



WTF4SD-1H162220A00

W4

MINIATURE PHOTOELECTRIC SENSORS

SICK
Sensor Intelligence.



Illustration may differ

Ordering information

| Type | Part no. |
|--------------------|----------|
| WTF4SD-1H162220A00 | 1139084 |

Other models and accessories → 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 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 $T_a = +25\text{ °C}$ |
| 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: 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 Static on: power on Flashing: IO-Link mode |
| LED yellow | Status of received light beam Static on: object present Static off: object not present |
| Special applications | Detecting flat objects, Detecting uneven, shiny objects |

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 | 0x80031D |
| DeviceID DEC | 8389405 |
| Compatible master port type | A |
| SIO mode support | Yes |

Electrical data

| | |
|--|--|
| Supply voltage U_B | 10 V DC ... 30 V DC ¹⁾ |
| Ripple | $\leq 5\text{ V}_{pp}$ |
| Usage category | DC-12 (According to EN 60947-5-2) DC-13 (According to EN 60947-5-2) |
| Current consumption | $\leq 20\text{ mA}$, without load. At $U_B = 24\text{ V}$ |
| Protection class | III |
| Digital output | |
| Number | 2 |
| Type | Push-pull: PNP/NPN |

¹⁾ Limit values.

²⁾ This switching output must not be connected to another output.

| | |
|---------------------------------------|--|
| Signal voltage PNP HIGH/LOW | Approx. $U_B - 2.5 \text{ V} / 0 \text{ V}$ |
| Signal voltage NPN HIGH/LOW | Approx. $U_B / < 2.5 \text{ V}$ |
| Output current I_{max} | $\leq 100 \text{ mA}$ |
| Circuit protection outputs | Reverse polarity protected Overcurrent protected Short-circuit protected |
| Response time | $\leq 650 \mu\text{s}$ |
| Repeatability (response time) | 300 μs |
| Switching frequency | 750 Hz |
| Pin/Wire assignment | |
| Function of pin 4/black (BK) | Digital output, light switching, object present → output Q_{L1} LOW, 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} HIGH 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, 4-wire, 2 m |
| Connection detail | |
| Deep-freeze property | Do not bend below 0 °C |
| Conductor size | 0.14 mm ² |
| Cable diameter | Ø 3.4 mm |
| Length of cable (L) | 2 m |
| Material | |
| Housing | Plastic, VISTAL® |
| Front screen | Plastic, PMMA |
| Cable | Plastic PVC |
| 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: $\leq 50,000 \text{ lx}$ Sunlight: $\leq 50,000 \text{ lx}$ |
| 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 AND OR |
| Timer function | Deactivated On delay Off delay ON and OFF delay 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 |

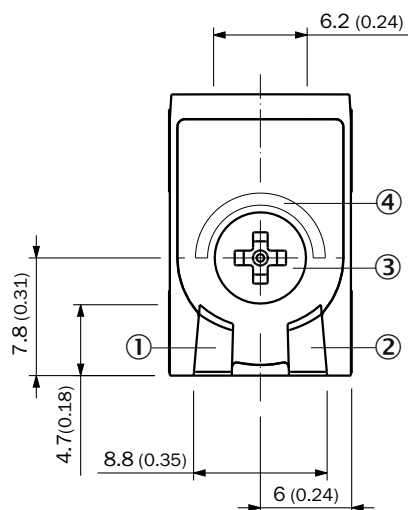
Classifications

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

Adjustments

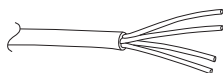
Display and adjustment elements



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

Connection type

Cable, 4-wire



Truth table

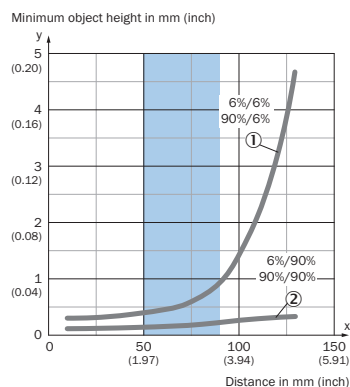
Push-pull: PNP/NPN - light switching Q

| | 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 | ⚠️ | ✗ |
| | | |

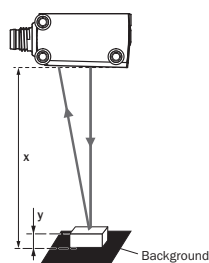
Push-pull: PNP/NPN – dark switching \bar{Q}

| | 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 | ✗ | ⚠ |

Characteristic curve



Example:
 Reliable detection of the object

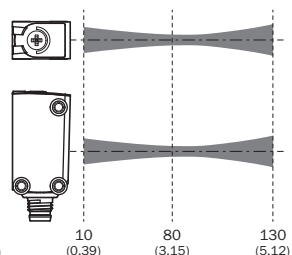
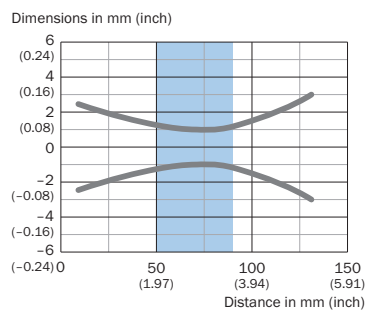


Black background (6 % remission factor)
 Distance of sensor to background $x = 70$ mm
 Required minimum object height $y = 0.6$ mm
 For all objects regardless of their colors

Recommended sensing range for the best performance

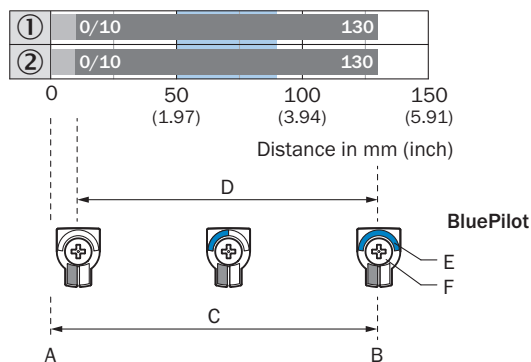
- ① Black background, 6% remission factor
- ② White background, 90% remission factor

Light spot size



Recommended sensing range for the best performance

Sensing range diagram

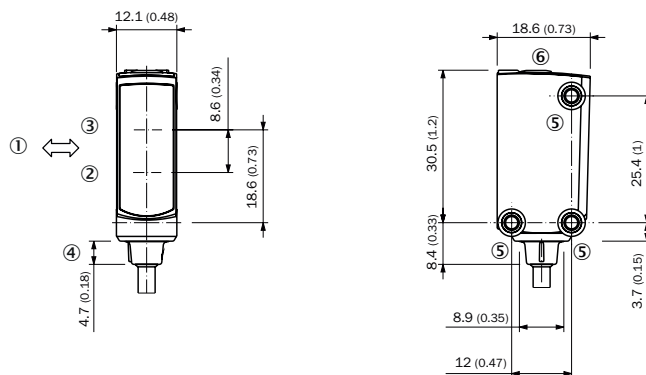


Recommended sensing range for the best performance

| | |
|---|---|
| 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 (Dimensions in mm (inch))

Dimensional drawing, sensor



- ① Standard direction of the material being detected
- ② Center of optical axis, sender
- ③ Center of optical axis, receiver
- ④ Connection
- ⑤ M3 mounting hole
- ⑥ Display and adjustment elements

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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