



WTB4SP-1H162220A00

W4

PHOTOELECTRIC SENSORS

SICK
Sensor Intelligence.



Ordering information

| Type | part no. |
|--------------------|----------|
| WTB4SP-1H162220A00 | 1139082 |

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

Illustration may differ



Detailed technical data

Features

| | |
|---|---|
| Functional principle | Photoelectric proximity sensor |
| Functional principle detail | Background suppression, NarrowBeam |
| Sensing range | |
| Sensing range min. | 4 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 distance between set sensing range and background (black 6% / white 90%) | 0.5 mm, At 70 mm distance |
| Recommended sensing range for the best performance | 20 mm ... 90 mm |
| Emitted beam | |
| Light source | PinPoint LED |
| Type of light | Visible red light |
| Shape of light spot | Point-shaped |
| Light spot size (distance) | 1.8 mm (70 mm) |
| Maximum dispersion of the emitted beam around the standardized transmission axis (squint angle) | < +/- 1.5° (at Ta = +23 °C) |
| Focus position | 70 mm |
| 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 Ta = +25 °C |

| | | |
|--|---|--|
| Smallest detectable object (MDO) typ. | 0.1 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 |
| 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 |
| Special applications | Detecting uneven, shiny objects, Detection of poorly remitting and tilted objects | |

Safety-related parameters

| | |
|-------------------------|-------------|
| MTTF_D | 1,404 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} Bit 1 = switching signal Q _{L2} Bit 2 ... 15 = Current receiver level (live) |
| VendorID | 26 |
| DeviceID HEX | 0x80034D |
| DeviceID DEC | 8389453 |
| 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) 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 |

¹⁾ Limit values.²⁾ This switching output must not be connected to another output.

| | |
|---------------------------------------|---|
| 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 | $\leq 500 \mu\text{s}$ |
| Repeatability (response time) | 150 μs |
| Switching frequency | 1,000 Hz |
| Pin/Wire assignment | |
| Function of pin 4/black (BK) | Digital output, dark switching, object present \rightarrow output $\bar{Q}_{L1} \text{ LOW}$ ²⁾ IO-Link communication C |
| 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, light switching, object present \rightarrow output $Q_{L1} \text{ HIGH}$ 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.

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, 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 Switch-on delay Off delay ON and OFF delay Impulse (one shot) |
| Inverter | Yes |
| Switching frequency | SIO Logic: 900 Hz ¹⁾ |
| Response time | SIO Logic: 550 µs ¹⁾ |
| Repeatability | SIO Logic: 200 µs ¹⁾ |
| Switching signal | |
| Switching signal Q _{L1} | Switching output |
| Switching signal Q̄ _{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

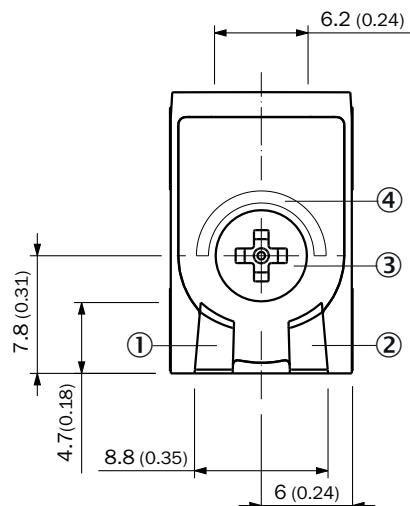
| | |
|---|---|
| EU declaration of conformity | ✓ |
| UK declaration of conformity | ✓ |
| ACMA declaration of conformity | ✓ |
| Moroccan declaration of conformity | ✓ |
| China-RoHS | ✓ |
| cULus certificate | ✓ |

Classifications

| | |
|---------------------|----------|
| ECLASS 5.0 | 27270904 |
| ECLASS 5.1.4 | 27270904 |
| ECLASS 6.0 | 27270904 |

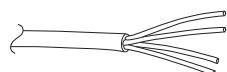
| | |
|-----------------------|----------|
| ECLASS 6.2 | 27270904 |
| ECLASS 7.0 | 27270904 |
| ECLASS 8.0 | 27270904 |
| ECLASS 8.1 | 27270904 |
| ECLASS 9.0 | 27270904 |
| ECLASS 10.0 | 27270904 |
| ECLASS 11.0 | 27270904 |
| ECLASS 12.0 | 27270903 |
| ETIM 5.0 | EC002719 |
| ETIM 6.0 | EC002719 |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

display and adjustment elements

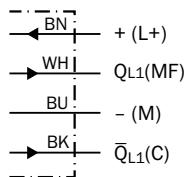


- ① LED green
- ② LED yellow
- ③ Teach-Turn adjustment
- ④ LED blue

Connection type Cable, 4-wire



Connection diagram Cd-504

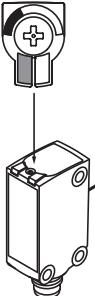
Truth table Push-pull: PNP/NPN – dark switching \bar{Q}

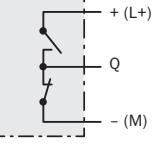
| | Dark switching \bar{Q} (normally closed (upper switch), normally open (lower switch)) | |
|-------------------------|---|-----------------------------|
| | Object not present → Output HIGH | Object present → Output LOW |
| Light receive | ✗ | ✓ |
| Light receive indicator | ✗ | ✗ |
| Load resistance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

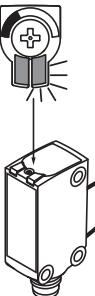
Diagram illustrating the internal circuit of the sensor. The circuit is a PNP transistor configuration. The collector is connected to the output terminal, the base is connected to the light receiving element, and the emitter is connected to the common ground terminal. The output terminal is labeled with a bar over Q, indicating it is the inverse of the collector current.

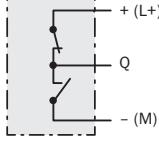
Truth table Push-pull: PNP/NPN - light switching Q

| 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 | ✗ | ⚡ |



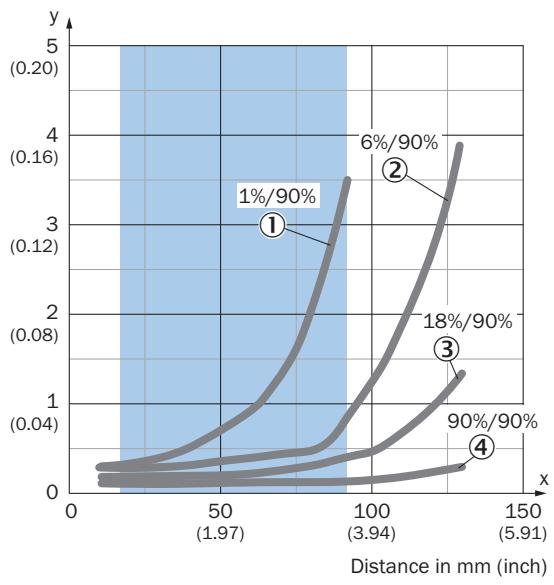






Characteristic curve

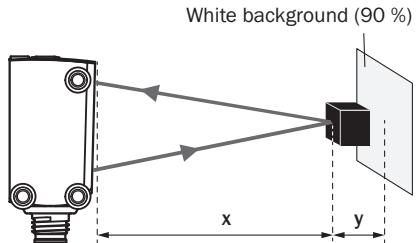
Minimum distance in mm (y) between the set sensing range and white background (90 % remission factor)



■ Recommended sensing range for the best performance

- ① ultra-black object, 1% remission factor
- ② Black object, 6% remission factor
- ③ Gray object, 18% remission factor
- ④ White object, 90% remission factor

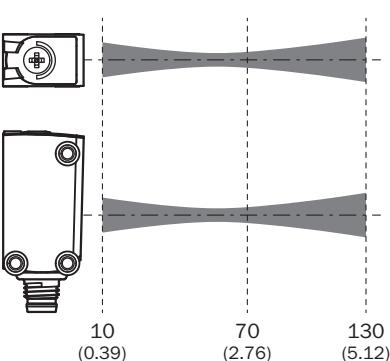
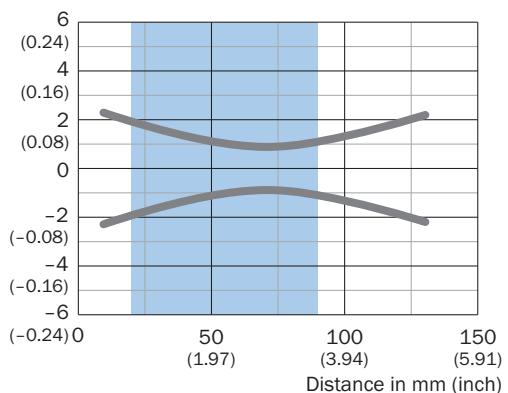
Example:
Safe suppression of the background



White background (90 %)
Black object (6 % remission factor)
Set sensing range x = 80 mm
Needed minimum distance to white background y = 0.5 mm

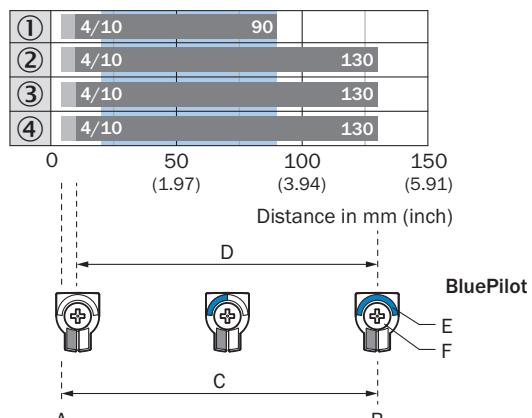
Light spot size

Dimensions in mm (inch)



Recommended sensing range for the best performance

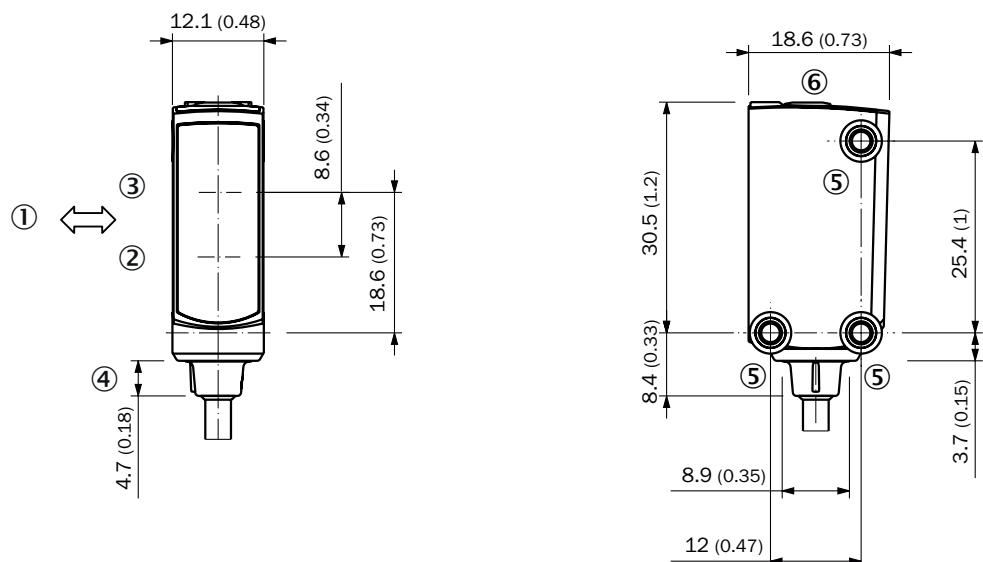
Sensing range diagram



Recommended sensing range for the best performance

| 1 | | Ultra-black object, 1% remission factor |
|---|--|---|
| 2 | | Black object, 6% remission factor |
| 3 | | Gray object, 18% remission factor |
| 4 | | 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 |

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

SICK AT A GLANCE

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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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