Data sheet


# WTM10L-241611D0A00ZWZZZZZZZZZ1

W10

PHOTOELECTRIC SENSORS

SICK
Sensor Intelligence.

Illustration may differ

## Ordering information

| Type | part no. |
|---|---|
| WTM10L-241611D0A00ZWZZZZZZZZZ1 | 1133546 |

Other models and accessories ➜ 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) |
| | 25 mm (Mode 2 - Standard) |
| | 25 mm (Mode 3 - Precision) |
| Sensing range max. | 300 mm (Mode 1 - Speed) |
| | 500 mm (Mode 2 - Standard) |
| | 700 mm (Mode 3 - Precision) |
| Adjustable switching threshold for background suppression | 25 mm ... 300 mm (Mode 1 - Speed) |
| | 25 mm ... 500 mm (Mode 2 - Standard) |
| | 25 mm ... 700 mm (Mode 3 - Precision) |

[1] 90% remission factor.
[2] Equivalent to 1 σ.
[3] Observe min. warm-up time of 15 minutes.
[4] Do not intentionally look into the laser beam. Never point the laser beam at people's eyes.

| | |
|---|---|
| Reference object | Object with 90% remission factor (complies with standard white according to DIN 5033) |
| Minimum distance between set sensing range and background (black 6% / white 90%) | 6 mm, at a distance of 250 mm (Mode 1 - Speed) |
| | 8 mm, at a distance of 400 mm (Mode 2 - Standard) |
| | 10 mm, at a distance of 500 mm (Mode 3 - Precision) |
| Recommended sensing range for the best performance | 50 mm ... 250 mm (Mode 1 - Speed) |
| | 50 mm ... 400 mm (Mode 2 - Standard) |
| | 50 mm ... 500 mm (Mode 3 - Precision) |
| **Distance value** | |
| Measuring range | 25 mm ... 700 mm |
| Resolution | 1 mm |
| Repeatability | < 0.5 % [1) 2) 3)] |
| Accuracy | < 4 % [1)] |
| 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 0.4 mm (250 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 [4)] |
| Wave length | 655 nm |
| Pulse duration | 4 µs |
| Maximum pulse power | < 2.5 mW |
| Average service life | 50,000 h at $T_U$ = +25 °C |
| **Smallest detectable object (MDO) typ.** | |
| | 0.6 mm (at a distance of 250 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 indicator<br>Static on: power on |

[1)] 90% remission factor.

[2)] Equivalent to 1 σ.

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

[4)] Do not intentionally look into the laser beam. Never point the laser beam at people's eyes.

| | |
|---|---|
| | Flashing: IO-Link mode |
| LED yellow | Status of received light beam<br>Static on: object present<br>Static off: object not present |
| **Special features** | MultiMode |
| **Special applications** | Detecting small objects, Detection of objects moving at high speeds, Detecting flat objects, Detecting uneven, shiny objects, Detection of poorly remitting and tilted objects |
| **Items supplied** | Fastening nut (1x) |

[1] 90% remission factor.
[2] Equivalent to 1 σ.
[3] Observe min. warm-up time of 15 minutes.
[4] Do not intentionally look into the laser beam. Never point the laser beam at people's eyes.

## Safety-related parameters

| | |
|---|---|
| **$MTTF_D$** | 473 years |
| **$DC_{avg}$** | 0 % |
| **$T_M$ (mission time)** | 10 years |

## Communication interface

| | |
|---|---|
| **IO-Link** | ✓ , 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 $Q_{L1}$ |
| | Bit 1 = switching signal $Q_{L2}$ |
| | Bit 2 ... 5 = Qint.1 ... Qint.4 |
| | Bit 6 = Operating status of the sensor |
| | Bit 7 ... 15 = Empty |
| | Bit 16 ... 31 = Distance to object |
| VendorID | 26 |
| DeviceID HEX | 0x80032E |
| DeviceID DEC | 8389422 |
| Compatible master port type | A |
| SIO mode support | Yes |

## Electronics

| | |
|---|---|
| **Supply voltage $U_B$** | 10 V DC ... 30 V DC [1] |
| **Ripple** | ≤ 5 $V_{pp}$ |
| **Usage category** | DC-12 (According to EN 60947-5-2)<br>DC-13 (According to EN 60947-5-2) |
| **Current consumption** | ≤ 25 mA, without load. At $U_B$ = 24 V |
| **Protection class** | III |
| **Digital output** | |
| Number | 2 |

[1] Limit values.
[2] Signal transit time with resistive load in switching mode.
[3] With light/dark ratio 1:1.

| | |
|---|---|
| Type | Push-pull: PNP/NPN, Individually adjustable |
| Switching mode | Light/dark switching |
| Output characteristic | Individually adjustable |
| Signal voltage PNP HIGH/LOW | Approx. $U_B$-2.0 V / 0 V |
| 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) [2] |
| | 5 ms (Mode 2 - Standard) [2] |
| | 15 ms (Mode 3 - Precision) [2] |
| Repeatability (response time) | < 0,5 % |
| Switching frequency | 275 Hz (Mode 1 - Speed) [3] |
| | 100 Hz (Mode 2 - Standard) [3] |
| | 30 Hz (Mode 3 - Precision) [3] |
| **Pin/Wire assignment** | |
| BN 1 | + (L+) |
| WH 2 | $\bar{Q}_{L1}$/MF<br>Digital output, dark switching, object present → output $\bar{Q}$L1 LOW (background suppression) |
| | Digital output, light switching, object present → output QL1 LOW (foreground suppression)<br>The pin 2 function of the sensor can be configured |
| | Additional possible settings via IO-Link |
| BU 3 | - (M) |
| BK 4 | QL1/C<br>Digital output, light switching, object present → output QL1 HIGH (background suppression) |
| | Digital output, dark switching, object present → output $\bar{Q}$L1 HIGH (foreground suppression) |
| | IO-Link communication C<br>The pin 4 function of the sensor can be configured |
| | Additional possible settings via IO-Link |

[1] Limit values.
[2] Signal transit time with resistive load in switching mode.
[3] With light/dark ratio 1:1.

## Mechanics

| | |
|---|---|
| **Housing** | Hybrid |
| **Dimensions (W x H x D)** | 18 mm x 57 mm x 42.2 mm |
| **Connection** | Male connector M12, 4-pin |
| **Material** | |
| 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) |

| | |
|---|---|
| **Weight** | Approx. 100 g |
| **Maximum tightening torque of the fixing screws** | 0.56 Nm |
| **Max. tightening torque of the M18 fixing nuts** | 2 Nm |

## Ambient data

| | |
|---|---|
| **Enclosure rating** | IP67 (EN 60529)<br>IP69 (Replaces IP69K with ISO 20653: 2013-03) |
| **Ambient operating temperature** | –10 °C ... +55 °C |
| **Ambient temperature, storage** | –40 °C ... +75 °C |
| **Warm-up time** | Observe min. warm-up time of 15 minutes [1] |
| **Typ. Ambient light immunity** | Artificial light: ≤ 10,000 lx<br>Sunlight: ≤ 10,000 lx |
| **Air humidity** | 35 % ... 95 %, relative humidity (no condensation) |
| **Electromagnetic compatibility (EMC)** | 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. |

[1] During the device warm-up phase, the measured values are subject to increased scatter (temperature drift).

## Smart Task

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

## Diagnosis

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

## Certificates

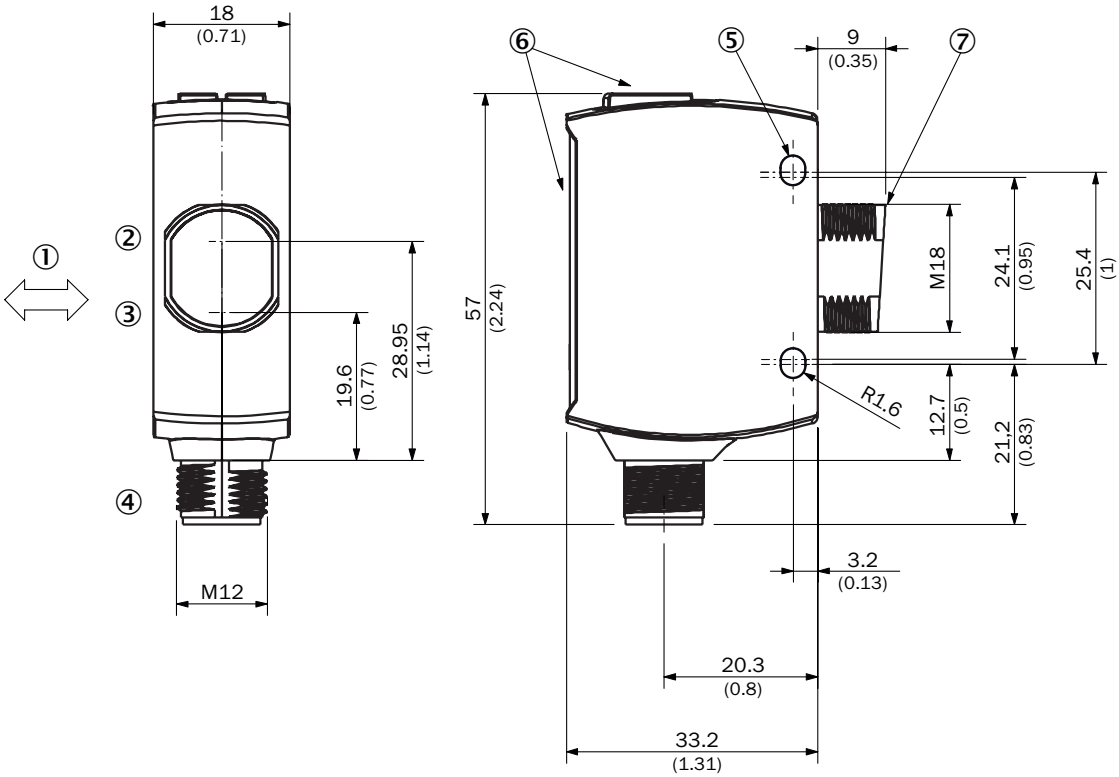
| | |
|---|---|
| **EU declaration of conformity** | ✓ |
| **UK declaration of conformity** | ✓ |
| **ACMA declaration of conformity** | ✓ |
| **Moroccan declaration of conformity** | ✓ |

| | |
|---|---|
| **China RoHS** | ✓ |
| **cULus certificate** | ✓ |
| **IO-Link certificate** | ✓ |
| **Laser safety (IEC 60825-1) certificate** | ✓ |
| **Information according to Art. 3 of Data Act (Regulation EU 2023/2854)** | ✓ |

## Classifications

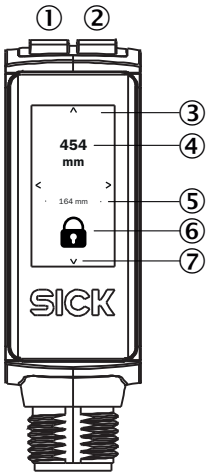
| | |
|---|---|
| **ECLASS 5.0** | 27270904 |
| **ECLASS 5.1.4** | 27270904 |
| **ECLASS 6.0** | 27270904 |
| **ECLASS 6.2** | 27270904 |
| **ECLASS 7.0** | 27270904 |
| **ECLASS 8.0** | 27270904 |
| **ECLASS 8.1** | 27270904 |
| **ECLASS 9.0** | 27270904 |
| **ECLASS 10.0** | 27270904 |
| **ECLASS 11.0** | 27270904 |
| **ECLASS 12.0** | 27270903 |
| **ETIM 5.0** | EC002719 |
| **ETIM 6.0** | EC002719 |
| **ETIM 7.0** | EC002719 |
| **ETIM 8.0** | EC002719 |
| **UNSPSC 16.0901** | 39121528 |

## Dimensional drawing




Dimensions in mm (inch)
① Standard direction of the material being detected
② Center of optical axis, receiver
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

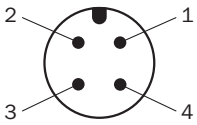
## display and adjustment elements



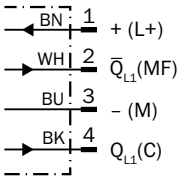

① LED green
② LED yellow

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

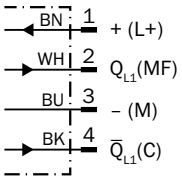
## Connection type M12 male connector, 4-pin



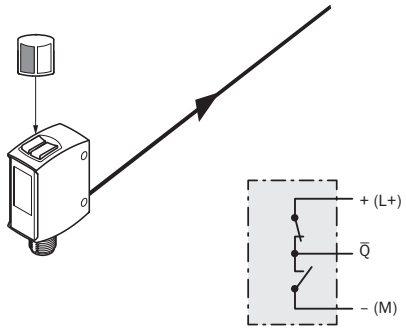
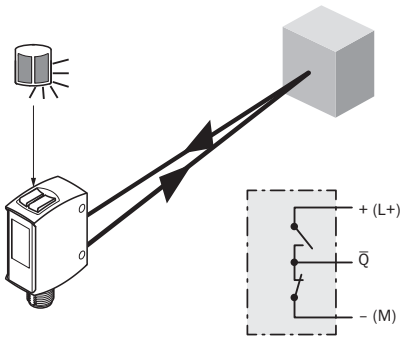

## Connection diagram Cd-561 (background suppression)



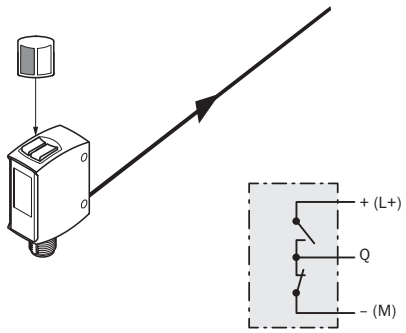
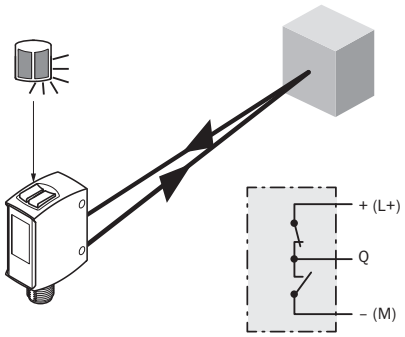

## Connection diagram Cd-562 (foreground suppression)



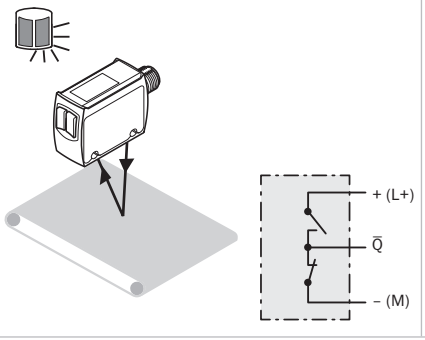
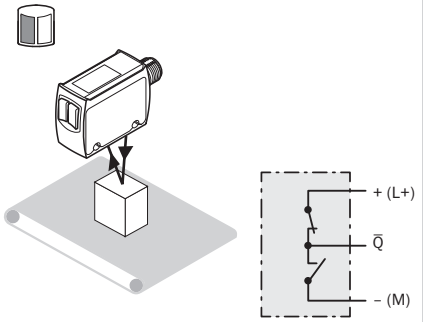
## Truth table Push-pull: PNP/NPN - dark switching $\bar{Q}$ (background suppression)

| | 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 | ⚠ | ⊗ |
| |  |  |

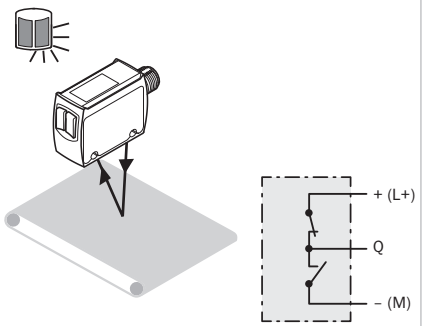
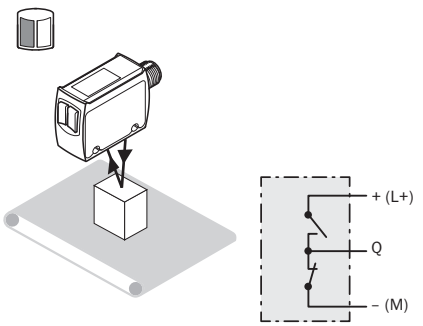
## Truth table Push-pull: PNP/NPN - light switching Q (background suppression)

| | 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 | ⊗ | ⚠ |
| |  |  |

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

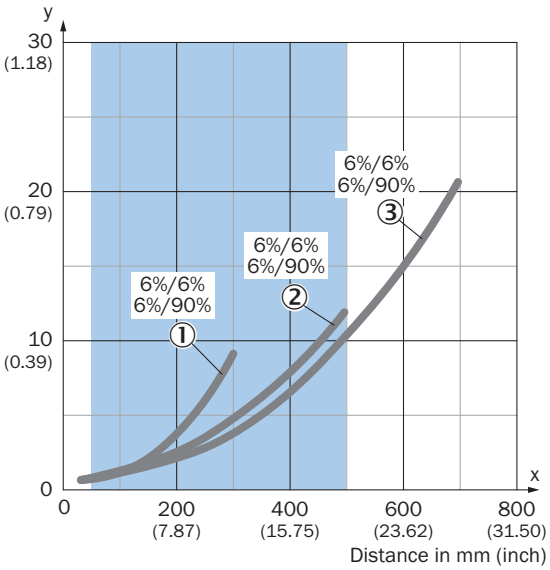
| | Dark switching $\bar{Q}$ (normally open (upper switch), normally closed (lower switch)) | |
|---|---|---|
| | Object not present ➜ Output LOW | Object present ➜ Output HIGH |
| Light receive | ✓ | ✗ |
| Light receive indicator | ☀ | ✗ |
| Load resistance to L+ | ⚡ | ✗ |
| Load resistance to M | ✗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

## Truth table Push-pull: PNP/NPN - 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 | ⚡ | ✗ |
| |  |  |

## Characteristic curve Background suppression

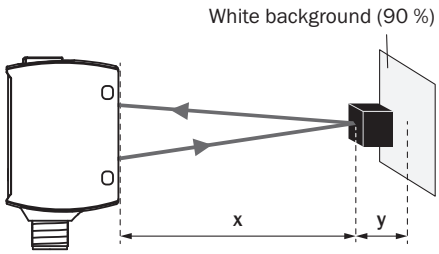
Minimum distance in mm (y) between the set sensing range and white background (90 % remission)




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

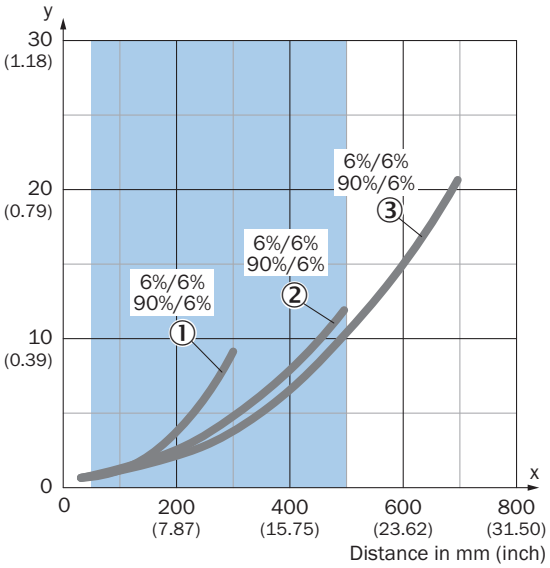
Example:
Safe suppression of the background




Black object (6 % remission)
Set sensing range x = 500 mm
Needed minimum distance to white background y = 10 mm

## Characteristic curve Foreground suppression

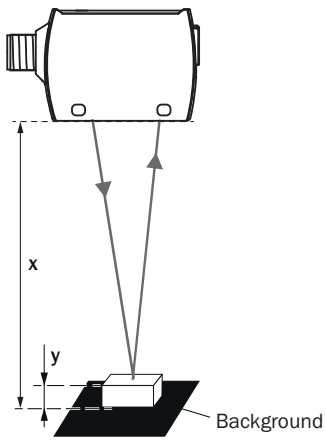
Minimum object height in mm (inch)




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

Example:
Reliable detection of the object

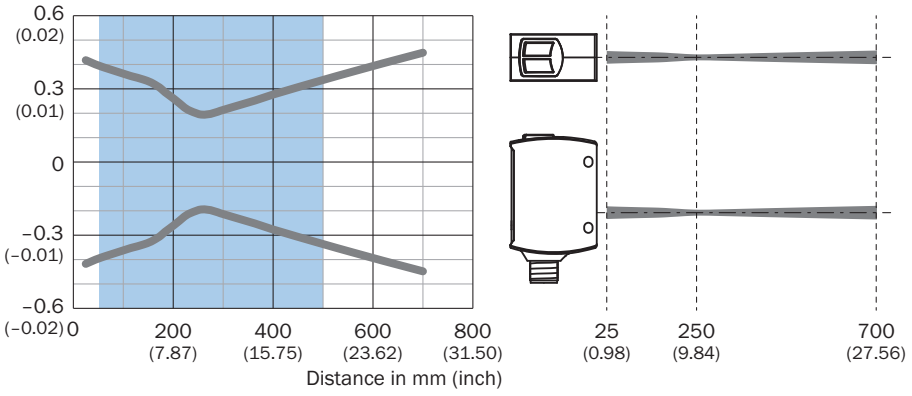



Black background (6 % remission factor)
Distance of sensor to background x = 500 mm
Required minimum object height y = 10 mm
For all objects regardless of their colors

③ Black object, 6% remission factor, Mode 3 - Precision

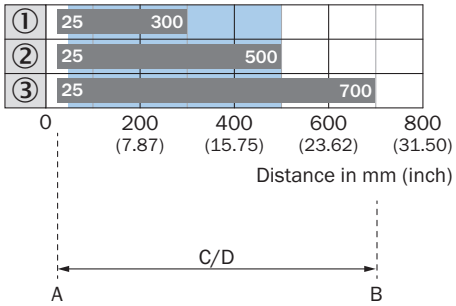
## Light spot size Background suppression

Dimensions in mm (inch)




Recommended sensing range for the best performance

## Sensing range diagram Background suppression




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

| | Brief description | Type | part no. |
|---|---|---|---|
| network devices | | | |
|  | | SIG350-0004AP100 | 6076871 |
|  | | SIG300-0A0GAA100 | 1131014 |
|  | | SIG300-0A04AA100 | 1131011 |
|  | | SIG300-0A05AA100 | 1131012 |
|  | | SIG300-0A06AA100 | 1131013 |

| | Brief description | Type | part no. |
|---|---|---|---|
| Mounting systems | | | |
|  | • **Description:** Plate N08 for universal clamp bracket<br>• **Material:** Steel, zinc diecast<br>• **Details:** Zinc plated steel (sheet), Zinc die cast (clamping bracket)<br>• **Items supplied:** Universal clamp (5322626), mounting hardware<br>• **Usable for:** W100, W150, W4S, W4F, W8, W9-3, W8G, W8 Laser, W8 Inox, G6, W100 Laser, W100-2, W10, G6 Inox, RAY10, W4SLG-3, W9, GR18, MultiPulse, Reflex Array, MultiLine, LUT3, KT5, KT8, KT10, CS8 | BEF-KHS-N08 | 2051607 |
|  | • **Description:** Mounting bracket for M18 sensors<br>• **Material:** Steel<br>• **Details:** Steel, zinc coated<br>• **Items supplied:** Without mounting hardware<br>• **Suitable for:** GR18, V180-2, V18, W15, Z1, Z2 | BEF-WN-M18 | 5308446 |
|  | • **Description:** Mounting bracket for M18 sensors<br>• **Material:** Stainless steel<br>• **Details:** Stainless steel<br>• **Items supplied:** Without mounting hardware | BEF-WN-M18N | 5320947 |
| connectors and cables | | | |
|  | • **Connection type head A:** Female connector, M12, 4-pin, straight, A-coded<br>• **Connection type head B:** Flying leads<br>• **Signal type:** Sensor/actuator cable<br>• **Cable:** 5 m, 4-wire, PUR, halogen-free<br>• **Description:** Sensor/actuator cable, unshielded<br>• **Application:** Uncontaminated zones, Zones with oils and lubricants, Robot, Drag chain operation | YF2A14-050UB3XLEAX | 2095608 |
|  | • **Connection type head A:** Female connector, M12, 4-pin, straight, A-coded<br>• **Connection type head B:** Flying leads<br>• **Signal type:** Sensor/actuator cable<br>• **Cable:** 5 m, 4-wire, PVC<br>• **Description:** Sensor/actuator cable, unshielded<br>• **Application:** Zones with chemicals, Uncontaminated zones | YF2A14-050VB3XLEAX | 2096235 |
|  | • **Connection type head A:** Female connector, M12, 4-pin, straight<br>• **Connection type head B:** Flying leads<br>• **Signal type:** Sensor/actuator cable<br>• **Cable:** 5 m, 4-wire, PVC<br>• **Description:** Sensor/actuator cable, unshielded<br>• **Connection systems:** Flying leads<br>• **Note:** This product is generally resistant to chemical cleaning agents (see ECOLAB). Please do not use cleaning agents of any other Kind., Not resistant against lactic acid & hydrogen peroxide (H2O2)<br>• **Application:** Hygienic and washdown zones | DOL-1204-G05MNI | 6052615 |
|  | • **Connection type head A:** Female connector, M12, 4-pin, straight<br>• **Connection type head B:** Flying leads<br>• **Signal type:** Sensor/actuator cable<br>• **Cable:** 5 m, 4-wire, PP<br>• **Description:** Sensor/actuator cable, unshielded<br>• **Connection systems:** Flying leads<br>• **Note:** This product is generally resistant to chemical cleaning agents (see ECOLAB) and other chemical compounds such as H2O2 and CH2O2. Before permanent installation is carried out, the material's resistance to the cleaning agent being used must be checked., Resistant against lactic acid & hydrogen peroxide (H2O2)<br>• **Application:** Hygienic and washdown zones, Drag chain operation | DOL-1204-G05MRN | 6058476 |

# 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