



WTF4FD-31312220ZZZ

W4

PHOTOELECTRIC SENSORS

SICK
Sensor Intelligence.



Ordering information

Type	part no.
WTF4FD-31312220ZZZ	1113185

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

Illustration may differ



Detailed technical data

Features

Functional principle	Photoelectric proximity sensor
Functional principle detail	Foreground suppression
Sensing range	
Sensing range min.	0 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 object height at set sensing range in front of black background (6% remission factor)	0.8 mm, at a distance of 40 mm
Recommended sensing range for the best performance	30 mm ... 70 mm
Emitted beam	
Light source	PinPoint LED
Type of light	Visible red light
Shape of light spot	Rectangular, Consisting of two parallel light spots
Light spot size (distance)	2 mm x 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 $T_a = +25^\circ\text{C}$
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-Turn adjustment	BluePilot: For setting the sensing range
Display	
LED blue	BluePilot: sensing range indicator
LED green	Operating indicatorStatic on: power on
LED yellow	Status of received light beamStatic on: object presentStatic off: object not present
Special applications	Detecting flat objects

Safety-related parameters

MTTF_D	661 years
DC_{avg}	0 %
T_M (mission time)	20 years

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 $U_B = 24 \text{ V}$
Protection class	III
Digital output	
Number	1
Type	Push-pull: PNP/NPN
Switching mode	Light switching
Signal voltage PNP HIGH/LOW	Approx. $U_B - 2.5 \text{ V} / 0 \text{ V}$
Signal voltage NPN HIGH/LOW	Approx. $U_B / < 2.5 \text{ V}$
Output current I _{max.}	$\leq 100 \text{ mA}$
Circuit protection outputs	Reverse polarity protected Overcurrent protected Short-circuit protected
Response time	$\leq 650 \mu\text{s}$
Repeatability (response time)	300 μs ²⁾
Switching frequency	750 Hz ³⁾

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.

Pin/Wire assignment

Function of pin 4/black (BK)

Digital output, light switching, object present → output Q LOW⁴⁾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	Cable with connector M8, 3-pin, 110 mm
Connection detail	
Deep-freeze property	Do not bend below 0 °C
Conductor size	0.14 mm ²
Cable diameter	Ø 3.4 mm
Length of cable (L)	77 mm
Material	
Housing	Plastic, VISTAL®
Front screen	Plastic, PMMA
Cable	Plastic, PVC
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

Certificates

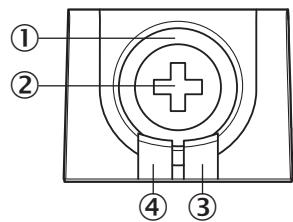
EU declaration of conformity	✓
UK declaration of conformity	✓
ACMA declaration of conformity	✓
Moroccan declaration of conformity	✓

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

Classifications

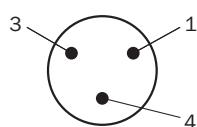
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ECLASS 5.1.4	27270904
ECLASS 6.0	27270904
ECLASS 6.2	27270904
ECLASS 7.0	27270904
ECLASS 8.0	27270904
ECLASS 8.1	27270904
ECLASS 9.0	27270904
ECLASS 10.0	27270904
ECLASS 11.0	27270904
ECLASS 12.0	27270903
ETIM 5.0	EC002719
ETIM 6.0	EC002719
ETIM 7.0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

display and adjustment elements

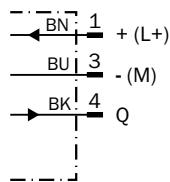


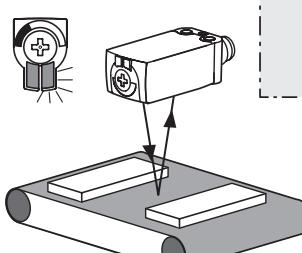
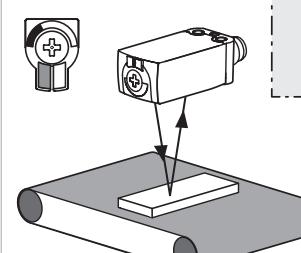
- ① LED blue
- ② Teach-Turn adjustment
- ③ LED yellow
- ④ LED green

Connection type Connector M8, 3-pin

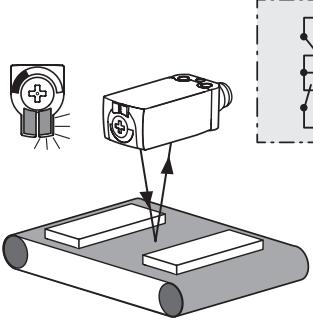
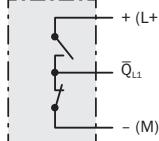
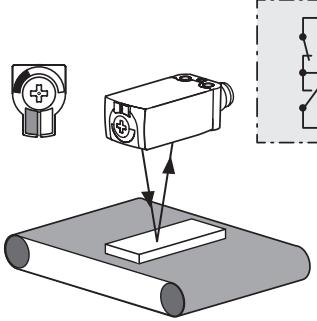
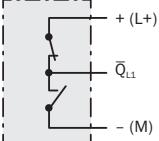


Connection diagram Cd-045

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

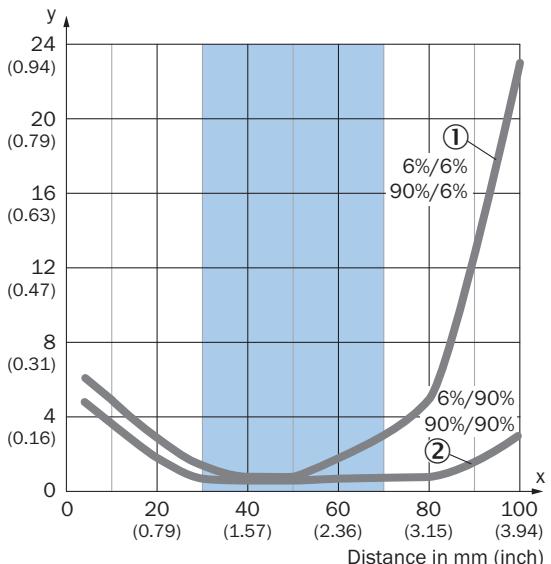
Light switching Q_{L1} (normally closed (upper switch), normally open (lower switch))		
	Object not present → Output HIGH	Object present → Output LOW
Light receive	✓	✗
Light receive indicator	💡	✗
Load resistance to L+	✗	⚡
Load resistance to M	⚡	✗
		

Truth table Push-pull: PNP/NPN – dark switching \bar{Q}_{L1}

		Dark switching \bar{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

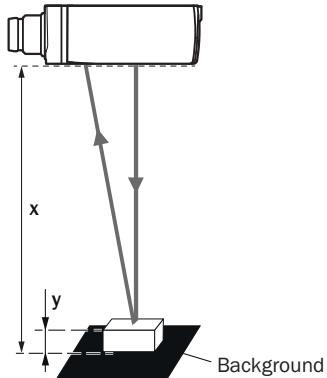
Minimum object height in mm (inch)



Recommended sensing range for the best performance

① Black background, 6% remission factor
 ② White background, 90% remission factor

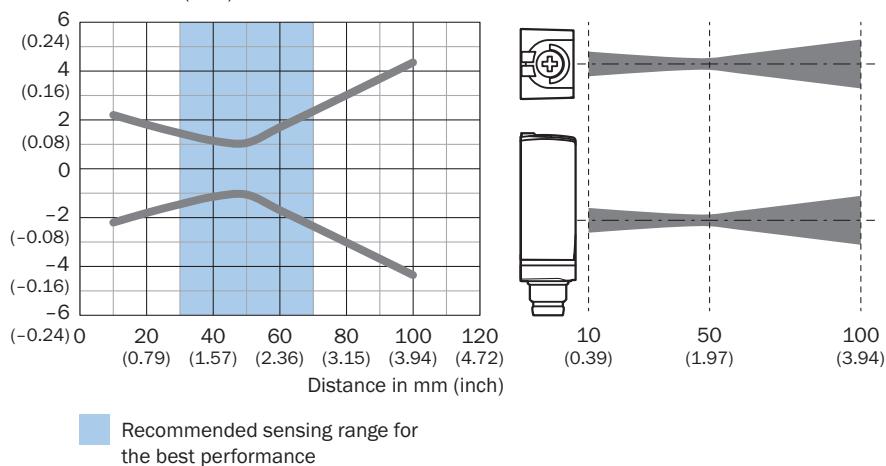
Example:
 Reliable detection of the object



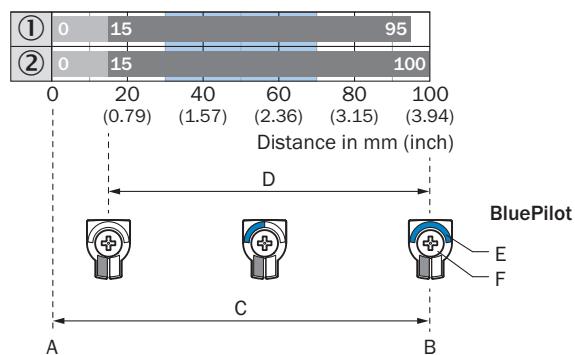
Black background (6 % remission factor)
 Distance of sensor to background x = 40 mm
 Required minimum object height y = 0.8 mm
 For all objects regardless of their colors

Light spot size

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 foreground suppression

E = Sensing range indicator

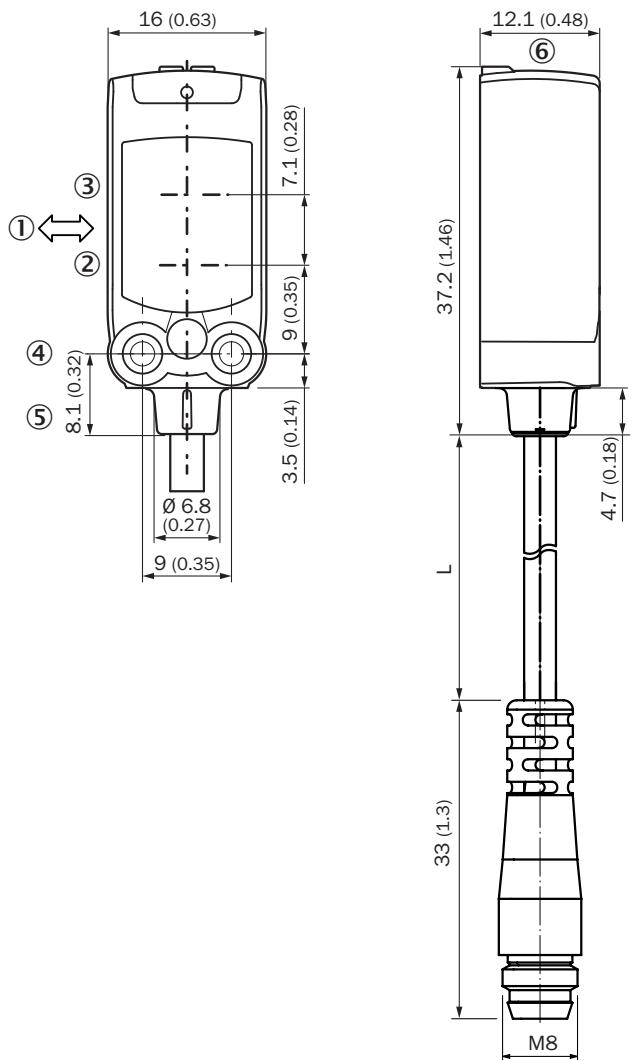
F = Teach-Turn adjustment

Recommended sensing range for the best performance

① Black background, 6% remission factor

② White background, 90% remission factor

Dimensional drawing



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: Female connector, M8, 3-pin, straight, A-coded Connection type head B: Flying leads Signal type: Sensor/actuator cable Cable: 5 m, 3-wire, PVC Description: Sensor/actuator cable, unshielded Application: Zones with chemicals, Uncontaminated zones 	YF8U13-050VA1XLEAX	2095884
	<ul style="list-style-type: none"> Connection type head A: Male connector, M8, 3-pin, straight, A-coded Description: Unshielded Connection systems: Screw-type terminals Permitted cross-section: 0.14 mm² ... 0.5 mm² 	STE-0803-G	6037322

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