



DATA SHEET

# WTB4FP-2216R250A00

W4  
Photoelectric sensors

**SICK** Sensor Intelligence

PHOTOELECTRIC SENSORS

WTB4F-  
P-2216R250A00

ORDERING INFORMATION

Type	part no.
WTB4FP-2216R250A00	1121418

Further device versions and accessories at [www.sick.com/W4](http://www.sick.com/W4)



Illustration may differ

DETAILED TECHNICAL DATA

FEATURES

Functional principle	Photoelectric proximity sensor	
Functional principle detail	Background suppression, MultiSwitch, NarrowBeam, distance value	
Sensing range	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
Distance value	Measuring range	15 mm ... 100 mm
	Repeatability	0,3 mm ... 1,5 mm <sup>1) 2) 3)</sup>
	Accuracy	Typ. 0.8 mm at 15 ... 60 mm distance <sup>1)</sup>
		Typ. 2.0 mm at 60 ... 100 mm distance <sup>1)</sup>
	Distance value output	Via IO-Link
	Resolution	1 mm

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

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

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

Update rate of the distance value	20 ms
Emitted beam	<p>Light source PinPoint LED</p> <p>Type of light Visible red light</p> <p>Shape of light spot Point-shaped</p> <p>Light spot size (distance) Ø 2 mm (50 mm)</p> <p>Maximum dispersion of the emitted beam around the standardized transmission axis (squint angle) &lt; +/- 1.5° (at T<sub>u</sub> = +23 °C)</p>
Key LED figures	<p>Normative reference EN 62471:2008-09   IEC 62471:2006, modified</p> <p>LED risk group marking Free group</p> <p>Wave length 635 nm</p> <p>Average service life 100,000 h at T<sub>a</sub> = +25 °C</p>
Smallest detectable object (MDO) typ.	0.1 mm, At 50 mm distance (object with 90% remission (complies with standard white according to DIN 5033))
Adjustment	<p>Teach-in button BluePilot For setting the sensing range</p> <p>IO-Link For configuring the sensor parameters and Smart Task functions</p>
Display	<p>LED blue BluePilot: Display of mode, display of output states Q<sub>1</sub> (LED 1-3 permanently on) and Q<sub>12</sub> (LED 5-7 permanently on)</p> <p>LED green Operating indicator Static on: power on Flashing: IO-Link mode</p> <p>LED yellow Status of received light beam Static on: object present Static off: object not present</p>
Special applications	Detecting flat objects, Detecting small objects

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

<sup>2)</sup> Equivalent to 1 σ.

<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

**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	<p>Bit 0 = switching signal Q<sub>1</sub></p> <p>Bit 1 = switching signal Q<sub>12</sub></p> <p>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.</p>
VendorID	26
DeviceID HEX	0x8002C3
DeviceID DEC	8389315
Compatible master port type	A
SIO mode support	Yes

**ELECTRONICS**

Supply voltage $U_B$	10 V DC ... 30 V DC <sup>1)</sup>																		
Ripple	$\leq 5 V_{pp}$																		
Usage category	DC-12 (According to EN 60947-5-2) DC-13 (According to EN 60947-5-2)																		
Current consumption	$\leq 25$ mA, without load. At $U_B = 24$ V																		
Protection class	III																		
Digital output	<table border="0"> <tr> <td>Number</td> <td>2 (individually adjustable)</td> </tr> <tr> <td>Type</td> <td>Push-pull: PNP/NPN</td> </tr> <tr> <td>Signal voltage PNP HIGH/LOW</td> <td>Approx. <math>U_B - 2.5</math> V / 0 V</td> </tr> <tr> <td>Signal voltage NPN HIGH/LOW</td> <td>Approx. <math>U_B / &lt; 2.5</math> V</td> </tr> <tr> <td>Output current <math>I_{max}</math></td> <td><math>\leq 100</math> mA</td> </tr> <tr> <td>Circuit protection outputs</td> <td>Reverse polarity protected Overcurrent protected Short-circuit protected</td> </tr> <tr> <td>Response time</td> <td><math>\leq 1,000 \mu s</math> <sup>2)</sup></td> </tr> <tr> <td>Repeatability (response time)</td> <td>360 <math>\mu s</math></td> </tr> <tr> <td>Switching frequency</td> <td>500 Hz <sup>3)</sup></td> </tr> </table>	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 $I_{max}$	$\leq 100$ mA	Circuit protection outputs	Reverse polarity protected Overcurrent protected Short-circuit protected	Response time	$\leq 1,000 \mu s$ <sup>2)</sup>	Repeatability (response time)	360 $\mu s$	Switching frequency	500 Hz <sup>3)</sup>
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<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**

Housing	Rectangular						
Design detail	Flat						
Dimensions (W x H x D)	16 mm x 40.1 mm x 12.1 mm						
Connection	Male connector M8, 4-pin						
Material	<table border="0"> <tr> <td>Housing</td> <td>Plastic, VISTAL<sup>®</sup></td> </tr> <tr> <td>Front screen</td> <td>Plastic, PMMA</td> </tr> <tr> <td>Male connector</td> <td>Plastic, VISTAL<sup>®</sup></td> </tr> </table>	Housing	Plastic, VISTAL <sup>®</sup>	Front screen	Plastic, PMMA	Male connector	Plastic, VISTAL <sup>®</sup>
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Front screen	Plastic, PMMA						
Male connector	Plastic, VISTAL <sup>®</sup>						
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: $\leq 50,000$ lx Sunlight: $\leq 50,000$ 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 Switch-on delay Off delay ON and OFF delay Impulse (one shot)
Inverter	Yes
Switching frequency	SIO Logic: 450 Hz <sup>1)</sup> IOL: 450 Hz <sup>2)</sup>
Response time	SIO Logic: 1100 µs <sup>1)</sup> IOL: 1100 µs <sup>2)</sup>
Repeatability	SIO Logic: 400 µs <sup>1)</sup> IOL: 450 µs <sup>2)</sup>
Switching signal	Switching signal Q <sub>L1</sub> Switching output Switching signal Q <sub>L2</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.

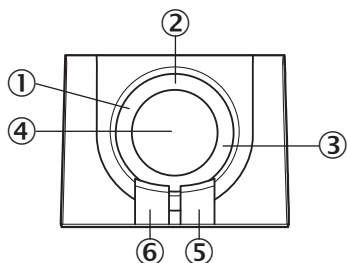
**DIAGNOSIS**

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**

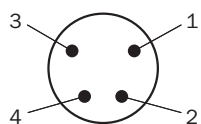
EU declaration of conformity	✓
UK declaration of conformity	✓
ACMA declaration of conformity	✓
Moroccan declaration of conformity	✓
China RoHS	✓
ECOLAB certificate	✓
cULus certificate	✓
IO-Link certificate	✓
Information according to Art. 3 of Data Act (Regulation EU 2023/2854)	✓

**DISPLAY AND ADJUSTMENT ELEMENTS**

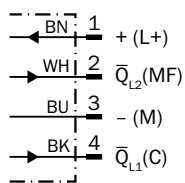


- ① LED blue
- ② indicator switching output mode
- ③ indicator distance mode
- ④ Teach-in button
- ⑤ LED yellow
- ⑥ LED green

**CONNECTION TYPE MALE CONNECTOR M8, 4-PIN**



**CONNECTION DIAGRAM CD-520**



**TRUTH TABLE PUSH-PULL: PNP/NPN - LIGHT SWITCHING Q<SUB>L2</SUB>**

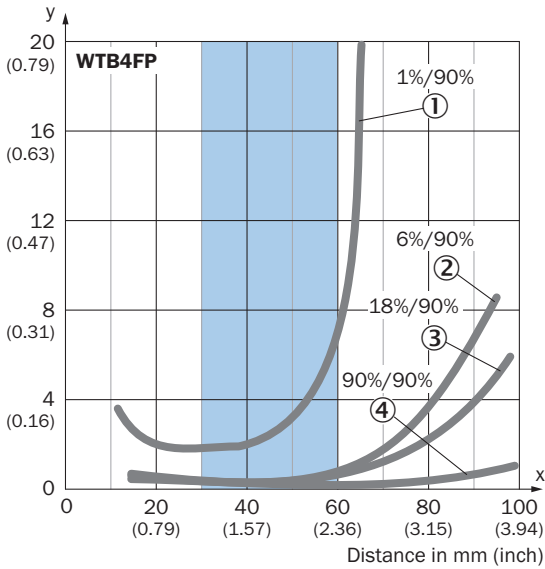
	Light switching Q <sub>L2</sub> (normally open (upper switch), normally closed (lower switch))	
	Object not present → Output LOW	Object present → Output HIGH
Light receive	✗	✔
Light receive indicator	✗	☀
Load resistance to L+	⚡	✗
Load resistance to M	✗	⚡

**TRUTH TABLE PUSH-PULL: PNP/NPN - LIGHT SWITCHING Q<sub>L1</sub>**

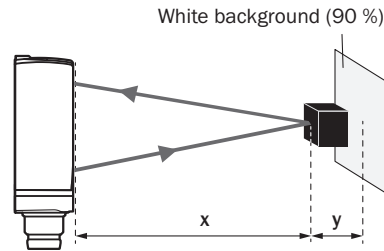
	Light switching Q <sub>L1</sub> (normally open (upper switch), normally closed (lower switch))	
	Object not present → Output LOW	Object present → Output HIGH
Light receive	✗	✓
Light receive indicator	✗	☀
Load resistance to L+	⚡	✗
Load resistance to M	✗	⚡

**CHARACTERISTIC CURVE**

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



Example:  
Safe suppression of the background



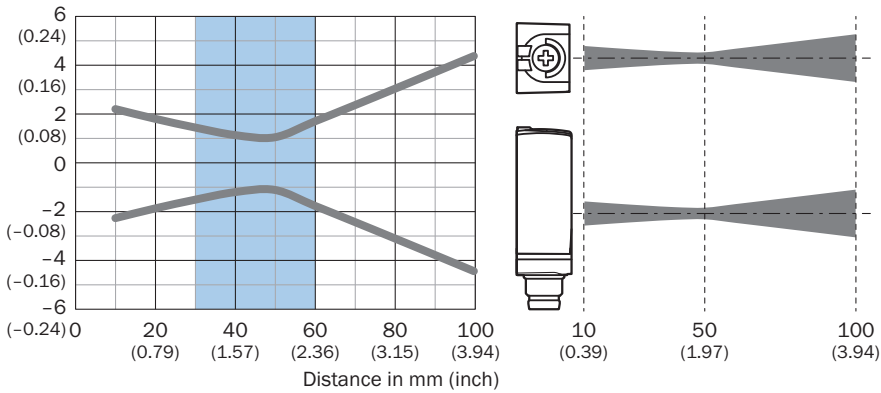
Black object (6 % remission)  
Set sensing range x = 40 mm  
Needed minimum distance to white background y = 0.5 mm

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

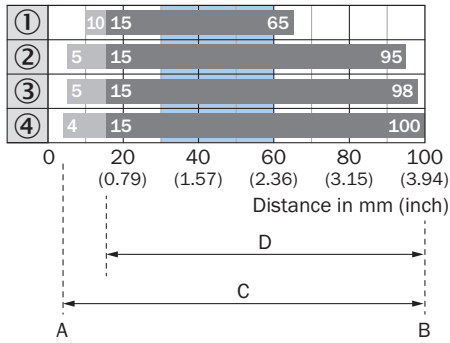
**LIGHT SPOT SIZE**

Dimensions in mm (inch)



Recommended sensing range for the best performance

**SENSING RANGE DIAGRAM**

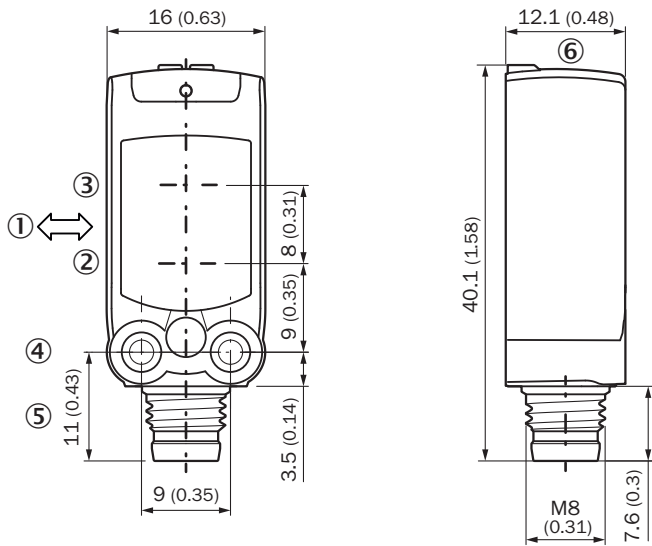


A = Sensing range min. in mm  
 B = Sensing range max. in mm  
 C = Viewing range  
 D = Adjustable switching threshold for background suppression

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)

- 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

Further information as well as suitable accessories, example applications and downloads such as CAD dimensional models, operating instructions and software can be found at [www.sick.com/1121418](http://www.sick.com/1121418)



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# SICK AT A GLANCE

SICK is a leading global technology company for intelligent sensors and integrated solutions in industrial automation. Our technologies set benchmarks, making your industrial processes more efficient, safer and more sustainable – both in logistics and manufacturing operations.

SICK combines sensor intelligence with industry expertise and certified consulting services. We provide the ideal foundation for scalable as well as tailor-made automation solutions and create added value along the entire value chain. Our close partnerships with our customers are more than just a promise: Together, we optimize productivity, improve quality, protect health and safety, and help build a sustainable future. All with empathy and trust.

Since 1946, we have been developing innovative technologies with passion and a pioneering spirit. With a global network in around 40 countries, SICK has a global presence and is always close by. The company's headquarters are located in Waldkirch near Freiburg, Germany. Our customers benefit from our understanding of both local and global requirements, which enables us to deliver tailor-made solutions

**SICK**  
Sensor Intelligence