



DATA SHEET

WTF4FD-84161220A00

W4
Photoelectric sensors

SICK

Sensor Intelligence

PHOTOELECTRIC SENSORS

WT-
F4FD-84161220A00

ORDERING INFORMATION

Type	part no.
WTF4FD-84161220A00	1133355

Further device versions and accessories at 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	Point-shaped, 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 T ₀ = +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-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 indicator Static on: power on Flashing: IO-Link mode
	LED yellow	Status of received light beam Static on: object present Static 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

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 ₁
		Bit 1 = switching signal Q ₂
		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	≤ 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

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. $U_B - 2.5 \text{ V} / 0 \text{ V}$
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)	$300 \mu\text{s}$ ²⁾
Switching frequency	750 Hz ³⁾
Pin/Wire assignment	
Function of pin 4/black (BK)	Digital output, dark switching, object present → output \bar{Q}_L 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, light switching, object present → output Q_L 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	Cable with M12 male connector, 4-pin, 182 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)	140 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: $\leq 50,000 \text{ lx}$ Sunlight: $\leq 50,000 \text{ lx}$
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: 700 Hz ¹⁾ IOL: 700 Hz ²⁾
Response time	SIO Logic: 700 µs ¹⁾ IOL: 700 µs ²⁾
Repeatability	SIO Logic: 350 µs ¹⁾ IOL: 400 µs ²⁾
Switching signal	Switching signal Q_{L1} Switching output Switching signal \bar{Q}_{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.

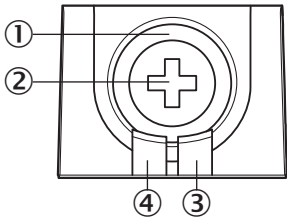
DIAGNOSIS

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

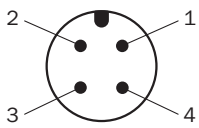
EU declaration of conformity	✓
UK declaration of conformity	✓
ACMA declaration of conformity	✓
Moroccan declaration of conformity	✓
China RoHS	✓
ECOLAB certificate	✓
cULus certificate	✓
IO-Link certificate	✓
Information according to Art. 3 of Data Act (Regulation EU 2023/2854)	✓

DISPLAY AND ADJUSTMENT ELEMENTS

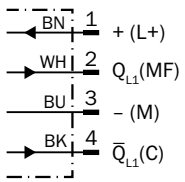


- ① LED blue
- ② Teach-Turn adjustment
- ③ LED yellow
- ④ LED green

CONNECTION TYPE M12 MALE CONNECTOR, 4-PIN



CONNECTION DIAGRAM CD-503



TRUTH TABLE PUSH-PULL: PNP/NPN - DARK SWITCHING \bar{Q}_{L1}

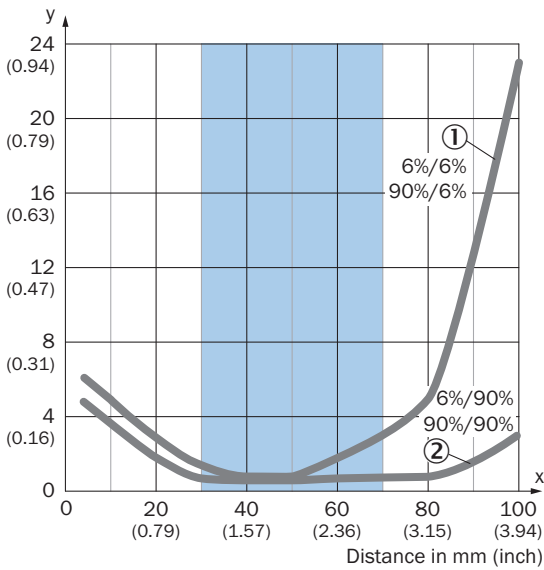
	Dark switching \bar{Q}_{L1} (normally open (upper switch), normally closed (lower switch))	
	Object not present → Output LOW	Object present → Output HIGH
Light receive	✔	✘
Light receive indicator	☀	✘
Load resistance to L+	⚡	✘
Load resistance to M	✘	⚡

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	⚡	✗

CHARACTERISTIC CURVE

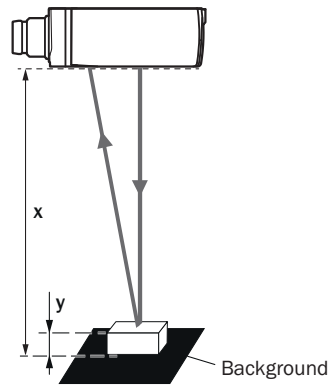
Minimum object height in mm (inch)



Recommended sensing range for the best performance

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

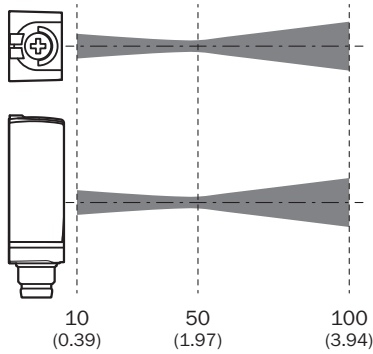
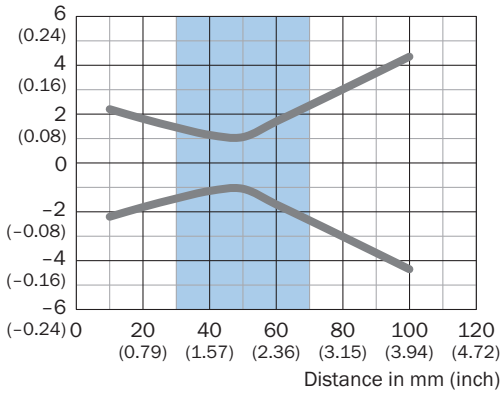
Example:
Reliable detection of the object



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

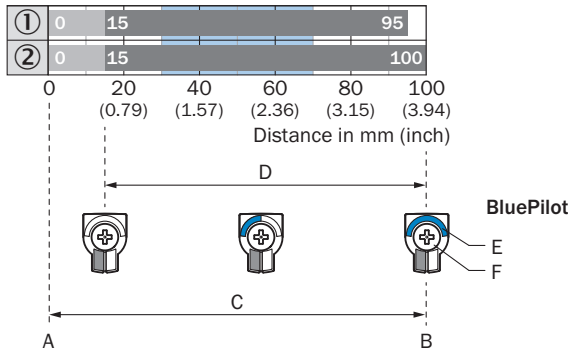
LIGHT SPOT SIZE

Dimensions in mm (inch)



Recommended sensing range for the best performance

SENSING RANGE DIAGRAM

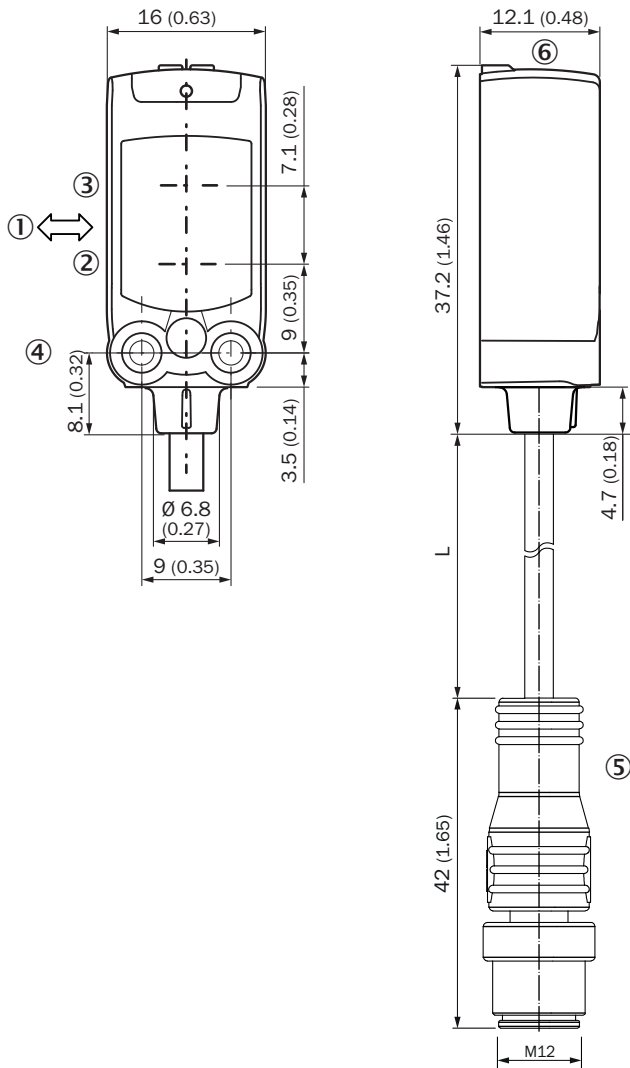


- A = Sensing range min. in mm
- B = Sensing range max. in mm
- C = Viewing range
- D = Adjustable switching threshold for foreground suppression
- E = Sensing range indicator
- F = Teach-Turn adjustment

Recommended sensing range for the best performance

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

DIMENSIONAL DRAWING



Dimensions in mm (inch)

For length of cable (L), see technical data

- 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 Cable with M12 male connector
- 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/1133355



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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

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