



WTB4FP-2216R250A00

W4

PHOTOELECTRIC SENSORS

SICK
Sensor Intelligence.



Illustration may differ



Ordering information

Type	part no.
WTB4FP-2216R250A00	1121418

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

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
	Resolution	1 mm
	Repeatability	0,3 mm ... 1,5 mm ^{1) 2) 3)}
	Accuracy	Typ. 0.8 mm at 15 ... 60 mm distance ¹⁾

¹⁾ 6% ... 90% remission factor.
²⁾ Equivalent to 1 σ .
³⁾ See repeatability characteristic lines.

		Typ. 2.0 mm at 60 ... 100 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 2 mm (50 mm)
Maximum dispersion of the emitted beam around the standardized transmission axis (squint angle)		< +/- 1.5° (at Ta = +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.		
0.1 mm (At 50 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
Display		
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 indicatorStatic on: power onFlashing: IO-Link mode
LED yellow		Status of received light beamStatic on: object presentStatic off: object not present
Special applications		
Detecting flat objects, Detecting small objects		

¹⁾ 6% ... 90% remission factor.

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

Communication interface

IO-Link		✓ , IO-Link V1.1
Data transmission rate Cycle time Process data length Process data structure	COM2 (38,4 kBaud)	
	2.3 ms	
	16 Bit	
	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	0x8002C3
DeviceID DEC	8389315
Compatible master port type	A
SIO mode support	Yes

Electronics

Supply voltage U_B	10 V DC ... 30 V DC ¹⁾
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	≤ 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	$\leq 1,000 \mu s$ ²⁾
Repeatability (response time)	360 μs
Switching frequency	500 Hz ³⁾
Pin/Wire assignment	
Function of pin 4/black (BK)	Digital output, dark switching, object present $\rightarrow$ output Q_{L1} LOW; IO-Link communication C ⁴⁾
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, dark switching, object present $\rightarrow$ output Q_{L2} LOW ⁴⁾
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.

⁴⁾ 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	
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 Switch-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

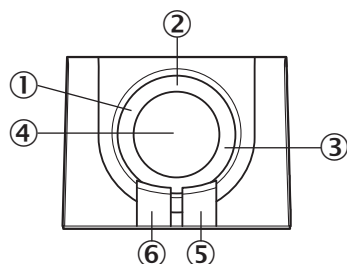
Certificates

EU declaration of conformity	✓
UK declaration of conformity	✓
ACMA declaration of conformity	✓
Moroccan declaration of conformity	✓
China-RoHS	✓
ECOLAB certificate	✓
cULus certificate	✓
EAC certificate / DoC	✓
IO-Link	✓

Classifications

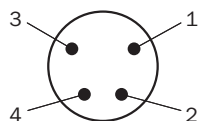
ECLASS 5.0	27270904
ECLASS 5.1.4	27270904
ECLASS 6.0	27270904
ECLASS 6.2	27270904
ECLASS 7.0	27270904
ECLASS 8.0	27270904
ECLASS 8.1	27270904
ECLASS 9.0	27270904
ECLASS 10.0	27270904
ECLASS 11.0	27270904
ECLASS 12.0	27270903
ETIM 5.0	EC002719
ETIM 6.0	EC002719
ETIM 7.0	EC002719
ETIM 8.0	EC002719
UNSPSC 16.0901	39121528

display and adjustment elements

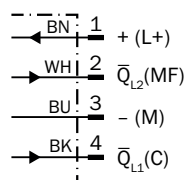


- ① LED blue
- ② indicator switching output mode
- ③ indicator distance mode
- ④ Teach-in button
- ⑤ LED yellow
- ⑥ LED green

Connection type Male connector M8, 4-pin



Connection diagram Cd-520



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

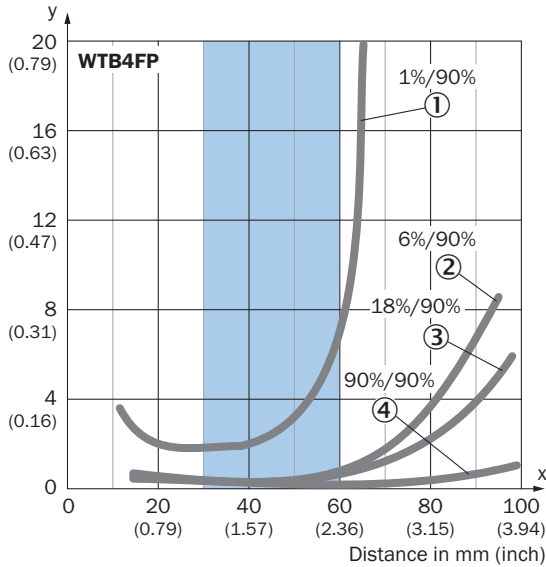
	Light switching Q _{L1} (normally open (upper switch), normally closed (lower switch))	
	Object not present → Output LOW	Object present → Output HIGH
Light receive	⊗	✓
Light receive indicator	⊗	☀
Load resistance to L+	⚡	⊗
Load resistance to M	⊗	⚡

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

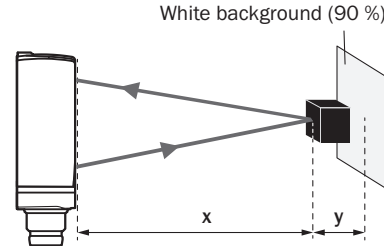
	Light switching Q _{L2} (normally open (upper switch), normally closed (lower switch))	
	Object not present → Output LOW	Object present → Output HIGH
Light receive	⊗	✓
Light receive indicator	⊗	☀
Load resistance to L+	⚡	⊗
Load resistance to M	⊗	⚡

Characteristic curve

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



Example:
Safe suppression of the background



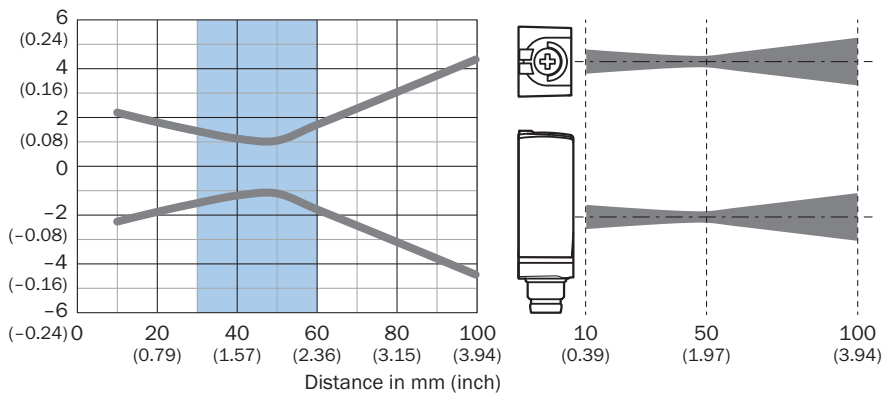
Black object (6 % remission)
Set sensing range $x = 40$ mm
Needed minimum distance to white background $y = 0.5$ mm

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

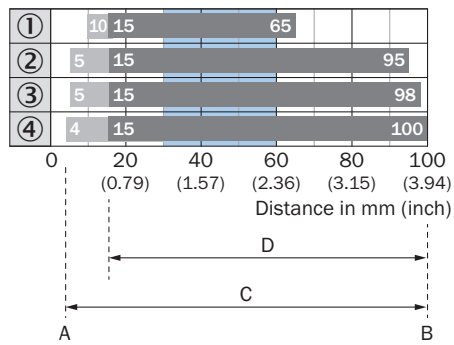
Light spot size

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

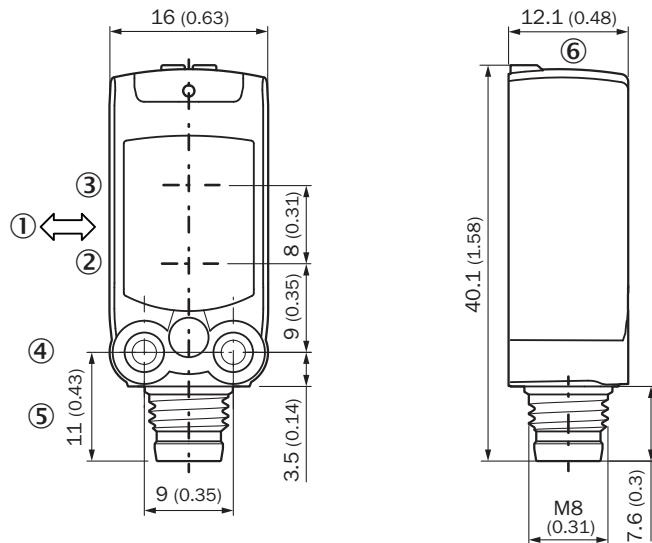
① ultra-black object, 1% remission factor

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

Recommended accessories

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

	Brief description	Type	part no.
Mounting systems			
	• Description: Mounting bracket for wall mounting • Material: Stainless steel • Details: Stainless steel 1.4571 • Items supplied: Mounting hardware included • Suitable for: W4S, W4F, W4S	BEF-W4-A	2051628
connectors and cables			
	• Connection type head A: Male connector, M8, 4-pin, straight, A-coded • Description: Unshielded • Connection systems: Screw-type terminals • Permitted cross-section: 0.14 mm² ... 0.5 mm²	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