More Precision

optoCONTROL // Optical precision micrometers
Optical precision micrometers

Micrometers from Micro-Epsilon operate according to the ThruBeam principle. Here, the transmitter produces a parallel light curtain that is transmitted via a lens arrangement into the receiving unit. The beam is interrupted if there is an object in the light path. The shadowing generated by this object is recorded by the receiving optical system and output as a geometric value.

Several types of ThruBeam technology are used across the six different sensor models in the range so as to cover as wide a field of applications as possible.

Optical micrometers can be used for dimensional measurements in production, quality assurance and service tasks. Factors such as the diameter, gap, height, position and also the received amount of light or opacity can be measured.

Wear-free and long service life

All optoCONTROL sensors function without a rotating mirror and so are completely wear-free. The parallel light curtain is produced by a special lens arrangement in the light source (transmitter). High quality components in the receiving optical system, e.g. filter and lenses, enable high accuracies to be achieved. Therefore, the optoCONTROL micrometers are ideally suited to applications in which high precision and complete reliability are required.
Flexible in use

Micrometers are primarily used as part of the manufacturing process and quality control of a production line, measuring continuous material, as well as single parts. The relevant technologies used here, such as laser intensity measurements and CCD chip imaging, are suitable for a wide variety of applications.

The compact models in the optoCONTROL product family work for production line applications and for integration into machine tools and other production machinery. High measuring rates ensure a high, continuous production rate.

Special application areas

The optoCONTROL 2500 and 2600 model ranges can be modified for customer specific applications, for example:

- Carry case version for service tasks
- Customized cable lengths, modified cable outlet
- Version with reduced light source to receiver gap
- Version with deflection mirror for installation in tight spaces
- Customer-specific software, e.g. measurement programs, statistics (only for ODC2600)
- Customer-specific linearity adjustment

---

<table>
<thead>
<tr>
<th>Measuring ranges</th>
<th>Measurement mode</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>optoCONTROL 1200</td>
<td>Measuring range up to 30 mm</td>
<td>4 - 5</td>
</tr>
<tr>
<td>Compact, fast and space-saving 90° version; integrated controller</td>
<td></td>
<td></td>
</tr>
<tr>
<td>optoCONTROL 2500</td>
<td>Measuring range up to 34 mm</td>
<td>6 - 7</td>
</tr>
<tr>
<td>High accuracy and stability / resolution 1 μm; target-sensor gap up to 700 mm (optional 1850 mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>optoCONTROL 2520</td>
<td>Measuring range up to 46 mm</td>
<td>8 - 9</td>
</tr>
<tr>
<td>Compact design with integrated controller; target-sensor gap up to 2000 mm / resolution 1 μm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>optoCONTROL 2600</td>
<td>Measuring range up to 40 mm</td>
<td>10 - 11</td>
</tr>
<tr>
<td>Maximum accuracy and stability; target-sensor gap up to 400 mm; telecentric lenses / resolution 0.1 μm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Diameter of a pulley

Thickness measurement of flat plastic film and rubber strips

Measuring system detects the XY position of the needle in an industrial sewing machine

Bearing shell detection in automotive manufacturing
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 occurring light is provided by analog electronics and output as an analog signal.

System design
optoCONTROL 1200 consists of a light source and a receiving unit. The complete controller electronics are integrated in the receiver housing. The light source and receiver can be installed at any distance up to 5 meters from each other. All models can be installed without additional brackets in both vertical and horizontal positions. The compact design of the housing and the 90° version also enable easy mounting of the miniature micrometers in tight installation spaces. As well as the analog output, an adjustable limit switch is also available. This can be operated both as NPN (bright switching) as well as in PNP logic (dark switching).

The target must be positioned inside the measuring window for the diameter measurement. Smallest diameter typ. > 0.3 mm. For gap measurement from 50 - 400 μm there is an option using light quantity measurement.

High quality glass lens optics
Robust and compact design with integrated controller
Limit switch with up to 60 kHz switching frequency
Axial and radial design

Measurement mode
Edge
Diameter
Gap
The distance is adjustable from 20 mm to maximum 5 m (no calibration required)
Frequency response 100 kHz (-3dB)

Options for horizontal and vertical mounting
Analog and switching output

optoCONTROL 1200/90:
Version with 90° beam path for mounting in tight spaces.
Optional mounting with ODC1202-L mounting rail as C-frame.
Model | ODC1200 (axial model) | ODC 1200/90 (90° model) | ODC1201
---|---|---|---
Measuring range | 2 mm, 5 mm, 10 mm, 16 mm | 2 mm, 5 mm, 10 mm, 16 mm, 20 mm, 30 mm
Distance light source - receiver (free space) | min. 20 mm to max. 5 m
Linearity | ≤ 2 % FSO | ≤ 3.5 % FSO | ≤ 2 % FSO, ≤ 3.5 % FSO
Resolution (dynamic) typ. | 10 μm, 25 μm, 50 μm, 80 μm | 10 μm, 25 μm, 50 μm, 80 μm, 100 μm, 150 μm
Frequency response | 100 kHz (-3db)
Light source | semiconductor laser < 0.39 mW, 670 nm (red, laser class 1)
Permissible ambient light | ≤ 5000 lx
Analog output | 0 ... 10 VDC (adjustable gain)
Temperature drift of the analog output | ≤ 130 mV (at 10 - 50 °C)
Switching output | PNP dark switching and NPN bright switching (max. switching frequency 60 kHz) adjustable signal threshold
Shock | 15 g / 6 ms
Vibration | 15 g / 10 Hz...1 kHz
Operation temperature | -20 ... 70 °C
Operation voltage | 12-32 VDC, reverse polarity protection
Mounting holes | straight up M4 x 5 mm, M5 x 8 mm | ø4.1 mm M4 x 6 mm
Weight (without cable) | light source appr. 150 g, receiver appr. 120 g | appr. 170 g, appr. 160 g, appr. 260 g
Protection class | IP67

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 light source and receiver of 0.5 m.

Analog offset < 0.05 V
1) Increasing the distance, the measurement of hot targets is possible without damaging the controller electronics
2) For gap measurements 50 - 400 μm there is an controller option available: thrubeam operation with distances up to 700 mm
3) Shadowing from ambient daylight increases the signal stability

---

**optoCONTROL 1200**

- Laser light source
- Receiver
- Mounting holes: M5, 8 mm deep, M4, 5 mm deep
- Weight: light source 150 g, receiver 120 g

**optoCONTROL 1200/90**

- Laser light source
- Receiver
- Mounting holes: M6, 8 mm deep, M5, 5 mm deep
- Weight: light source 160 g, receiver 160 g

**optoCONTROL 1201**

- Laser light source
- Receiver
- Mounting holes: M6, 6 mm deep
- Weight: light source 170 g, receiver 160 g
Measuring principle

optoCONTROL 2500 is a laser-based measuring system with integrated high resolution CCD camera. The Thru-Beam micrometer measures the dimension of an object or the position of an edge by using the shadow-casting principle. The data obtained with various, selectable measuring programs is output via analog and digital interfaces. Thanks to the high measuring rate, the outstanding accuracy and excellent resolution, the laser micrometer is ideally suited to precision measurement and inspection tasks on moving products in production lines.

System design

optoCONTROL 2500 consists of a sensor unit and a controller. The sensor unit comprises a laser light source (transmitter) and a CCD camera (receiver). A parallel light curtain is produced with the laser light source. The CCD array in the receiver measures the contour formed by shadow casting of the measurement object with high accuracy. The sensor unit is controlled and evaluated by an intelligent controller with graphical display for operation and display of the measured values.

High resolution and precision
Measuring rate 2.3 kHz for fast processes
Laser-ThruBeam technology
Six different measuring programs
Free parameterisation and data acquisition tool

Measuring range 34 mm
Resolution 1 μm
Measuring rate 2.3 kHz
Linearity < 10 μm
Analog output 0 ... 10VDC
Serial interface RS232/RS422
Laser class 1

Predefined measurement modes
(six individual programs can be selected)

Segment
Two-Segment
Gap
Edge light / dark
Edge dark / light
Diameter
Center

Analog output
Digital output
Switching output

External controller:
easy operation and measured value display

Light source to receiver distance can be selected from 150 to 700 mm (option up to 1850 mm)

Measuring range 34 mm
Measurement object diameter from 0.3 mm
High accuracy:
Linearity ≤ 10 μm
Resolution 1 μm
**Model**

<table>
<thead>
<tr>
<th>Measure</th>
<th>ODC 2500-35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td>34 mm</td>
</tr>
<tr>
<td>Smallest diameter or gap (detectable target)</td>
<td>typ. ≥ 0.3 mm</td>
</tr>
<tr>
<td>Distance light source - receiver</td>
<td>300 mm (150 mm - 700 mm) (Option up to 1850 mm) ¹</td>
</tr>
<tr>
<td>Distance (target to receiver)</td>
<td>20 ... 150 mm</td>
</tr>
<tr>
<td>Linearity ²</td>
<td>≤ 10 µm</td>
</tr>
<tr>
<td>Resolution ³</td>
<td>1 µm</td>
</tr>
<tr>
<td>Repeatability</td>
<td>≤ 3 µm</td>
</tr>
<tr>
<td>Measuring rate</td>
<td>2.3 kHz</td>
</tr>
<tr>
<td>Light source</td>
<td>Semiconductor laser 670 nm, class 1</td>
</tr>
<tr>
<td>Analog output</td>
<td>0 ... 10 V, range -10 ... +10 V</td>
</tr>
<tr>
<td>Digital output</td>
<td>RS 232 or RS 422</td>
</tr>
<tr>
<td>Switching output</td>
<td>1 x error, 2 x limit, 2 x warning; LC-display, 3 x LED; Sync-Out</td>
</tr>
<tr>
<td>Input</td>
<td>Sync-In: zero; Laser On/Off</td>
</tr>
<tr>
<td>Shock</td>
<td>acc. IEC 68-2-29</td>
</tr>
<tr>
<td>Vibration</td>
<td>acc. IEC 68-2-6</td>
</tr>
<tr>
<td>Operation temperature</td>
<td>0 °C ... 50 °C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20 °C ... 70 °C</td>
</tr>
<tr>
<td>Power supply</td>
<td>24 VDC (±15 %)</td>
</tr>
<tr>
<td>Cable length</td>
<td>2 m (option: extension 3 m / 8 m)</td>
</tr>
<tr>
<td>Protection class</td>
<td>receiver / light source IP64, controller IP40</td>
</tr>
<tr>
<td>Display</td>
<td>LCD-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)</td>
</tr>
<tr>
<td>Measuring programs</td>
<td>diameter, gap, position / edge, segment,two-segment</td>
</tr>
</tbody>
</table>

All specifications are measured at a constant temperature of 20 °C after a warm-up time of 30 minutes.

¹ If distances increase, linearity and resolution may decline
² Valid for distance of the target to receiver 20 ≤ 5 mm; distance light source - CCD-camera 150 mm
³ Display resolution

**Customer specific versions**

- Carry case version for service tasks
- Customized cable lengths, modified cable outlet
- Version with reduced light source to receiver gap
- Version with deflection mirror for installation in restricted, tight spaces
- OEM measuring programs adaption
Compact laser micrometer for large distances

optoCONTROL 2520 is a compact laser micrometer which stands out due to a high accuracy with a maximum measuring range of 46 mm. optoCONTROL 2520 is flexible in use. Therefore, the measurement object can be in any position within the light curtain and the distance from the transmitter to the receiver may be chosen freely. The smallest detectable diameter of the measurement object is about 0.5 mm whereby for example PINs or small gaps can be measured. optoCONTROL 2520 can also be used for counting tasks and roundness measurement.

RS422 as well as Ethernet / EtherCAT are available as interfaces. The configuration is performed via a comfortable web interface. Thereby, measured values and limiting values can be shown in a simple way, measuring programs may be chosen and filters be applied easily. Apart from this, a video signal is provided for the measurement setting.
Modell | ODC 2520
---|---
Measuring range | 46 mm
Smallest diameter or gap | typ. ≥ 0.5 mm
Distance light source - receiver (free space) | with mounting rail 100 … 300 mm; without mounting rail up to approx. 2 m
Distance (target to receiver) | 20 mm, max. 1500 … 2000 mm
Linearity (3σ) | < 12 μm
Digital resolution | 1 μm
Repeatability | ≤ 5 μm
Measuring rate | 2.5 kHz
Light source | semiconductor laser 670 nm (red), laser class 1M (Pmax 2 mW)
Analog output | 0 … 10 V not electrically isolated, 14Bit D/A
Digital output | RS 422; max. 4 MBit/s, full-duplex, not electrically isolated
EtherCAT
Switching outputs | 2 outputs, selectable for error or limit values, not electrically isolated
High level depends from operating voltage
In-/Outputs | Zeroing / mastering, reset to factory setting; not electrically isolated,
24 V logic (HTL), High level depends from operating voltage
TrigIn / Synch / symmetrical SyncOut, RS422 level, load resistance (120 Ohm)
and direction switchable via software, not electrically isolated
Shock | 15 g / 6 ms
Vibration | 2 g / 20 … 500 Hz
Operation temperature | 0 °C … 50 °C
Storage temperature | -20 °C … 70 °C
Power supply | +24 VDC (11 … 30 VDC), < 1 A
Connector | receiver 3-pin connector M8 for supply of the light source; 14-pin connector M16 for power supply and signals;
Display LEDs | receiver 4-pin connector M12x1 for Ethernet / EtherCAT
Protection class | receiver / light source IP64
Measuring programs | Edge light/dark; edge dark/light; (outer-) diameter/ width incl. center gap / (inner diameter) incl. center; Any segment edges incl. center
Functions | averaging, filter; Threshold adjustment for transparent targets;
edge detection and measurement direction reversible;
current measuring value, Maximum, Minimum, Peak to Peak;
edge / level / software triggering synchronization, counting function
Operation, measured value display | Web interface for parametrisation and display (incl. measurement server for transmitting multiple measuring values to the PC)

All specifications are measured at a constant temperature of 20 °C, sensor in continuous operation.

1) Distance light source - receiver 300 mm, distance target - receiver 20 mm and 50 mm, mode: edge light/dark
2) Measured at static noise for 3 min.
Measuring principle

optoCONTROL 2600 is an optical measuring system with integrated high resolution CCD camera. Using a special lens arrangement, an LED light source produces a parallel light curtain (visible red light), which is imaged on the CCD camera via a telecentric lens. If an object to be measured is placed in the light curtain, the shadow it creates is detected by the CCD array. The measured data is output via analog and digital interfaces. The system is insensitive to high external light conditions.

System design

optoCONTROL 2600 consists of a sensor unit and a controller, which are attached to a mounting rail. The sensor unit comprises a light source with high power LED and a receiver with telecentric lens and CCD array. The sensor unit is controlled and evaluated by an intelligent controller with graphical display for operation and display of the measured value. The adjustable light source enables precise measurement of most transparent objects. Significantly higher accuracies and repeatability of measured data is made possible due to the combination of LED with telecentric lens arrangement. The system is insensitive to dirt and moisture.
Model ODC2600-40 ODC2600-40(209) ODC2600-40(210)
Measuring range 40 mm 40 mm 40 mm
Min. target size 0.3 mm
Distance light source - receiver (free space)\(^1\) 300 (±50) mm 400 (±50) mm 400 (±50) mm
Measuring distance (target - receiver) 150 (±5) mm 200 (±5) mm 200 (±5) mm
Measuring rate 2.3 kHz
Resolution \(^1\) 0.1 μm
Linearity \(^2\) < ±3 μm
Repeatability \(^2\) ±1 μm ±1.5 μm ±1.5 μm
Light source red LED 625 nm
Analog output 0 to 10 VDC, ±10 VDC, selectable
Digital interface RS232 (115.2 kBaud); RS422 (691.2 kBaud)
Switching output Error, 4x limit values; max. 30V DC ≤ 100 mA
Signal input Zero setting/reset, trigger/light (on/off); synchronization
Digital output Synchronization \(^4\)
Connection Receiver integrated cable, length 2 m 12-pole
Light source integrated cable, length 2 m 5-pole
Controller Receiver: 12-pole M8 socket; light source: 5-pole socket for light source
Supply: 3-pole socket; signal: 25-pole SUB-D socket
Mounting Mounting rail (see accessories), mounting holes
Temperature range Storage -20 °C … +70 °C (non-condensing)
Operation 0 °C … +50 °C (non-condensing)
Supply voltage +24 VDC (±15 %)
Max. current consumption < 1 A
Shock (DIN EN 60068-2-27) 15 g / 6 ms
Vibration (DIN EN 60068-2-6) 2 g / 20 … 500 Hz
Protection class (DIN EN 60529) Receiver / light source IP64
Controller IP40
Material Receiver / light source Aluminum housing
Light source 450 g
Receiver 800 g
Controller 1200 g
Mounting rail 900 g 1100 g
Measuring programs Edge light-dark; edge dark-light; (outside) diameter/width; gap/(inside diameter); any segment edge
Control and display elements LCD display (value, maximum, minimum, peak-to-peak) measurement chart in mm / inch, selectable; menu language in German / English, selectable; 3x LEDs (power on, light on, error)
Special features 4 editable user programs

Optional versions
- Carry case version for service tasks
- Customised cable lengths, modified cable outlet
- Customer-specific software (measuring programs, statistics)
- System for measurement of grooved surfaces
- System with reduced distance between transmitter and receiver
- System with reduced and increased distance between transmitter and receiver

---

\(^{1}\) Resolution of the digital display (resolution of digital output 0.6 μm)
\(^{2}\) Measured with 3 sigma; edge measurement without averaging, working distance 150 ±5 mm, option 209/210: 200 mm ±5 mm
\(^{3}\) Measured with static noise over 3 min.
\(^{4}\) Only for synchronization of two or more optoCONTROL 2600 models
IF2008/PCIE - Interface card for synchronous measurement data acquisition

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 analog signals and 8x I/O Signals
- FIFO data memory
- Synchronous data acquisition
- PCI plug-in card
- IF2008PCIe with PCI Express interface

Example: measurement of diameters with two optoCONTROL. The diameter to be measured can be increased using two optoCONTROL. See CSP2008 universal controller.

IF2008E - Expansion board

Particular benefits
- Two digital signals, two analog signals and 8 I/O signals
- Overall with IF2008: 6 digital signals, 2 encoders and 2 analog signals and 8 I/O signals
- FIFO data memory
- Synchronous data acquisition

Diverse ODC tools

Depending on the sensor, diverse tools for continuous measurement value recording and parameter set up are available free of charge.
CSP2008 - Universal controller for up to six sensor signals

The controller CSP2008 has been designed to process 2 to 6 both optical and other sensors from Micro-Epsilon (6 digital or 4 analog input signals max., 2x internal + 4x external via EtherCAT modules from the company Beckhoff. EtherCAT is intended as external bus for connecting further sensors and I/O modules. The controller is equipped with a display offering multicolor backlighting which changes its color in the case of exceeding the limit value while a signal is displayed.

Features

- Real-time processing of input and output signals at up to 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 web browser
- 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)
- Extremely flexible and powerful functionality; function modules can be combined in many ways
- Simple mounting using DIN rail TS 35

IF1032/ETH

The IF1032/ETH interface module now enables to run sensors equipped with analog interfaces with the proven operating concept based on a web interface. The Ethernet interface permits to easily display the measured data on a PC. Moreover, sensors can be connected to an EtherCAT bus. The RS485 interface allows to connect new sensors that use the Micro-Epsilon specific RS485 protocol.

Interfaces

- 1x RS485 (ME-internal protocol)
- 2x analog-in (14 bit, max. 4 ksp/s), voltage
- 1x analog-in, (14 bit, max. 4 ksp/s), current
- Inputs for supply voltage
- Trigger input
- EtherCAT synchronisation output
- Output for sensor power supply
### Accessories optoCONTROL 1200/1201

<table>
<thead>
<tr>
<th>Article number</th>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2901260</td>
<td>PC1200-5</td>
<td>Power supply and signal cable 5 m, straight connector, for light source and receiver unit</td>
</tr>
<tr>
<td>2901483</td>
<td>PC1200-10</td>
<td>Power supply and signal cable 10 m, straight connector, for light source and receiver unit</td>
</tr>
<tr>
<td>2901261</td>
<td>PC1200/90-5</td>
<td>Power supply and signal cable 5 m, angled connector, for light source and receiver unit</td>
</tr>
<tr>
<td>0260031.11</td>
<td>DD241PC(11)-U</td>
<td>Digital display unit, RS232, connection for 1 analog sensor 0-10 V, 2 limit switches</td>
</tr>
<tr>
<td>2420066</td>
<td>IF1032/ETH</td>
<td>ME Ethernet/EtherCAT interface module max.14 Bit/4k samples/sec</td>
</tr>
<tr>
<td>2966006</td>
<td>* ODC1202-L100</td>
<td>Mounting rail for ODC1202, 400 mm; distance light source/receiver max. 100 mm</td>
</tr>
<tr>
<td>2966007</td>
<td>* ODC1202-L200</td>
<td>Mounting rail for ODC1202, 500 mm; distance light source/receiver max. 200 mm</td>
</tr>
<tr>
<td>2966008</td>
<td>* ODC1202-L500</td>
<td>Mounting rail for ODC1202, 800 mm; distance light source/receiver max. 500 mm</td>
</tr>
<tr>
<td>2966018</td>
<td>JU1200-VR</td>
<td>ODC1200 adjustment plate for vertical mounting of the receiver</td>
</tr>
<tr>
<td>2966019</td>
<td>JU1200-HR</td>
<td>ODC1200 adjustment plate for horizontal mounting of the receiver</td>
</tr>
<tr>
<td>2966020</td>
<td>JU1200-VT</td>
<td>ODC1200 adjustment plate for vertical mounting of the transmitter</td>
</tr>
<tr>
<td>2966021</td>
<td>JU1200-HT</td>
<td>ODC1200 adjustment plate for horizontal mounting of the transmitter</td>
</tr>
<tr>
<td>2966024</td>
<td>BR1200L220</td>
<td>Bracket for mounting as C-frame, length 220 mm, 2 pcs. required</td>
</tr>
<tr>
<td>2966025</td>
<td>BR1200L320</td>
<td>Bracket four mounting as C-frame, height 320 mm, 2 pcs. required</td>
</tr>
<tr>
<td>2420066</td>
<td>IF1032/ETH</td>
<td>ME Ethernet/EtherCAT interface module max.14 Bit/4k samples/sec</td>
</tr>
</tbody>
</table>

*only for C-frame mounting combined with adjustment plate JU1200 and bracket BR1200*

### Accessories optoCONTROL 2500/2600

<table>
<thead>
<tr>
<th>Article number</th>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2901123</td>
<td>PC2500-3</td>
<td>Power supply cable 3 m, open</td>
</tr>
<tr>
<td>2901124</td>
<td>PC2500-10</td>
<td>Power supply cable 10 m, open</td>
</tr>
<tr>
<td>2901120</td>
<td>SCA2500-3</td>
<td>Signal output cable, analog, 3 m</td>
</tr>
<tr>
<td>2901215</td>
<td>SCA2500-10</td>
<td>Signal output cable, analog, 10 m</td>
</tr>
<tr>
<td>2901121</td>
<td>SCD2500-3/3/RS232</td>
<td>Signal output cable, 3 m, analog / RS232</td>
</tr>
<tr>
<td>2213017</td>
<td>IF2008</td>
<td>PCI interface card RS422</td>
</tr>
<tr>
<td>2213018</td>
<td>IF2008E</td>
<td>Expansion board analog / RS422 / PCI</td>
</tr>
<tr>
<td>2901122</td>
<td>SCD2500-3/10/RS422</td>
<td>Signal output cable, 3 m, analog / RS422, 10 m</td>
</tr>
<tr>
<td>2901057</td>
<td>CE1800-3</td>
<td>Sensor cable extension for camera, 3 m</td>
</tr>
<tr>
<td>2901118</td>
<td>CE2500-3</td>
<td>Sensor cable extension for light source, 3 m</td>
</tr>
<tr>
<td>2901058</td>
<td>CE1800-8</td>
<td>Sensor cable extension for camera, 8 m</td>
</tr>
<tr>
<td>2901119</td>
<td>CE2500-8</td>
<td>Sensor cable extension for light source, 8 m</td>
</tr>
<tr>
<td>2420057</td>
<td>CSP2008</td>
<td>Universal controller for up to six sensor signals</td>
</tr>
<tr>
<td>2901504</td>
<td>SCD2500-3/CSP</td>
<td>Output cable, 3 m, for connection to CSP2008</td>
</tr>
<tr>
<td>2901506</td>
<td>SCD2500-10/CSP</td>
<td>Output cable, 10 m, for connection to CSP2008</td>
</tr>
</tbody>
</table>

### Accessories optoCONTROL 2500/2600

<table>
<thead>
<tr>
<th>Article number</th>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2964022</td>
<td>MBC300</td>
<td>Assembly block for controller ODC2500/2600</td>
</tr>
<tr>
<td>2213024</td>
<td>IF2004/USB converter</td>
<td>4 channel RS422/USB converter</td>
</tr>
<tr>
<td>2213025</td>
<td>IF2001/USB converter</td>
<td>IF2001/USB converter RS422 to USB</td>
</tr>
<tr>
<td>2213022</td>
<td>RS-422/USB converter</td>
<td>Industrial converter for ODC2xxx sensors, RS-422/USB</td>
</tr>
<tr>
<td>2901111</td>
<td>SCD2500-3/RS422</td>
<td>Output cable RS422, 3 m, open ends</td>
</tr>
<tr>
<td>2901508</td>
<td>IF2008-Y adaptation cable</td>
<td>Adaption cable, Y-type, 100 mm</td>
</tr>
<tr>
<td>2901561</td>
<td>SCD2500-3/FI2008</td>
<td>Interface cable</td>
</tr>
<tr>
<td>2901563</td>
<td>SCD2500-8/FI2008</td>
<td>Interface cable</td>
</tr>
<tr>
<td>6414071</td>
<td>Extension clamp</td>
<td>Extension clamp RS422 to CSP2008</td>
</tr>
</tbody>
</table>
Further cable lengths on request.

<table>
<thead>
<tr>
<th>Accessories optoCONTROL 2520</th>
</tr>
</thead>
<tbody>
<tr>
<td>2901925 SCD2520-3</td>
</tr>
<tr>
<td>29011002 SCD2520/90-5</td>
</tr>
<tr>
<td>29011042 SCD2520/90-8</td>
</tr>
<tr>
<td>29011003 PC/SC2520/90-5</td>
</tr>
<tr>
<td>2901918 PC/SC2520-3</td>
</tr>
<tr>
<td>29011037 PC/SC2520-10</td>
</tr>
<tr>
<td>29011038 PC/SC2520-20</td>
</tr>
<tr>
<td>29011039 PC/SC2520-30</td>
</tr>
<tr>
<td>29011040 SCD2520-5 M12</td>
</tr>
<tr>
<td>2901919 CE2520-1</td>
</tr>
<tr>
<td>2901920 CE2520-2</td>
</tr>
<tr>
<td>2901921 CE2520-5</td>
</tr>
<tr>
<td>2901922 CE2520/90-1</td>
</tr>
<tr>
<td>2901923 CE2520/90-2</td>
</tr>
<tr>
<td>2901924 CE2520/90-5</td>
</tr>
<tr>
<td>2901967 PC/SC2520-3/CSP</td>
</tr>
<tr>
<td>2213024 IF2004/USB converter</td>
</tr>
<tr>
<td>2213022 RS-422/USB converter</td>
</tr>
<tr>
<td>2213025 IF2001/USB converter</td>
</tr>
<tr>
<td>026031.10 DD241PC(10)-U</td>
</tr>
<tr>
<td>026031.11 DD241PC(11)-U</td>
</tr>
<tr>
<td>2213017 IF2008</td>
</tr>
<tr>
<td>2213018 IF2008E</td>
</tr>
<tr>
<td>2901528 IF2008-Y adaptation cable</td>
</tr>
<tr>
<td>2420057 CSP2008</td>
</tr>
<tr>
<td>6414071 Extension clamp</td>
</tr>
<tr>
<td>6414113 EK1122/CSP2008 2 port RJ45 EtherCAT junction</td>
</tr>
<tr>
<td>6414114 EK1100/CSP2008 Bus terminal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accessories power supplies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2420066 PS2030</td>
</tr>
<tr>
<td>2420062 PS2020</td>
</tr>
<tr>
<td>2420042 PS2011</td>
</tr>
</tbody>
</table>

Further cable lengths on request.

**optoCONTROL 2520** use a semiconductor class 1M laser with a wavelength of 670 nm. The maximum optical output power is $P = 0.2 W$, $E = 0.2 mW/cm^2, \lambda = 670 nm$.

**Class 1 Laser Product**

IEC 60825-1: 2008-05

THIS PRODUCT COMPLIES WITH FDA REGULATIONS 21CFR 1040.10 AND 1040.11

The maximum optical output power is $P = 0.2 W$, $E = 0.2 mW/cm^2$, $\lambda = 670 nm$.

**optoCONTROL 12xx and 2500** use a semiconductor class 1 laser with a wavelength of 670 nm. The maximum optical output power is $P = 0.39 mW$. This laser class does not require any additional protection equipment. The maximum optical output power is $P = 0.2 W$, $E = 0.2 mW/cm^2$, $\lambda = 670 nm$.

**Class 1 Laser Product**

IEC 60825-1: 2008-05

THIS PRODUCT COMPLIES WITH FDA REGULATIONS 21CFR 1040.10 AND 1040.11

The maximum optical output power is $P = 0.39 mW$. This laser class does not require any additional protection equipment.
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