



WTB4FP-2216D150A00

W4F

MINIATURE PHOTOELECTRIC SENSORS

SICK
Sensor Intelligence.



Illustration may differ

Ordering information

| Type | Part no. |
|--------------------|----------|
| WTB4FP-2216D150A00 | 1107693 |

Other models and accessories → www.sick.com/W4F



Detailed technical data

Features

| | |
|--|---|
| Functional principle | Photoelectric proximity sensor |
| Functional principle detail | Background suppression, MultiSwitch |
| Sensing range | |
| Sensing range min. | 4 mm |
| Sensing range max. | 220 mm |
| Adjustable switching threshold for background suppression | 15 mm ... 220 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%) | 3 mm, at a distance of 80 mm |
| Recommended sensing range for the best performance | 40 mm ... 140 mm |
| Distance value | |
| Measuring range | 15 mm ... 220 mm |
| Resolution | 1 mm |
| Repeatability | 0,3 mm ... 2,2 mm ^{1) 2) 3)} |

1) 6 % ... 90 % remission.

2) Equivalent to 1 σ .

3) See repeatability characteristic lines.

| | | |
|--|---|--|
| | Accuracy | Typ. 3.0 mm at 15 ... 50 mm distance ¹⁾ Typ. 4.5 mm at 50 ... 100 mm distance ¹⁾ Typ. 6.5 mm at 100 ... 150 mm distance ¹⁾ Typ. 12 mm at 150 ... 220 mm distance ¹⁾ |
| | Distance value output | Via IO-Link |
| | Update rate of the distance value | 20 ms |
| Emitted beam | | |
| | Light source | PinPoint LED |
| | Type of light | Visible red 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 T _a = +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 90% remission (complies with standard white according to DIN 5033))) |
| Adjustment | | |
| | Teach-in button | BluePilot: For setting the sensing range |
| | IO-Link | For configuring the sensor parameters and Smart Task functions |
| Indication | | |
| | LED blue | BluePilot: Display of mode, display of output states Q _{L1} (LED 1-3 permanently on) and Q _{L2} (LED 5-7 permanently on) |
| | 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 |

¹⁾ 6 % ... 90 % remission.

²⁾ Equivalent to 1 σ.

³⁾ See repeatability characteristic lines.

Safety-related parameters

| | |
|-------------------------------------|--|
| MTTF_D | 642 years |
| DC_{avg} | 0 % |
| T_M (mission time) | 20 years (EN ISO 13849) Rate of use: 60 % |

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} Process data structure: A: Bit 2 ... 15 = Current receiver level (live). Process data structure B: Bit 2 ... 15 = Distance to object. Can be switched between A and B via IO-Link. |
| VendorID | 26 |
| DeviceID HEX | 0x80024C |
| DeviceID DEC | 8389196 |
| 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) DC-13 (According to EN 60947-5-2) |
| Current consumption | ≤ 25 mA, without load. At U _B = 24 V |
| Protection class | III |
| Digital output | |
| Number | 2 (individually adjustable) |
| Type | Push-pull: PNP/NPN |
| 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 | ≤ 1,000 μs ²⁾ |
| Repeatability (response time) | 360 μs |
| Switching frequency | 500 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 |
| 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 → output Q _{L2} HIGH |
| 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.

Mechanical data

| | |
|-------------------------------|---------------------------|
| Housing | Rectangular |
| Dimensions (W x H x D) | 16 mm x 40.1 mm x 12.1 mm |
| Connection | Male connector M8, 4-pin |
| Material | |
| Housing | Plastic, VISTAL® |
| Front screen | Plastic, PMMA |

| | |
|---|------------------|
| Male connector | Plastic, VISTAL® |
| 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 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 AND OR Window Hysteresis |
| Timer function | Deactivated On delay Off delay ON and OFF delay Impulse (one shot) |
| Inverter | Yes |
| Switching frequency | SIO Logic: 450 Hz ¹⁾ IOL: 450 Hz ²⁾ |
| Response time | SIO Logic: 1100 µs ¹⁾ IOL: 1100 µs ²⁾ |
| Repeatability | SIO Logic: 400 µs ¹⁾ IOL: 450 µs ²⁾ |
| Switching signal | |
| Switching signal Q _{L1} | Switching output |
| Switching signal Q _{L2} | 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 |

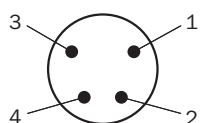
| | |
|--|-----|
| Detailed device status | Yes |
| Operating hour counter | Yes |
| Operating hours counter with reset function | Yes |
| Quality of teach | Yes |

Classifications

| | |
|-----------------------|----------|
| eCl@ss 5.0 | 27270904 |
| eCl@ss 5.1.4 | 27270904 |
| eCl@ss 6.0 | 27270904 |
| eCl@ss 6.2 | 27270904 |
| eCl@ss 7.0 | 27270904 |
| eCl@ss 8.0 | 27270904 |
| eCl@ss 8.1 | 27270904 |
| eCl@ss 9.0 | 27270904 |
| eCl@ss 10.0 | 27270904 |
| eCl@ss 11.0 | 27270904 |
| eCl@ss 12.0 | 27270903 |
| ETIM 5.0 | EC002719 |
| ETIM 6.0 | EC002719 |
| ETIM 7.0 | EC002719 |
| ETIM 8.0 | EC002719 |
| UNSPSC 16.0901 | 39121528 |

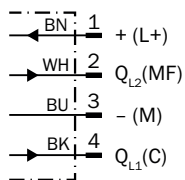
Connection type

Male connector M8, 4-pin



Connection diagram

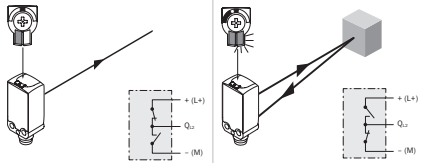
Cd-488



Truth table

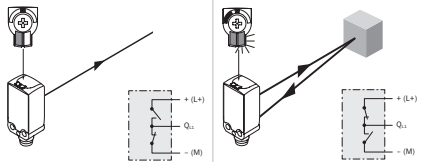
Push-pull: PNP/NPN - light switching Q_{L2}

| | Light switching Q_{L2} (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 | ⊗ | ⚠ |



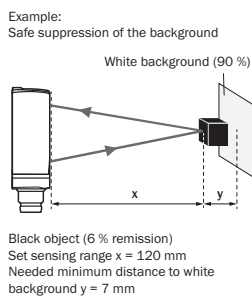
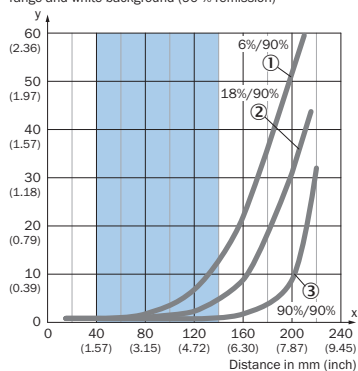
Push-pull: PNP/NPN - light switching Q_{L1}

| | Light switching Q_{L1} (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

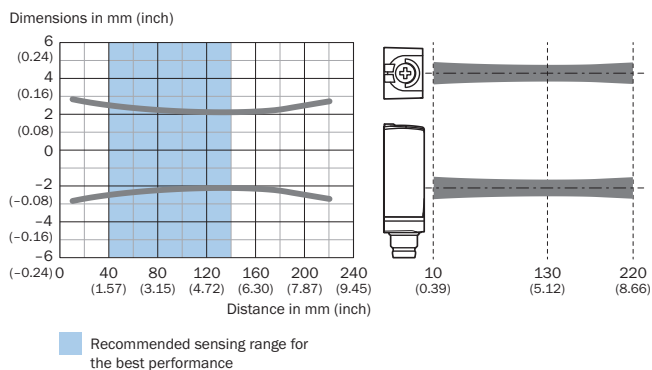
Minimum distance in mm (y) between the set sensing range and white background (90% remission)



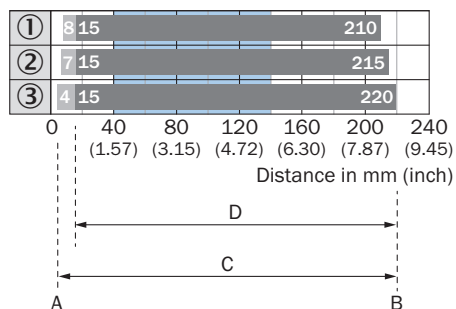
Recommended sensing range for the best performance

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

Light spot size



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

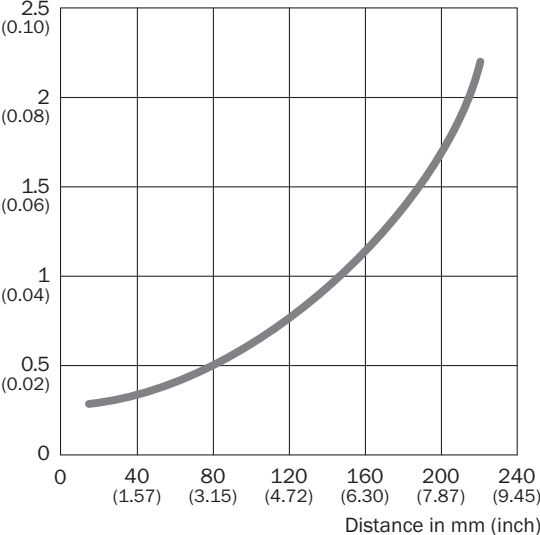
Recommended sensing range for the best performance

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

Repeatability

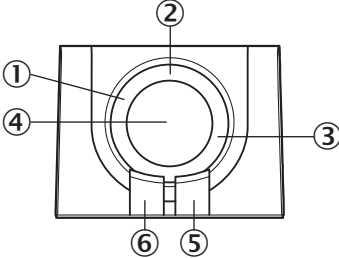
Repeatability

Repeatability in mm (inch)



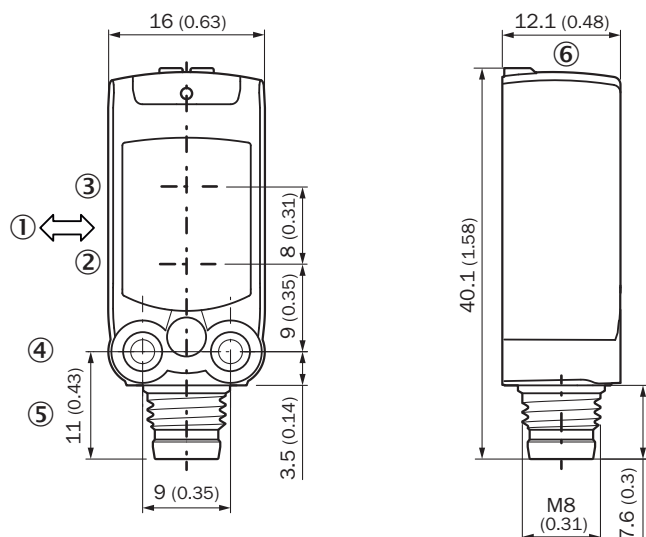
Adjustments

Display and adjustment elements



- ① LED blue
- ② Indicator switching output mode
- ③ Indicator distance mode
- ④ Teach-in button
- ⑤ LED yellow
- ⑥ LED green



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/W4F

| | Brief description | Type | Part no. |
|---|--|-------------|-----------------|
| Mounting brackets and plates | | | |
|  | Mounting bracket for wall mounting, Stainless steel 1.4571, mounting hardware included | BEF-W4-A | 2051628 |
| Plug connectors and cables | | | |
|  | Head A: male connector, M8, 4-pin, straight Cable: unshielded | STE-0804-G | 6037323 |

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