



WTM10L-241612D0A00ZWZZZZZZZZ1  
W10

PHOTOELECTRIC SENSORS

**SICK**  
Sensor Intelligence.



Illustration may differ



Ordering information

| Type                          | part no. |
|-------------------------------|----------|
| WTM10L-241612D0A00ZWZZZZZZZZ1 | 1133544  |

Other models and accessories → [www.sick.com/W10](http://www.sick.com/W10)

Detailed technical data

Features

|                                                           |                                                                                                                                                                                                         |
|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Functional principle                                      | Photoelectric proximity sensor                                                                                                                                                                          |
| Functional principle detail                               | Background suppression, Foreground suppression, MultiMode                                                                                                                                               |
| MultiMode                                                 | Background suppression<br>Foreground suppression<br>1-point teach-in<br>2-point teach-in<br>Manual teach-in<br>ApplicationSelect (Mode 1 - Speed, Mode 2 - Standard, Mode 3 - Precision)<br>Measurement |
| Sensing range                                             |                                                                                                                                                                                                         |
| Sensing range min.                                        | 25 mm (Mode 1 - Speed)<br>25 mm (Mode 2 - Standard)<br>25 mm (Mode 3 - Precision)                                                                                                                       |
| Sensing range max.                                        | 220 mm (Mode 1 - Speed)<br>300 mm (Mode 2 - Standard)<br>400 mm (Mode 3 - Precision)                                                                                                                    |
| Adjustable switching threshold for background suppression | 25 mm ... 220 mm (Mode 1 - Speed)<br>25 mm ... 300 mm (Mode 2 - Standard)<br>25 mm ... 400 mm (Mode 3 - Precision)                                                                                      |
| Reference object                                          | Object with 90% remission factor (complies with standard white according to DIN 5033)                                                                                                                   |

1) 90% remission factor.  
2) Equivalent to 1  $\sigma$ .  
3) Observe min. warm-up time of 15 minutes.

|                                                                                  |                                                                                                 |                                                                                                                                                           |
|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Minimum distance between set sensing range and background (black 6% / white 90%) | 2 mm, at a distance of 150 mm (Mode 1 - Speed)                                                  |                                                                                                                                                           |
|                                                                                  | 4 mm, At 210 mm distance (Mode 2 - Standard)                                                    |                                                                                                                                                           |
|                                                                                  | 10 mm, at a distance of 300 mm (Mode 3 - Precision)                                             |                                                                                                                                                           |
|                                                                                  | Recommended sensing range for the best performance                                              |                                                                                                                                                           |
|                                                                                  | 50 mm ... 150 mm (Mode 1 - Speed)                                                               |                                                                                                                                                           |
|                                                                                  | 50 mm ... 210 mm (Mode 2 - Standard)                                                            |                                                                                                                                                           |
| Distance value                                                                   | 50 mm ... 300 mm (Mode 3 - Precision)                                                           |                                                                                                                                                           |
|                                                                                  | Measuring range                                                                                 | 25 mm ... 400 mm                                                                                                                                          |
|                                                                                  | Resolution                                                                                      | 1 mm                                                                                                                                                      |
|                                                                                  | Repeatability                                                                                   | < 0,5 % <sup>1)</sup> 2) 3)                                                                                                                               |
|                                                                                  | Accuracy                                                                                        | < 3 % <sup>1)</sup>                                                                                                                                       |
|                                                                                  | Distance value output                                                                           | Via IO-Link + display                                                                                                                                     |
| Emitted beam                                                                     |                                                                                                 |                                                                                                                                                           |
|                                                                                  | Light source                                                                                    | Laser                                                                                                                                                     |
|                                                                                  | Type of light                                                                                   | Visible red light                                                                                                                                         |
|                                                                                  | Shape of light spot                                                                             | Point-shaped                                                                                                                                              |
|                                                                                  | Light spot size (distance)                                                                      | Ø 0.2 mm (150 mm)                                                                                                                                         |
|                                                                                  | Maximum dispersion of the emitted beam around the standardized transmission axis (squint angle) | < +/- 1.0° (at Ta = +23 °C)                                                                                                                               |
| Key laser figures                                                                |                                                                                                 |                                                                                                                                                           |
|                                                                                  | Normative reference                                                                             | IEC 60825-1 / CDRH 21 CFR 1040.10 & 1040.11, EN 60825-1:2014, IEC 60825-1:2014 (except for tolerances according to Laser Notice No. 56 dated May 8, 2019) |
|                                                                                  | Laser class                                                                                     | 1                                                                                                                                                         |
|                                                                                  | Wave length                                                                                     | 655 nm                                                                                                                                                    |
|                                                                                  | Pulse duration                                                                                  | 4 µs                                                                                                                                                      |
|                                                                                  | Maximum pulse power                                                                             | < 2.5 mW                                                                                                                                                  |
|                                                                                  | Average service life                                                                            | 50,000 h at T <sub>U</sub> = +25 °C                                                                                                                       |
| Smallest detectable object (MDO) typ.                                            |                                                                                                 |                                                                                                                                                           |
|                                                                                  | 0.2 mm (at a distance of 150 mm)                                                                |                                                                                                                                                           |
|                                                                                  | Object with 90% remission factor (complies with standard white according to DIN 5033)           |                                                                                                                                                           |
| Adjustment                                                                       |                                                                                                 |                                                                                                                                                           |
|                                                                                  | Touch display                                                                                   | For setting the sensing range and configuring the sensor parameters                                                                                       |
|                                                                                  | IO-Link                                                                                         | For configuring the sensor parameters and Smart Task functions                                                                                            |
| Display                                                                          |                                                                                                 |                                                                                                                                                           |
|                                                                                  | Display                                                                                         | Display of mode, display of output states, display of the distance value, display of the set value                                                        |
|                                                                                  | LED green                                                                                       | Operating indicatorStatic on: power onFlashing: IO-Link mode                                                                                              |
|                                                                                  | LED yellow                                                                                      | Status of received light beamStatic on: object presentStatic off: object not present                                                                      |
| Special features                                                                 |                                                                                                 |                                                                                                                                                           |
|                                                                                  | MultiMode                                                                                       |                                                                                                                                                           |

1) 90% remission factor.

2) Equivalent to 1 σ.

3) Observe min. warm-up time of 15 minutes.

|                             |                                                                                                                                                                                |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Special applications</b> | Detecting small objects, Detection of objects moving at high speeds, Detecting flat objects, Detecting uneven, shiny objects, Detection of poorly remitting and tilted objects |
| <b>Items supplied</b>       | Fastening nut (1x)                                                                                                                                                             |

<sup>1)</sup> 90% remission factor.

<sup>2)</sup> Equivalent to 1  $\sigma$ .

<sup>3)</sup> Observe min. warm-up time of 15 minutes.

## Safety-related parameters

|                                     |           |
|-------------------------------------|-----------|
| <b>MTTF<sub>D</sub></b>             | 473 years |
| <b>DC<sub>avg</sub></b>             | 0 %       |
| <b>T<sub>M</sub> (mission time)</b> | 10 years  |

## Communication interface

|                             |                                                                                                                                                                                                                                   |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>IO-Link</b>              | ✓, IO-Link V1.1                                                                                                                                                                                                                   |
| Data transmission rate      | COM2 (38,4 kBaud)                                                                                                                                                                                                                 |
| Cycle time                  | 3.4 ms                                                                                                                                                                                                                            |
| Process data length         | 32 Bit                                                                                                                                                                                                                            |
| Process data structure      | Bit 0 = switching signal Q <sub>L1</sub><br>Bit 1 = switching signal Q <sub>L2</sub><br>Bit 2 ... 5 = Quint.1 ... Quint.4<br>Bit 6 = Operating status of the sensor<br>Bit 7 ... 15 = Empty<br>Bit 16 ... 31 = Distance to object |
| VendorID                    | 26                                                                                                                                                                                                                                |
| DeviceID HEX                | 0x80032D                                                                                                                                                                                                                          |
| DeviceID DEC                | 8389421                                                                                                                                                                                                                           |
| Compatible master port type | A                                                                                                                                                                                                                                 |
| SIO mode support            | Yes                                                                                                                                                                                                                               |

## Electronics

|                                     |                                                                        |
|-------------------------------------|------------------------------------------------------------------------|
| <b>Supply voltage U<sub>B</sub></b> | 10 V DC ... 30 V DC <sup>1)</sup>                                      |
| <b>Ripple</b>                       | ≤ 5 V <sub>pp</sub>                                                    |
| <b>Usage category</b>               | DC-12 (According to EN 60947-5-2)<br>DC-13 (According to EN 60947-5-2) |
| <b>Current consumption</b>          | ≤ 25 mA, without load. At U <sub>B</sub> = 24 V                        |
| <b>Protection class</b>             | III                                                                    |
| <b>Digital output</b>               |                                                                        |
| Number                              | 2                                                                      |
| Type                                | Push-pull: PNP/NPN, Individually adjustable                            |
| Switching mode                      | Light/dark switching                                                   |
| Output characteristic               | Individually adjustable                                                |
| Signal voltage PNP HIGH/LOW         | Approx. U <sub>B</sub> -2.0 V / 0 V                                    |

<sup>1)</sup> Limit values.

<sup>2)</sup> Signal transit time with resistive load in switching mode.

<sup>3)</sup> With light/dark ratio 1:1.

|                               |                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Signal voltage NPN HIGH/LOW   | Approx. $U_B$ -1.0 V / < 2.5 V                                                                                                                                                                                                                                                                                                               |
| Output current $I_{max}$      | ≤ 100 mA                                                                                                                                                                                                                                                                                                                                     |
| Circuit protection outputs    | Reverse polarity protected                                                                                                                                                                                                                                                                                                                   |
|                               | Overcurrent protected                                                                                                                                                                                                                                                                                                                        |
|                               | Short-circuit protected                                                                                                                                                                                                                                                                                                                      |
| Response time                 | 1.8 ms (Mode 1 - Speed) <sup>2)</sup>                                                                                                                                                                                                                                                                                                        |
|                               | 5 ms (Mode 2 - Standard) <sup>2)</sup>                                                                                                                                                                                                                                                                                                       |
|                               | 15 ms (Mode 3 - Precision) <sup>2)</sup>                                                                                                                                                                                                                                                                                                     |
| Repeatability (response time) | < 0,5 %                                                                                                                                                                                                                                                                                                                                      |
| Switching frequency           | 275 Hz (Mode 1 - Speed) <sup>3)</sup>                                                                                                                                                                                                                                                                                                        |
|                               | 100 Hz (Mode 2 - Standard) <sup>3)</sup>                                                                                                                                                                                                                                                                                                     |
|                               | 30 Hz (Mode 3 - Precision) <sup>3)</sup>                                                                                                                                                                                                                                                                                                     |
| <b>Pin/Wire assignment</b>    |                                                                                                                                                                                                                                                                                                                                              |
| BN 1                          | + (L+)                                                                                                                                                                                                                                                                                                                                       |
| WH 2                          | $\bar{Q}_{L1}$ /MFDigital output, dark switching, object present → output $\bar{Q}_{L1}$ LOW (background suppression)<br><br>Digital output, light switching, object present → output QL1 LOW (foreground suppression)The pin 2 function of the sensor can be configured<br><br>Additional possible settings via IO-Link                     |
| BU 3                          | - (M)                                                                                                                                                                                                                                                                                                                                        |
| BK 4                          | QL1/CDigital output, light switching, object present → output QL1 HIGH (background suppression)<br><br>Digital output, dark switching, object present → output $\bar{Q}_{L1}$ HIGH (foreground suppression)<br><br>IO-Link communication CThe pin 4 function of the sensor can be configured<br><br>Additional possible settings via IO-Link |

<sup>1)</sup> Limit values.

<sup>2)</sup> Signal transit time with resistive load in switching mode.

<sup>3)</sup> With light/dark ratio 1:1.

## Mechanics

|                                                       |                                                          |
|-------------------------------------------------------|----------------------------------------------------------|
| <b>Housing</b>                                        | Hybrid                                                   |
| <b>Dimensions (W x H x D)</b>                         | 18 mm x 57 mm x 42.2 mm                                  |
| <b>Connection</b>                                     | Male connector M12, 4-pin                                |
| <b>Material</b>                                       |                                                          |
|                                                       | Housing Metal, Stainless steel V4A (1.4404, 316L)        |
|                                                       | Front screen Plastic, PMMA                               |
|                                                       | Display cover Plastic, PMMA                              |
|                                                       | LED Plastic, ABS                                         |
|                                                       | Male connector Metal, Stainless steel V4A (1.4404, 316L) |
| <b>Weight</b>                                         | Approx. 100 g                                            |
| <b>Maximum tightening torque of the fixing screws</b> | 0.56 Nm                                                  |
| <b>Max. tightening torque of the M18 fixing nuts</b>  | 2 Nm                                                     |

Ambient data

|                                            |                                                                                                                                                                                             |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Enclosure rating</b>                    | IP67 (EN 60529)<br>IP69 (Replaces IP69K with ISO 20653: 2013-03)                                                                                                                            |
| <b>Ambient operating temperature</b>       | –10 °C ... +55 °C                                                                                                                                                                           |
| <b>Ambient temperature, storage</b>        | –40 °C ... +75 °C                                                                                                                                                                           |
| <b>Warm-up time</b>                        | Observe min. warm-up time of 15 minutes <sup>1)</sup>                                                                                                                                       |
| <b>Typ. Ambient light immunity</b>         | Artificial light: ≤ 15,000 lx<br>Sunlight: ≤ 15,000 lx                                                                                                                                      |
| <b>Air humidity</b>                        | 35 % ... 95 %, relative humidity (no condensation)                                                                                                                                          |
| <b>Electromagnetic compatibility (EMC)</b> | EN 60947-5-2, The sensor complies with the Radio Safety Requirements (EMC) for the industrial sector (Radio Safety Class A). It may cause radio interference if used in a residential area. |

<sup>1)</sup> During the device warm-up phase, the measured values are subject to increased scatter (temperature drift).

Smart Task

|                                 |                                                                                       |
|---------------------------------|---------------------------------------------------------------------------------------|
| <b>Smart Task name</b>          | Base logics                                                                           |
| <b>Logic function</b>           | Direct<br>AND<br>OR<br>Window<br>Hysteresis                                           |
| <b>Timer function</b>           | Deactivated<br>Switch-on delay<br>Off delay<br>ON and OFF delay<br>Impulse (one shot) |
| <b>Inverter</b>                 | Yes                                                                                   |
| <b>Switching signal</b>         |                                                                                       |
| Switching signal $Q_{L1}$       | Switching output                                                                      |
| Switching signal $\bar{Q}_{L1}$ | Switching output                                                                      |

Diagnosis

|                                                    |                                      |
|----------------------------------------------------|--------------------------------------|
| <b>Device temperature</b>                          |                                      |
| Measuring range                                    | Very cold, cold, moderate, warm, hot |
| <b>Device status</b>                               | Yes                                  |
| <b>Detailed device status</b>                      | Yes                                  |
| <b>Operating hour counter</b>                      | Yes                                  |
| <b>Operating hours counter with reset function</b> | Yes                                  |

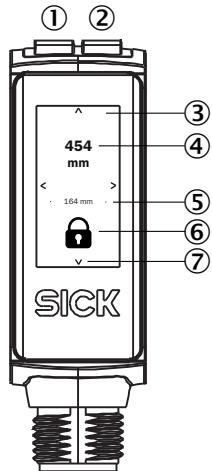
Certificates

|                                               |   |
|-----------------------------------------------|---|
| <b>EU declaration of conformity</b>           | ✓ |
| <b>UK declaration of conformity</b>           | ✓ |
| <b>ACMA declaration of conformity</b>         | ✓ |
| <b>Moroccan declaration of conformity</b>     | ✓ |
| <b>China-RoHS</b>                             | ✓ |
| <b>cULus certificate</b>                      | ✓ |
| <b>IO-Link</b>                                | ✓ |
| <b>Laser safety (IEC 60825-1) certificate</b> | ✓ |



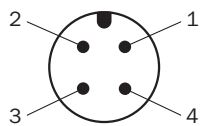
- ③ Center of optical axis, sender
- ④ Connection
- ⑤ Mounting hole, Ø 3.2 mm
- ⑥ display and adjustment elements
- ⑦ zero point measurement range

### display and adjustment elements

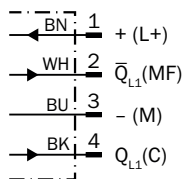


- ① LED green
- ② LED yellow
- ③ touch display
- ④ Current distance
- ⑤ Distance of last good teach-in
- ⑥ Lock/unlock status indicator
- ⑦ Display navigation arrows

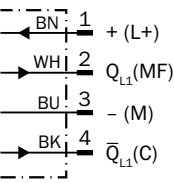
### Connection type M12 male connector, 4-pin



### Connection diagram Cd-561 (background suppression)



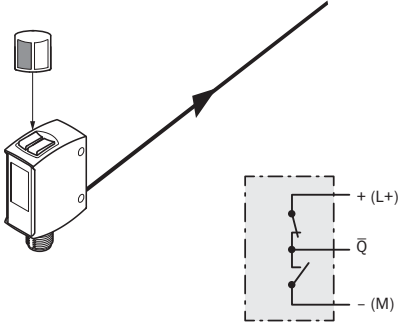
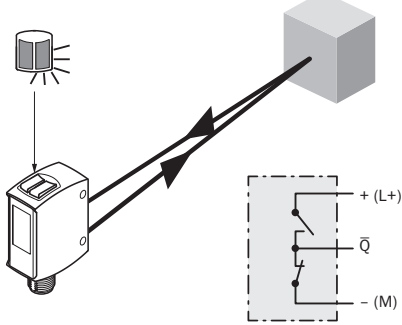
Connection diagram Cd-562 (foreground suppression)



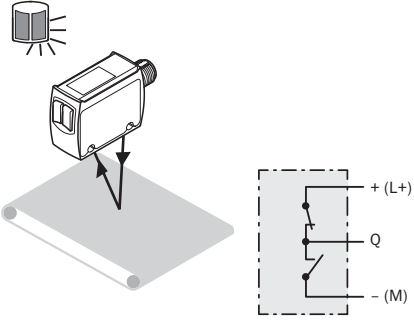
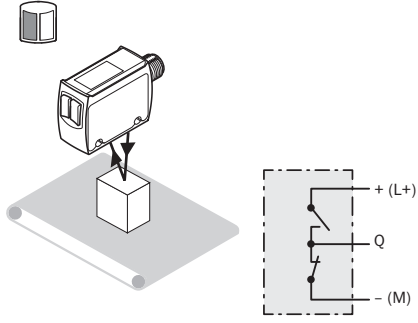
Truth table Push-pull: PNP/NPN - dark switching  $\bar{Q}$  (foreground suppression)

|                         | Dark switching $\bar{Q}$ (normally open (upper switch), normally closed (lower switch)) |                              |
|-------------------------|-----------------------------------------------------------------------------------------|------------------------------|
|                         | Object not present → Output LOW                                                         | Object present → Output HIGH |
| Light receive           | ✓                                                                                       | ✗                            |
| Light receive indicator | ☀                                                                                       | ✗                            |
| Load resistance to L+   | ⚡                                                                                       | ✗                            |
| Load resistance to M    | ✗                                                                                       | ⚡                            |
|                         |                                                                                         |                              |

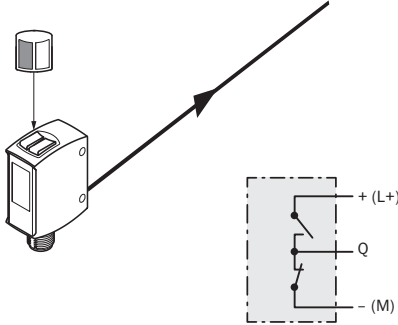
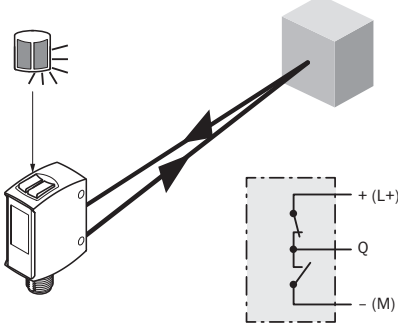
Truth table Push-pull: PNP/NPN - dark switching  $\bar{Q}$  (background suppression)

|                         | Dark switching $\bar{Q}$ (normally closed (upper switch), normally open (lower switch)) |                                                                                     |
|-------------------------|-----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                         | Object not present → Output HIGH                                                        | Object present → Output LOW                                                         |
| Light receive           | ✗                                                                                       | ✓                                                                                   |
| Light receive indicator | ✗                                                                                       | ☀                                                                                   |
| Load resistance to L+   | ✗                                                                                       | ⚡                                                                                   |
| Load resistance to M    | ⚡                                                                                       | ✗                                                                                   |
|                         |       |  |

Truth table Push-pull: PNP/NPN - light switching Q (foreground suppression)

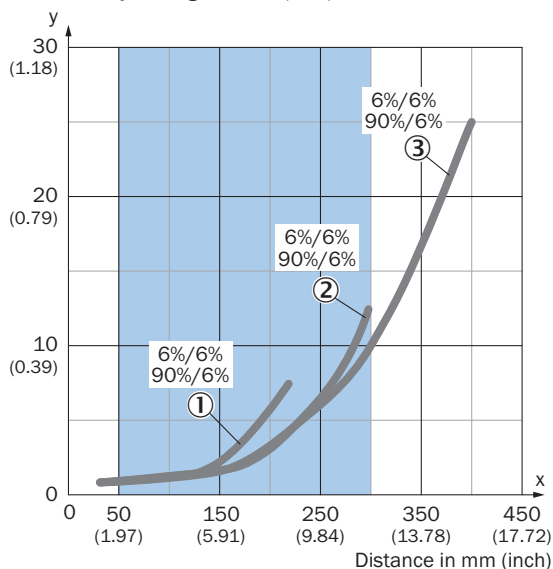
|                         | Light switching Q (normally closed (upper switch), normally open (lower switch))     |                                                                                       |
|-------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                         | Object not present → Output HIGH                                                     | Object present → Output LOW                                                           |
| Light receive           | ✓                                                                                    | ✗                                                                                     |
| Light receive indicator | ☀                                                                                    | ✗                                                                                     |
| Load resistance to L+   | ✗                                                                                    | ⚡                                                                                     |
| Load resistance to M    | ⚡                                                                                    | ✗                                                                                     |
|                         |  |  |

## Truth table Push-pull: PNP/NPN - light switching Q (background suppression)

|                         | Light switching Q (normally open (upper switch), normally closed (lower switch))  |                                                                                     |
|-------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                         | Object not present → Output LOW                                                   | Object present → Output HIGH                                                        |
| Light receive           | ✗                                                                                 | ✓                                                                                   |
| Light receive indicator | ✗                                                                                 | ☀                                                                                   |
| Load resistance to L+   | ⚡                                                                                 | ✗                                                                                   |
| Load resistance to M    | ✗                                                                                 | ⚡                                                                                   |
|                         |  |  |

## Characteristic curve (Foreground suppression)

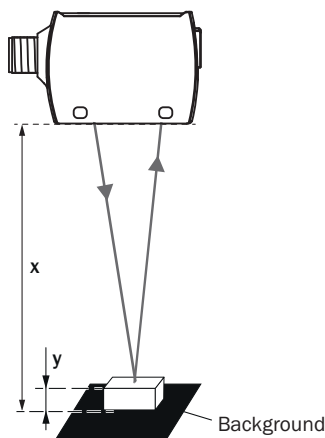
Minimum object height in mm (inch)



Recommended sensing range for the best performance

- ① Black object, 6% remission factor, Mode 1 - Speed
- ② Black object, 6% remission factor, Mode 2 - Standard
- ③ Black object, 6% remission factor, Mode 3 - Precision

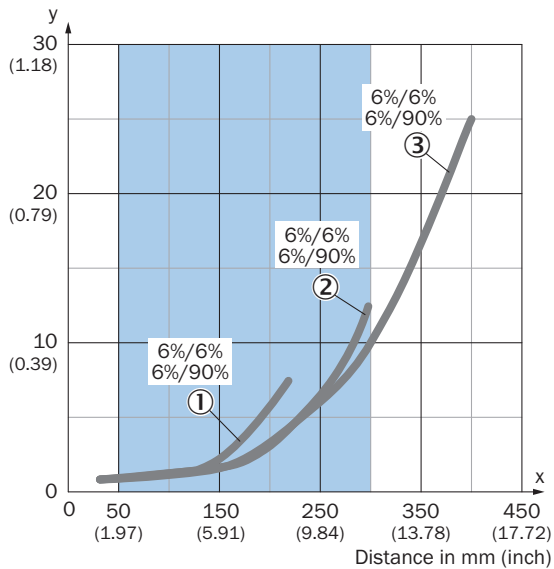
Example:  
Reliable detection of the object



Black background (6 % remission factor)  
Distance of sensor to background  $x = 300$  mm  
Required minimum object height  $y = 10$  mm  
For all objects regardless of their colors

## Characteristic curve (Background suppression)

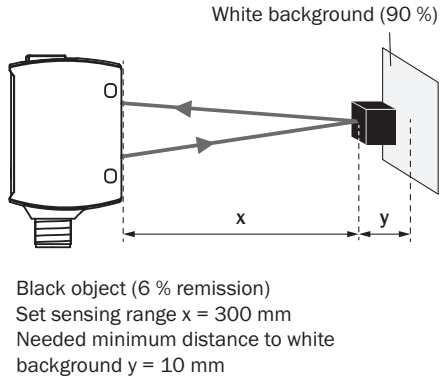
Minimum distance in mm (y) between the set sensing range and white background (90 % remission)



Recommended sensing range for the best performance

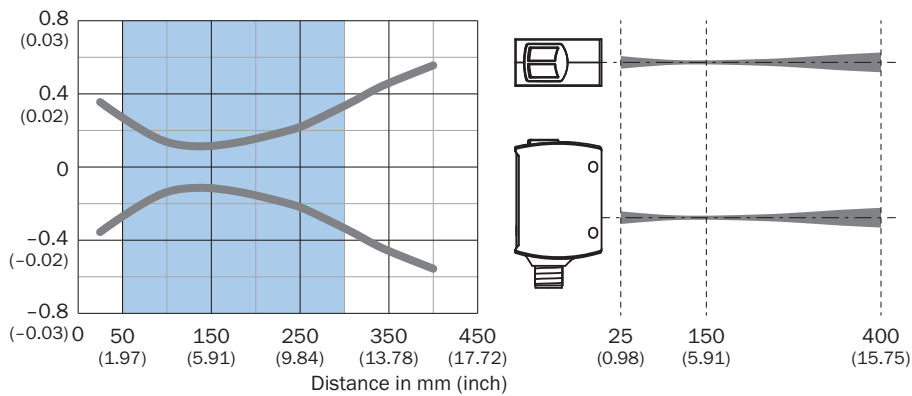
- ① Black object, 6% remission factor, Mode 1 - Speed
- ② Black object, 6% remission factor, Mode 2 - Standard
- ③ Black object, 6% remission factor, Mode 3 - Precision

Example:  
Safe suppression of the background



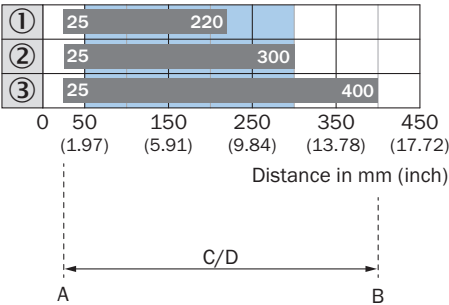
## Light spot size

Dimensions in mm (inch)



Recommended sensing range for the best performance

Sensing range diagram



Recommended sensing range for the best performance

| 1 | Black object, 6% remission factor, Mode 1 - Speed         |
|---|-----------------------------------------------------------|
| 2 | Black object, 6% remission factor, Mode 2 - Standard      |
| 3 | Black object, 6% remission factor, Mode 3 - Precision     |
| A | Sensing range min. in mm                                  |
| B | Sensing range max. in mm                                  |
| C | Field of view                                             |
| D | Adjustable switching threshold for background suppression |

Recommended accessories

Other models and accessories → [www.sick.com/W10](http://www.sick.com/W10)

|                                                                                     | Brief description                                                                                                                                                                                                                                                                                                                                                                                                            | Type               | part no. |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------|
| network devices                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |          |
|    |                                                                                                                                                                                                                                                                                                                                                                                                                              | SIG350-0004AP100   | 6076871  |
|    |                                                                                                                                                                                                                                                                                                                                                                                                                              | SIG300-0A0GAA100   | 1131014  |
|    |                                                                                                                                                                                                                                                                                                                                                                                                                              | SIG300-0A04AA100   | 1131011  |
|  |                                                                                                                                                                                                                                                                                                                                                                                                                              | SIG300-0A05AA100   | 1131012  |
|  |                                                                                                                                                                                                                                                                                                                                                                                                                              | SIG300-0A06AA100   | 1131013  |
| connectors and cables                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |          |
|  | <ul style="list-style-type: none"><li>• <b>Connection type head A:</b> Female connector, M12, 4-pin, straight, A-coded</li><li>• <b>Connection type head B:</b> Flying leads</li><li>• <b>Signal type:</b> Sensor/actuator cable</li><li>• <b>Cable:</b> 5 m, 4-wire, PVC</li><li>• <b>Description:</b> Sensor/actuator cable, unshielded</li><li>• <b>Application:</b> Zones with chemicals, Uncontaminated zones</li></ul> | YF2A14-050VB3XLEAX | 2096235  |

## SICK AT A GLANCE

SICK is one of the leading manufacturers of intelligent sensors and sensor solutions for industrial applications. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in a wide range of industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

Comprehensive services complete our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

For us, that is “Sensor Intelligence.”

## WORLDWIDE PRESENCE:

Contacts and other locations –[www.sick.com](http://www.sick.com)