# WTB4ST-32161120A00

W4

**MINIATURE PHOTOELECTRIC SENSORS**

SICK
Sensor Intelligence.

## Ordering information

| Type | Part no. |
|---|---|
| WTB4ST-32161120A00 | 1132090 |

Other models and accessories ➜ www.sick.com/W4

## Detailed technical data

### Features

| | |
|---|---|
| **Functional principle** | Photoelectric proximity sensor |
| **Functional principle detail** | Background suppression, DoubleLine |
| **Sensing range** | |
| Sensing range min. | 0 mm |
| Sensing range max. | 150 mm |
| Adjustable switching threshold for background suppression | 10 mm ... 150 mm |
| 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%) | 0.8 mm, At 70 mm distance |
| Recommended sensing range for the best performance | 50 mm ... 90 mm |
| **Emitted beam** | |
| Light source | PinPoint LED |
| Type of light | Visible red light |
| Shape of light spot | Line-shaped, two parallel line-shaped light spots |
| Light spot size (distance) | 2.5 mm x 16 mm (50 mm) |
| Maximum dispersion of the emitted beam around the standardized transmission axis (squint angle) | < +/- 1.5° (at Ta = +23 °C) |

| Key LED figures | |
|---|---|
| Normative reference | EN 62471:2008-09 | IEC 62471:2006, modified |
| LED risk group marking | Free group |
| Wave length | 635 nm |
| Average service life | 100,000 h at $T_a$ = +25 °C |
| **Smallest detectable object (MDO) typ.** | 1 mm (At 70 mm distance)<br><br>Object with 90% remission factor (complies with standard white according to DIN 5033) |
| **Adjustment** | |
| Teach-Turn adjustment | BluePilot: For setting the sensing range |
| IO-Link | For configuring the sensor parameters and Smart Task functions |
| **Indication** | |
| LED blue | BluePilot: sensing range indicator |
| LED green | Operating indicator<br>Static on: power on<br>Flashing: IO-Link mode |
| LED yellow | Status of received light beam<br>Static on: object present<br>Static off: object not present |
| **Special applications** | Detecting flat objects, Detecting objects wrapped in film, Detecting perforated objects, Detecting uneven, shiny objects |

## Safety-related parameters

| | |
|---|---|
| **$MTTF_D$** | 1,399 years |
| **$DC_{avg}$** | 0% |

## Communication interface

| **IO-Link** | ✔, IO-Link V1.1 |
|---|---|
| Data transmission rate | COM2 (38,4 kBaud) |
| Cycle time | 2.3 ms |
| Process data length | 16 Bit |
| Process data structure | Bit 0 = switching signal $Q_{L1}$<br>Bit 1 = switching signal $Q_{L2}$<br>Bit 2 ... 15 = Current receiver level (live) |
| VendorID | 26 |
| DeviceID HEX | 0x80031E |
| DeviceID DEC | 8389406 |
| Compatible master port type | A |
| SIO mode support | Yes |

## Electrical data

| **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** | ≤ 20 mA, without load. At $U_B$ = 24 V |

[1] Limit values.

[2] This switching output must not be connected to another output.

| Protection class | III |
|---|---|
| **Digital output** | |
| Number | 2 |
| Type | Push-pull: PNP/NPN |
| Switching mode | Light/dark switching |
| Signal voltage PNP HIGH/LOW | Approx. $U_B$-2.5 V / 0 V |
| Signal voltage NPN HIGH/LOW | Approx. $U_B$ / < 2.5 V |
| Output current $I_{max.}$ | ≤ 100 mA |
| Circuit protection outputs | Reverse polarity protected<br>Overcurrent protected<br>Short-circuit protected |
| Response time | ≤ 1,000 µs |
| Repeatability (response time) | 240 µs |
| Switching frequency | 500 Hz |
| **Pin/Wire assignment** | |
| Function of pin 4/black (BK) | Digital output, light switching, object present → output $Q_{L1}$ HIGH, IO-Link communication C [2] |
| Function of pin 4/black (BK) – detail | The pin 4 function of the sensor can be configured, Additional possible settings via IO-Link |
| Function of pin 2/white (WH) | Digital output, dark switching, object present → output $\bar{Q}_{L1}$ LOW [2] |
| Function of pin 2/white (WH) – detail | The pin 2 function of the sensor can be configured, Additional possible settings via IO-Link |

[1] Limit values.

[2] This switching output must not be connected to another output.

## Mechanical data

| Housing | Rectangular |
|---|---|
| **Design detail** | Slim |
| **Dimensions (W x H x D)** | 12.1 mm x 41.9 mm x 18.6 mm |
| **Connection** | Cable with M8 male connector, 4-pin, 114 mm |
| **Connection detail** | |
| Deep-freeze property | Do not bend below 0 °C |
| Conductor size | 0.14 mm² |
| Cable diameter | Ø 3.4 mm |
| Length of cable (L) | 77 mm |
| Length of male connector | 37 mm |
| **Material** | |
| Housing | Plastic, VISTAL® |
| Front screen | Plastic, PMMA |
| Cable | Plastic, PVC |
| Male connector | Plastic, VISTAL® |
| **Maximum tightening torque of the fixing screws** | 0.4 Nm |

## Ambient data

| Enclosure rating | IP66 (EN 60529)<br>IP67 (EN 60529) |
|---|---|
| **Ambient operating temperature** | –40 °C ... +60 °C |

| | |
|---|---|
| **Ambient temperature, storage** | −40 °C ... +75 °C |
| **Typ. Ambient light immunity** | Artificial light: ≤ 50,000 lx<br>Sunlight: ≤ 50,000 lx |
| **Shock resistance** | 30 g, 11 ms (3 positive and 3 negative shocks along X, Y, Z axes, 18 total shocks (EN60068-2-27)) |
| **Vibration resistance** | 10 Hz ... 1,000 Hz (Amplitude 1 mm, 3 x 30 min (EN60068-2-6)) |
| **Air humidity** | 35 % ... 95 %, relative humidity (no condensation) |
| **Electromagnetic compatibility (EMC)** | EN 60947-5-2 |
| **Resistance to cleaning agent** | ECOLAB |
| **UL File No.** | NRKH.E181493 & NRKH7.E181493 |

## Smart Task

| | |
|---|---|
| **Smart Task name** | Base logics |
| **Logic function** | Direct<br>AND<br>OR |
| **Timer function** | Deactivated<br>Switch-on delay<br>Off delay<br>ON and OFF delay<br>Impulse (one shot) |
| **Inverter** | Yes |
| **Switching frequency** | SIO Logic: 450 Hz [1] |
| **Response time** | SIO Logic: 1100 µs [1] |
| **Repeatability** | SIO Logic: 500 µs [1] |
| **Switching signal** | |
| Switching signal $Q_{L1}$ | Switching output |
| Switching signal $\bar{Q}_{L1}$ | Switching output |

[1] Use of Smart Task functions without IO-Link communication (SIO mode).

## 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 |
| **Quality of teach** | Yes |

## 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 |

## Maßzeichnung (Dimensions in mm (inch))
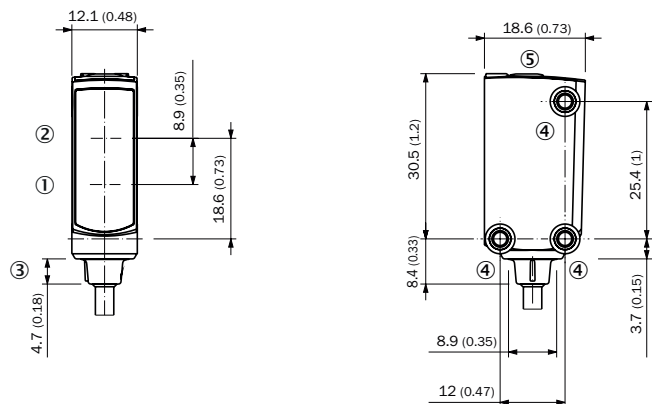
## Dimensional drawing (Dimensions in mm (inch))

Dimensional drawing, connection
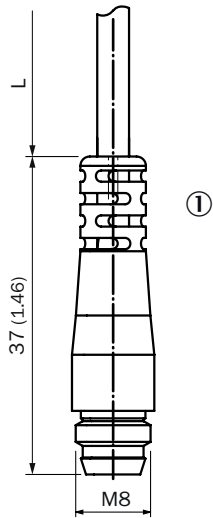
For length of cable (L), see technical data
① Cable with connector M8

Dimensional drawing, sensor

① Center of optical axis, receiver
② Center of optical axis, sender
③ Connection
④ M3 mounting hole
⑤ Display and adjustment elements

## Adjustments

Display and adjustment elements
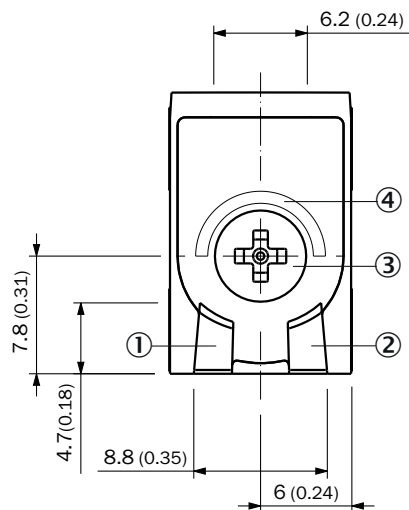
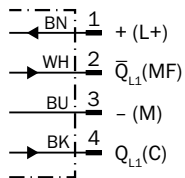① LED green
② LED yellow
③ Teach-Turn adjustment
④ LED blue

## Connection type

Male connector M8, 4-pin
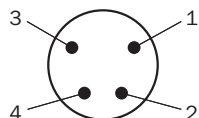
## Connection diagram

Cd-490



| | | |
|---|---|---|
| BN | 1 | + (L+) |
| WH | 2 | $\bar{Q}_{L1}$(MF) |
| BU | 3 | – (M) |
| BK | 4 | $Q_{L1}$(C) |

## Truth table

Push-pull: PNP/NPN – dark switching $\bar{Q}$

| | 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 | ⚠ | ⊗ |
| |  |  |

Push-pull: PNP/NPN - light switching Q

| | 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

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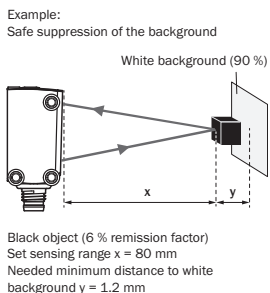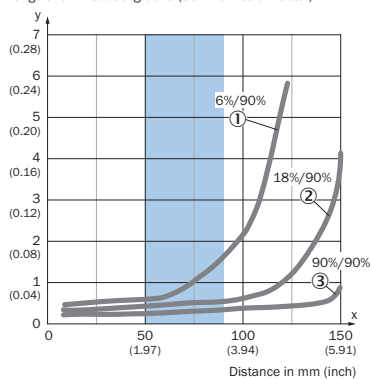


Example:
Safe suppression of the background

White background (90 %)

Black object (6 % remission factor)
Set sensing range x = 80 mm
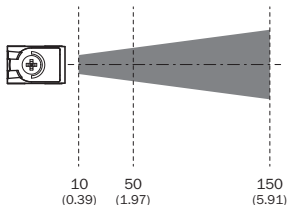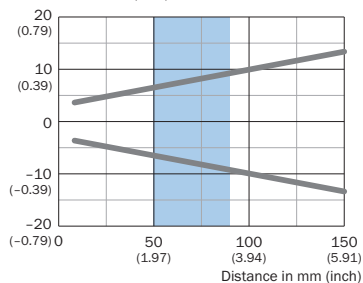Needed minimum distance to white background y = 1.2 mm

■ Recommended sensing range for the best performance

① Black object, 6% remission factor
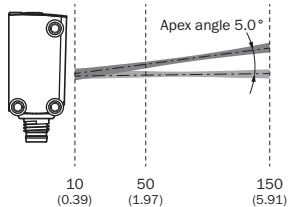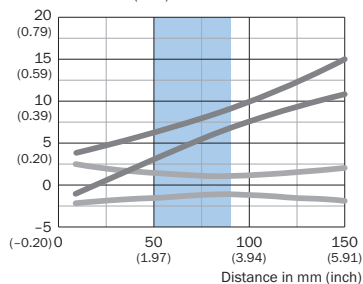② Gray object, 18% remission factor
③ White object, 90% remission factor
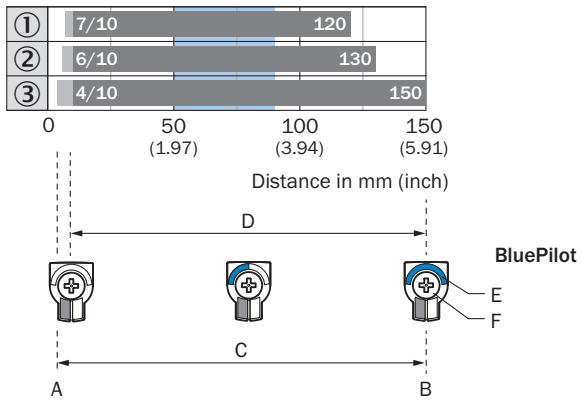
## Light spot size

Dimensions in mm (inch)



■ Recommended sensing range for the best performance

Dimensions in mm (inch)



Apex angle 5.0°

■ Recommended sensing range for the best performance

## Sensing range diagram



Recommended sensing range for the best performance

| | |
|---|---|
| 1 | Black object, 6% remission factor |
| 2 | Gray object, 18% remission factor |
| 3 | White object, 90% remission factor |
| A | Sensing range min. in mm |
| B | Sensing range max. in mm |
| C | Field of view |
| D | Adjustable switching threshold for background suppression |
| E | Sensing range indicator |
| F | Teach-Turn adjustment |

## 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."**

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