



# WTB4FP-3216D250A00

W4

MINIATURE PHOTOELECTRIC SENSORS

**SICK**  
Sensor Intelligence.



Illustration may differ

### Ordering information

Type	Part no.
WTB4FP-3216D250A00	1121416

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, MultiSwitch, NarrowBeam
<b>Sensing range</b>	
Sensing range min.	4 mm
Sensing range max.	100 mm
Adjustable switching threshold for background suppression	15 mm ... 100 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%)	5 mm, at a distance of 40 mm
Recommended sensing range for the best performance	30 mm ... 60 mm
<b>Distance value</b>	
Measuring range	15 mm ... 100 mm
Resolution	1 mm
Repeatability	0,3 mm ... 1,5 mm <sup>1) 2) 3)</sup>

1) 6% ... 90% remission factor.

2) Equivalent to 1  $\sigma$ .

3) See repeatability characteristic lines.

Accuracy	Typ. 0.8 mm at 15 ... 60 mm distance, Typ. 2.0 mm at 60 ... 100 mm distance <sup>1) 1)</sup>
Distance value output	Via IO-Link
Update rate of the distance value	20 ms
<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 2 mm (50 mm)
Maximum dispersion of the emitted beam around the standardized transmission axis (squint angle)	< +/- 1.5° (at T <sub>a</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 <sub>a</sub> = +25 °C
<b>Smallest detectable object (MDO) typ.</b>	
	0.1 mm (At 50 mm distance (object with 90% remission (complies with standard white according to DIN 5033)))
<b>Adjustment</b>	
Teach-in button	BluePilot: For setting the sensing range
IO-Link	For configuring the sensor parameters and Smart Task functions
<b>Indication</b>	
LED blue	BluePilot: Display of mode, display of output states Q <sub>L1</sub> (LED 1-3 permanently on) and Q <sub>L2</sub> (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
<b>Special applications</b>	
	Detecting flat objects, Detecting small objects

<sup>1)</sup> 6% ... 90% remission factor.

<sup>2)</sup> Equivalent to 1  $\sigma$ .

<sup>3)</sup> See repeatability characteristic lines.

### Safety-related parameters

MTTF <sub>D</sub>	642 years
DC <sub>avg</sub>	0 %
T <sub>M</sub> (mission time)	20 years (EN ISO 13849, rate of use: 60 %)

### 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>

	Bit 1 = switching signal Q <sub>L2</sub> 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	0x8002C2
DeviceID DEC	8389314
Compatible master port type	A
SIO mode support	Yes

### Electrical data

<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>
<b>Usage category</b>	DC-12 (According to EN 60947-5-2) DC-13 (According to EN 60947-5-2)
<b>Current consumption</b>	≤ 25 mA, without load. At U <sub>B</sub> = 24 V
<b>Protection class</b>	III
<b>Digital output</b>	
Number	2 (individually adjustable)
Type	Push-pull: PNP/NPN
Signal voltage PNP HIGH/LOW	Approx. U <sub>B</sub> -2.5 V / 0 V
Signal voltage NPN HIGH/LOW	Approx. U <sub>B</sub> / < 2.5 V
Output current I <sub>max.</sub>	≤ 100 mA
Circuit protection outputs	Reverse polarity protected Overcurrent protected Short-circuit protected
Response time	≤ 1,000 μs <sup>2)</sup>
Repeatability (response time)	360 μs
Switching frequency	500 Hz <sup>3)</sup>
<b>Pin/Wire assignment</b>	
Function of pin 4/black (BK)	Digital output, light switching, object present → output Q <sub>L1</sub> HIGH; IO-Link communication C <sup>4)</sup>
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 <sub>L2</sub> HIGH <sup>4)</sup>
Function of pin 2/white (WH) – detail	The pin 2 function of the sensor can be configured, 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.

### Mechanical data

<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>	Cable with M8 male connector, 4-pin, 110 mm
<b>Connection detail</b>	
Deep-freeze property	Do not bend below 0 °C
Conductor size	0.14 mm <sup>2</sup>

Cable diameter	Ø 3.4 mm
Length of cable (L)	77 mm
<b>Material</b>	
Housing	Plastic, VISTAL®
Front screen	Plastic, PMMA
Cable	PVC
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) 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 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 AND OR Window Hysteresis
<b>Timer function</b>	Deactivated On delay Off delay ON and OFF delay Impulse (one shot)
<b>Inverter</b>	Yes
<b>Switching frequency</b>	SIO Logic: 450 Hz <sup>1)</sup> IOL: 450 Hz <sup>2)</sup>
<b>Response time</b>	SIO Logic: 1100 µs <sup>1)</sup> IOL: 1100 µs <sup>2)</sup>
<b>Repeatability</b>	SIO Logic: 400 µs <sup>1)</sup> IOL: 450 µs <sup>2)</sup>
<b>Switching signal</b>	
Switching signal Q <sub>L1</sub>	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.

Switching signal Q <sub>L2</sub>	Switching output
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- <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

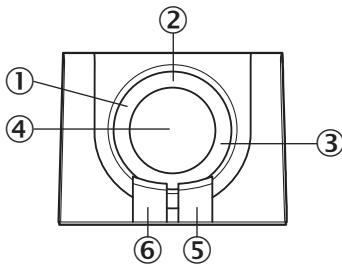
<b>Device temperature</b>	
Measuring range	Very cold, cold, moderate, warm, hot
<b>Device status</b>	Yes
<b>Detailed device status</b>	Yes
<b>Operating hour counter</b>	Yes
<b>Operating hours counter with reset function</b>	Yes
<b>Quality of teach</b>	Yes

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

## Adjustments

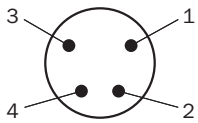
Display and adjustment elements



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

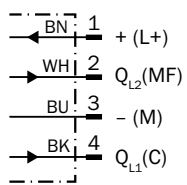
## Connection type

Male connector M8, 4-pin



## Connection diagram

Cd-488



## Truth table

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

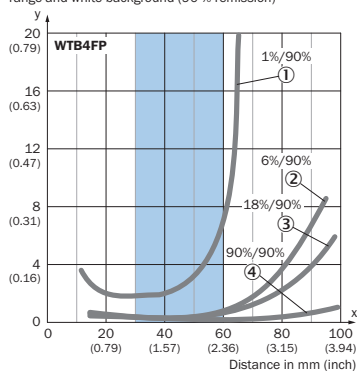
	Light switching $Q_{L2}$ (normally open (upper switch), normally closed (lower switch))	
	Object not present → Output LOW	Object present → Output HIGH
Light receive	✘	✔
Light receive indicator	✘	☀
Load resistance to L+	⚠	✘
Load resistance to M	✘	⚠

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

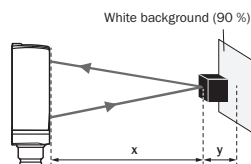
	Light switching $Q_{L1}$ (normally open (upper switch), normally closed (lower switch))	
	Object not present → Output LOW	Object present → Output HIGH
Light receive	✘	✔
Light receive indicator	✘	☀
Load resistance to L+	⚠	✘
Load resistance to M	✘	⚠

## Characteristic curve

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



Example:  
Safe suppression of the background



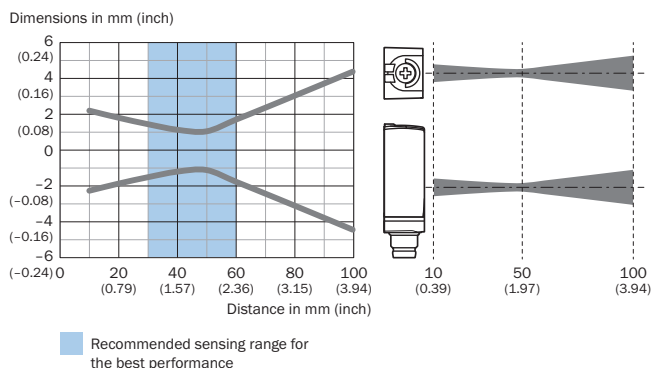
Black object (6 % remission)  
Set sensing range  $x = 40$  mm  
Needed minimum distance to white background  $y = 0.5$  mm

Recommended sensing range for the best performance

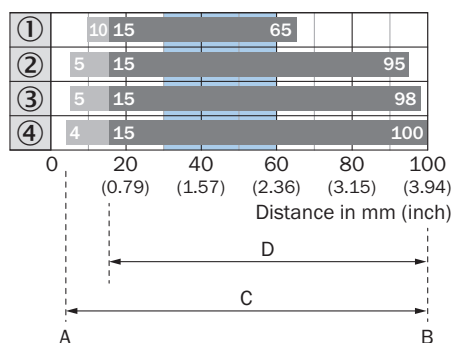
- ① Ultra-black object, 1% remission factor
- ② Black object, 6% remission factor
- ③ Gray object, 18% remission factor
- ④ White object, 90% remission factor



## Light spot size



## Sensing range diagram

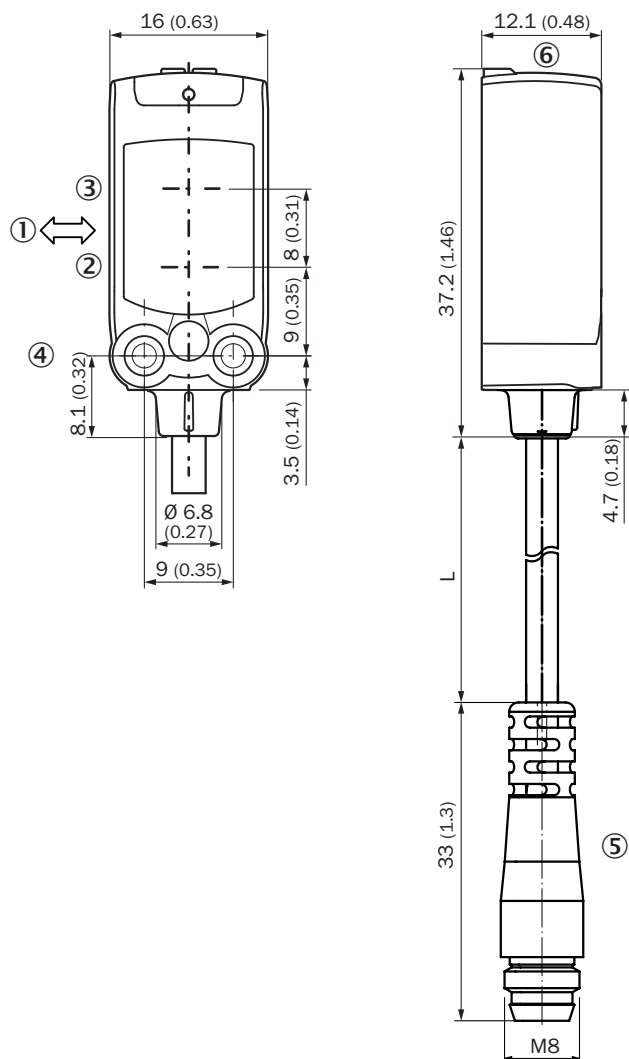


A = Sensing range min. in mm  
 B = Sensing range max. in mm  
 C = Viewing range  
 D = Adjustable switching threshold for background suppression

Recommended sensing range for the best performance

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

**Dimensional drawing** (Dimensions in mm (inch))





For length of cable (L), see technical data

- 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 Cable with connector M8
- ⑥ Display and adjustment elements

**Recommended accessories**

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

	<b>Brief description</b>	<b>Type</b>	<b>Part no.</b>
<b>Mounting brackets and plates</b>			
	Mounting bracket for wall mounting, Stainless steel 1.4571, mounting hardware included	BEF-W4-A	2051628

	Brief description	Type	Part no.
Plug connectors and cables			
	<ul style="list-style-type: none"><li>• <b>Connection type head A:</b> Male connector, M8, 4-pin, straight</li><li>• <b>Description:</b> Unshielded</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

## 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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