



**WTB4SP-22167220A00**

W4

**PHOTOELECTRIC SENSORS**

**SICK**  
Sensor Intelligence.



## Ordering information

Type	part no.
WTB4SP-22167220A00	1139487

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

Illustration may differ



## Detailed technical data

### Features

<b>Functional principle</b>	Photoelectric proximity sensor
<b>Functional principle detail</b>	Background suppression, NarrowBeam
<b>Sensing range</b>	
Sensing range min.	4 mm
Sensing range max.	130 mm
Adjustable switching threshold for background suppression	10 mm ... 130 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%)	0.5 mm, At 70 mm distance
Recommended sensing range for the best performance	20 mm ... 90 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)	1.8 mm (70 mm)
Maximum dispersion of the emitted beam around the standardized transmission axis (squint angle)	< +/- 1.5° (at Ta = +23 °C)
<b>Focus position</b>	70 mm
<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 Ta = +25 °C

<b>Smallest detectable object (MDO) typ.</b>	0.1 mm (At 70 mm distance) Object with 90% remission factor (complies with standard white according to DIN 5033)	
<b>Adjustment</b>	Teach-Turn adjustment	BluePilot: 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 indicatorStatic on: power on/Flashing: IO-Link mode
	LED yellow	Status of received light beamStatic on: object presentStatic off: object not present
<b>Special features</b>	Pin2 pre-setting (MF): teach-in via cable	
<b>Special applications</b>	Detecting uneven, shiny objects, Detection of poorly remitting and tilted objects	

## Safety-related parameters

<b>MTTF<sub>D</sub></b>	1,404 years
<b>DC<sub>avg</sub></b>	0%

## 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> Bit 2 ... 15 = Current receiver level (live)
VendorID	26
DeviceID HEX	0x80034F
DeviceID DEC	8389455
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>
<b>Usage category</b>	DC-12 (According to EN 60947-5-2) DC-13 (According to EN 60947-5-2)
<b>Current consumption</b>	≤ 20 mA, without load. At U <sub>B</sub> = 24 V
<b>Protection class</b>	III
<b>Digital output</b>	
Number	2
Type	Push-pull: PNP/NPN
Switching mode	Light switching

<sup>1)</sup> Limit values.<sup>2)</sup> This switching output must not be connected to another output.

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	$\leq 500$ $\mu$ s
Repeatability (response time)	150 $\mu$ s
Switching frequency	1,000 Hz
<b>Pin/Wire assignment</b>	
Function of pin 4/black (BK)	Digital output, light switching, object present $\rightarrow$ output $Q_{L1}$ HIGH <sup>2)</sup>
	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 input, teach, HIGH active <sup>2)</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> This switching output must not be connected to another output.

## Mechanics

<b>Housing</b>	Rectangular
<b>Design detail</b>	Slim
<b>Dimensions (W x H x D)</b>	12.1 mm x 41.9 mm x 18.6 mm
<b>Connection</b>	Male connector M8, 4-pin
<b>Material</b>	
Housing	Plastic, VISTAL®
Front screen	Plastic, PMMA
Male connector	Plastic, VISTAL®
<b>Maximum tightening torque of the fixing screws</b>	0.4 Nm

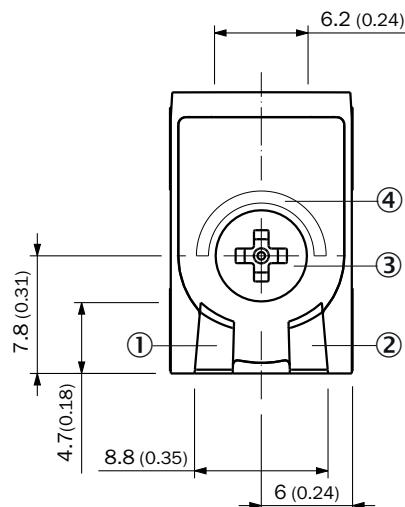
## Ambient data

<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: $\leq 50,000$ lx Sunlight: $\leq 50,000$ 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
<b>Smart Task</b>	
<b>Smart Task name</b>	Base logics
<b>Logic function</b>	Direct AND OR
<b>Timer function</b>	Deactivated Switch-on delay Off delay ON and OFF delay Impulse (one shot)
<b>Inverter</b>	Yes
<b>Switching frequency</b>	SIO Logic: 900 Hz <sup>1)</sup>
<b>Response time</b>	SIO Logic: 550 µs <sup>1)</sup>
<b>Repeatability</b>	SIO Logic: 200 µs <sup>1)</sup>
<b>Switching signal</b>	
Switching signal Q <sub>L1</sub>	Switching output
Switching signal Q̄ <sub>L1</sub>	Switching output
<sup>1)</sup> Use of Smart Task functions without IO-Link communication (SIO mode).	
<b>Diagnosis</b>	
<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
<b>Certificates</b>	
<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>cULus certificate</b>	✓
<b>Classifications</b>	
<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

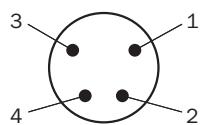
<b>ECLASS 9.0</b>	27270904
<b>ECLASS 10.0</b>	27270904
<b>ECLASS 11.0</b>	27270904
<b>ECLASS 12.0</b>	27270903
<b>ETIM 5.0</b>	EC002719
<b>ETIM 6.0</b>	EC002719
<b>ETIM 7.0</b>	EC002719
<b>ETIM 8.0</b>	EC002719
<b>UNSPSC 16.0901</b>	39121528

## display and adjustment elements

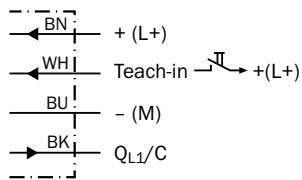


- ① LED green
- ② LED yellow
- ③ Teach-Turn adjustment
- ④ LED blue

Connection type Male connector M8, 4-pin



## Connection diagram Cd-509



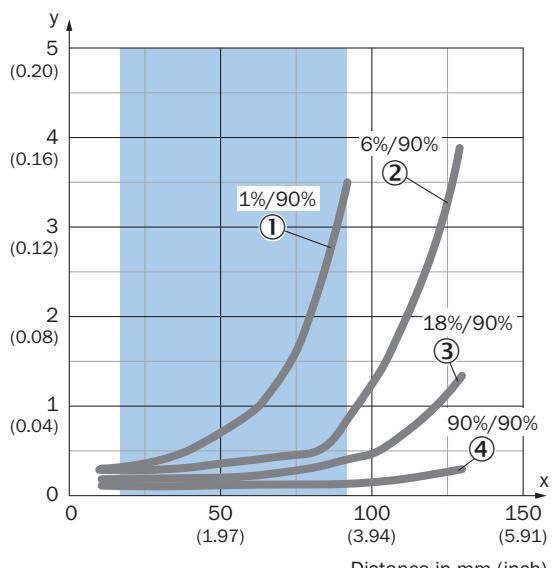
## Truth table Push-pull: PNP/NPN - light switching Q

	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	✗	⚠

The diagram illustrates the internal circuit of the sensor. It consists of a light source (LED) connected to + (L+) and a photo diode connected to -(M). The output Q is connected to the normally open (NO) contact of the photo switch. The normally closed (NC) contact of the photo switch is connected to the common terminal of the load. When an object is present, it blocks the light, causing the photo diode to conduct. This triggers the photo switch, which opens the NO contact and closes the NC contact. The output Q then goes high (Output HIGH). Without an object, the photo diode does not conduct, the photo switch remains open, and the output Q goes low (Output LOW).

## Characteristic curve

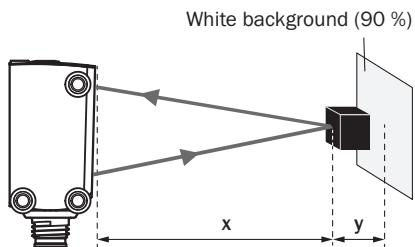
Minimum distance in mm (y) between the set sensing range and white background (90 % remission factor)



■ 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

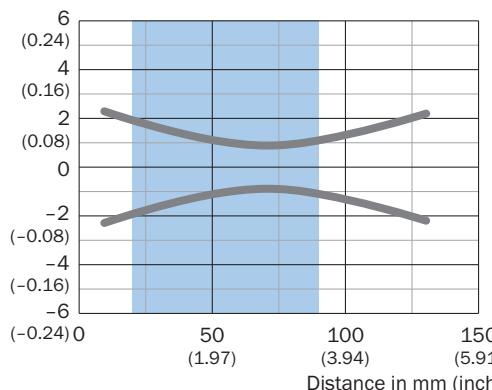
Example:  
Safe suppression of the background



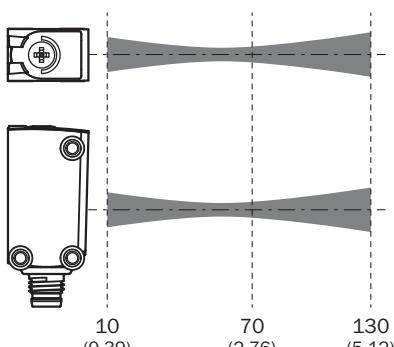
White background (90 %)  
Black object (6 % remission factor)  
Set sensing range  $x = 80$  mm  
Needed minimum distance to white background  $y = 0.5$  mm

## Light spot size

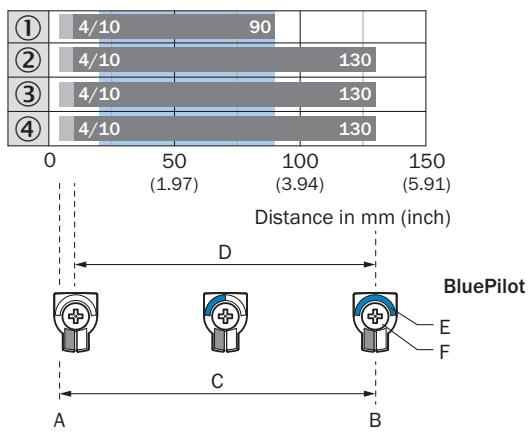
Dimensions in mm (inch)



■ Recommended sensing range for the best performance



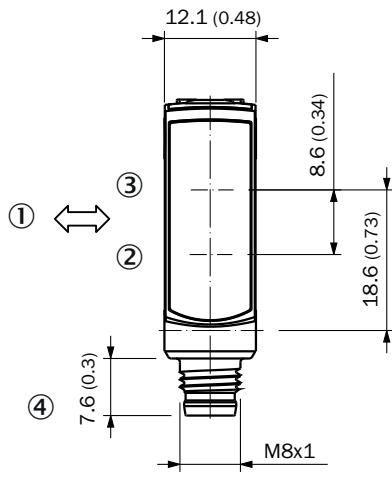
### Sensing range diagram



Recommended sensing range for the best performance

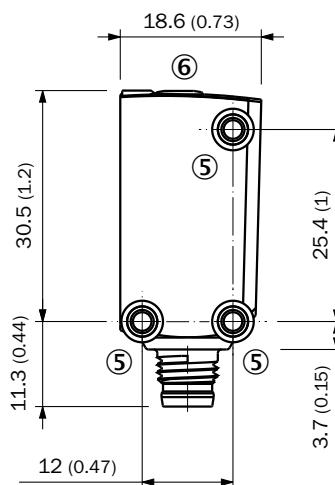
1	Ultra-black object, 1% remission factor
2	Black object, 6% remission factor
3	Gray object, 18% remission factor
4	White object, 90% remission factor
A	Sensing range min. in mm
B	Sensing range max. in mm
C	Field of view
D	Adjustable switching threshold for background suppression
E	Sensing range indicator
F	Teach-Turn adjustment

### Dimensional drawing, sensor



Dimensions in mm (inch)

- ① Standard direction of the material being detected
- ② Center of optical axis, receiver



- ③ Center of optical axis, sender
- ④ Connection
- ⑤ M3 mounting hole
- ⑥ display and adjustment elements

## 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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