



DATA SHEET

WTS12F-24161120A00ZDZZZZZZZZZZZ1

W12
Photoelectric sensors

SICK Sensor Intelligence



Illustration may differ

PHOTOELECTRIC SENSORS

WTS12F-
24161120A00ZDZZZZZZZZ1

ORDERING INFORMATION

Type	part no.
WTS12F-24161120A00ZDZZZZZZZZ1	1149429

Further device versions and accessories at www.sick.com/W12



DETAILED TECHNICAL DATA

FEATURES

Functional principle		Photoelectric proximity sensor
Functional principle detail		Background suppression, TwinEye technology
Sensing range		
	Sensing range min.	10 mm
	Sensing range max.	750 mm
Adjustable switching threshold for background suppression		40 mm ... 750 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%)		8 mm, at a distance of 300 mm
Recommended sensing range for the best performance		50 mm ... 400 mm
Emitted beam		
	Light source	PinPoint Pro LED
	Type of light	Visible red light
	Shape of light spot	Rectangular
	Light spot size (distance)	10 mm x 8 mm (300 mm)
Maximum dispersion of the emitted beam around the standardized transmission axis (squint angle)		< +/- 1.0° (at T ₀ = +23 °C)
Focus position		300 mm
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.		
		0.3 mm, at a distance of 200 mm
		Object with 90% remission factor (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 uneven, shiny objects

SAFETY-RELATED PARAMETERS

MTTF _D	1,208 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	8 Bit
Process data structure	Bit 0 = switching signal Bit 1 = switching signal Q _{L1} Bit 2 = switching signal Q _{L2} Bit 3 ... 7 = empty
VendorID	26
DeviceID HEX	0x80039B
DeviceID DEC	8389531
Compatible master port type	A
SIO mode support	Yes

ELECTRONICS

Supply voltage U _B	10 V DC ... 30 V DC ¹⁾
Ripple	≤ 5 V
Usage category	DC-12 (According to EN 60947-5-2) DC-13 (According to EN 60947-5-2)
Current consumption	≤ 40 mA, without load. At U _B = 24 V
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	≤ 330 μs
Repeatability (response time)	100 μs

¹⁾ Limit values.

²⁾ This switching output must not be connected to another output.

Switching frequency		1,500 Hz
Pin/Wire assignment		
	Function of pin 4/black (BK)	Digital output, dark switching, object present → output $\bar{Q}_{L1}$ HIGH ²⁾ 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 output, light switching, object present → output Q_{L1} LOW ²⁾
	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⁾ This switching output must not be connected to another output.

MECHANICS

Housing	Rectangular	
Dimensions (W x H x D)	15.6 mm x 49.5 mm x 43.1 mm	
Connection	Male connector M12, 4-pin	
Material		
	Housing	Metal, zinc diecast
	Front screen	Plastic, PMMA
	Male connector	Plastic, VISTAL®
Weight	Approx. 77 g	
Maximum tightening torque of the fixing screws	1.4 Nm	

AMBIENT DATA

Enclosure rating	IP66 (EN 60529) IP67 (EN 60529) IP69 (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	50 g, 11 ms (25 positive and 25 negative shocks along X, Y, Z axes, 150 total shocks (EN60068-2-27))
Vibration resistance	10 Hz ... 2,000 Hz (Amplitude 0.5 mm / 10 g, 20 sweeps per axis, for X, Y, Z axes, 1 octave/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: 1300 Hz ¹⁾

¹⁾ Use of Smart Task functions without IO-Link communication (SIO mode).
²⁾ Use of Smart Task functions with IO-Link communication function.

	IOL: 1200 Hz ²⁾	
Response time	SIO Logic: 390 µs ¹⁾ IOL: 420 µs ²⁾	
Repeatability	SIO Logic: 140 µs ¹⁾ IOL: 170 µs ²⁾	
Switching signal	Switching signal Q_{Li}	Switching output
	Switching signal $\bar{Q}_{Li}$	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.

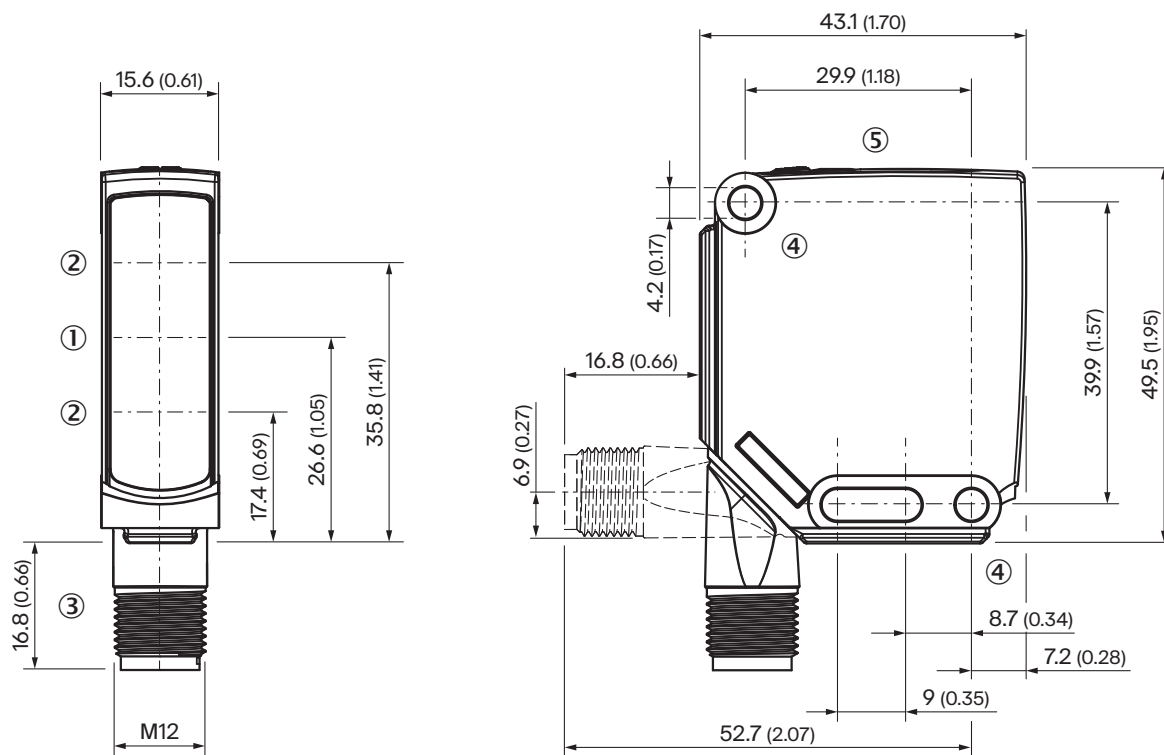
DIAGNOSIS

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	✓
China Compulsory Product Certification (CCC) exempt	✓
ECOLAB certificate	✓
cULus certificate	✓
IO-Link certificate	✓
Photobiological safety (IEC EN 62471)	✓
Information according to Art. 3 of Data Act (Regulation EU 2023/2854)	✓

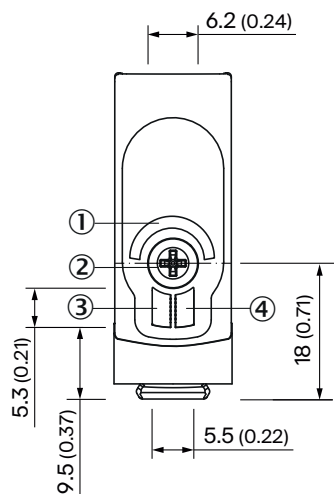
DIMENSIONAL DRAWING, SENSOR



Dimensions in mm (inch)

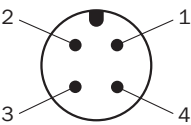
- ① Center of optical axis, sender
- ② Center of optical axis, receiver
- ③ Connection
- ④ Mounting hole, Ø 4.2 mm
- ⑤ display and adjustment elements

DISPLAY AND ADJUSTMENT ELEMENTS

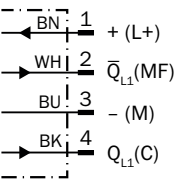


- ① LED blue
- ② Teach-Turn adjustment
- ③ LED green
- ④ LED yellow

CONNECTION TYPE M12 MALE CONNECTOR, 4-PIN



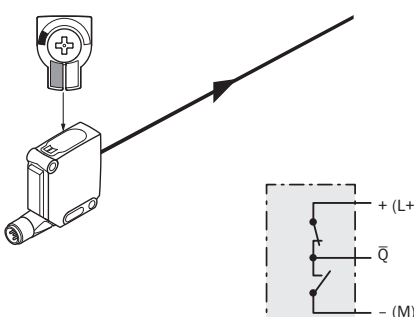
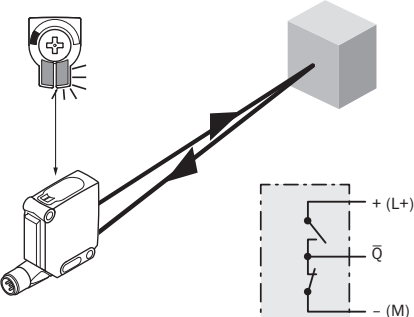
CONNECTION DIAGRAM CD-490



TRUTH TABLE PUSH-PULL: PNP/NPN - LIGHT SWITCHING Q

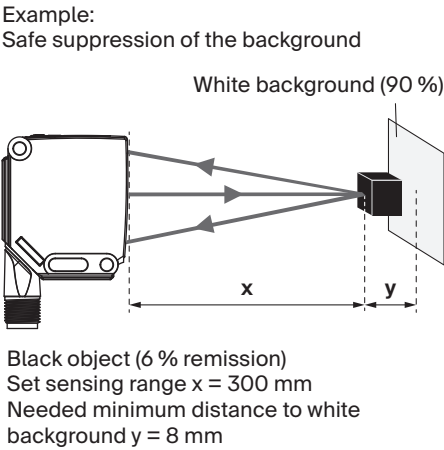
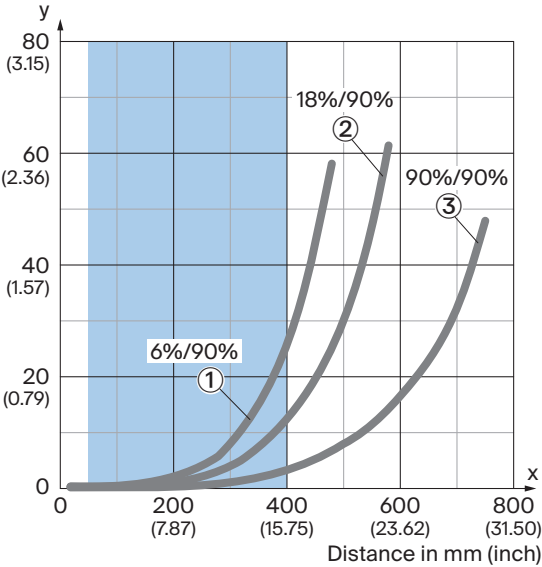
	Light switching Q (normally open (upper switch), normally closed (lower switch))	
	Object not present → Output LOW	Object present → Output HIGH
Light receive	✗	✓
Light receive indicator	✗	💡
Load resistance to L+	⚡	✗
Load resistance to M	✗	⚡

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	⚡	✗
		

CHARACTERISTIC CURVE

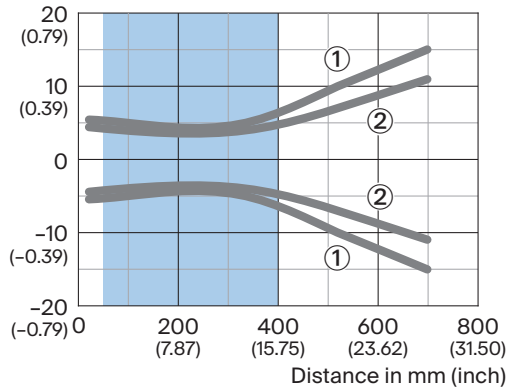
Minimum distance in mm (y) between the set sensing range and white background (90 % remission)



- Recommended sensing range for the best performance
- ① Sensing range on black, 6% remission factor
 - ② Sensing range on gray, 18% remission factor
 - ③ Sensing range on white, 90% remission factor

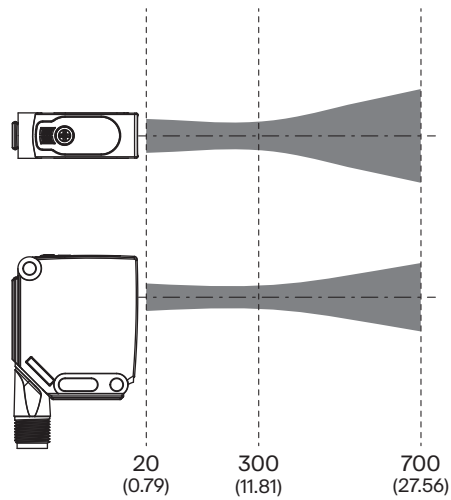
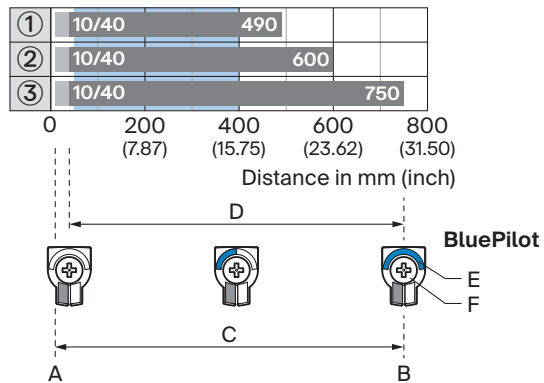
LIGHT SPOT SIZE

Dimensions in mm (inch)



Recommended sensing range for the best performance

- ① Light spot horizontal
② Light spot vertical

**SENSING RANGE DIAGRAM**

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 |
| 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 |

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/1149429



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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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