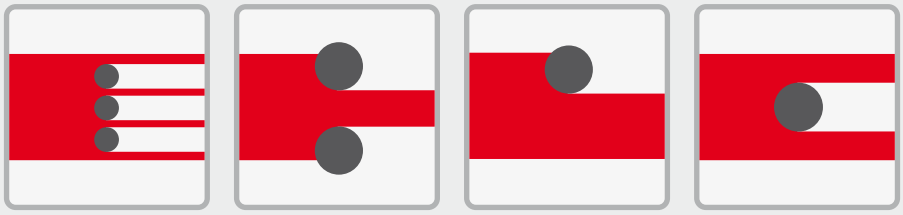
Measuring principle

optoCONTROL 2500 is a laser-based measuring system with integrated high resolution CCD camera. The ThruBeam micrometer measures the dimension of a measurement object or the position of an edge of a body according to the shadow-casting principle. The data obtained with various, selectable measuring programs are output via analog and digital interfaces. With the high measuring rate, the outstanding accuracy and the excellent resolution, this laser micrometer is the perfect instrument for precise measurement in off and online applications.

System design

optoCONTROL 2500 consists of a dual head sensor unit, the transmitter (laser light source) and the receiver (CCD imager), which are mounted opposing each other. These sensor heads are connected to an instrument controller which processes the digital image and calculates the desired dimensions. This highly sophisticated controller transforms the sensor into a stand alone intelligent measurement instrument including a LCD graphical display, touch keys and an analog and digital interface.

Factory set measurement programs plus six user defined programs

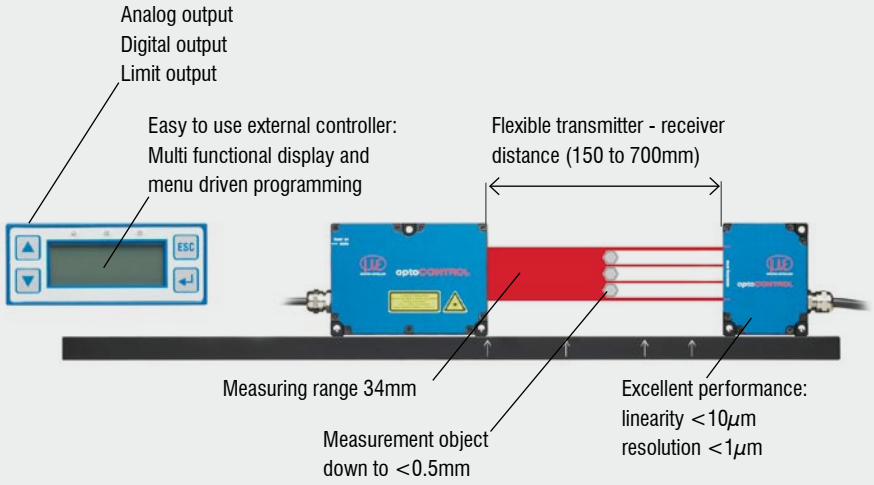


Segment
2-Segment

Gap

Edge light / dark
Edge dark / light

Diameter



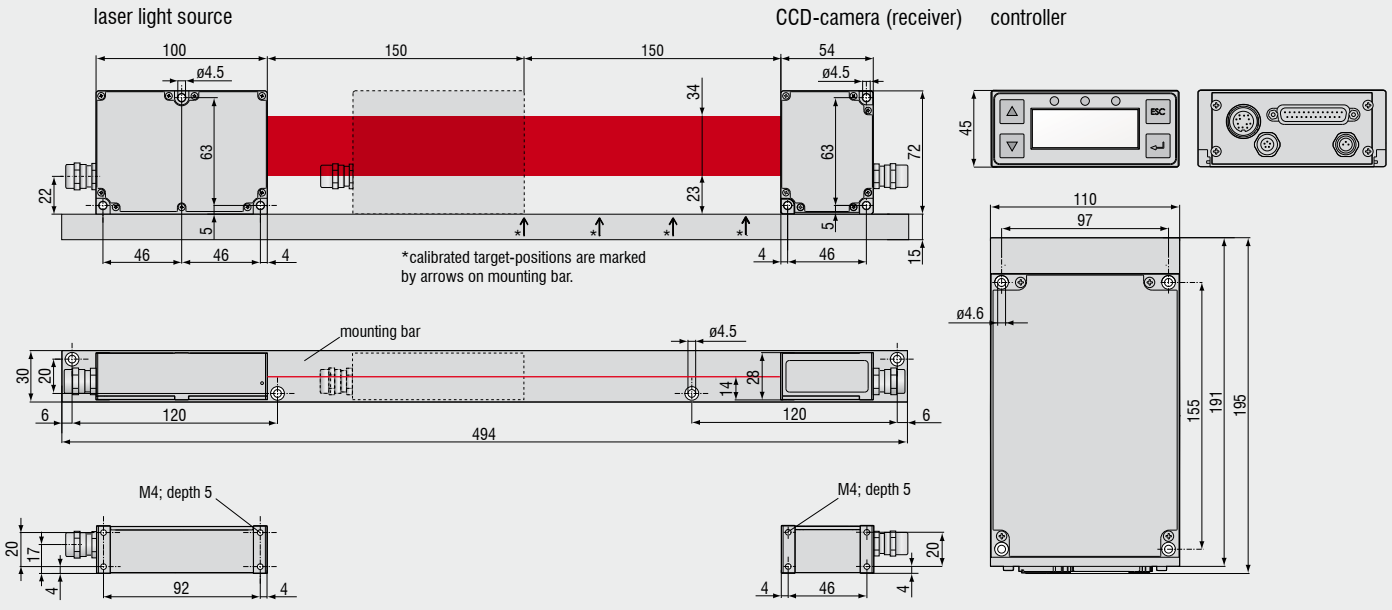
Special features

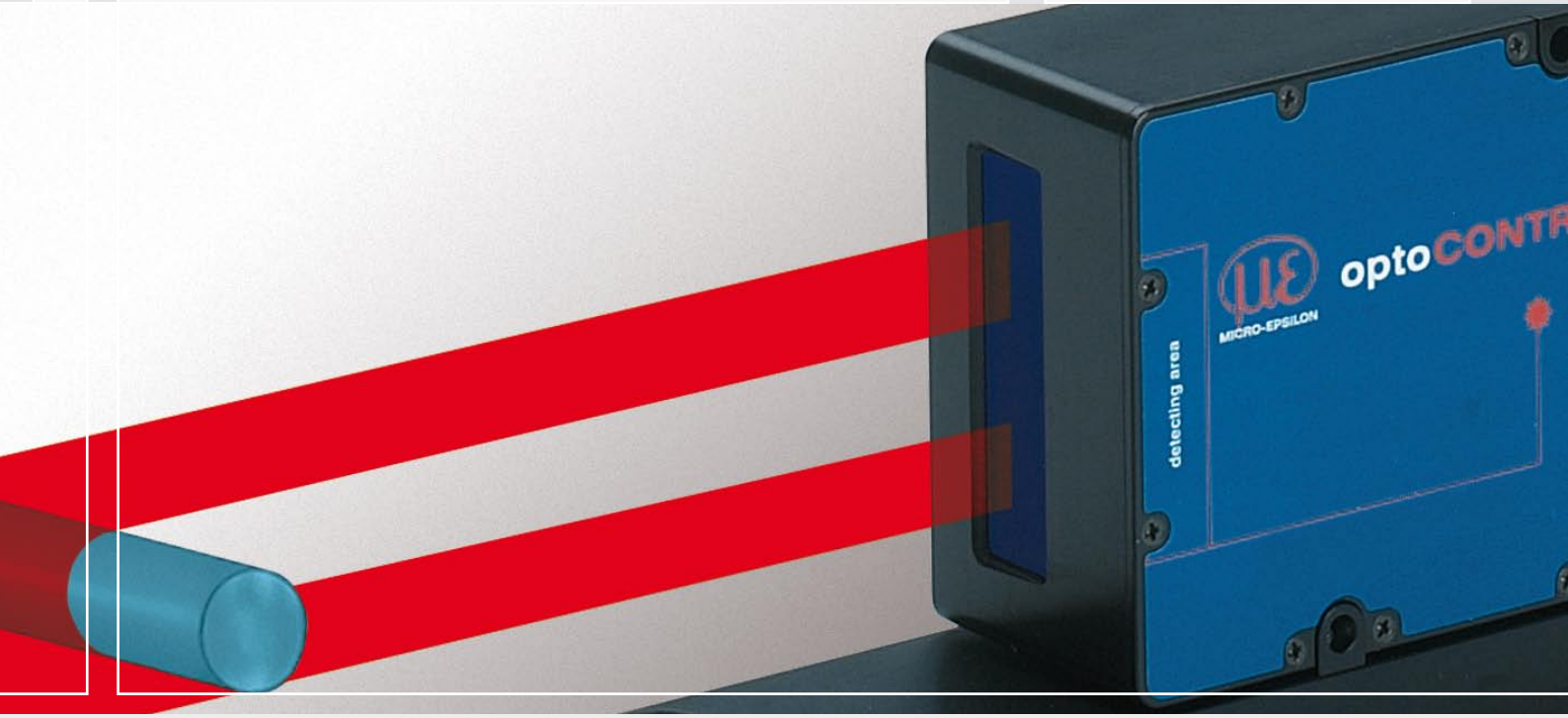
- ➔ Excellent measurement specification
- ➔ Real time measuring rate of 2300Hz
- ➔ Solid state technology with CCD camera
- ➔ Fully instrumented programmable controller

Model	ODC 2500-35
Measuring range	34mm
Smallest diameter (detectable target)	<500µm
Distance lightsource - CCD-camera	300mm (150mm - 700mm)
Distance (target to receiver)	20 ... 150mm
Linearity [1]	<10µm
Resolution [2]	1µm
Shadow cross section	spatial resolution <100µm
Repeatibility	≤3µm
Measuring rate	2300 Hz
Light source	semiconductor laser 670nm, class 2
Analog output	0 ... 10V, range -10 ... + 10V free scalable with offset and gain
Digital output	RS 232 or RS 422
Switching output	1 x error, 2 x limit, 2 x warning; LC-Display, 3 x LED; Sync-Out
Input	sync-In; zero ; Laser On/Off
Operating temperature	0°C to 50°C
Storage temperature	-20°C to 70°C
Power supply	24VDC (± 15%) <1 A
Vibration	acc. IEC 60068-2-6 2 g / 20 ... 500 Hz
Shock	acc.IEC 60068-2-29 15 g / 6 ms
Cable length	2m (option: extension 3m/8m)
Protection class	IP 64 (receiver + light source) / IP 40 (controller)
Display	LC-display (value, maximum, minimum, peak-to-peak); display in mm or inch, selectable; menu languages in german / english, selectable; 3x LED (power on, light on, error)
Measuring programs	diameter, gap, position, edge, segment, 2-segment, user defined

All specifications are measured at a constant temperature of 20°C after a warm-up time of 30 minutes.
[1] Valid for distance of the target to receiver 20±5mm; Distance lightsource - CCD-camera 150mm
[2] Display resolution

OEM and custom sensor options:
- Cable length and cable exit
- Dimensional changes
- Filters or mirror for beam redirection
- Custom software





Measuring principle

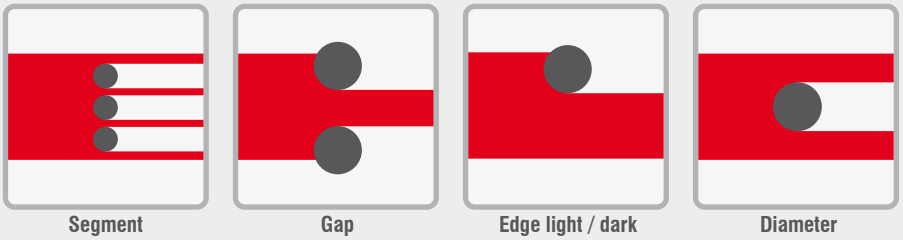
optoCONTROL 2600 is a LED - based measuring system with integrated high resolution CCD camera. The ThruBeam micrometer measures the dimension of a measurement object or the position of an edge of a body according to the shadow-casting principle. Using a high quality telecentric lens system, optical filters and active temperature compensation, this model is able to produce the most accurate readings in the world of non contact micrometers.

System design

optoCONTROL 2600 consists of a dual head sensor unit, the transmitter (red LED light source) and the receiver (high speed CCD imager), which are mounted opposing each other. These sensor heads are connected to an instrument controller which processes the digital image and calculates the desired dimensions. This highly sophisticated controller transforms the sensor into a stand alone intelligent measurement instrument including a LCD graphical display, touch keys and an analog and digital interface.

Measurement interference due to contamination, dust and ambient light are kept to minimum by the use of the telecentric optical lens system.

Factory set measurement programs plus six user defined programs

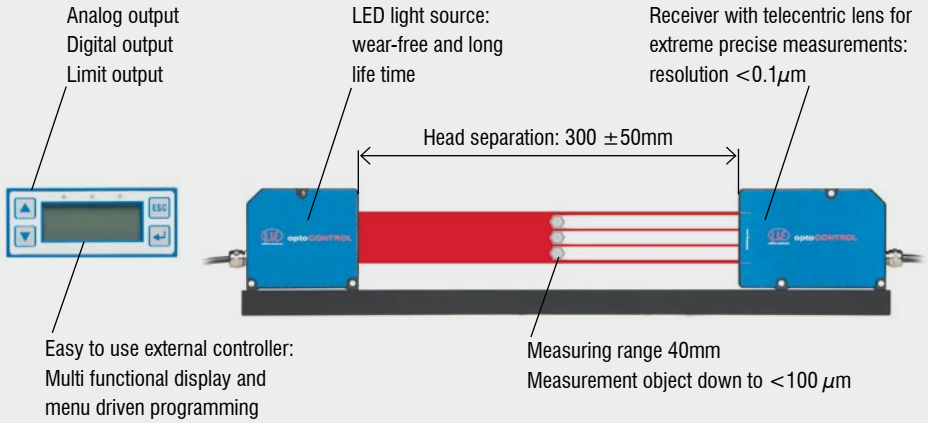


Segment
Multisegment

Gap

Edge light / dark
Edge dark / light

Diameter



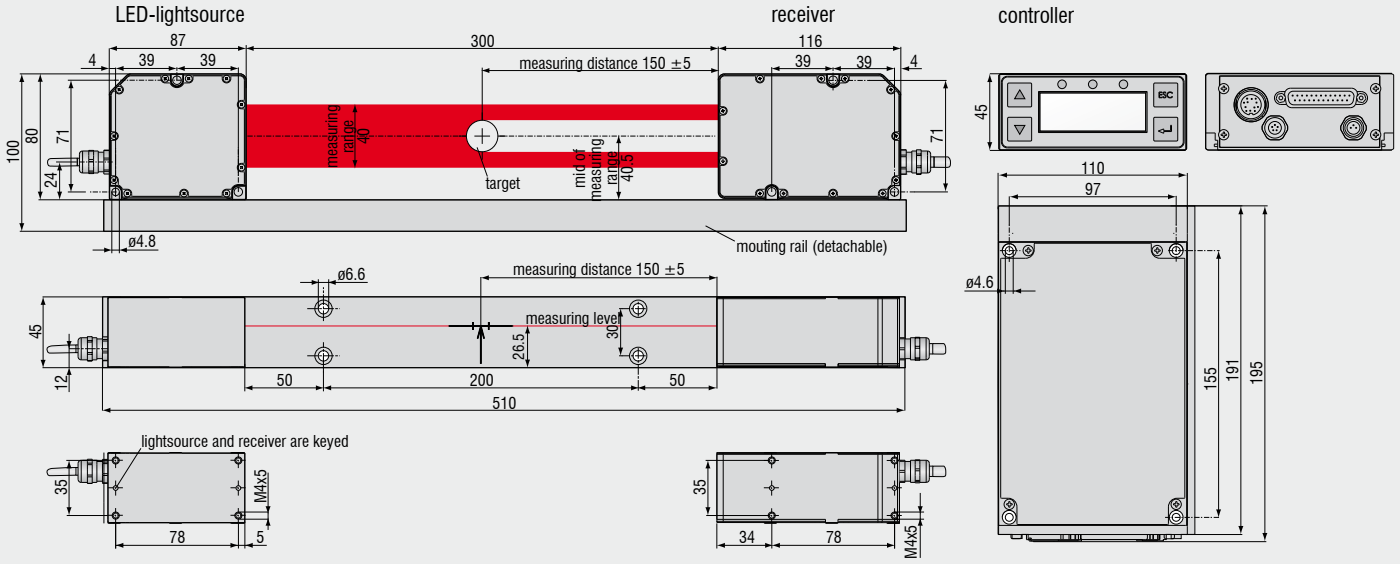
Special features

- ➔ Best accuracy
- ➔ Real time measuring rate of 2300 Hz
- ➔ Built in optical alignment aid
- ➔ Measures even transparent objects
- ➔ Programmable dynamic CCD threshold
- ➔ Minimized contamination and ambient light interference
- ➔ Synchronization and external trigger control

Model	ODC2600-40
Measuring range	40mm
Smallest diameter (detectable target)	<100µm
Distance lightsource - CCD-camera	300 (±50)mm
Distance (target to receiver)	150 (±5)mm
Linearity (3s) [1]	<±1µm
Resolution [2]	0.1µm
Shadow cross section	spatial resolution <20µm
Measuring rate	2300 Hz
Light source	red LED
Analog output (voltage)	0 ... 10V, range -10 ... + 10V free scalable with offset and gain
Digital output	RS232 (115.2kBaud) or RS422 (691.2kBaud)
Switching output	error, 4x limit, synchronisation
Input	zero; reset; trigger; synchronisation; light on/off (programmable)
Operation temperature	0°C to 50°C
Storage temperature	-20°C to 70°C
Supply voltage	24VDC (±15%), <1 A
Vibration	acc. IEC 60068-2-6 2g / 20 ... 500Hz
Shock	acc. IEC 60068-2-29 15g / 6ms
Cable length (controller-transmitter / controller-CCD-camera)	Standard: 2m
Protection class	IP 64 (receiver + light source) / IP 40 (controller)
Measuring programs	diameter, gap, position ,edge, segment, multi segment, user defined
Display	LC-display (value, maximum, minimum, peak-to-peak); display in mm or inch, selectable; menu languages in german / english, selectable; 3x LED (power on, light on, error)

All specifications are measured at a constant temperature of 20°C after a warm-up time of 30 minutes.
[1] Edge measurement at 2.3kHz, no averaging at the target, operating distance 150 ±5mm.
[2] Display resolution (resolution digital output 0.6µm)

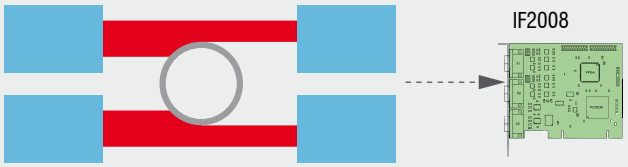
Optional versions
- Cable length and cable exit
- Dimensional changes
- Filters or mirror for beam redirection
- Custom software



Synchronized measurements with multiple micrometers

- Thickness measurement
- Level measurement
- Width measurements
- Planarity measurements
- Edge tracking
- Large diameter measurement
- Eccentricity, wobble or roundness

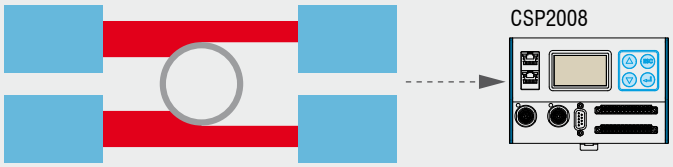
Interface card IF 2008 for synchronized real time data recording with mapping capability



up to 6 digital signals, 2 analog signals, 2 encoders

The IF 2008 interface card is designed for installation in PCs and enables the synchronous acquisition and mapping of up to 6 digital sensor signals, 2 analog sensor signals and 2 encoders. The onboard FIFO memory offloads the high speed data collection to the card and transfers the stored data to the user interface. A comprehensive software development kit (SDK) makes the application programming easy and painless.

CSP 2008: smart signal processor for multiple sensor signals



2 to 6 analog or digital signals

The CSP2008 controller is a standalone solution used for processing up to 6 digital or analog input signals (2x internal + 4x external via EtherCAT modules from the Beckhoff company). EtherCAT is also used for external interface of additional sensors and further I/O modules. The controller has a display with multi colored backlighting activating color alarms when exceeding the programmed alarm limits.

Math functions:

A,B; A+B; A-B; -A-B; K-A-B; K+A+B; K+A-B; K+A; K+B; K(A+B); K(A+k*B); Advance filter options

Accessories for optoCONTROL 1200/1201/1202

Art. No.	Modell	
2901260	PC1200-5	Power supply and signal cable 5m, straight connector, for light source and receiver unit
2901261	PC1200/90-5	Power supply and signal cable 5m, 90 degree connector, for light source and receiver unit
2420019	PS2010	Power supply for DIN rail mounting, input 230VAC, output 24V DC/2.5 A
2901497	CE1202-2	Connecting cable transmitter-receiver, 2m
2901482	CE1202-5	Connecting cable transmitter-receiver, 5m
2901371	SCD1202-2	Digital output cable, 2m, for connection to a RS232 port
2901509	SCD1202-5	Digital output cable, 5m, for connection to a RS232 port
2901373	SCA1202-2	Power supply and analog output cable, 2m
2901510	SCA1202-5	Power supply and analog output cable, 5m

Accessories for optoCONTROL 2500/2600

2420057	CSP2008	Universal controller for several signals
2213017	IF2008	PCI interface card RS422
2901057	CE1800-3	Sensor cable extension for camera, 3m
2901118	CE2500-3	Sensor cable extension for light source, 3m
2901058	CE1800-8	Sensor cable extension for camera, 8m
2901119	CE2500-8	Sensor cable extension for light source, 8m
2901120	SCA2500-3	3 Signal output cable, analog, 3m
2901121	SCD2500-3/3/RS232	Output cable with RS422, 3 and 10m, for connection to IF2008
2213014	USB Converter RS422 to USB	
2901122	SCD2500-3/10/RS422	Signal output cable 3m / RS422 10m
2901123	PC2500-3	Power supply cable 3m
2901124	PC2500-10	Power supply cable 10m
2901504	SCD2500-3/CSP	Power supply and output cable 3m, for connection to CSP2008
2901505	SCD2500-10/CSP	Power supply and output cable 10m, for connection to CSP2008

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