SICK.COM


DATA SHEET

# WTF4SD-84161220A00

W4
Photoelectric sensors

SICK Sensor Intelligence

Illustration may differ

## PHOTOELECTRIC SENSORS

# WT-F4SD-84161220A00

### ORDERING INFORMATION

| Type | part no. |
|---|---|
| WTF4SD-84161220A00 | 1139113 |

Further device versions and accessories at www.sick.com/W4

## DETAILED TECHNICAL DATA

### FEATURES

| | |
|---|---|
| Functional principle | Photoelectric proximity sensor |
| Functional principle detail | Foreground suppression |
| Sensing range | |
| Sensing range min. | 0 mm |
| Sensing range max. | 130 mm |
| Adjustable switching threshold for background suppression | 10 mm ... 130 mm |
| Reference object | Object with 90% remission factor (complies with standard white according to DIN 5033) |
| Minimum object height at set sensing range in front of black background (6% remission factor) | 0.6 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 | Rectangular, Consisting of two parallel light spots |
| Maximum dispersion of the emitted beam around the standardized transmission axis (squint angle) | < +/- 1.5° (at $T_U$ = +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. | 0.6 mm, At 70 mm distance |

| | |
|---|---|
| | Object with 90% remission factor (complies with standard white according to DIN 5033) |
| Adjustment | |
| Teach-Turn adjustment | BluePilot<br>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 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 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 | 0x800338 |
| DeviceID DEC | 8389432 |
| 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 | ≤ 20 mA, without load. At $U_B$ = 24 V |
| 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 | ≤ 650 µs |
| Repeatability (response time) | 300 µs |

[1] Limit values.

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

| | |
|---|---|
| Switching frequency | 750 Hz |
| Pin/Wire assignment | |
| Function of pin 4/black (BK) | Digital output, dark switching, object present → output $\bar{Q}_{L1}$ HIGH [2] |
| | IO-Link communication C |
| Function of pin 4/black (BK) – detail | The pin 4 function of the sensor can be configured<br>Additional possible settings via IO-Link |
| Function of pin 2/white (WH) | Digital output, light switching, object present → output $Q_{L1}$ LOW [2] |
| Function of pin 2/white (WH) – detail | The pin 2 function of the sensor can be configured<br>Additional possible settings via IO-Link |

[1] Limit values.

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

## MECHANICS

| | |
|---|---|
| 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 M12 male connector, 4-pin, 190 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) | 142 mm |
| Length of male connector | 48 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 |

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

| | |
|---|---|
| | Impulse (one shot) |
| Inverter | Yes |
| Switching frequency | SIO Logic: 700 Hz [1] |
| Response time | SIO Logic: 700 µs [1] |
| Repeatability | SIO Logic: 350 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).

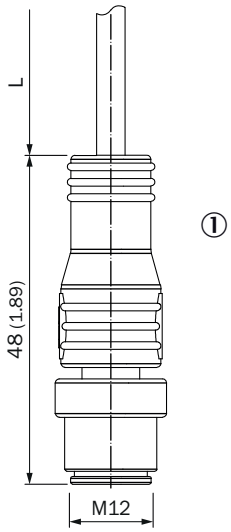
## DIAGNOSIS

| | |
|---|---|
| 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 |

## CERTIFICATES

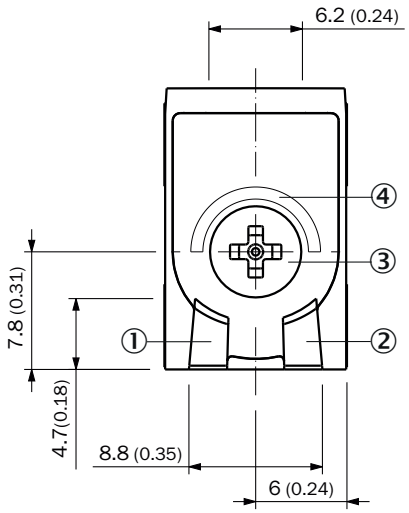
| | |
|---|---|
| EU declaration of conformity | ✓ |
| UK declaration of conformity | ✓ |
| ACMA declaration of conformity | ✓ |
| Moroccan declaration of conformity | ✓ |
| China RoHS | ✓ |
| cULus certificate | ✓ |
| Information according to Art. 3 of Data Act (Regulation EU 2023/2854) | ✓ |

## DIMENSIONAL DRAWING, CONNECTION



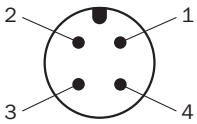

Dimensions in mm (inch)
For length of cable (L), see technical data
① Cable with M12 male connector

### DISPLAY AND ADJUSTMENT ELEMENTS

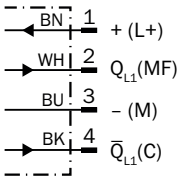



① LED green
② LED yellow
③ Teach-Turn adjustment
④ LED blue

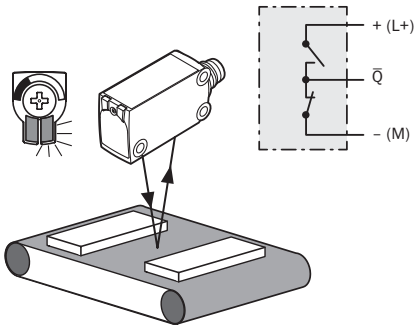
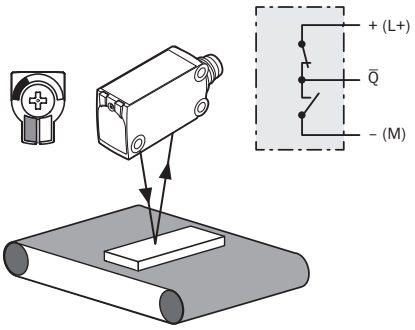
### CONNECTION TYPE M12 MALE CONNECTOR, 4-PIN



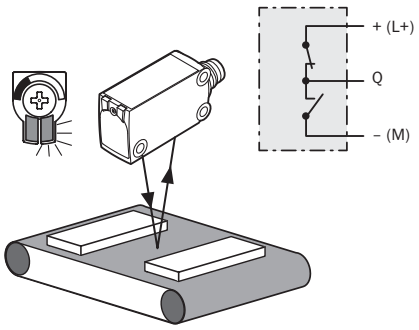
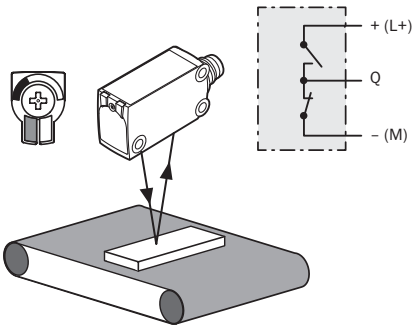

### CONNECTION DIAGRAM CD-503



### TRUTH TABLE PUSH-PULL: PNP/NPN – DARK SWITCHING $\bar{Q}$

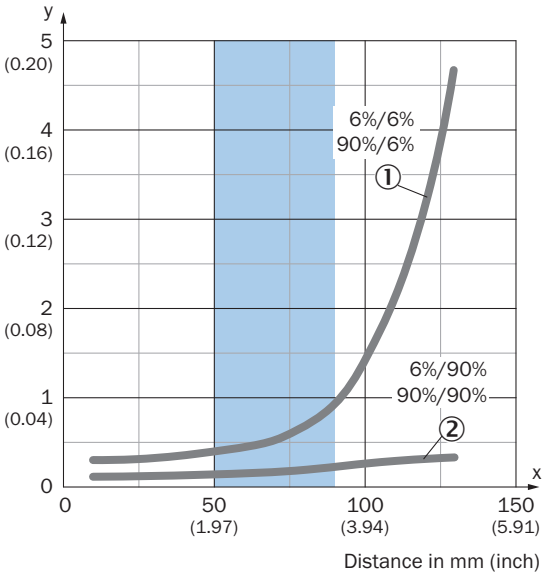
| | Dark switching $\bar{Q}$ (normally open (upper switch), normally closed (lower switch)) | |
|---|---|---|
| | Object not present ➜ Output LOW | Object present ➜ Output HIGH |
| Light receive | ✓ | ✗ |
| Light receive indicator | ● | ✗ |
| Load resistance to L+ | ⚠ | ✗ |
| Load resistance to M | ✗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

### TRUTH TABLE PUSH-PULL: PNP/NPN - LIGHT SWITCHING Q

| | 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

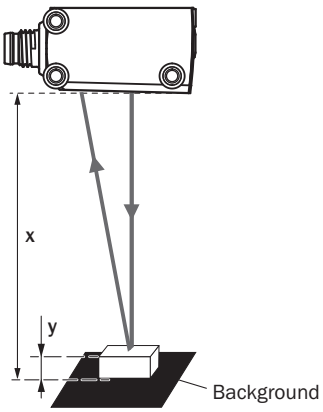
Minimum object height in mm (inch)




Recommended sensing range for the best performance

① Black background, 6% remission factor
② White background, 90% remission factor

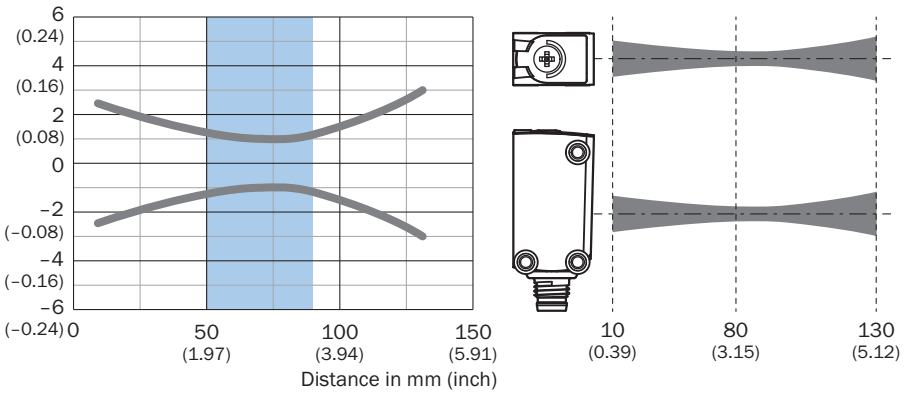
Example:
Reliable detection of the object




Black background (6 % remission factor)
Distance of sensor to background x = 70 mm
Required minimum object height y = 0.6 mm
For all objects regardless of their colors

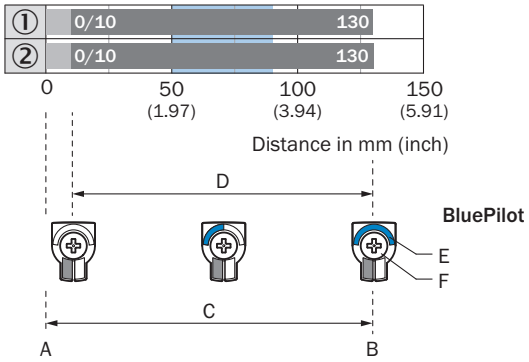
## LIGHT SPOT SIZE

Dimensions in mm (inch)




Recommended sensing range for the best performance

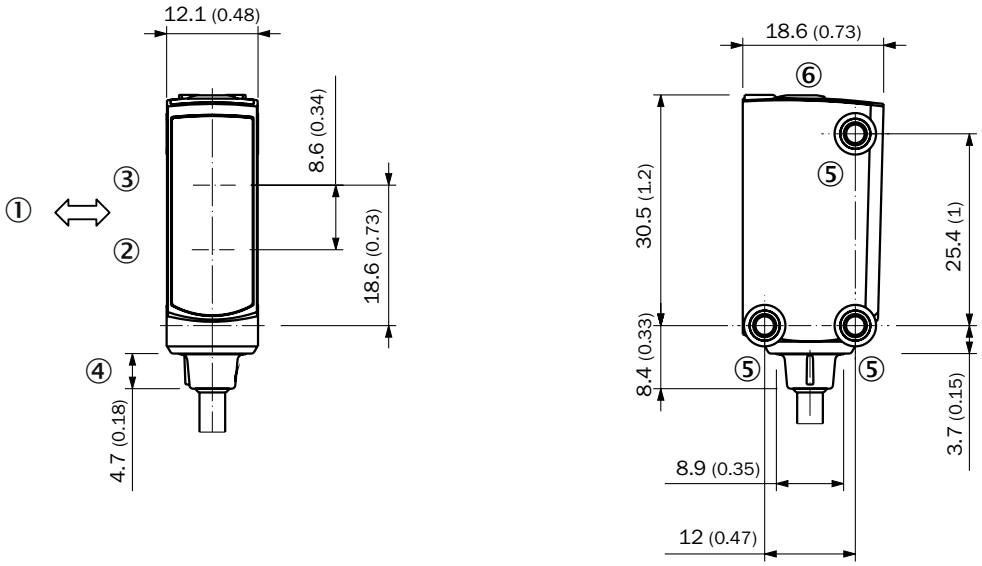
## SENSING RANGE DIAGRAM




Recommended sensing range for the best performance

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

## DIMENSIONAL DRAWING, SENSOR




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 M3 mounting hole
⑥ display and adjustment elements

Further information as well as suitable accessories, example applications and downloads such as CAD dimensional models, operating instructions and software can be found at www.sick.com/1139113

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# SICK AT A GLANCE

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SICK combines sensor intelligence with industry expertise and certified consulting services. We provide the ideal foundation for scalable as well as tailor-made automation solutions and create added value along the entire value chain. Our close partnerships with our customers are more than just a promise: Together, we optimize productivity, improve quality, protect health and safety, and help build a sustainable future. All with empathy and trust.

Since 1946, we have been developing innovative technologies with passion and a pioneering spirit. With a global network in around 40 countries, SICK has a global presence and is always close by. The company's headquarters are located in Waldkirch near Freiburg, Germany. Our customers benefit from our understanding of both local and global requirements, which enables us to deliver tailor-made solutions

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