No product range will ever be large enough to provide the optimum solution for every application. Occasionally, requirements exist which cannot be satisfied by available market solutions. For this reason, our development engineers cooperate closely with our customers. In our search for the optimum solution for specific requirements, customer-specific sensors are constantly being created.

Special solutions span from special mechanical shapes to completely new sensor systems. An innovative sensor solution can help you to attain a significant competitive advantage.

We would be happy to advise you!
Distance and intensity-based
# Photoelectric distance measuring sensors

## Overview

### Photoelectric distance measuring sensors

<table>
<thead>
<tr>
<th>product family</th>
<th>OADM 12</th>
<th>OADM 13</th>
<th>OADM 13</th>
<th>OADM 20</th>
<th>OADM 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>width / diameter</td>
<td>12,4 mm</td>
<td>13,4 mm</td>
<td>13,4 mm</td>
<td>20,6 mm</td>
<td>20,6 mm</td>
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<tr>
<td>measuring distance Sd</td>
<td>16 ... 26 mm</td>
<td>50 ... 350 mm</td>
<td>50 ... 350 mm</td>
<td>50 ... 550 mm</td>
<td>100 ... 500 mm</td>
</tr>
<tr>
<td>resolution</td>
<td>0,002 ... 0,006 mm</td>
<td>0,01 ... 0,4 mm</td>
<td>0,01 ... 0,4 mm</td>
<td>&lt; 0,01 mm</td>
<td>0,2 ... 0,5 mm</td>
</tr>
<tr>
<td>linearity error</td>
<td>± 0,006 ... ± 0,015 mm</td>
<td>± 0,05 ... ± 1,2 mm</td>
<td>± 0,05 ... ± 1,2 mm</td>
<td>± 0,03 mm</td>
<td>± 0,8 ... ± 2 mm</td>
</tr>
<tr>
<td>response time / release time</td>
<td>&lt; 0,9 ms</td>
<td>&lt; 0,9 ms</td>
<td>&lt; 0,9 ms</td>
<td>&lt; 10 ms</td>
<td>&lt; 10 ms</td>
</tr>
<tr>
<td>adjustment</td>
<td>Teach-in: button / external</td>
<td>Teach-in: button / external</td>
<td>Teach-in: button / external</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>output circuit</td>
<td>analog</td>
<td>analog</td>
<td>analog</td>
<td>analog</td>
<td>analog</td>
</tr>
<tr>
<td>output signal</td>
<td>4 ... 20 mA</td>
<td>0 ... 10 VDC</td>
<td>4 ... 20 mA</td>
<td>4 ... 20 mA</td>
<td>4 ... 20 mA</td>
</tr>
<tr>
<td>connection types</td>
<td>connector</td>
<td>connector</td>
<td>connector</td>
<td>connector</td>
<td>connector</td>
</tr>
<tr>
<td>housing material</td>
<td>metal</td>
<td>metal</td>
<td>metal</td>
<td>metal</td>
<td>metal</td>
</tr>
</tbody>
</table>

### OADM 20

| width / diameter | 20,6 mm | 20,6 mm | 20,6 mm | 20,3 mm | 20,4 mm |
| measuring distance Sd | 30 ... 50 mm | 100 ... 500 mm | 50 ... 300 mm | 30 ... 130 mm | 100 ... 600 mm |
| resolution | < 0,01 mm | 0,2 ... 0,5 mm | 0,01 ... 0,4 mm | 0,005 ... 0,06 mm | 0,01 ... 0,2 mm |
| linearity error | ± 0,03 mm | ± 0,8 ... ± 2 mm | ± 0,05 ... ± 1,2 mm | ± 0,015 ... ± 0,2 mm | ± 0,07 ... ± 0,8 mm |
| response time / release time | < 10 ms | < 10 ms | < 2,5 ms | < 0,9 ms | < 5 ms |
| adjustment | no | no | Teach-in: button / external | external | Teach-in: button / external |
| output circuit | RS 485 | RS 485 | analog | analog | analog |
| output signal | 4 ... 20 mA | 0 ... 10 VDC | 4 ... 20 mA | 4 ... 20 mA | 4 ... 20 mA |
| connection types | connector | connector | cable | connector | connector |
| housing material | metal | metal | metal | metal | metal |
### Photoelectric distance measuring sensors

<table>
<thead>
<tr>
<th>OADM 20</th>
<th>OADM 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Image](47x699 to 119x771)</td>
<td>![Image](126x699 to 198x771)</td>
</tr>
<tr>
<td>20,6 mm</td>
<td>20,6 mm</td>
</tr>
<tr>
<td>30 ... 70 mm</td>
<td>100 ... 600 mm</td>
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<tr>
<td>30 ... 130 mm</td>
<td>200 ... 1000 mm</td>
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<tr>
<td>50 ... 300 mm</td>
<td></td>
</tr>
<tr>
<td>0,004 ... 0,02 mm</td>
<td>0,015 ... 0,067 mm</td>
</tr>
<tr>
<td>0,005 ... 0,06 mm</td>
<td>0,12 ... 2,5 mm</td>
</tr>
<tr>
<td>0,01 ... 0,33 mm</td>
<td></td>
</tr>
<tr>
<td>± 0,012 ... ± 0,06 mm</td>
<td>± 0,05 ... ± 2 mm</td>
</tr>
<tr>
<td>± 0,015 ... ± 0,2 mm</td>
<td>± 0,48 ... ± 10 mm</td>
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<tr>
<td>± 0,03 ... ± 1 mm</td>
<td></td>
</tr>
<tr>
<td>&lt; 0,9 ms</td>
<td>&lt; 0,9 ms</td>
</tr>
<tr>
<td>Teach-in: button / external</td>
<td>Teach-in: button / external</td>
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<tr>
<td>analog</td>
<td>analog</td>
</tr>
<tr>
<td>4 ... 20 mA / 0 ... 10 VDC</td>
<td>4 ... 20 mA / 0 ... 10 VDC</td>
</tr>
<tr>
<td>connector</td>
<td>connector</td>
</tr>
<tr>
<td>metal</td>
<td>metal</td>
</tr>
</tbody>
</table>

230 232
Photoelectric distance measuring sensors

General information

OADM is a range of laser distance sensors with products covering the measuring range from 16 to 1000 mm. The compact sensors with integrated microcontrollers produce an accurate output signal proportional to the measured distance. Intelligent internal signal analysis permits the sensor to operate accurately regardless of the color and most surfaces. The sensor can always be easily and precisely aligned with the small, visible spot of light. Distances to rough surfaces can be reliably measured by using a fine laser line in place of the laser spot, so that a wider area is monitored.

Typical applications

This family of sensors, with its wide selection of measuring ranges, can be used in many applications.

Typical applications are:

- Applications in which the production process is continuously monitored by the sensor to detect slow changes at an early stage and thereby achieve a reduction of rejects and costs.
- Automation of test points and test equipment permits increased productivity.
- Automation of format settings permits multifunctional machines and rapid, precise reconfiguration.

In some other applications, objects with rough and uneven surfaces must be measured. Sometimes, the surface of the object even has small holes or gaps. Such objects can be easily measured using a laser line optical system, which supplies a fine laser line in place of a focused laser beam.
Photoelectric distance measuring sensors

Characteristics and advantages

Response time
Measuring cycles as short as 0,9 ms permit accurate measurements even on moving parts.

Integrated microcontroller
The integrated microcontroller makes an external processing device unnecessary and makes it simple to place the sensor wherever it is needed.

High resolution and linearity
By the use of a photodiode line, a very high linearity of ±0,006 mm is achieved at a resolution of up to 0,002 mm (measured on matte white ceramic).

Laser spot or laser line
Distances, even to rough surfaces, are reliably measured by using a laser line instead of the laser spot.

Any surface
Intelligent signal processing improves the measurements made on critical surfaces by the photodiode line.

Teach-in function
The measuring range can be adjusted within the maximum measuring range by the user with the Teach-in button or via the Teach-in cable. The analog output has its full span within this taught-in range. The factory setting is the maximum measuring range. The taught-in range has a minimum extent. The resolution and linearity change when the measuring range is changed. The closer the furthest point of the measuring range is to the sensor, the better the resolution.

Synchronization/hold function
The measurements of several sensors can be synchronized using the synch input, or the last value can be held and the laser diode switched off.

Insensitivity to external light
An algorithm makes the sensor insensitive to external light sources.
Photoelectric distance measuring sensors

Technology and operation

The distance measurement is based on the triangulation principle. The laser beam strikes the object as a small point. The receiver of the sensor (photodiode line) detects the position of this point. The angle of incidence changes according to the distance, and thereby the position of the laser point on the receiver. The photodiode line is read by an integrated microcontroller. The controller accurately calculates the angle from the light distribution on the photodiode line and then calculates the distance to the object from this. This distance is either issued at the serial port or converted into an output current proportional to the distance. The microcontroller guarantees a high degree of linearity and measuring precision. The combination of a photodiode line and a microcontroller permits interfering reflections to be suppressed and thereby provides reliable data from critical surfaces. The sensor adapts to different colors by adjusting its internal sensitivity, making it virtually independent of the color of the object. A digital output is activated if there is no object within the measuring range or if insufficient light is received to correctly detect the object, e.g. if the sensor is dirty. The possible resolution and accuracy change with the distance. The same distance $d$ which causes a large change in the angle $\varphi_1$ close to the sensor produces a much smaller change in the angle $\varphi_2$ at a greater distance (see drawing). This non-linear behavior is corrected by the microcontroller, so that the output signal remains linear to the distance.
Mounting and adjustment

With all triangulation sensors, it must be ensured that the laser spot can be seen directly by the optical system of the receiver and that no obstructions are in front of the receiver.

With glossy or reflective objects, the direct reflection must not impinge on the receiver. This can be avoided by slightly tilting the sensor.

For optimum measurement results, the sensor must be installed perpendicular to the movement of the object.

A simple rule applies that the distance between the sensor and the object should be kept as small as possible for each application. The shorter the range, the better (more than proportional) the resolution and accuracy.

Note on electromagnetic compatibility: ground the sensor and use a shielded connecting cable.
Photoelectric distance measuring sensors

**Sd = 16 ... 120 mm**

- pocket-size design
- teachable measuring range Sr > 1 mm
- resolution up to 2 μm

### General Data

<table>
<thead>
<tr>
<th>Adjustment</th>
<th>Teach-in: button / external</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power on indication</td>
<td>LED green</td>
</tr>
<tr>
<td>Soiled lens indicator</td>
<td>LED red / LED red blinking</td>
</tr>
<tr>
<td>Light source</td>
<td>Pulsed red laser diode</td>
</tr>
<tr>
<td>Wave length</td>
<td>650 nm</td>
</tr>
<tr>
<td>Laser class</td>
<td>2</td>
</tr>
<tr>
<td>Beam type</td>
<td>Point</td>
</tr>
<tr>
<td>Interference suppression</td>
<td>&lt; 30 ms</td>
</tr>
</tbody>
</table>

### Measuring Distance Sd = 16 ... 26 mm

- Teach-in range min. > 1 mm
- Resolution 0,002 ... 0,015 mm
- Linearity error ± 0,006 ... ± 0,015 mm
- Beam diameter 0,5 ... 0,2 mm

### Measuring Distance Sd = 16 ... 120 mm

- Teach-in range min. > 2 mm
- Resolution 0,002 ... 0,12 mm
- Linearity error ± 0,015 ... ± 0,35 mm
- Beam diameter 0,9 ... 0,5 mm

### Electrical Data

- Response time / release time < 0,9 ms
- Voltage supply range +Vs 12 ... 28 VDC
- Current consumption max. 100 mA
- Output circuit Analog
- Short circuit protection Yes
- Reverse polarity protection Yes, Vs to GND

### Mechanical Data

- Width / Diameter 12,4 mm
- Height / Length 37 mm
- Depth 34,5 mm
- Type Rectangular
- Housing material Die-cast zinc
- Front (optics) Glass
- Connection types Connector M8, 4 pin

### Ambient Conditions

- Operating temperature 0 ... +50 °C
- Protection class IP 67

### Connection Diagrams

#### Analog

```
WH (2) -> BK (4) \rightarrow V5 \rightarrow Teach-in \rightarrow Analog \rightarrow BU (3) \rightarrow BV
```

### Connectors

- ESG 32AP0200G 4 pin 2 m straight (shielded)
- ESG 32AP0500G 4 pin 5 m straight (shielded)
- ESW 31AP0500G 4 pin 5 m angular (shielded)

### Accessories

- SENSOFIX Mounting Kit 10150328
- Mounting Bracket 10113873

### Remarks

- For objects with a reflectivity < 4 %, the response time / release time is increased automatically up to max. 1.5 ms.
- Missed measurement up to 30 cycles (30 ms) will be suppressed. During this time the analog output stays on hold.

### Laser Warning

![Laser Warning](https://www.baumerelectric.com/images/laser_warning.png)

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated July 26, 2001.

### Order Reference

<table>
<thead>
<tr>
<th>Order Reference</th>
<th>Measuring Distance Sd</th>
<th>Output Signal</th>
<th>Load Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>OADM 1216430/S35A</td>
<td>16 ... 26 mm</td>
<td>4 ... 20 mA</td>
<td>&lt; (Vs - 6 V) / 0,02 A</td>
</tr>
<tr>
<td>OADM 1216460/S35A</td>
<td>16 ... 120 mm</td>
<td>4 ... 20 mA</td>
<td>&lt; (Vs - 6 V) / 0,02 A</td>
</tr>
<tr>
<td>OADM 12U6430/S35A</td>
<td>16 ... 26 mm</td>
<td>0 ... 10 VDC</td>
<td>&gt; 100 kOhm</td>
</tr>
<tr>
<td>OADM 12U6460/S35A</td>
<td>16 ... 120 mm</td>
<td>0 ... 10 VDC</td>
<td>&gt; 100 kOhm</td>
</tr>
</tbody>
</table>
Photoelectric distance measuring sensors

resolution

<table>
<thead>
<tr>
<th>Sd = 16 ... 26 mm</th>
<th>Sd = 16 ... 120 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Br = (max)</td>
<td>Br = (max)</td>
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<tr>
<td>Br = (max)</td>
<td>Br = (max)</td>
</tr>
<tr>
<td>Br = (max)</td>
<td>Br = (max)</td>
</tr>
</tbody>
</table>

linearity errors

<table>
<thead>
<tr>
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<th>Sd = 16 ... 120 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Br = (max)</td>
<td>Br = (max)</td>
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<td>Br = (max)</td>
<td>Br = (max)</td>
</tr>
<tr>
<td>Br = (max)</td>
<td>Br = (max)</td>
</tr>
</tbody>
</table>

dimension drawing

* emitter axis

www.baumerelectric.com
Photoelectric distance measuring sensors

Sd = 50 ... 550 mm

- compact housing, voltage output
- teachable measuring range Sr > 5 mm
- resolution up to 10 μm

**general data**
- adjustment: Teach-in: button / external
- power on indication: LED green
- soiled lens indicator: LED red / LED red blinking
- light source: pulsed red laser diode
- wave length: 650 nm
- laser class: 2
- interference suppression: < 30 ms

**measuring distance Sd = 50 ... 350 mm**
- Teach-in range min.: > 5 mm
- resolution: 0.01 ... 0.4 mm
- linearity error: ± 0.05 ... ± 1.2 mm

**measuring distance Sd = 50 ... 550 mm**
- Teach-in range min.: > 10 mm
- resolution: 0.01 ... 1.1 mm
- linearity error: ± 0.08 ... ± 3.5 mm

**electrical data**
- voltage supply range: +Vs 12 ... 28 VDC
- current consumption max.: 80 mA
- output circuit: analog
- output signal: 0 ... 10 VDC
- load resistance: > 100 kOhm
- short circuit protection: yes
- reverse polarity protection: yes, Vs to GND

**measuring distance Sd = 50 ... 350 mm**
- response time / release time: < 0.9 ms

**measuring distance Sd = 50 ... 550 mm**
- response time / release time: < 1.5 ms

**mechanical data**
- width / diameter: 13.4 mm
- height / length: 48.2 mm
- depth: 40 mm
- type: rectangular
- housing material: aluminum
- front (optics): glass
- connection types: connector M8, 4 pin

**ambient conditions**
- operating temperature: 0 ... +50 °C
- protection class: IP 67

**order reference**
- measuring distance Sd
- beam type
- beam width
- beam height
- beam diameter

<table>
<thead>
<tr>
<th>Order Reference</th>
<th>Measuring Distance Sd</th>
<th>Beam Type</th>
<th>Beam Width</th>
<th>Beam Height</th>
<th>Beam Diameter</th>
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<tbody>
<tr>
<td>OADM 13U6475/S35A</td>
<td>50 ... 350 mm</td>
<td>point</td>
<td>-</td>
<td>-</td>
<td>1 mm</td>
</tr>
<tr>
<td>OADM 13U6480/S35A</td>
<td>50 ... 550 mm</td>
<td>point</td>
<td>-</td>
<td>-</td>
<td>1 mm</td>
</tr>
<tr>
<td>OADM 13U6575/S35A</td>
<td>50 ... 350 mm</td>
<td>line</td>
<td>2 mm</td>
<td>4 ... 9 mm</td>
<td>-</td>
</tr>
<tr>
<td>OADM 13U6580/S35A</td>
<td>50 ... 550 mm</td>
<td>line</td>
<td>2 mm</td>
<td>4 ... 13 mm</td>
<td>-</td>
</tr>
</tbody>
</table>

**connection diagram**

- BN (1) → +Vs
- Analog BU (3) → 0 V
- WH (2) → teach in
- BK (4) → analog U

**connectors**
- ESG 32AP0200G 4 pin 2 m straight (shielded)
- ESG 32AP0500G 4 pin 5 m straight (shielded)
- ESW 31AP0500G 4 pin 5 m angular (shielded)

**accessories**
- SENSOFIX mounting kit 10161829
- mounting bracket 10161695
  for details, see accessories section

**remarks**
For objects with a reflectivity < 10 %, the response time / release time is increased automatically up to max. 3 ms (OADM 13x6x75/ S35A) resp. 5 ms (OADM 13x6x80/S35A).
Missed measurement up to 30 cycles (30 ms) will be suppressed. During this time the analog output stays on hold.

**laser warning**

- CAUTION
- LASER RADIATION
- DO NOT STARE INTO BEAM
- LASERDIODE
- Class 2 LASER Product

Wavelength: 620 - 680 nm
Max. av. output: < 1 mW
IEC 60825-1, Am. 2, 2001
Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated July 26, 2001
Photoelectric distance measuring sensors

**Resolution**

<table>
<thead>
<tr>
<th>Sd = 50 ... 350 mm</th>
<th>Sd = 50 ... 550 mm</th>
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</thead>
<tbody>
<tr>
<td><img src="image1" alt="Graph 1" /></td>
<td><img src="image2" alt="Graph 2" /></td>
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**Linearity errors**

<table>
<thead>
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<th>Sd = 50 ... 550 mm</th>
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<tr>
<td><img src="image3" alt="Graph 3" /></td>
<td><img src="image4" alt="Graph 4" /></td>
</tr>
</tbody>
</table>

**Beam alignment (line)**

![Beam alignment diagram](image5)

**Dimension drawing**

![Dimension drawing](image6)

* emitter axis

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Photoelectric distance measuring sensors

**Sd = 50 ... 550 mm**

- compact housing, current output
- teachable measuring range Sr > 5 mm
- resolution up to 10 μm

<table>
<thead>
<tr>
<th>general data</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>adjustment</td>
<td>Teach-in: button / external</td>
</tr>
<tr>
<td>power on indication</td>
<td>LED green</td>
</tr>
<tr>
<td>soiled lens indicator</td>
<td>LED red / LED red blinking</td>
</tr>
<tr>
<td>light source</td>
<td>pulsed red laser diode</td>
</tr>
<tr>
<td>wavelength</td>
<td>650 nm</td>
</tr>
<tr>
<td>class laser</td>
<td>2</td>
</tr>
<tr>
<td>interference suppression</td>
<td>&lt; 30 ms</td>
</tr>
</tbody>
</table>

**measuring distance Sd = 50 ... 350 mm**

- Teach-in range min. > 5 mm
- resolution 0,01 ... 0,4 mm
- linearity error ± 0,05 ... ± 1,2 mm

**measuring distance Sd = 50 ... 550 mm**

- Teach-in range min. > 10 mm
- resolution 0,01 ... 1,1 mm
- linearity error ± 0,08 ... ± 3,5 mm

<table>
<thead>
<tr>
<th>electrical data</th>
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<tr>
<td>voltage supply range</td>
<td>+Vs 12 ... 28 VDC</td>
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<tr>
<td>current consumption max.</td>
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<tr>
<td>output circuit</td>
<td>analog</td>
</tr>
<tr>
<td>output signal</td>
<td>4 ... 20 mA</td>
</tr>
<tr>
<td>load resistance</td>
<td>&lt; (+Vs - 6 V) / 0,02 A</td>
</tr>
<tr>
<td>short circuit protection</td>
<td>yes</td>
</tr>
<tr>
<td>reverse polarity protection</td>
<td>yes, Vs to GND</td>
</tr>
</tbody>
</table>

**measuring distance Sd = 50 ... 350 mm**

- response time / release time < 0,9 ms

**measuring distance Sd = 50 ... 550 mm**

- response time / release time < 1,5 ms

<table>
<thead>
<tr>
<th>mechanical data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>width / diameter</td>
<td>13,4 mm</td>
</tr>
<tr>
<td>height / length</td>
<td>48,2 mm</td>
</tr>
<tr>
<td>depth</td>
<td>40 mm</td>
</tr>
<tr>
<td>type</td>
<td>rectangular</td>
</tr>
<tr>
<td>housing material</td>
<td>aluminum</td>
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<tr>
<td>front (optics)</td>
<td>glass</td>
</tr>
<tr>
<td>connection types</td>
<td>connector M8, 4 pin</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ambient conditions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>operating temperature</td>
<td>0 ... +50 °C</td>
</tr>
<tr>
<td>protection class</td>
<td>IP 67</td>
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<table>
<thead>
<tr>
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<th>measuring distance Sd</th>
<th>beam type</th>
<th>beam width</th>
<th>beam height</th>
<th>beam diameter</th>
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</thead>
<tbody>
<tr>
<td>OADM 1316475/S35A</td>
<td>50 ... 350 mm</td>
<td>point</td>
<td>-</td>
<td>-</td>
<td>1 mm</td>
</tr>
<tr>
<td>OADM 1316480/S35A</td>
<td>50 ... 550 mm</td>
<td>point</td>
<td>-</td>
<td>-</td>
<td>1 mm</td>
</tr>
<tr>
<td>OADM 1316575/S35A</td>
<td>50 ... 350 mm</td>
<td>line</td>
<td>2 mm</td>
<td>4 ... 9 mm</td>
<td>-</td>
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<tr>
<td>OADM 1316580/S35A</td>
<td>50 ... 550 mm</td>
<td>line</td>
<td>2 mm</td>
<td>4 ... 13 mm</td>
<td>-</td>
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</tbody>
</table>

**connection diagram**

BN (1) -> vVs

WV (2) -> teach-in

BK (4) -> analog I

BU (3) -> 0 V

<table>
<thead>
<tr>
<th>connectors</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ESG 32AP0200G</td>
<td>4 pin</td>
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<tr>
<td>ESG 32AP0500G</td>
<td>4 pin</td>
</tr>
<tr>
<td>ESW 31AP0500G</td>
<td>4 pin</td>
</tr>
</tbody>
</table>

**accessories**

- SENSOFIX mounting kit 10161829
- mounting bracket 10161695

For details, see accessories section

**remarks**

For objects with a reflectivity < 10 %, the response time / release time is increased automatically up to max. 3 ms (OADM 13x6x75/S35A) resp. 5 ms (OADM 13x6x80/S35A). Missed measurement up to 30 cycles (30 ms) will be suppressed. During this time the analog output stays on hold.

**laser warning**

**CAUTION**

*LASER RADIATION*

*DO NOT STARE INTO BEAM *

*LASERDIODE*

*Class 2 LASER Product*

Wavelength: 620 - 680 nm

Max. av. output: < 1 mW

IEC 60825-1, Am. 2, 2001

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated July 26, 2001

---

For objects with a reflectivity < 10 %, the response time / release time is increased automatically up to max. 3 ms (OADM 13x6x75/S35A) resp. 5 ms (OADM 13x6x80/S35A). Missed measurement up to 30 cycles (30 ms) will be suppressed. During this time the analog output stays on hold.
Photoelectric distance measuring sensors

**resolution**

<table>
<thead>
<tr>
<th>Sd = 50 ... 350 mm</th>
<th>Sd = 50 ... 550 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="#" alt="Resolution Graph" /></td>
<td><img src="#" alt="Resolution Graph" /></td>
</tr>
</tbody>
</table>

**linearity errors**

<table>
<thead>
<tr>
<th>Sd = 50 ... 350 mm</th>
<th>Sd = 50 ... 550 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="#" alt="Linearity Graph" /></td>
<td><img src="#" alt="Linearity Graph" /></td>
</tr>
</tbody>
</table>

**beam alignment (line)**

![Beam Alignment](#)

**dimension drawing**

![Dimension Drawing](#)

* emitter axis
**Photoelectric distance measuring sensors**

**Sd = 30 ... 250 mm**

- current or voltage output
- resolution up to 10 μm
- with laser line for rough surfaces

**general data**

<table>
<thead>
<tr>
<th>Adjustment</th>
<th>no</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power on indication</td>
<td>LED green</td>
</tr>
<tr>
<td>Soiled lens indicator</td>
<td>LED red / LED red blinking</td>
</tr>
<tr>
<td>Light source</td>
<td>Pulsed red laser diode</td>
</tr>
<tr>
<td>Wavelength</td>
<td>650 nm</td>
</tr>
<tr>
<td>Laser class</td>
<td>2</td>
</tr>
</tbody>
</table>

**Measuring distance Sd = 30 ... 50 mm**

- Resolution: < 0.01 mm
- Linearity error: ± 0.03 mm

**Measuring distance Sd = 30 ... 130 mm**

- Resolution: 0.05 ... 0.07 mm
- Linearity error: ± 0.15 ... ± 0.22 mm

**Measuring distance Sd = 50 ... 250 mm**

- Resolution: 0.1 ... 0.3 mm
- Linearity error: ± 0.3 ... ± 0.8 mm

**electrical data**

- Response time / release time: < 10 ms
- Voltage supply range: +Vs 12 ... 28 VDC
- Current consumption max.: 100 mA
- Output circuit: Analog
- Output signal: 4 ... 20 mA / 0 ... 10 VDC
- Load resistance (analog I): < (+Vs - 6 V) / 0.02 A
- Load resistance (analog U): > 100 kΩm
- Output current: < 100 mA
- Alarm output: PNP
- Short circuit protection: yes
- Reverse polarity protection: yes, Vs to GND

**mechanical data**

- Width / Diameter: 20.6 mm
- Height / Length: 65 mm
- Depth: 50 mm
- Type: Rectangular
- Housing material: Die-cast zinc
- Front (optics): Glass
- Connection types: Connector M12, 5 pin, rotatable

**ambient conditions**

- Operating temperature: 0 ... +50 °C
- Protection class: IP 67

**connection diagram**

![Connection Diagram]

**connectors**

- ES 34CP2B 5 pin 2 m straight (shielded)
- ES 34CP5B 5 pin 5 m straight (shielded)
- Additional cable connectors and field wirable connectors, see accessories

**accessories**

- Mounting bracket: 10131521
- Protector cap: 10156878
- For details, see accessories section

**laser warning**

- **CAUTION**
- **LASER RADIATION**
- **DO NOT STARE INTO BEAM**
- **LASER DIODE**
- **Class 2 LASER PRODUCT**
- **Wavelength: 620 - 680 nm**
- **Max. av. output: < 1 mW**
- **IEC 60825-1, Am. 2, 2001**
- **Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated July 26, 2001**

**remarks**

- While switching-on the sensor, it checks if there is a current at current output BK (4). If so, the current output is activated. If not, the voltage output GY (5) is activated after 100 ms.

**order reference**

<table>
<thead>
<tr>
<th>OADM 204440/S14C</th>
<th>Measuring distance Sd</th>
<th>Beam type</th>
<th>Beam width</th>
<th>Beam height</th>
<th>Beam diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>OADM 204440/S14C</td>
<td>30 ... 50 mm</td>
<td>Point</td>
<td>-</td>
<td>-</td>
<td>1 ... 0.4 mm</td>
</tr>
<tr>
<td>OADM 204460/S14C</td>
<td>30 ... 130 mm</td>
<td>Point</td>
<td>-</td>
<td>-</td>
<td>2 ... 1 mm</td>
</tr>
<tr>
<td>OADM 204470/S14C</td>
<td>50 ... 250 mm</td>
<td>Point</td>
<td>-</td>
<td>-</td>
<td>2 mm</td>
</tr>
<tr>
<td>OADM 204540/S14C</td>
<td>30 ... 60 mm</td>
<td>Line</td>
<td>1 ... 0.4 mm</td>
<td>2 mm</td>
<td>-</td>
</tr>
<tr>
<td>OADM 204560/S14C</td>
<td>30 ... 130 mm</td>
<td>Line</td>
<td>2 ... 1 mm</td>
<td>3 ... 5 mm</td>
<td>-</td>
</tr>
<tr>
<td>OADM 204570/S14C</td>
<td>50 ... 250 mm</td>
<td>Line</td>
<td>2.5 mm</td>
<td>4 ... 10 mm</td>
<td>-</td>
</tr>
</tbody>
</table>
Photoelectric distance measuring sensors

resolution

Sd = 30 ... 50 mm
Sd = 30 ... 130 mm
Sd = 50 ... 250 mm

linearity errors

Sd = 30 ... 50 mm
Sd = 30 ... 130 mm
Sd = 50 ... 250 mm

beam alignment (line)

dimension drawing
Photoelectric distance measuring sensors

Sd = 100 ... 1000 mm

- current or voltage output
- resolution up to 0,5 mm
- with laser line for rough surfaces

**general data**

<table>
<thead>
<tr>
<th>adjustment</th>
<th>no</th>
</tr>
</thead>
<tbody>
<tr>
<td>power on indication</td>
<td>LED green</td>
</tr>
<tr>
<td>soiled lens indicator</td>
<td>LED red / LED red blinking</td>
</tr>
<tr>
<td>light source</td>
<td>pulsed red laser diode</td>
</tr>
<tr>
<td>wave length</td>
<td>650 nm</td>
</tr>
<tr>
<td>laser class</td>
<td>2</td>
</tr>
</tbody>
</table>

**measuring distance Sd = 100 ... 500 mm**

| resolution | 0,2 ... 0,5 mm |
| linearity error | ± 0,8 ... ± 2 mm |

**measuring distance Sd = 200 ... 1000 mm**

| resolution | 0,6 ... 2,5 mm |
| linearity error | ± 2,4 ... ± 10 mm |

**electrical data**

| response time / release time | < 10 ms |
| voltage supply range +Vs | 12 ... 28 VDC |
| current consumption max. | 100 mA |
| output circuit | analog |
| output signal | 4 ... 20 mA / 0 ... 10 VDC |
| load resistance (analog I) | < (+Vs - 6 V) / 0,02 A |
| load resistance (analog U) | > 100 kOhm |
| output current | < 100 mA |
| alarm output | PNP |
| short circuit protection | yes |
| reverse polarity protection | yes, Vs to GND |

**mechanical data**

| width / diameter | 20,6 mm |
| height / length | 65 mm |
| depth | 50 mm |
| type | rectangular |
| housing material | die-cast zinc |
| front (optics) | glass |
| connection types | connector M12, 5 pin, rotatable |

**ambient conditions**

| operating temperature | 0 ... +50 °C |
| protection class | IP 67 |

**connection diagram**

**connectors**

- ES 34CP2B 5 pin 2 m straight (shielded)
- ES 34CP5B 5 pin 5 m straight (shielded)

additional cable connectors and field wireable connectors, see accessories

**accessories**

- mounting bracket 10131521
- protector cap 10156878

for details, see accessories section

**remarks**

While switching-on the sensor, it checks if there is a current at current output BK (4). If so, the current output is activated. If not, the voltage output GY (5) is activated after 100 ms.

**laser warning**

CAUTION

LASER RADIATION

DO NOT STARE INTO BEAM

LASERDIODE

Class 2 LASER Product

Wavelength: 620 - 680 nm
Max. av. output: < 1 mW
IEC 60825-1, Am. 2, 2001
Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated July 26, 2001

**order reference**

<table>
<thead>
<tr>
<th>measuring distance Sd</th>
<th>beam type</th>
<th>beam width</th>
<th>beam height</th>
<th>beam diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>OADM 204471/S14C</td>
<td>100 ... 500 mm</td>
<td>point</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>OADM 204481/S14C</td>
<td>200 ... 1000 mm</td>
<td>point</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>OADM 204571/S14C</td>
<td>100 ... 500 mm</td>
<td>line</td>
<td>2,5 mm</td>
<td>5,5 ... 18 mm</td>
</tr>
<tr>
<td>OADM 204581/S14C</td>
<td>200 ... 1000 mm</td>
<td>line</td>
<td>2,5 mm</td>
<td>8,5 ... 35 mm</td>
</tr>
</tbody>
</table>
Photoelectric distance measuring sensors

**Resolution**

<table>
<thead>
<tr>
<th>Distance Range</th>
<th>Sd = 100 ... 500 mm</th>
<th>Sd = 200 ... 1000 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td><img src="graph1.png" alt="Graph" /></td>
<td><img src="graph2.png" alt="Graph" /></td>
</tr>
</tbody>
</table>

**Linearity Errors**

<table>
<thead>
<tr>
<th>Distance Range</th>
<th>Sd = 100 ... 500 mm</th>
<th>Sd = 200 ... 1000 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linearity Errors</td>
<td><img src="graph3.png" alt="Graph" /></td>
<td><img src="graph4.png" alt="Graph" /></td>
</tr>
</tbody>
</table>

**Beam Alignment (Line)**

![Beam Alignment Diagram](beam alignment.png)

**Dimension Drawing**

![Dimension Drawing](dimension drawing.png)
Photoelectric distance measuring sensors

---

**Sd = 30 ... 300 mm**

- response time < 0,9 ms
- teachable measuring range Sr > 2 mm
- resolution up to 4 μm

### General Data

- **Adjustment**: Teach-in: button / external
- **Power On Indication**: LED green
- **Soiled Lens Indicator**: LED red / LED red blinking
- **Light Source**: Pulsed red laser diode
- **Wavelength**: 650 nm
- **Laser Class**: 2

### Measuring Distance Sd = 30 ... 70 mm

- **Teach-in Range Min.**: > 2 mm
- **Resolution**: 0.004 ... 0.02 mm
- **Linearity Error**: ± 0.012 ... ± 0.06 mm

### Measuring Distance Sd = 30 ... 130 mm

- **Teach-in Range Min.**: > 3 mm
- **Resolution**: 0.005 ... 0.06 mm
- **Linearity Error**: ± 0.015 ... ± 0.2 mm

### Measuring Distance Sd = 50 ... 300 mm

- **Teach-in Range Min.**: > 5 mm
- **Resolution**: 0.01 ... 0.33 mm
- **Linearity Error**: ± 0.03 ... ± 1 mm

### Electrical Data

- **Response Time / Release Time**: < 0.9 ms
- **Voltage Supply Range**: +Vs 12 ... 28 VDC
- **Current Consumption Max.**: 100 mA
- **Output Circuit**: Analog
- **Output Signal**: 4 ... 20 mA / 0 ... 10 VDC
- **Load Resistance (Analog I)**: < (+Vs - 6 V) / 0.02 A
- **Load Resistance (Analog U)**: > 100 kOhm
- **Output Current**: < 100 mA
- **Alarm Output**: PNP
- **Short Circuit Protection**: Yes
- **Reverse Polarity Protection**: Yes, Vs to GND

### Mechanical Data

- **Width / Diameter**: 20.6 mm
- **Height / Length**: 65 mm
- **Type**: Rectangular
- **Housing Material**: Die-cast zinc
- **Connection Types**: Connector M12, 8 pin, rotatable

### Ambient Conditions

- **Operating Temperature**: 0 ... +50 °C
- **Protection Class**: IP 67

---

### Order Reference

<table>
<thead>
<tr>
<th>Order Reference</th>
<th>Measuring Distance Sd</th>
<th>Beam Type</th>
<th>Beam Width</th>
<th>Beam Height</th>
<th>Beam Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>OADM 206441/S14F</td>
<td>30 ... 70 mm</td>
<td>Point</td>
<td>-</td>
<td>-</td>
<td>1 ... 0.2 mm</td>
</tr>
<tr>
<td>OADM 206460/S14F</td>
<td>30 ... 130 mm</td>
<td>Point</td>
<td>-</td>
<td>-</td>
<td>2 ... 1 mm</td>
</tr>
<tr>
<td>OADM 206472/S14F</td>
<td>50 ... 300 mm</td>
<td>Point</td>
<td>-</td>
<td>-</td>
<td>2 mm</td>
</tr>
<tr>
<td>OADM 206541/S14F</td>
<td>30 ... 70 mm</td>
<td>Line</td>
<td>1 ... 0.2 mm</td>
<td>2 mm</td>
<td>-</td>
</tr>
<tr>
<td>OADM 206560/S14F</td>
<td>30 ... 130 mm</td>
<td>Line</td>
<td>2 ... 1 mm</td>
<td>3 ... 6 mm</td>
<td>-</td>
</tr>
<tr>
<td>OADM 206572/S14F</td>
<td>50 ... 300 mm</td>
<td>Line</td>
<td>2.5 mm</td>
<td>4 ... 12 mm</td>
<td>-</td>
</tr>
</tbody>
</table>
Photoelectric distance measuring sensors

resolution

Sd = 30 ... 70 mm

Sd = 30 ... 130 mm

Sd = 50 ... 300 mm

linearity errors

Sd = 30 ... 70 mm

Sd = 30 ... 130 mm

Sd = 50 ... 300 mm

beam alignment (line)

dimension drawing

* emitter axis
Photoelectric distance measuring sensors

**Sd = 100 ... 1000 mm**

- response time < 0.9 ms
- teachable measuring range Sr > 10 mm
- resolution up to 15 μm

### General Data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Adjustment</td>
<td>Teach-in: button / external</td>
</tr>
<tr>
<td>Power on indication</td>
<td>LED green</td>
</tr>
<tr>
<td>Soiled lens indicator</td>
<td>LED red / LED red blinking</td>
</tr>
<tr>
<td>Light source</td>
<td>Pulsed red laser diode</td>
</tr>
<tr>
<td>Wave length</td>
<td>650 nm</td>
</tr>
<tr>
<td>Laser class</td>
<td>2</td>
</tr>
</tbody>
</table>

### Measuring Distance Sd = 100 ... 600 mm

- Teach-in range min.: > 10 mm
- Resolution: 0.015 ... 0.67 mm
- Linearity error: ± 0.05 ... ± 2 mm

### Measuring Distance Sd = 200 ... 1000 mm

- Teach-in range min.: > 20 mm
- Resolution: 0.12 ... 2.5 mm
- Linearity error: ± 0.48 ... ± 10 mm

### Electrical Data

- Response time / release time: < 0.9 ms
- Voltage supply range: +Vs 12 ... 28 VDC
- Current consumption max.: 100 mA
- Output circuit: Analog
- Output signal: 4 ... 20 mA / 0 ... 10 VDC
- Load resistance (analog I): < (+Vs - 6 V) / 0.02 A
- Load resistance (analog U): > 100 kOhm
- Output current: < 100 mA
- Alarm output: PNP
- Short circuit protection: Yes
- Reverse polarity protection: Yes, Vs to GND

### Mechanical Data

- Width / diameter: 20.6 mm
- Height / length: 65 mm
- Depth: 50 mm
- Type: Rectangular
- Housing material: Die-cast zinc
- Front (optics): Glass
- Connection types: Connector M12, 8 pin, rotatable

### Ambient Conditions

- Operating temperature: 0 ... +50 °C
- Protection class: IP 67

### Order Reference

<table>
<thead>
<tr>
<th>Reference</th>
<th>Measuring Distance Sd</th>
<th>Beam Type</th>
<th>Beam Width</th>
<th>Beam Height</th>
<th>Beam Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>OADM 206480/S14F</td>
<td>100 ... 600 mm</td>
<td>Point</td>
<td>-</td>
<td>-</td>
<td>2 mm</td>
</tr>
<tr>
<td>OADM 206481/S14F</td>
<td>200 ... 1000 mm</td>
<td>Point</td>
<td>-</td>
<td>-</td>
<td>2 mm</td>
</tr>
<tr>
<td>OADM 206580/S14F</td>
<td>100 ... 600 mm</td>
<td>Line</td>
<td>2.5 mm</td>
<td>5.5 ... 21 mm</td>
<td>-</td>
</tr>
<tr>
<td>OADM 206581/S14F</td>
<td>200 ... 1000 mm</td>
<td>Line</td>
<td>2.5 mm</td>
<td>8.5 ... 35 mm</td>
<td>-</td>
</tr>
</tbody>
</table>

### Connection Diagram

![Connection Diagram](connection_diagram.png)

### Connectors

- ESG 34FP02008 8 pin 2 m straight (shielded)
- ESG 34FP05008 8 pin 5 m straight (shielded)

### Accessories

- Mounting bracket: 10131521
- Protector cap: 10156878

### Remarks

For objects with a reflectivity < 7 % (OADM 206x80/S14F) or < 15 % (OADM 206x81/S14F) the response time/release time is increased automatically up to 2.8 ms.

### Laser Warning

**CAUTION**

*LASER RADIATION*

*DO NOT STARE INTO BEAM*

*LASERDIODE Class 2 LASER Product*

-Wavelength: 620 - 680 nm
-Max. av. output: < 1 mW

IEC 60825-1, Am. 2, 2001

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated July 26, 2001
Photoelectric distance measuring sensors

**resolution**

<table>
<thead>
<tr>
<th>Sd = 100 ... 600 mm</th>
<th>Sd = 200 ... 1000 mm</th>
</tr>
</thead>
</table>

**linearity errors**

<table>
<thead>
<tr>
<th>Sd = 100 ... 600 mm</th>
<th>Sd = 200 ... 1000 mm</th>
</tr>
</thead>
</table>

**beam alignment (line)**

**dimension drawing**

---

M12 x 1

* emitter axis
Photoelectric distance measuring sensors

**Sd = 30 ... 250 mm**

- serial interface RS 485
- resolution up to 10 μm
- with laser line for rough surfaces

### General Data

<table>
<thead>
<tr>
<th>Adjustment</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power on indication</td>
<td>LED green</td>
</tr>
<tr>
<td>Soiled Lens indicator</td>
<td>LED red / LED red blinking</td>
</tr>
<tr>
<td>Light source</td>
<td>Pulsed red laser diode</td>
</tr>
<tr>
<td>Wave length</td>
<td>650 nm</td>
</tr>
<tr>
<td>Laser class</td>
<td>2</td>
</tr>
</tbody>
</table>

### Measuring Distance Sd = 30 ... 50 mm

<table>
<thead>
<tr>
<th>Resolution</th>
<th>&lt; 0.01 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linearity error</td>
<td>± 0.03 mm</td>
</tr>
</tbody>
</table>

### Measuring Distance Sd = 30 ... 130 mm

<table>
<thead>
<tr>
<th>Resolution</th>
<th>0.05 ... 0.07 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linearity error</td>
<td>± 0.15 ... ± 0.22 mm</td>
</tr>
</tbody>
</table>

### Measuring Distance Sd = 50 ... 250 mm

<table>
<thead>
<tr>
<th>Resolution</th>
<th>0.1 ... 0.3 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linearity error</td>
<td>± 0.3 ... ± 0.8 mm</td>
</tr>
</tbody>
</table>

### Electrical Data

- Response time / Release time: < 10 ms
- Voltage supply range: +Vs 12 ... 28 VDC
- Current consumption max.: 100 mA
- Output circuit: RS 485
- Output current: < 100 mA
- Alarm output: push-pull
- Short circuit protection: yes
- Reverse polarity protection: yes, Vs to GND

### Mechanical Data

- Width / Diameter: 20.6 mm
- Height / Length: 65 mm
- Depth: 50 mm
- Type: Rectangular
- Housing material: Die-cast zinc
- Front (optics): Glass
- Connection types: Connector M12, 8 pin, rotatable

### Ambient Conditions

- Operating temperature: 0 ... +50 °C
- Protection class: IP 67

### Order Reference

<table>
<thead>
<tr>
<th>OADM 20S4440/S14F</th>
<th>Measuring Distance Sd</th>
<th>Beam Type</th>
<th>Beam Width</th>
<th>Beam Height</th>
<th>Beam Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 ... 50 mm</td>
<td>Point</td>
<td>-</td>
<td>-</td>
<td>1 ... 0.4 mm</td>
<td></td>
</tr>
</tbody>
</table>

| OADM 20S4460/S14F | 30 ... 130 mm         | Point     | -          | 2 ... 1 mm  |

| OADM 20S4470/S14F | 50 ... 250 mm         | Point     | -          | 2 mm        |

| OADM 20S4540/S14F | 30 ... 50 mm          | Line      | 1 ... 0.4 mm | 2 mm        |

| OADM 20S4560/S14F | 30 ... 130 mm         | Line      | 2 ... 1 mm  | 3 ... 5 mm  |

| OADM 20S4570/S14F | 50 ... 250 mm         | Line      | 2.5 mm     | 4 ... 10 mm |

---

**Connection Diagram**

- **BN (2)**
- **RS 485**
- **push-pull**
- **out**
- **Ye (4)**
- **VH (1)**
- **Rx/Tx-**
- **Rx/Tx+**
- **BU (7)**
- **n.c.**
- **0 V**

**Connectors**

- ESG 34FP0200B 8 pin 2 m straight (shielded)
- ESG 34FP0800B 8 pin 5 m straight (shielded)

**Accessories**

- Mounting bracket: 10131521
- Protector cap: 10156878

**Remarks**

The sensor has a switching output (out) that is activated when the measurement is determined within the range between threshold 1 and threshold 2. Both thresholds can be set via interface.

**Laser Warning**

**CAUTION**

Laser Radiation: Do Not Stare Into Beam Laser Diode

Class 2 LASER Product

Wavelength: 620 - 680 nm
Max. av. output: < 1 mW
IEC 60825-1, Am. 2, 2001
Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 30, dated July 26, 2001
Photoelectric distance measuring sensors

**Resolution**

- $S_d = 30 \ldots 50$ mm
- $S_d = 30 \ldots 130$ mm
- $S_d = 50 \ldots 250$ mm

**Linearity errors**

- $S_d = 30 \ldots 50$ mm
- $S_d = 30 \ldots 130$ mm
- $S_d = 50 \ldots 250$ mm

**Beam alignment (line)**

**Dimension drawing**

*Emitter axis*
Photoelectric distance measuring sensors

Sd = 100 ... 1000 mm

- serial interface RS 485
- resolution up to 0,5 mm
- with laser line for rough surfaces

### general data

<table>
<thead>
<tr>
<th>adjustment</th>
<th>no</th>
</tr>
</thead>
<tbody>
<tr>
<td>power on indication</td>
<td>LED green</td>
</tr>
<tr>
<td>soiled lens indicator</td>
<td>LED red / LED red blinking</td>
</tr>
<tr>
<td>light source</td>
<td>pulsed red laser diode</td>
</tr>
<tr>
<td>wave length</td>
<td>650 nm</td>
</tr>
<tr>
<td>laser class</td>
<td>2</td>
</tr>
</tbody>
</table>

#### measuring distance Sd = 100 ... 500 mm

<table>
<thead>
<tr>
<th>resolution</th>
<th>0,2 ... 0,5 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>linearity error</td>
<td>± 0,8 ... ± 2 mm</td>
</tr>
</tbody>
</table>

#### measuring distance Sd = 200 ... 1000 mm

<table>
<thead>
<tr>
<th>resolution</th>
<th>0,6 ... 2,5 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>linearity error</td>
<td>± 2,4 ... ± 10 mm</td>
</tr>
</tbody>
</table>

### electrical data

| response time / release time | < 10 ms |
| voltage supply range +Vs     | 12 ... 28 VDC |
| current consumption max.     | 100 mA |
| output circuit               | RS 485 |
| output current               | < 100 mA |
| alarm output                 | push-pull |
| short circuit protection     | yes |
| reverse polarity protection  | yes, Vs to GND |

### mechanical data

| width / diameter | 20,6 mm |
| height / length  | 65 mm   |
| depth            | 50 mm   |
| type             | rectangular |
| housing material | die-cast zinc |
| front (optics)   | glass |
| connection types | connector M12, 8 pin, rotatable |

### ambient conditions

| operating temperature | 0 ... +50 °C |
| protection class      | IP 67 |

### order reference measuring distance Sd

<table>
<thead>
<tr>
<th>Order Reference</th>
<th>Measuring Distance Sd</th>
<th>Beam Type</th>
<th>Beam Width</th>
<th>Beam Height</th>
<th>Beam Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>OADM 20S471/S14F</td>
<td>100 ... 500 mm</td>
<td>point</td>
<td>-</td>
<td>-</td>
<td>2 mm</td>
</tr>
<tr>
<td>OADM 20S481/S14F</td>
<td>200 ... 1000 mm</td>
<td>point</td>
<td>-</td>
<td>-</td>
<td>2 mm</td>
</tr>
<tr>
<td>OADM 20S4571/S14F</td>
<td>100 ... 500 mm</td>
<td>line</td>
<td>2,5 mm</td>
<td>5,5 ... 18 mm</td>
<td>-</td>
</tr>
<tr>
<td>OADM 20S4581/S14F</td>
<td>200 ... 1000 mm</td>
<td>line</td>
<td>2,5 mm</td>
<td>8,5 ... 35 mm</td>
<td>-</td>
</tr>
</tbody>
</table>

### laser warning

**CAUTION**

LASER RADIATION
DO NOT STARE
INTO BEAM
LASERDIODE
Class 2 LASER PRODUCT

Wavelength: 650 - 680 nm
Max. av. output: < 1 mW
IEC 60825-1, Am. 2, 2001
Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 35, dated July 26, 2001

### remarks

The sensor has a switching output (out) that is activated when the measurement is determined within the range between threshold 1 and threshold 2. Both thresholds can be set via interface.

### accessories

- mounting bracket 10131521
- protector cap 10156878

For details, see accessories section.

### connectors

- ESG 34FP0200B 8 pin 2 m straight (shielded)
- ESG 34FP0800B 8 pin 5 m straight (shielded)

Additional cable connectors and field wireable connectors, see accessories section.

www.baumerelectric.com
**Photoelectric distance measuring sensors**

**Resolution**

\[ S_d = 100 \ldots 500 \text{ mm} \]

\[ S_d = 200 \ldots 1000 \text{ mm} \]

**Linearity errors**

\[ S_d = 100 \ldots 500 \text{ mm} \]

\[ S_d = 200 \ldots 1000 \text{ mm} \]

**Beam alignment (line)**

**Dimension drawing**

![Dimension drawing of OADM 20 sensor](www.baumerelectric.com)
Photoelectric distance measuring sensors

Sd = 50 ... 600 mm

- suitable for outdoor applications
- very high ambient light immunity
- extremely vibration resistant

**general data**

<table>
<thead>
<tr>
<th>Adjustment</th>
<th>Teach-in: button / external</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power on indication</td>
<td>LED green</td>
</tr>
<tr>
<td>Soiled lens indicator</td>
<td>LED red / LED red blinking</td>
</tr>
<tr>
<td>Light source</td>
<td>Pulsed red laser diode</td>
</tr>
<tr>
<td>Wave length</td>
<td>650 nm</td>
</tr>
<tr>
<td>Laser class</td>
<td>2</td>
</tr>
<tr>
<td>Beam type</td>
<td>Line</td>
</tr>
<tr>
<td>Beam width</td>
<td>2 mm</td>
</tr>
</tbody>
</table>

**measuring distance Sd = 50 ... 300 mm**

- Teach-in range min. > 5 mm
- Resolution 0.01 ... 0.4 mm
- Linearity error ± 0.05 ... ± 1.2 mm
- Beam height 3 ... 7 mm

**measuring distance Sd = 100 ... 600 mm**

- Teach-in range min. > 10 mm
- Resolution 0.015 ... 0.8 mm
- Linearity error ± 0.05 ... ± 2.4 mm
- Beam height 7 ... 17 mm

**electrical data**

- Response time / release time < 2.5 ms
- Voltage supply range +Vs 12 ... 28 VDC
- Current consumption max. 100 mA
- Output circuit analog
- Output signal 0 ... 20 mA / 0 ... 10 VDC
- Load resistance (analog I) < (+Vs - 6 V) / 0.02 A
- Load resistance (analog U) > 100 kOhm
- Output current < 100 mA
- Alarm output PNP
- Short circuit protection yes
- Reverse polarity protection yes, Vs to GND

**mechanical data**

- Width / diameter 20.6 mm
- Height / length 65 mm
- Depth 50 mm
- Type Rectangular
- Housing material Die-cast zinc
- Front (optics) Glass
- Connection types Cable 8 pin, 2 m

**ambient conditions**

- Ambient light immunity 100 kLux
- Operating temperature -20 ... +60 °C
- Protection class IP 67

**connection diagram**

<table>
<thead>
<tr>
<th>Analog PNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>+Vs</td>
</tr>
<tr>
<td>n.c.</td>
</tr>
<tr>
<td>Analog I</td>
</tr>
<tr>
<td>Analog U</td>
</tr>
<tr>
<td>Alarm</td>
</tr>
<tr>
<td>Ext. teach</td>
</tr>
<tr>
<td>Sync. in</td>
</tr>
<tr>
<td>0 V</td>
</tr>
<tr>
<td>Bn (2)</td>
</tr>
<tr>
<td>WH (1)</td>
</tr>
<tr>
<td>Qn (5)</td>
</tr>
<tr>
<td>Ql (4)</td>
</tr>
<tr>
<td>Rd (8)</td>
</tr>
<tr>
<td>Gx (5)</td>
</tr>
<tr>
<td>Ye (4)</td>
</tr>
<tr>
<td>Bu (7)</td>
</tr>
<tr>
<td>Gy (5)</td>
</tr>
<tr>
<td>Wh (1)</td>
</tr>
</tbody>
</table>

**accessories**

- Mounting bracket 10131521
- Protector cap 10156878

For details, see accessories section

**remarks**

Fault suppression

If the laser beam is interrupted or if measurement faults occur, the analog outputs and the alarm output remain at their most recent valid value for a max. of 300 ms. Every valid value is immediately passed on to the outputs. If no valid value appears within 300 ms, the analog outputs switch to 4 mA / 0 V and the alarm output goes to HIGH.

For objects with a reflectivity < 10 % (OADM 2016592) the response time/release time is increased automatically up to 4 ms.

**laser warning**

**CAUTION**

Laser Radiation
Do not stare into beam Laserdiode
Class 2 Laser Product

Wavelength 650 - 680 nm
Max. av. output < 1 mW
IEC 60825-1, Am. 2, 2001
Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 30, dated July 26, 2001

**order reference**

<table>
<thead>
<tr>
<th>OADM 2016591</th>
<th>50 ... 300 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>OADM 2016592</td>
<td>100 ... 600 mm</td>
</tr>
</tbody>
</table>
Photoelectric distance measuring sensors

**resolution**

<table>
<thead>
<tr>
<th>Sd = 50 ... 300 mm</th>
<th>Sd = 100 ... 600 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="resolution_1.png" alt="Graph" /></td>
<td><img src="resolution_2.png" alt="Graph" /></td>
</tr>
</tbody>
</table>

**linearity errors**

<table>
<thead>
<tr>
<th>Sd = 50 ... 300 mm</th>
<th>Sd = 100 ... 600 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="linearity_1.png" alt="Graph" /></td>
<td><img src="linearity_2.png" alt="Graph" /></td>
</tr>
</tbody>
</table>

**beam alignment (line)**

![Beam Alignment](beam_alignment.png)

**dimension drawing**

![Dimension Drawing](dimensionDrawing.png)

* emitter axis
Photoelectric distance measuring sensors

OADR 20

Sd = 30 ... 600 mm

- protection class IP 69K
- stainless steel housing
- front screen PMMA

**general data**

<table>
<thead>
<tr>
<th>adjustment</th>
<th>external</th>
</tr>
</thead>
<tbody>
<tr>
<td>power on indication</td>
<td>LED green</td>
</tr>
<tr>
<td>soiled lens indicator</td>
<td>LED red / LED red blinking</td>
</tr>
<tr>
<td>light source</td>
<td>pulsed red laser diode</td>
</tr>
<tr>
<td>wave length</td>
<td>650 nm</td>
</tr>
<tr>
<td>laser class</td>
<td>2</td>
</tr>
</tbody>
</table>

**measuring distance Sd = 30 ... 130 mm**

Teach-in range min. > 3 mm

resolution 0,005 ... 0,06 mm

linearity error ± 0,015 ... ± 0,2 mm

**measuring distance Sd = 50 ... 300 mm**

Teach-in range min. > 5 mm

resolution 0,01 ... 0,33 mm

linearity error ± 0,03 ... ± 1 mm

**measuring distance Sd = 100 ... 600 mm**

Teach-in range min. > 10 mm

resolution 0,015 ... 0,67 mm

linearity error ± 0,05 ... ± 2 mm

**electrical data**

response time / release time < 0,9 ms

electrical data

voltage supply range +Vs 12 ... 28 VDC

current consumption max. 100 mA

output circuit analog

output signal 4 ... 20 mA / 0 ... 10 VDC

load resistance (analog I) < (+Vs - 6 V) / 0,02 A

load resistance (analog U) > 100 kOhm

output current < 100 mA

alarm output PNP

short circuit protection yes

reverse polarity protection yes, Vs to GND

**mechanical data**

width / diameter 20,3 mm

height / length 65 mm

depth 50 mm

type rectangular

housing material stainless steel 1.4404 (A4)

front (optics) PMMA

connection types connector M12, 8 pin, rotatable

**ambient conditions**

operating temperature 0 ... +50 °C

protection class IP 69K

OADR 20

<table>
<thead>
<tr>
<th>measuring distance Sd</th>
<th>beam type</th>
<th>beam width</th>
<th>beam height</th>
<th>beam diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>OADR 206460/S14F</td>
<td>30 ... 130 mm</td>
<td>point</td>
<td>-</td>
<td>2 ... 1 mm</td>
</tr>
<tr>
<td>OADR 206472/S14F</td>
<td>50 ... 300 mm</td>
<td>point</td>
<td>-</td>
<td>2 mm</td>
</tr>
<tr>
<td>OADR 206480/S14F</td>
<td>100 ... 600 mm</td>
<td>point</td>
<td>-</td>
<td>2 mm</td>
</tr>
<tr>
<td>OADR 206560/S14F</td>
<td>30 ... 130 mm</td>
<td>line</td>
<td>2 ... 1 mm</td>
<td>3 ... 5 mm</td>
</tr>
<tr>
<td>OADR 206572/S14F</td>
<td>50 ... 300 mm</td>
<td>line</td>
<td>2,5 mm</td>
<td>4 ... 12 mm</td>
</tr>
<tr>
<td>OADR 206580/S14F</td>
<td>100 ... 600 mm</td>
<td>line</td>
<td>2,5 mm</td>
<td>5,5 ... 21 mm</td>
</tr>
</tbody>
</table>

**connection diagram**

**connectors**

ESG 34FP0200B 8 pin 2 m straight (shielded)

ESG 34FP0500B 8 pin 5 m straight (shielded)

additional cable connectors and field wireable connectors, see accessories

**remarks**

For objects with a reflectivity < 7 % (OADR 206x80/S14F) the response time/release time is increased automatically up to 2.8 ms.

**laser warning**

**CAUTION**

Laser Radiation

DO NOT STARE INTO BEAM

Laserdiode Class 2 LASER Product

Wavelength: 620 - 680 nm

Max. av. output: < 1 mW

IEC 60825-1, Am. 2, 2001

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated July 30, 2001

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Photoelectric distance measuring sensors

Resolution

<table>
<thead>
<tr>
<th>Sd = 30 ... 130 mm</th>
<th>Sd = 50 ... 300 mm</th>
<th>Sd = 100 ... 600 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Graph 1" /></td>
<td><img src="image2.png" alt="Graph 2" /></td>
<td><img src="image3.png" alt="Graph 3" /></td>
</tr>
</tbody>
</table>

Linearity errors

<table>
<thead>
<tr>
<th>Sd = 30 ... 130 mm</th>
<th>Sd = 50 ... 300 mm</th>
<th>Sd = 100 ... 600 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image4.png" alt="Graph 4" /></td>
<td><img src="image5.png" alt="Graph 5" /></td>
<td><img src="image6.png" alt="Graph 6" /></td>
</tr>
</tbody>
</table>

Beam alignment (line)

Dimension drawing

* emitter axis
Photoelectric distance measuring sensors

**Photoelectric distance measuring sensors**

**Sd = 100 ... 1000 mm**

- teachable measuring range Sr > 10 mm
- resolution up to 10 μm
- synchronization input

<table>
<thead>
<tr>
<th><strong>general data</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>adjustment</td>
<td>Teach-in: button / external</td>
</tr>
<tr>
<td>Teach-in range min.</td>
<td>&gt; 10 mm</td>
</tr>
<tr>
<td>power on indication</td>
<td>LED green</td>
</tr>
<tr>
<td>soiled lens indicator</td>
<td>LED red / LED red blinking</td>
</tr>
<tr>
<td>light source</td>
<td>pulsed red laser diode</td>
</tr>
<tr>
<td>wave length</td>
<td>650 nm</td>
</tr>
<tr>
<td>laser class</td>
<td>2</td>
</tr>
</tbody>
</table>

**measuring distance Sd = 100 ... 600 mm**

- resolution: 0.01 ... 0.2 mm
- linearity error: ± 0.07 ... ± 0.8 mm

**measuring distance Sd = 200 ... 1000 mm**

- resolution: 0.02 ... 0.5 mm
- linearity error: ± 0.08 ... ± 2 mm

**electrical data**

- voltage supply range: +Vs 12 ... 28 VDC
- current consumption max.: 100 mA
- output circuit: analog
- output signal: 4 ... 20 mA / 0 ... 10 VDC
- load resistance (analog I): < (+Vs - 6 V) / 0.02 A
- load resistance (analog U): > 100 kOhm
- output current: < 100 mA
- alarm output: PNP
- short circuit protection: yes
- reverse polarity protection: yes, Vs to GND

**measuring distance Sd = 100 ... 600 mm**

- response time / release time: < 5 ms

**measuring distance Sd = 200 ... 1000 mm**

- response time / release time: < 10 ms

**mechanical data**

- width / diameter: 20.4 mm
- height / length: 135 mm
- depth: 45 mm
- type: rectangular
- housing material: aluminum
- front (optics): glass
- connection types: connector M12, 8 pin, rotatable

**ambient conditions**

- operating temperature: 0 ... +50 °C
- protection class: IP 67

**connection diagram**

- Analog PNP
- **connectors**
  - ESG 34FP0200B 8 pin 2 m straight (shielded)
  - ESG 34FP0500B 8 pin 5 m straight (shielded)
  - additional cable connectors and field wireable connectors, see accessories

**laser warning**

- **CAUTION**
- LASER RADIATION
- DO NOT STARE INTO BEAM LASERDIODE
- Wavelength: 620 - 680 nm
- Max. av. output: < 1 mW
- IEC 60825-1, Am. 2, 2001
- Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated July 26, 2001

**order reference**

<table>
<thead>
<tr>
<th>Sd</th>
<th>measuring distance Sd</th>
<th>beam type</th>
<th>beam width</th>
<th>beam height</th>
<th>beam diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 ... 600 mm</td>
<td>point</td>
<td>-</td>
<td>-</td>
<td>2 mm</td>
<td></td>
</tr>
<tr>
<td>200 ... 1000 mm</td>
<td>point</td>
<td>-</td>
<td>-</td>
<td>2 mm</td>
<td></td>
</tr>
<tr>
<td>100 ... 600 mm</td>
<td>line</td>
<td>2 mm</td>
<td>4 ... 13 mm</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>200 ... 1000 mm</td>
<td>line</td>
<td>2.5 mm</td>
<td>6 ... 20 mm</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

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Photoelectric distance measuring sensors

**resolution**

<table>
<thead>
<tr>
<th>SD = 100 ... 600 mm</th>
<th>SD = 200 ... 1000 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>At 10mm</td>
<td>At 100mm</td>
</tr>
<tr>
<td>At 120mm</td>
<td>At 150mm</td>
</tr>
<tr>
<td>At 200mm</td>
<td>At 250mm</td>
</tr>
<tr>
<td>At 300mm</td>
<td>At 350mm</td>
</tr>
<tr>
<td>At 500mm</td>
<td>At 500mm</td>
</tr>
</tbody>
</table>

**linearity errors**

<table>
<thead>
<tr>
<th>SD = 100 ... 600 mm</th>
<th>SD = 200 ... 1000 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>At 10mm</td>
<td>At 100mm</td>
</tr>
<tr>
<td>At 120mm</td>
<td>At 150mm</td>
</tr>
<tr>
<td>At 200mm</td>
<td>At 250mm</td>
</tr>
<tr>
<td>At 300mm</td>
<td>At 350mm</td>
</tr>
<tr>
<td>At 500mm</td>
<td>At 500mm</td>
</tr>
</tbody>
</table>

**beam alignment (line)**

**dimension drawing**

*Emitter axis*
### Difference sensors

#### Overview

<table>
<thead>
<tr>
<th>Product Family</th>
<th>OBDM 12</th>
<th>OBDM 12</th>
<th>OBDM 12</th>
<th>OBDM 12</th>
<th>OBDM 12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Step Analysis</td>
<td>Min./Max. Analysis</td>
<td>Tolerance Analysis</td>
<td>Window Analysis</td>
<td>2-Point Comparison</td>
</tr>
<tr>
<td>Width/Diameter</td>
<td>12.4 mm</td>
<td>12.4 mm</td>
<td>12.4 mm</td>
<td>12.4 mm</td>
<td>12.4 mm</td>
</tr>
<tr>
<td>Sensing Distance Tw</td>
<td>16 ... 120 mm</td>
<td>16 ... 120 mm</td>
<td>16 ... 120 mm</td>
<td>16 ... 120 mm</td>
<td>16 ... 120 mm</td>
</tr>
<tr>
<td>Response Time</td>
<td>&lt; 5 ms</td>
<td>&lt; 1 ms</td>
<td>&lt; 1 ms</td>
<td>&lt; 1 ms</td>
<td>&lt; 1 ms</td>
</tr>
<tr>
<td>NPN</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>PNP</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
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<tr>
<td>Connection Types</td>
<td>Connector</td>
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<td>Connector</td>
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<tr>
<td>Housing Material</td>
<td>Metal</td>
<td>Metal</td>
<td>Metal</td>
<td>Metal</td>
<td>Metal</td>
</tr>
</tbody>
</table>
Difference sensors

General information

The range of difference sensors opens new perspectives in the field of sensing. The patented functions provide the user with new, innovative solutions in the detection of objects, monitoring of tolerances or the comparison of object sizes and object positions. With the fine laser beam and the high insensitivity of the sensor to colors, objects are accurately detected. Five different sensors with different functions are available according to the application.

Difference sensors with:
- Step analysis
- Window analysis
- Tolerance analysis
- Min./max. analysis
- 2-point comparisons

Characteristics and advantages

Difference evaluation
Distance measuring sensors with integrated logic for distance difference evaluation. Complex evaluation by the connected controller is no longer necessary, saving time and costs.

Nominal difference teachable
With the standardized Teach-in process of Baumer, the nominal difference can be quickly and easily programmed.

Switching output
The comparison of the actual and nominal difference is made internally by the sensors and is issued at the switching output as a simply assessed pass/fail signal.

Applications and functions

In some other applications, objects with rough and uneven surfaces must be measured. Sometimes, the surface of the object even has small holes or gaps. Such objects can be easily measured using a laser line optical system, which supplies a fine laser line in place of a focused laser beam.

Difference sensors with step analysis
In step analysis, objects are detected by their height difference (stage) and reported in the form of a digital output signal.

The sensor evaluates the positive or negative height difference within a specified time window of max. 5 ms. If the height difference is greater than 50 % of the taught-in value, an impulse of at least 10 ms is issued at the output. When the value is less than 50 %, the sensor switches back to the OFF state. If height differences are smaller than 50 % of the taught value within the time window (e.g. fluctuation of the conveyor belt), the sensor remains in the OFF state.

- The stage / edge from which the objects are detected can be adjusted (minimum object height 0.2 mm)
- Defined output impulse of 10 ms (can also be read by a normal PLC)
- Detection of objects on a fluctuation conveyor belt
- Detection of stages or edges
- Positioning of objects by an edge, regardless of the distance
Difference sensors

Applications and functions

Difference sensors with min./max. analysis
With min./max. analysis, objects can be inspected and monitored according to their scanned contour or shape. The scanning of the objects is activated by an external control signal. At the end of a detection sequence, the measured values are evaluated and the difference between the minimum and maximum values is determined. If the difference exceeds a nominal difference previously taught into the sensor, this is reported in the form of an ON signal. This signal remains active until a new detection sequence is started. When this starts, the output returns to the OFF state. If the difference is smaller than the nominal difference, the output remains in the OFF state.

- Difference is detected regardless of the distance
- Start and stop of the measuring cycle can be determined independently
- Easily evaluated pass/fail signal
  - Round true running or knock of wheels / discs can be checked regardless of the distance
  - Deformation of plastic parts after cooling can be checked

Difference sensors with tolerance analysis
The dimensional tolerance of objects can be determined by tolerance analysis. In the continuous detection of object distances, all measured values are checked to determine if it is between the specified maximum and minimum tolerances. In the case of if being between, an ON signal is issued at the output. If the distance remains within the tolerance range, the sensor remains in the OFF state.

- Sensor form of a caliper gauge
- Simple monitoring of a distance with a tolerance range (pass/fail information)
- Tolerance range and nominal distance can be taught in separately
  - Material thickness checking after a roller mill
  - Material thickness checking for extruders
Difference sensors

Applications and functions

Difference sensors with window analysis
With window analysis, objects can be classified by a specified switching window. For this purpose, the switching window is specified in a simple Teach-in procedure with upper and lower limits. If an object is outside the defined limits, this is reported at the switching output.

- Foreground and background suppression in a single sensor
- Positions can be taught in separately
- Smallest window 0.45 mm
- Interfering objects in the foreground and background can be suppressed
- Objects can be detected on a segmented conveyor belt

Difference sensors with 2-point comparison
In a 2-point comparison, two distances detected at two specifically chosen times are measured and compared.

The choice of the time is made using a sync signal. The first distance is measured at the rising flank of the signal and the second distance at the falling flank of the signal. After the second distance has been measured, the sensor evaluates the difference between the two distances and compares this with a previously taught-in maximum permissible deviation. If this is exceeded, the output assumes the ON state.

- Object heights can be compared regardless of the distance
- Deviation can be taught in (min. 0.3 mm)
- Measuring time can be determined separately by an external signal
- Checking the pressing depth of pins
- Comparison of the distances/heights of objects with a reference value
Difference sensors

Mounting and adjustment

The direct reflection from glossy or reflective objects must not impinge on the receiver. This can be avoided by slightly tilting the sensor.

For optimum measurement results, the sensor must be installed perpendicular to the movement of the object.
**Difference sensors**

**OBDM 12**

Tw = 16 ... 120 mm

- detection of edges
- reference steps adjustable
- min. output pulse 10 ms

### General Data

- **Type**: step analysis
- **Sensing Distance Tw**: 16 ... 120 mm
- **Teach-in Range Min.**: > 0.2 mm
- **Adjustment**: Teach-in
- **Power On Indication**: LED green
- **Output Indicator**: LED red
- **Light Source**: pulsed red laser diode
- **Laser Class**: 2
- **Wavelength**: 650 nm
- **Beam Diameter**: 0.5 ... 0.2

### Electrical Data

- **Response Time**: < 5 ms
- **Voltage Supply Range +Vs**: 12 ... 28 VDC
- **Current Consumption Max.**: 80 mA
- **Output Current**: < 100 mA
- **Output Pulse Length**: 10 ms
- **Voltage Drop Vd**: < 2.8 VDC
- **Reverse Polarity Protection**: yes, Vs to GND
- **Short Circuit Protection**: yes

### Mechanical Data

- **Width / Diameter**: 12.4 mm
- **Height / Length**: 37 mm
- **Depth**: 34.5 mm
- **Type**: rectangular
- **Housing Material**: die-cast zinc
- **Front (Optics)**: glass
- **Connection Types**: connector M8, 4 pin

### Ambient Conditions

- **Operating Temperature**: 0 ... +50 °C
- **Protection Class**: IP 67

### Connectors

- **ESG 32AH0200**: 4 pin 2 m straight
- **ESW 31AH0200**: 4 pin 2 m angular
- **Additional Cable Connectors and Field Wireable Connectors**: see accessories

### Accessories

- **SENSOFIX Mounting Kit**: 10150328
- **Mounting Bracket**: 10113873
- **For Details**: see accessories section

<table>
<thead>
<tr>
<th><strong>Order Reference</strong></th>
<th><strong>Output Circuit</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>OBDM 12N6910/S35A</td>
<td>NPN</td>
</tr>
<tr>
<td>OBDM 12P6910/S35A</td>
<td>PNP</td>
</tr>
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</table>

### Laser Warning

**CAUTION**

**LASER RADIATION**

**DO NOT STARE**

**INTO BEAM**

**LASER DIODE**

**Wavelength**: 650 nm - optional

Max. avg. output < 1 mW

IEC 60825-1: 2001

Class 2 LASER Product

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated July 30, 2001.
**Difference sensors**

**Tw = 16 ... 120 mm**

- analysis of distance differences (min./max.)
- max. difference tolerance adjustable
- measuring time selectable

### General Data

<table>
<thead>
<tr>
<th><strong>Type</strong></th>
<th>Sensing Distance Tw</th>
<th>Teach-in min.</th>
<th>Adjustment</th>
<th>Power on Indication</th>
<th>Output Indicator</th>
<th>Light Source</th>
<th>Laser Class</th>
<th>Wave Length</th>
<th>Beam Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16 ... 120 mm</td>
<td>&gt; 0.3 mm</td>
<td>Teach-in</td>
<td>LED green</td>
<td>LED red</td>
<td>Pulsed red LD</td>
<td>2</td>
<td>650 mm</td>
<td>0.5 ... 0.2 mm</td>
</tr>
</tbody>
</table>

### Electric Data

- **Response Time**: < 1 ms
- **Voltage Supply Range**: +Vs 12 ... 28 VDC
- **Current Consumption Max.**: 80 mA
- **Current Consumption Typ.**: 40 mA
- **Output Current**: < 100 mA
- **Voltage Drop Vd**: < 2.8 VDC
- **Reverse Polarity Protection**: yes, Vs to GND
- **Short Circuit Protection**: yes

### Mechanical Data

- **Width / Diameter**: 12.4 mm
- **Height / Length**: 37 mm
- **Depth**: 34.5 mm
- **Type**: Rectangular
- **Housing Material**: Die-cast zinc
- **Front (Optics)**: Glass
- **Connection Types**: Connector M8, 4 pin

### Ambient Conditions

- **Operating Temperature**: 0 ... +50 °C
- **Protection Class**: IP 67

### Connectors

- **ESG 32AH0200**: 4 pin, 2 m straight
- **ESW 31AH0200**: 4 pin, 2 m angular

### Accessories

- **SENSOFIX Mounting Kit**: 10150328
- **Mounting Bracket**: 10113873

### Order Reference

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<tr>
<td>OBDM 12P6920/S35A</td>
<td>PNP</td>
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</table>

### Connection Diagrams

- **PNP**: +Vs, ext. sync. in, output 0 V
- **NPN**: +Vs, sync. in, output

### Min. Detectable Difference

![Graph showing the relationship between min. detectable difference and sensing distance Tw.

### Laser Warning

**CAUTION**

**LASER RADIATION**

DO NOT STARE INTO BEAM

LASER DIODE

Wavelength: 620 - 680 nm

Max. av. output: < 1 mW

IEC 60825-1, Am. 2, 2001

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated July 26, 2001

*Emitter axis*
**OBDM 12**

**Difference sensors OBDM 12 (tolerance analysis)**

- **Tw = 16 ... 120 mm**

- Distance monitoring within a tolerance band
- Nominal distance
- Adjustable tolerance band

### General Data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Type</td>
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<tr>
<td>Sensing distance Tw</td>
<td>16 ... 120 mm</td>
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<tr>
<td>Teach-in range min.</td>
<td>&gt; 0.4 mm</td>
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<tr>
<td>Adjustment</td>
<td>Teach-in</td>
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<tr>
<td>Power on indication</td>
<td>LED green</td>
</tr>
<tr>
<td>Output indicator</td>
<td>LED red</td>
</tr>
<tr>
<td>Light source</td>
<td>Pulsed red laser diode</td>
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<tr>
<td>Laser class</td>
<td>2</td>
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<tr>
<td>Wave length</td>
<td>650 nm</td>
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<tr>
<td>Beam diameter</td>
<td>0.5 ... 0.2</td>
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### Electrical Data

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<th>Parameter</th>
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<tr>
<td>Response time</td>
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<tr>
<td>Voltage supply range +Vs</td>
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<tr>
<td>Current consumption max.</td>
<td>80 mA</td>
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<td>Current consumption typ.</td>
<td>40 mA</td>
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<tr>
<td>Output current</td>
<td>&lt; 100 mA</td>
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<td>Voltage drop Vd</td>
<td>&lt; 2.8 VDC</td>
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<tr>
<td>Reverse polarity protection</td>
<td>Yes, Vs to GND</td>
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<tr>
<td>Short circuit protection</td>
<td>Yes</td>
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</table>

### Mechanical Data

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<td>Depth</td>
<td>34.5 mm</td>
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<tr>
<td>Type</td>
<td>Rectangular</td>
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<tr>
<td>Housing material</td>
<td>Die-cast zinc</td>
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<tr>
<td>Front (optics)</td>
<td>Glass</td>
</tr>
<tr>
<td>Connection types</td>
<td>Connector M8, 4 pin</td>
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### Ambient Conditions

<table>
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<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
<tr>
<td>Operating temperature</td>
<td>0 ... +50 °C</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 67</td>
</tr>
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</table>

### Connectors

- ESG 32AH0200 4 pin 2 m straight
- ESW 31AH0200 4 pin 2 m angular

### Accessories

- SENSOFIX mounting kit 10150328
- Mounting bracket 10113873

### Order Reference

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**Lasers**

**CAUTION**

Laser Radiation

Do not stare into beam laser diode

Max. av. output < 1 mW

IEC 60825-1, Am. 2, 2001

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated July 30, 2001

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**Connection Diagrams**

**Dimension Drawing**
Difference sensors

**general data**
- **type**: window analysis
- **sensing distance Tw**: 16 ... 120 mm
- **Teach-in range min.**: > 0.4 mm
- **adjustment**: Teach-in
- **power on indication**: LED green
- **output indicator**: LED red
- **light source**: pulsed red laser diode
- **laser class**: 2
- **wave length**: 650 nm
- **beam diameter**: 0.5 ... 0.2 mm

**electrical data**
- **response time**: < 1 ms
- **voltage supply range**: +Vs 12 ... 28 VDC
- **current consumption max.**: 80 mA
- **current consumption typ.**: 40 mA
- **output current**: < 100 mA
- **voltage drop Vd**: < 2.8 VDC
- **reverse polarity protection**: yes, Vs to GND
- **short circuit protection**: yes

**mechanical data**
- **width / diameter**: 12.4 mm
- **height / length**: 37 mm
- **depth**: 34.5 mm
- **type**: rectangular
- **housing material**: die-cast zinc
- **front (optics)**: glass
- **connection types**: connector M8, 4 pin

**ambient conditions**
- **operating temperature**: 0 ... +50 °C
- **protection class**: IP 67

**connectors**
- **ESG 32AH0200**: 4 pin 2 m straight
- **ESW 31AH0200**: 4 pin 2 m angular

**accessories**
- **SENSOFIX mounting kit**: 10150328
- **mounting bracket**: 10113873

**order reference**
- **OBDM 12N6940/S35A**: NPN
- **OBDM 12P6940/S35A**: PNP

---

**CAUTION**

LASER RADIATION
DO NOT STARE
INTO BEAM
LASERDIODE
Class 2 LASER Product

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated July 26, 2001

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**min. detectable difference**

**laser warning**
Difference sensors

Tw = 16 ... 120 mm

- comparison of two distances
- max. tolerance adjustable
- specific measuring moment selectable

general data

- type: 2-point comparison
- sensing distance Tw: 16 ... 120 mm
- Teach-in range min.: > 0,3 mm
- adjustment: Teach-in
- power on indication: LED green
- output indicator: LED red
- light source: pulsed red laser diode
- laser class: 2
- wave length: 650 nm
- beam diameter: 0,5 ... 0,2 mm

electrical data

- response time: < 1 ms
- voltage supply range +Vs: 12 ... 28 VDC
- current consumption max.: 80 mA
- current consumption typ.: 40 mA
- output current: < 100 mA
- voltage drop Vd: < 2,8 VDC
- reverse polarity protection: yes, Vs to GND
- short circuit protection: yes

mechanical data

- width / diameter: 12,4 mm
- height / length: 37 mm
- depth: 34,5 mm
- type: rectangular
- housing material: die-cast zinc
- front (optics): glass
- connection types: connector M8, 4 pin

ambient conditions

- operating temperature: 0 ... +50 °C
- protection class: IP 67

collectors

- ESG 32AH0200 4 pin 2 m straight
- ESW 31AH0200 4 pin 2 m angular

accessories

- SENSOFIX mounting kit 10150328
- mounting bracket 10113873

order reference

- OBDM 12N6950/S35A: NPN
- OBDM 12P6950/S35A: PNP

---

CAUTION

LASER RADIATION
DO NOT STARE INTO BEAM
LASER DIODE
Wavelength: 620 - 680 nm
Max. av. output: < 1 mW
IEC 60825-1, Am. 2, 2001
Class 2 LASER PRODUCT

Complies with 21 CFR 1040.10 and
1040.11 except for deviations pursuant to
laser notice No. 50, dated July 26, 2001