



WTB4FT-22161120A00

W4

PHOTOELECTRIC SENSORS

SICK
Sensor Intelligence.

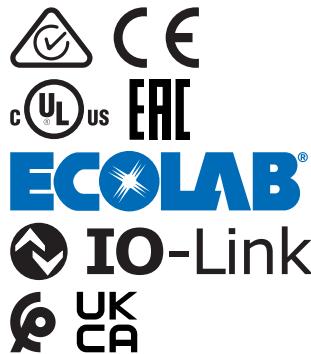


Ordering information

Type	part no.
WTB4FT-22161120A00	1105435

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

Illustration may differ



Detailed technical data

Features

Functional principle	Photoelectric proximity sensor
Functional principle detail	Background suppression, DoubleLine
Sensing range	
Sensing range min.	7 mm
Sensing range max.	120 mm
Adjustable switching threshold for background suppression	15 mm ... 120 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%)	1 mm, at a distance of 50 mm
Recommended sensing range for the best performance	30 mm ... 80 mm
Emitted beam	
Light source	PinPoint LED
Type of light	Visible red light
Shape of light spot	Line-shaped, two parallel line-shaped light spots
Light spot size (distance)	1.2 mm x 17 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 $T_a = +25^\circ\text{C}$
Smallest detectable object (MDO) typ.		1 mm (At 50 mm distance (object with 90% remission (complies with standard white according to DIN 5033)))
Adjustment		
	Teach-Turn adjustment	BluePilot: For setting the sensing range
	IO-Link	For configuring the sensor parameters and Smart Task functions
Display		
	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
Special applications		Detecting flat objects, Detecting objects wrapped in film, Detecting perforated objects, Detecting uneven, shiny objects

Safety-related parameters

MTTF_D	661 years
DC_{avg}	0 %
T_M (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	Bit 0 = switching signal Q _{L1} Bit 1 = switching signal Q _{L2} Bit 2 ... 15 = Current receiver level (live)
VendorID	26
DeviceID HEX	0x80024D
DeviceID DEC	8389197
Compatible master port type	A
SIO mode support	Yes

Electronics

Supply voltage U_B	10 V DC ... 30 V DC ¹⁾
Ripple	$\leq 5 \text{ V}_{\text{pp}}$
Usage category	DC-12 (According to EN 60947-5-2) DC-13 (According to EN 60947-5-2)
Current consumption	$\leq 25 \text{ mA}$, without load. At $U_B = 24 \text{ V}$

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.

Protection class	III
Digital output	
Number	2 (Complementary)
Type	Push-pull: PNP/NPN
Switching mode	Light/dark switching
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	$\leq 1,000$ μ s ²⁾
Repeatability (response time)	240 μ s
Switching frequency	500 Hz ³⁾
Pin/Wire assignment	
Function of pin 4/black (BK)	Digital output, light switching, object present → output Q_{L1} HIGH; 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 → output \bar{Q}_{L1} 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
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: 500 µs ¹⁾ IOL: 550 µs ²⁾
Switching signal	
Switching signal Q _{L1}	Switching output
Switching signal Ō _{L1}	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

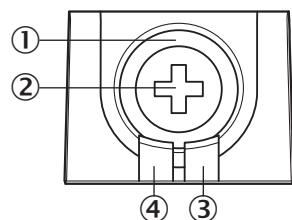
EU declaration of conformity	✓
UK declaration of conformity	✓
ACMA declaration of conformity	✓
Moroccan declaration of conformity	✓

China-RoHS	✓
ECOLAB certificate	✓
cULus certificate	✓
EAC certificate / DoC	✓
IO-Link	✓

Classifications

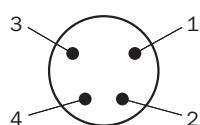
ECLASS 5.0	27270904
ECLASS 5.1.4	27270904
ECLASS 6.0	27270904
ECLASS 6.2	27270904
ECLASS 7.0	27270904
ECLASS 8.0	27270904
ECLASS 8.1	27270904
ECLASS 9.0	27270904
ECLASS 10.0	27270904
ECLASS 11.0	27270904
ECLASS 12.0	27270903
ETIM 5.0	EC002719
ETIM 6.0	EC002719
ETIM 7.0	EC002719
ETIM 8.0	EC002719
UNSPSC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

display and adjustment elements

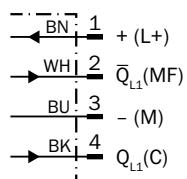


- ① LED blue
- ② Teach-Turn adjustment
- ③ LED yellow
- ④ LED green

Connection type Male connector M8, 4-pin



Connection diagram Cd-490



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

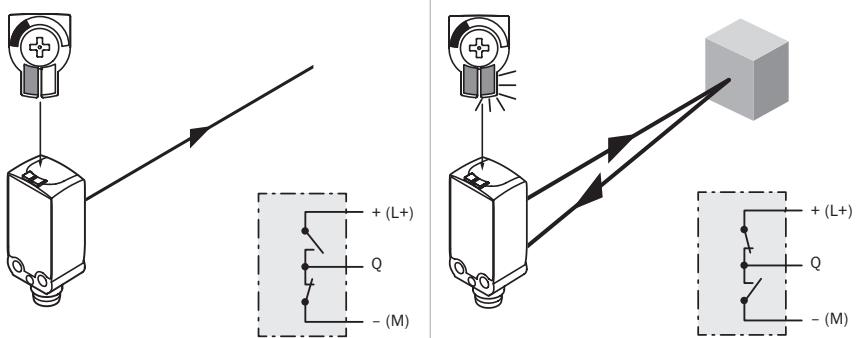
Dark switching \bar{Q} (normally closed (upper switch), normally open (lower switch))		
	Object not present → Output HIGH	Object present → Output LOW
Light receive	✗	✓
Light receive indicator	✗	✗
Load resistance to L+	✗	⚠
Load resistance to M	⚠	✗

Diagram illustrating the internal circuit of the photoelectric sensor. The circuit consists of a light source (represented by a '+' sign) and a receiver (represented by a '-' sign). The output is labeled \bar{Q} .

Diagram illustrating the sensor's operation when an object is present. Light from the source is blocked by the object, causing the receiver to trigger. The output is labeled \bar{Q} .

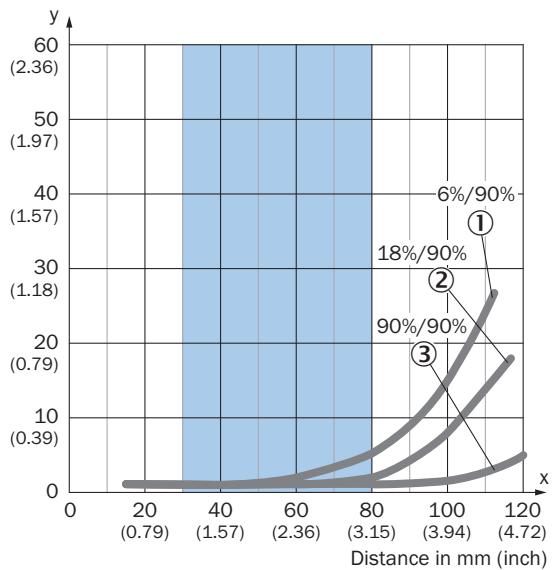
Truth table Push-pull: PNP/NPN - light switching Q

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

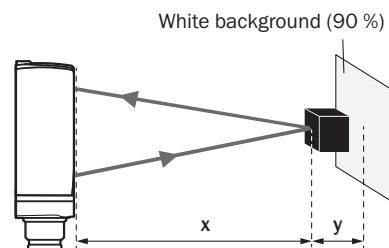
Minimum distance in mm (y) between the set sensing range and white background (90 % remission)



■ 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

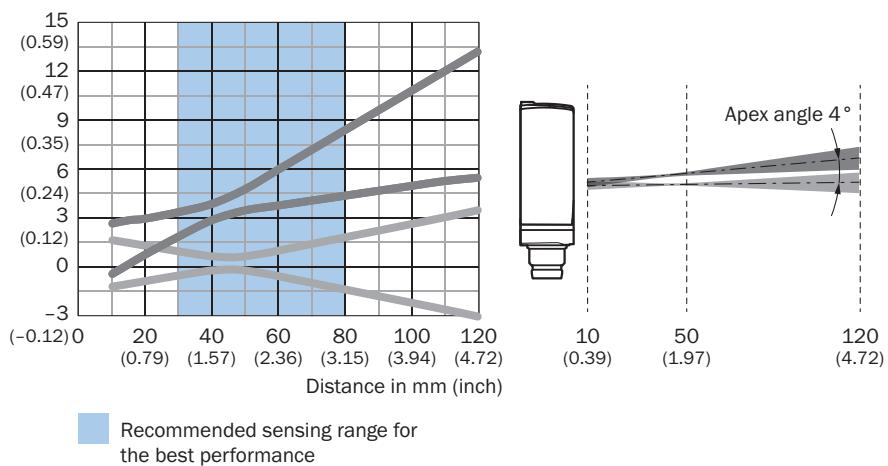
Example:
Safe suppression of the background



White background (90 %)
 Black object (6 % remission)
 Set sensing range $x = 80$ mm
 Needed minimum distance to white background $y = 5$ mm

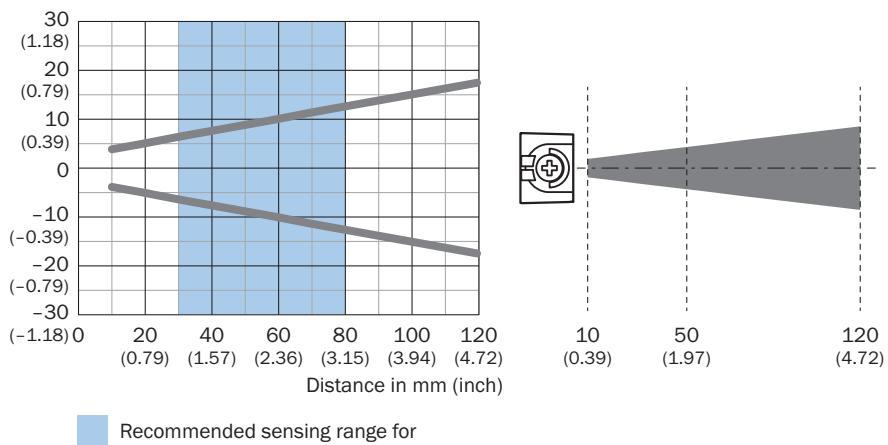
Light spot size Vertical

Dimensions in mm (inch)

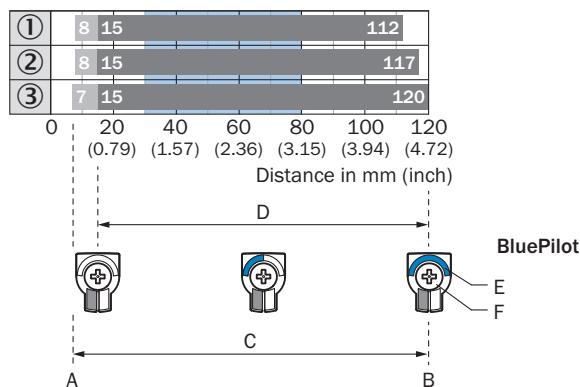


Light spot size Horizontal

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

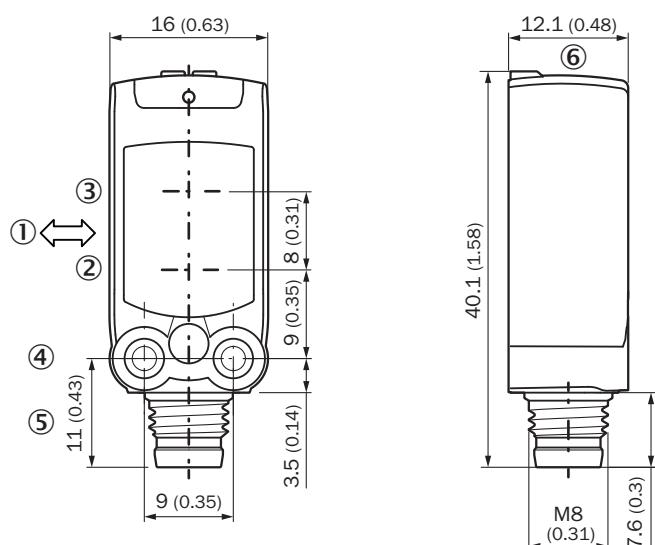
Blue shaded area = Recommended sensing range for the best performance

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

	Brief description	Type	part no.
Mounting systems			
	<ul style="list-style-type: none"> 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			
	<ul style="list-style-type: none"> 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:

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