



# WTB4FP-2216N120A00

W4

PHOTOELECTRIC SENSORS

**SICK**  
Sensor Intelligence.



Illustration may differ

### Ordering information

| Type               | part no. |
|--------------------|----------|
| WTB4FP-2216N120A00 | 1119984  |

Other models and accessories → [www.sick.com/W4](http://www.sick.com/W4)



### Detailed technical data

#### Features

|   |   |
|---|---|
| <b>Functional principle</b>   | Photoelectric proximity sensor  |
| <b>Functional principle detail</b>  | Background suppression  |
| <b>Sensing range</b>  |   |
| 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  |
| <b>Emitted beam</b>   |   |
| 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 <sub>U</sub> = +23 °C)   |
| <b>Key LED figures</b>  |   |

|  |   |
|--|---|
| 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 $T_a = +25 \text{ °C}$   |
| <b>Smallest detectable object (MDO) typ.</b> |   |
|  | 0.2 mm, At 130 mm distance (object with remission factor of 90% (complies with standard white according to DIN 5033)) |
| <b>Adjustment</b>                            |   |
| Teach-Turn adjustment                        | BluePilot<br>For setting the sensing range  |
| IO-Link                                      | For configuring the sensor parameters and Smart Task functions  |
| <b>Display</b>                               |   |
| 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                          |
| <b>Special features</b>                      | Pin2 pre-setting (MF): not active   |

### Safety-related parameters

|                                     |           |
|-------------------------------------|-----------|
| <b>MTTF<sub>D</sub></b>             | 642 years |
| <b>DC<sub>avg</sub></b>             | 0 %       |
| <b>T<sub>M</sub> (mission time)</b> | 20 years  |

### Communication interface

|                             |  |
|-----------------------------|--|
| <b>IO-Link</b>              | ✓ , 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 <sub>L1</sub><br>Bit 1 = switching signal Q <sub>L2</sub><br>Bit 2 ... 15 = Current receiver level (live) |
| VendorID                    | 26   |
| DeviceID HEX                | 0x8002B0   |
| DeviceID DEC                | 8389296  |
| Compatible master port type | A  |
| SIO mode support            | Yes  |

### Electronics

|                                     |                                   |
|-------------------------------------|-----------------------------------|
| <b>Supply voltage U<sub>B</sub></b> | 10 V DC ... 30 V DC <sup>1)</sup> |
| <b>Ripple</b>                       | ≤ 5 V <sub>pp</sub>               |

<sup>1)</sup> Limit values.

<sup>2)</sup> Signal transit time with resistive load in switching mode.

<sup>3)</sup> With light/dark ratio 1:1.

<sup>4)</sup> This switching output must not be connected to another output.

|                                       |   |
|---------------------------------------|---|
| <b>Usage category</b>                 | DC-12 (According to EN 60947-5-2)<br>DC-13 (According to EN 60947-5-2)  |
| <b>Current consumption</b>            | ≤ 25 mA, without load. At $U_B = 24\text{ V}$   |
| <b>Protection class</b>               | III   |
| <b>Digital output</b>                 |   |
| Number                                | 1   |
| Type                                  | Push-pull: PNP/NPN  |
| Switching mode                        | Dark switching  |
| 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 $I_{\text{max}}$       | ≤ 100 mA  |
| Circuit protection outputs            | Reverse polarity protected<br>Overcurrent protected<br>Short-circuit protected                                    |
| Response time                         | ≤ 500 $\mu\text{s}$ <sup>2)</sup>   |
| Repeatability (response time)         | 150 $\mu\text{s}$   |
| Switching frequency                   | 1,000 Hz <sup>3)</sup>  |
| <b>Pin/Wire assignment</b>            |   |
| Function of pin 4/black (BK)          | Digital output, dark switching, object present → output $\bar{Q}_{L1}$ LOW; IO-Link communication C <sup>4)</sup> |
| 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)          | Not active  |
| Function of pin 2/white (WH) – detail | The pin 2 function of the sensor can be configured<br>Additional possible settings via IO-Link                    |

<sup>1)</sup> Limit values.

<sup>2)</sup> Signal transit time with resistive load in switching mode.

<sup>3)</sup> With light/dark ratio 1:1.

<sup>4)</sup> This switching output must not be connected to another output.

## Mechanics

|   |                           |
|---|---------------------------|
| <b>Housing</b>  | Rectangular               |
| <b>Design detail</b>                                  | Flat                      |
| <b>Dimensions (W x H x D)</b>                         | 16 mm x 40.1 mm x 12.1 mm |
| <b>Connection</b>                                     | Male connector M8, 4-pin  |
| <b>Connection detail</b>                              |                           |
| Deep-freeze property                                  | Do not bend below 0 °C    |
| <b>Material</b>                                       |                           |
| Housing   | Plastic, VISTAL®          |
| Front screen  | Plastic, PMMA             |
| Male connector  | Plastic, VISTAL®          |
| <b>Weight</b>   | Approx. 30 g              |
| <b>Maximum tightening torque of the fixing screws</b> | 0.4 Nm                    |

Ambient data

|  |   |
|--|---|
| <b>Enclosure rating</b>                    | IP66 (EN 60529)<br>IP67 (EN 60529)  |
| <b>Ambient operating temperature</b>       | -40 °C ... +60 °C   |
| <b>Ambient temperature, storage</b>        | -40 °C ... +75 °C   |
| <b>Typ. Ambient light immunity</b>         | Artificial light: ≤ 50,000 lx<br>Sunlight: ≤ 50,000 lx  |
| <b>Shock resistance</b>                    | 30 g, 11 ms (3 positive and 3 negative shocks along X, Y, Z axes, 18 total shocks (EN60068-2-27)) |
| <b>Vibration resistance</b>                | 10 Hz ... 1,000 Hz (Amplitude 1 mm, 3 x 30 min (EN60068-2-6))                                     |
| <b>Air humidity</b>                        | 35 % ... 95 %, relative humidity (no condensation)  |
| <b>Electromagnetic compatibility (EMC)</b> | EN 60947-5-2  |
| <b>Resistance to cleaning agent</b>        | ECOLAB  |
| <b>UL File No.</b>                         | NRKH.E181493 & NRKH7.E181493  |

Smart Task

|                                  |   |
|----------------------------------|---|
| <b>Smart Task name</b>           | Base logics   |
| <b>Logic function</b>            | Direct<br>AND<br>OR   |
| <b>Timer function</b>            | Deactivated<br>Switch-on delay<br>Off delay<br>ON and OFF delay<br>Impulse (one shot) |
| <b>Inverter</b>                  | Yes   |
| <b>Switching frequency</b>       | SIO Logic: 900 Hz <sup>1)</sup><br>IOL: 800 Hz <sup>2)</sup>                          |
| <b>Response time</b>             | SIO Logic: 550 μs <sup>1)</sup><br>IOL: 600 μs <sup>2)</sup>                          |
| <b>Repeatability</b>             | SIO Logic: 200 μs <sup>1)</sup><br>IOL: 250 μs <sup>2)</sup>                          |
| <b>Switching signal</b>          |   |
| Switching signal Q <sub>L1</sub> | Switching output  |
| Switching signal $\bar{Q}_{L1}$  | Switching output  |

<sup>1)</sup> Use of Smart Task functions without IO-Link communication (SIO mode).

<sup>2)</sup> Use of Smart Task functions with IO-Link communication function.

Diagnosis

|  |                                      |
|--|--------------------------------------|
| <b>Device temperature</b>                          |                                      |
| Measuring range                                    | Very cold, cold, moderate, warm, hot |
| <b>Device status</b>                               | Yes                                  |
| <b>Detailed device status</b>                      | Yes                                  |
| <b>Operating hour counter</b>                      | Yes                                  |
| <b>Operating hours counter with reset function</b> | Yes                                  |
| <b>Quality of teach</b>                            | Yes                                  |

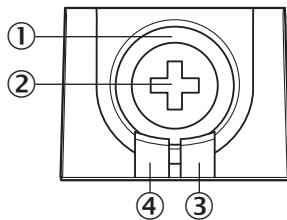
### Certificates

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

### Classifications

|                       |          |
|-----------------------|----------|
| <b>ECLASS 5.0</b>     | 27270904 |
| <b>ECLASS 5.1.4</b>   | 27270904 |
| <b>ECLASS 6.0</b>     | 27270904 |
| <b>ECLASS 6.2</b>     | 27270904 |
| <b>ECLASS 7.0</b>     | 27270904 |
| <b>ECLASS 8.0</b>     | 27270904 |
| <b>ECLASS 8.1</b>     | 27270904 |
| <b>ECLASS 9.0</b>     | 27270904 |
| <b>ECLASS 10.0</b>    | 27270904 |
| <b>ECLASS 11.0</b>    | 27270904 |
| <b>ECLASS 12.0</b>    | 27270903 |
| <b>ETIM 5.0</b>       | EC002719 |
| <b>ETIM 6.0</b>       | EC002719 |
| <b>ETIM 7.0</b>       | EC002719 |
| <b>ETIM 8.0</b>       | EC002719 |
| <b>UNSPSC 16.0901</b> | 39121528 |

### display and adjustment elements

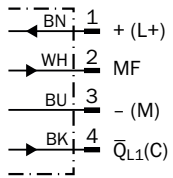


- ① LED blue
- ② Teach-Turn adjustment
- ③ LED yellow
- ④ LED green

Connection type Male connector M8, 4-pin



Connection diagram Cd-512



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

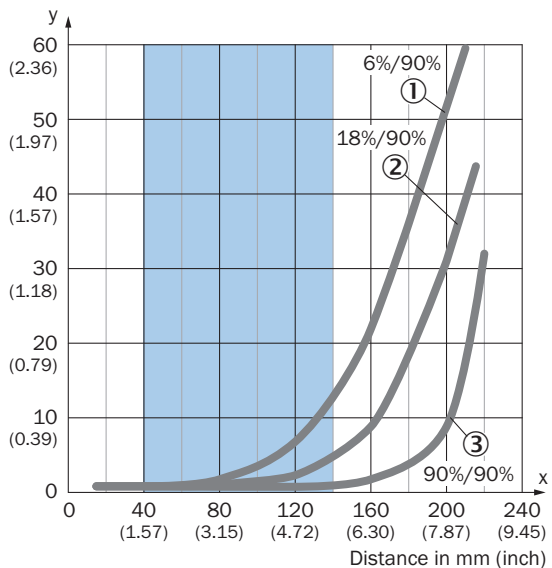
|                         | Dark switching $\bar{Q}$ (normally closed (upper switch), normally open (lower switch)) |                             |
|-------------------------|---|-----------------------------|
|                         | Object not present → Output HIGH  | Object present → Output LOW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

### 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

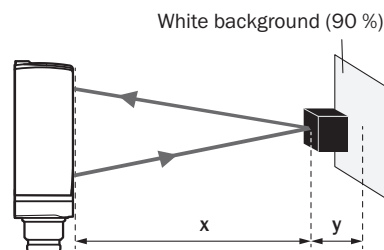
Minimum distance in mm (y) between the set sensing range and white background (90 % remission)



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



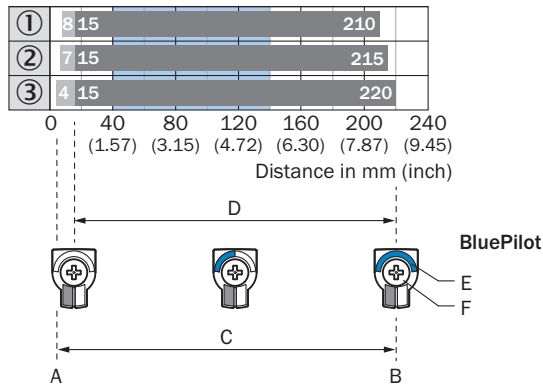
Black object (6 % remission)  
Set sensing range  $x = 120$  mm  
Needed minimum distance to white background  $y = 7$  mm

### Light spot size

Dimensions in mm (inch)



### Sensing range diagram

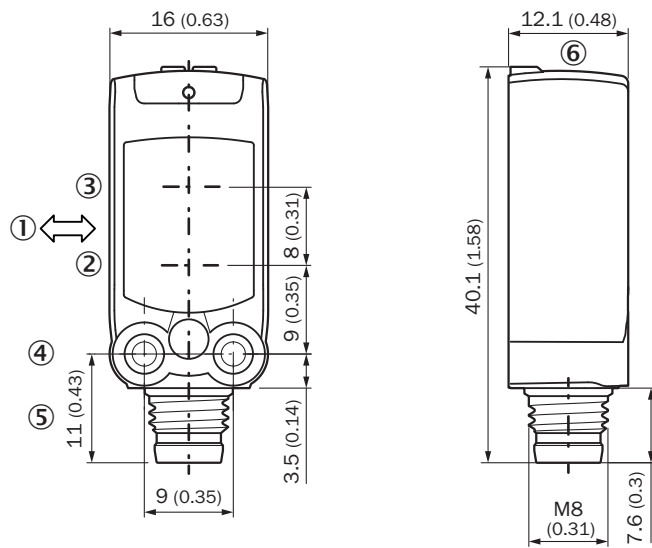


- A = Sensing range min. in mm
- B = Sensing range max. in mm
- C = Viewing range
- D = Adjustable switching threshold for background suppression
- E = Sensing range indicator
- F = Teach-Turn adjustment

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](http://www.sick.com/W4)

|   | Brief description  | Type               | part no. |
|---|--|--------------------|----------|
| Mounting systems  |  |                    |          |
|    | <ul style="list-style-type: none"> <li><b>Description:</b> Mounting bracket for wall mounting</li> <li><b>Material:</b> Stainless steel</li> <li><b>Details:</b> Stainless steel 1.4571</li> <li><b>Items supplied:</b> Mounting hardware included</li> <li><b>Suitable for:</b> W4S, W4F, W4S</li> </ul>  | BEF-W4-A           | 2051628  |
|    | <ul style="list-style-type: none"> <li><b>Description:</b> Mounting bracket for floor mounting</li> <li><b>Material:</b> Stainless steel</li> <li><b>Details:</b> Stainless steel 1.4571</li> <li><b>Items supplied:</b> Mounting hardware included</li> <li><b>Suitable for:</b> W4S, W4F, W4S</li> </ul>   | BEF-W4-B           | 2051630  |
|    | <ul style="list-style-type: none"> <li><b>Description:</b> Plate N08 for universal clamp bracket</li> <li><b>Material:</b> Steel, zinc diecast</li> <li><b>Details:</b> Zinc plated steel (sheet), Zinc die cast (clamping bracket)</li> <li><b>Items supplied:</b> Universal clamp (5322626), mounting hardware</li> <li><b>Usable for:</b> W100, W150, W4S, W4F, W8, W9-3, W8G, W8 Laser, W8 Inox, G6, W100 Laser, W100-2, W10, G6 Inox, RAY10, W4SLG-3, W9, GR18, MultiPulse, Reflex Array, MultiLine, LUT3, KT5, KT8, KT10, CS8</li> </ul> | BEF-KHS-N08        | 2051607  |
| connectors and cables   |  |                    |          |
|  | <ul style="list-style-type: none"> <li><b>Description:</b> Unshielded</li> <li><b>Connection type head A:</b> Male connector, M8, 4-pin, straight, A-coded</li> <li><b>Connection systems:</b> Screw-type terminals</li> <li><b>Permitted cross-section:</b> 0.14 mm<sup>2</sup> ... 0.5 mm<sup>2</sup></li> </ul>   | STE-0804-G         | 6037323  |
|  | <ul style="list-style-type: none"> <li><b>Description:</b> Sensor/actuator cable, unshielded</li> <li><b>Connection type head A:</b> Female connector, M8, 4-pin, straight, A-coded</li> <li><b>Connection type head B:</b> Flying leads</li> <li><b>Signal type:</b> Sensor/actuator cable</li> <li><b>Cable:</b> 5 m, 4-wire, PVC</li> <li><b>Application:</b> Uncontaminated zones, Zones with chemicals</li> </ul>   | YF8U14-050VA3XLEAX | 2095889  |
|  | <ul style="list-style-type: none"> <li><b>Description:</b> Sensor/actuator cable, unshielded</li> <li><b>Connection type head A:</b> Female connector, M8, 4-pin, straight, A-coded</li> <li><b>Connection type head B:</b> Flying leads</li> <li><b>Signal type:</b> Sensor/actuator cable</li> <li><b>Cable:</b> 5 m, 4-wire, PUR, halogen-free</li> <li><b>Application:</b> Drag chain operation, Zones with oils and lubricants, Robot, Drag chain operation</li> </ul>  | YF8U14-050UA3XLEAX | 2094792  |

## 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](http://www.sick.com)