Data sheet


# WTB4FI-1H161120A00

W4

PHOTOELECTRIC SENSORS

SICK
Sensor Intelligence.

Illustration may differ

## Ordering information

| Type | part no. |
|---|---|
| WTB4FI-1H161120A00 | 1113167 |

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

## Detailed technical data

### Features

| | |
|---|---|
| **Functional principle** | Photoelectric proximity sensor |
| **Functional principle detail** | Background suppression |
| **Sensing range** | |
| Sensing range min. | 6 mm |
| Sensing range max. | 250 mm |
| Adjustable switching threshold for background suppression | 15 mm ... 250 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%) | 4 mm, at a distance of 100 mm |
| Recommended sensing range for the best performance | 40 mm ... 160 mm |
| **Emitted beam** | |
| Light source | PinPoint LED |
| Type of light | Infrared light |
| Shape of light spot | Point-shaped |
| Light spot size (distance) | Ø 4.2 mm (130 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.** | |
| | 0.2 mm (At 130 mm distance (object with remission factor of 90% (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 |
| **Display** | |
| LED blue | BluePilot: sensing range indicator |
| LED green | Operating indicatorStatic on: power onFlashing: IO-Link mode |
| LED yellow | Status of received light beamStatic on: object presentStatic off: object not present |

## Safety-related parameters

| | |
|---|---|
| **$MTTF_D$** | 642 years |
| **$DC_{avg}$** | 0 % |
| **$T_M$ (mission time)** | 20 years |

## 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 $Q_{L1}$ |
| | Bit 1 = switching signal $Q_{L2}$ |
| | Bit 2 ... 15 = Current receiver level (live) |
| VendorID | 26 |
| DeviceID HEX | 0x80024B |
| DeviceID DEC | 8389195 |
| 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 |

[1] Limit values.
[2] Signal transit time with resistive load in switching mode.
[3] With light/dark ratio 1:1.
[4] This switching output must not be connected to another output.

| | |
|---|---|
| **Digital output** | |
| Number | 2 (Complementary) |
| 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 |
| | Overcurrent protected |
| | Short-circuit protected |
| Response time | ≤ 500 µs |
| Repeatability (response time) | 150 µs [2] |
| Switching frequency | 1,000 Hz [3] |
| **Pin/Wire assignment** | |
| Function of pin 4/black (BK) | Digital output, light switching, object present → output $Q_{L1}$ HIGH; IO-Link communication C [4] |
| 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 [4] |
| 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] Signal transit time with resistive load in switching mode.
[3] With light/dark ratio 1:1.
[4] This switching output must not be connected to another output.

## Mechanics

| | |
|---|---|
| **Housing** | Rectangular |
| **Design detail** | Flat |
| **Dimensions (W x H x D)** | 16 mm x 40.1 mm x 12.1 mm |
| **Connection** | Cable, 4-wire, 2 m |
| **Connection detail** | |
| Conductor size | 0.14 mm² |
| Cable diameter | Ø 3.4 mm |
| Length of cable (L) | 2 m |
| **Material** | |
| Housing | Plastic, VISTAL® |
| Front screen | Plastic, PMMA |
| Cable | Plastic, PVC |
| **Weight** | Approx. 30 g |
| **Maximum tightening torque of the fixing screws** | 0.4 Nm |

## Ambient data

| | |
|---|---|
| **Enclosure rating** | IP66 (EN 60529) |

| | |
|---|---|
| | 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: 900 Hz [1]<br>IOL: 800 Hz [2] |
| **Response time** | SIO Logic: 550 µs [1]<br>IOL: 600 µs [2] |
| **Repeatability** | SIO Logic: 200 µs [1]<br>IOL: 250 µs [2] |
| **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).
[2] Use of Smart Task functions with IO-Link communication function.

## 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 |

## Certificates

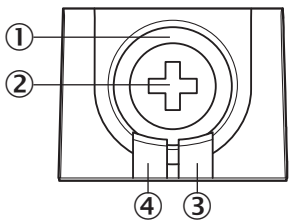
| | |
|---|---|
| **EU declaration of conformity** | ✓ |
| **UK declaration of conformity** | ✓ |

| | |
|---|---|
| **ACMA declaration of conformity** | ✓ |
| **Moroccan declaration of conformity** | ✓ |
| **China-RoHS** | ✓ |
| **ECOLAB certificate** | ✓ |
| **cULus certificate** | ✓ |
| **EAC certificate / DoC** | ✓ |
| **IO-Link** | ✓ |

## Classifications

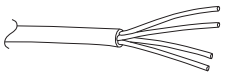
| | |
|---|---|
| **ECLASS 5.0** | 27270904 |
| **ECLASS 5.1.4** | 27270904 |
| **ECLASS 6.0** | 27270904 |
| **ECLASS 6.2** | 27270904 |
| **ECLASS 7.0** | 27270904 |
| **ECLASS 8.0** | 27270904 |
| **ECLASS 8.1** | 27270904 |
| **ECLASS 9.0** | 27270904 |
| **ECLASS 10.0** | 27270904 |
| **ECLASS 11.0** | 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 |

## display and adjustment elements

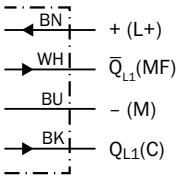



① LED blue
② Teach-Turn adjustment
③ LED yellow
④ LED green

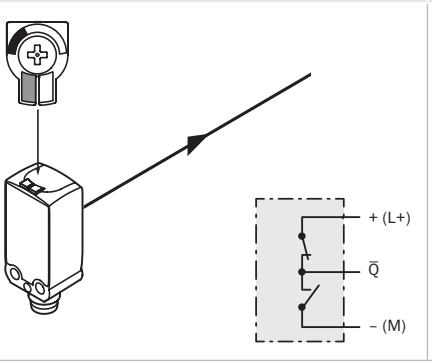
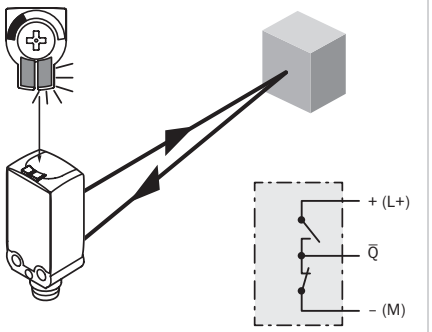
## Connection type Cable, 4-wire



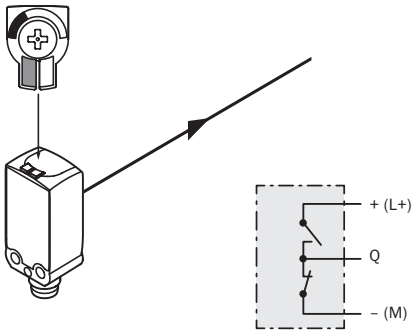
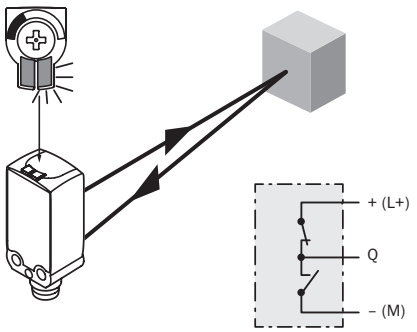
## Connection diagram Cd-491




## Truth table Push-pull: PNP/NPN – dark switching $\overline{Q}$

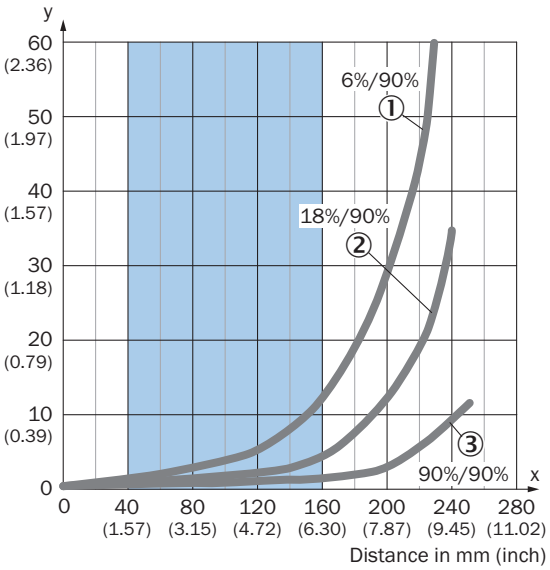
| | Dark switching $\overline{Q}$ (normally closed (upper switch), normally open (lower switch)) | |
|---|---|---|
| | Object not present ➜ Output HIGH | Object present ➜ Output LOW |
| Light receive | ⊗ | ✓ |
| Light receive indicator | ⊗ | ☀ |
| Load resistance to L+ | ⊗ | ⚠ |
| Load resistance to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

## Truth table Push-pull: PNP/NPN - light switching Q

| | 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

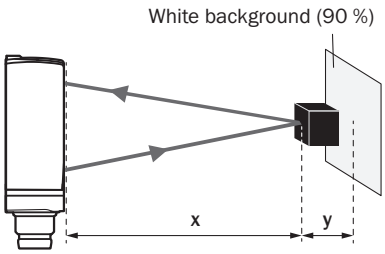
Minimum distance in mm (y) between the set sensing range and white background (90 % remission)




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

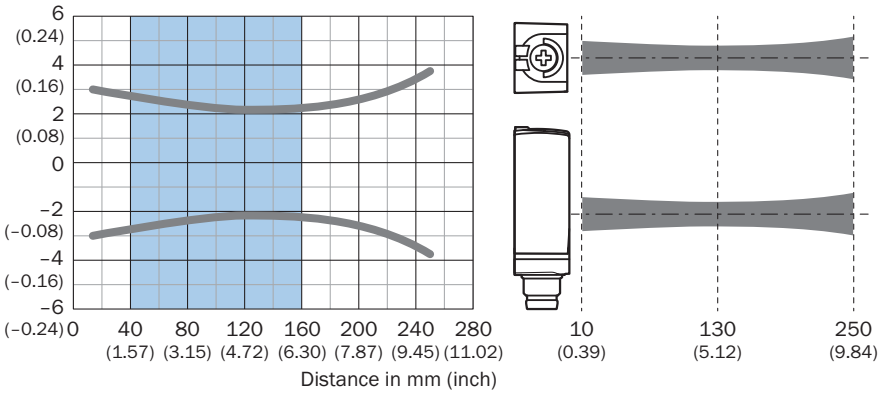
Example:
Safe suppression of the background




Black object (6 % remission)
Set sensing range x = 200 mm
Needed minimum distance to white background y = 29 mm

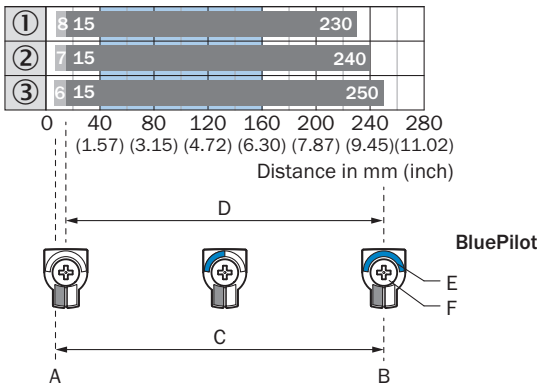
## Light spot size

Dimensions in mm (inch)




Recommended sensing range for the best performance

## Sensing range diagram

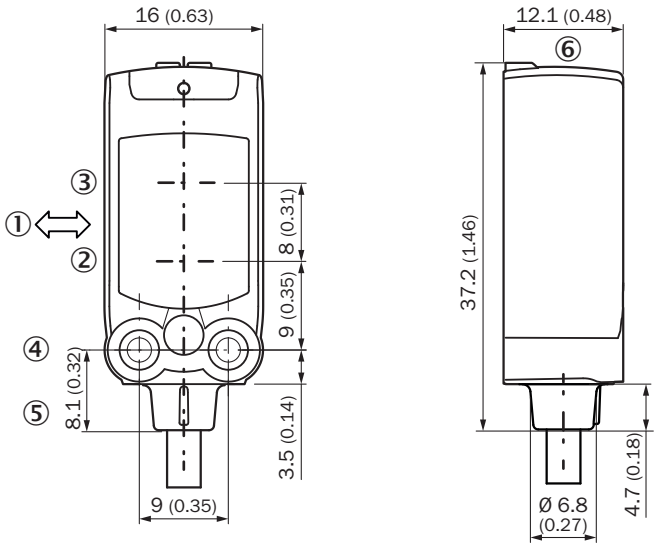



A = Sensing range min. in mm
B = Sensing range max. in mm
C = Viewing range
D = Adjustable switching threshold for background suppression
E = Sensing range indicator
F = Teach-Turn adjustment

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

## Dimensional drawing




Dimensions in mm (inch)
① Standard direction of the material being detected
② Center of optical axis, sender
③ Center of optical axis, receiver
④ M3 mounting hole
⑤ Connection
⑥ display and adjustment elements

## Recommended accessories

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

| | Brief description | Type | part no. |
|---|---|---|---|
| Mounting systems | | | |
|  | • **Description:** Mounting bracket for wall mounting<br>• **Material:** Stainless steel<br>• **Details:** Stainless steel 1.4571<br>• **Items supplied:** Mounting hardware included<br>• **Suitable for:** W4S, W4F, W4S | BEF-W4-A | 2051628 |

# 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



SICK
Sensor Intelligence.