



DATA SHEET

WTB16P-X01

W16
Photoelectric sensors

SICK

Sensor Intelligence



Illustration may differ

PHOTOELECTRIC SENSORS

WTB16P-X01

ORDERING INFORMATION

Type	part no.
WTB16P-X01	1131851

Further device versions and accessories at www.sick.com/W16



DETAILED TECHNICAL DATA

FEATURES

Functional principle		Photoelectric proximity sensor
Functional principle detail		Background suppression
Sensing range		
	Sensing range min.	10 mm
	Sensing range max.	1,000 mm
Adjustable switching threshold for background suppression		100 mm ... 1,000 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%)		25 mm, at a distance of 400 mm
Recommended sensing range for the best performance		100 mm ... 400 mm
Emitted beam		
	Light source	PinPoint LED
	Type of light	Visible red light
	Shape of light spot	Point-shaped
	Light spot size (distance)	Ø 6 mm (500 mm)
Maximum dispersion of the emitted beam around the standardized transmission axis (squint angle)		< +/- 1.0° (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
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	Explosive areas

SAFETY-RELATED PARAMETERS

MTTF _D	626 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 = empty
VendorID	26
DeviceID HEX	0x80015C
DeviceID DEC	8388956
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	≤ 30 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 and short-circuit protected Response time ≤ 500 μs ²⁾ Repeatability (response time) 150 μs Switching frequency 1,000 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 Q _{L1} LOW ⁴⁾ Function of pin 2/white (WH) – detail The pin 2 function of the sensor can be configured

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.

	Additional possible settings via IO-Link
¹⁾ Limit values.	
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³⁾ With light/dark ratio 1:1.	
⁴⁾ This switching output must not be connected to another output.	

MECHANICS

Housing	Rectangular
Dimensions (W x H x D)	26.7 mm x 81.5 mm x 55 mm
Connection	Cable with plug, M12, 4-pin, 318 mm
Connection detail	
Deep-freeze property	Do not bend below 0 °C
Conductor size	0.14 mm²
Cable diameter	Ø 4.8 mm
Length of cable (L)	270 mm
Length of male connector	48 mm
Bending radius	For flexible use > 12 x cable diameter
Bending cycles	1,000,000
Material	
Housing	Plastic, VISTAL®
Protective housing	Metal, Stainless steel V2A (1.4301)
Front screen	Plastic, PMMA
Cable	Plastic, PVC
Male connector	Plastic, VISTAL®
Weight	250 g
Maximum tightening torque of the fixing screws	2 Nm

AMBIENT DATA

Enclosure rating	IP66 (EN 60529) IP67 (EN 60529)
ATEX marking	ATEX II 3G Ex nA op is IIB T4 Gc X ATEX II 3D Ex tc IIIB T135°C Dc X In accordance with directive 2014/34 / EU
Ex area category	3D, 3G
Ambient operating temperature	-20 °C ... +50 °C
Ambient temperature, storage	-40 °C ... +75 °C
Shock resistance	50 g, 11 ms (25 positive and 25 negative shocks per axis, for X, Y, Z axes, 150 shocks in total (EN60068-2-27)) 50 g, 6 ms (5,000 positive and 5,000 negative shocks per axis, for X, Y, Z axes, 30,000 shocks in total (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

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

	Window Hysteresis
Timer function	Deactivated Switch-on delay Off delay ON and OFF delay Impulse (one shot)
Inverter	Yes
Switching frequency	SIO Logic: 800 Hz ¹⁾ IOL: 650 Hz ²⁾
Response time	SIO Logic: 600 µs ¹⁾ IOL: 750 µs ²⁾
Repeatability	SIO Logic: 300 µs ¹⁾ IOL: 400 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.

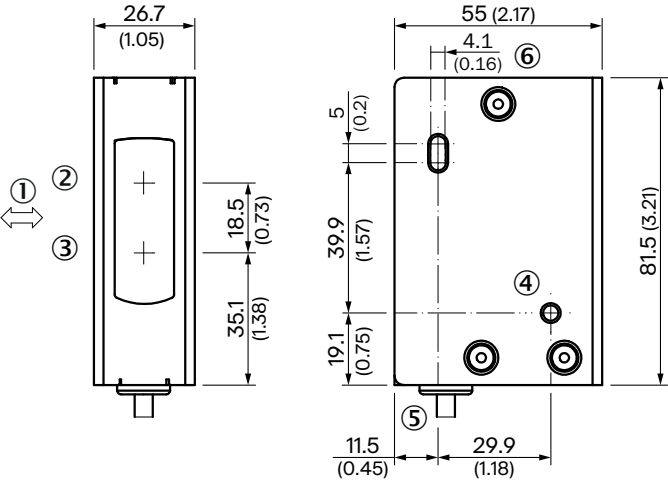
DIAGNOSIS

Device status	Yes
Quality of teach	Yes

CERTIFICATES

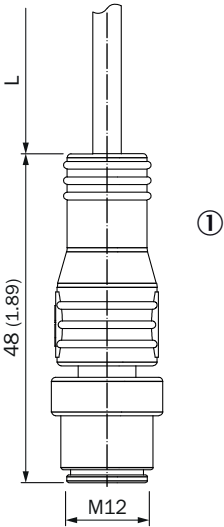
EU declaration of conformity	✓
UK declaration of conformity	✓
ACMA declaration of conformity	✓
Moroccan declaration of conformity	✓
China RoHS	✓
China Compulsory Product Certification (CCC) exempt	✓
cULus certificate	✓
Photobiological safety (DIN EN 62471) certificate	✓

DIMENSIONAL DRAWING



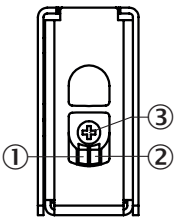
- Dimensions in mm (inch)
- ① Standard direction of the material being detected
 - ② Center of optical axis, sender
 - ③ Center of optical axis, receiver
 - ④ Mounting hole, Ø 5.2 mm
 - ⑤ Connection
 - ⑥ display and adjustment elements

DIMENSIONAL DRAWING, CONNECTION



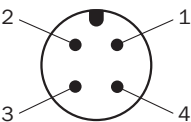
- Dimensions in mm (inch)
- For length of cable (L), see technical data
- ① Cable with M12 male connector

DISPLAY AND ADJUSTMENT ELEMENTS

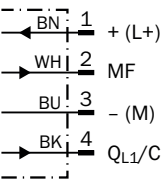


- ① LED indicator green
- ② LED indicator yellow
- ③ Teach-Turn adjustment

CONNECTION TYPE M12 MALE CONNECTOR, 4-PIN



CONNECTION DIAGRAM CD-390



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

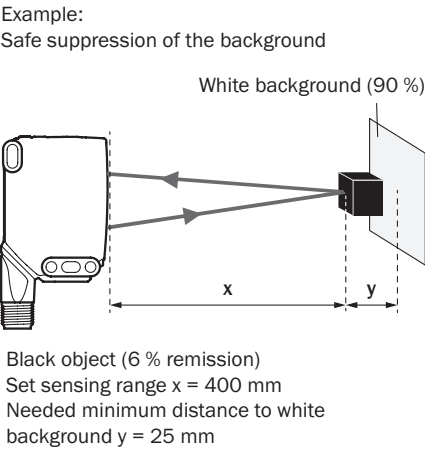
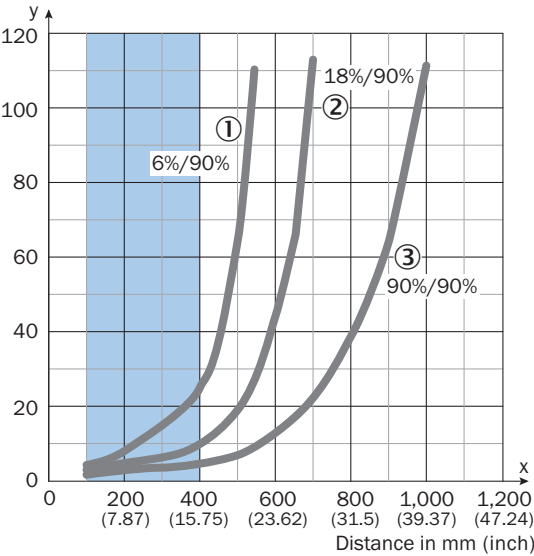
	Dark switching $\bar{Q}$ (normally closed (upper switch), normally open (lower switch))	
	Object not present → Output HIGH	Object present → Output LOW
Light receive	✗	✓
Light receive indicator	✗	☀
Load resistance to L+	✗	⚡
Load resistance to M	⚡	✗

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

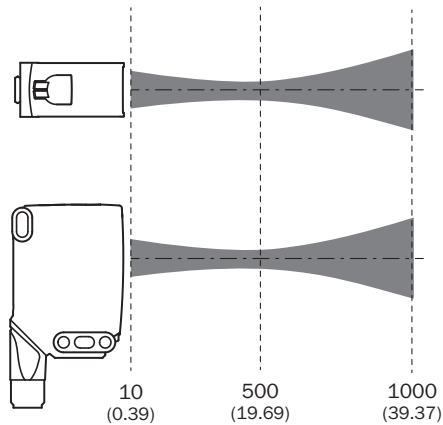
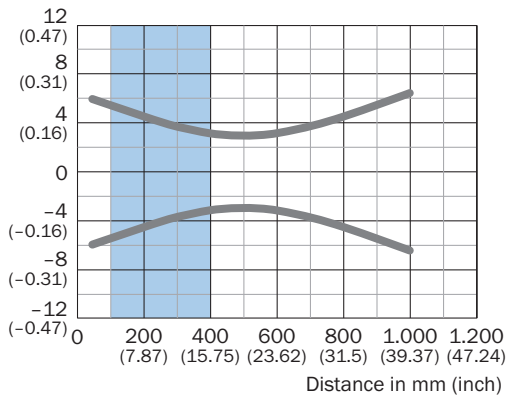
Minimum distance in mm (y) between the set sensing range and white background (90 % remission)



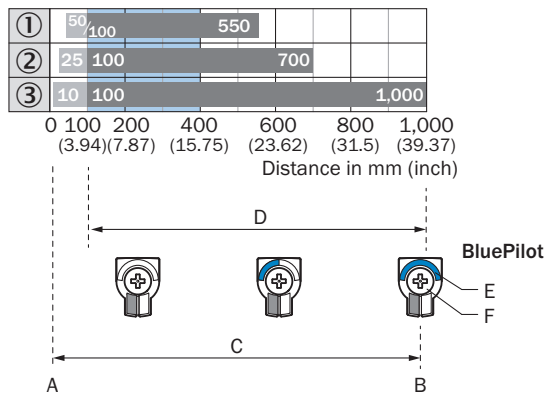
- Recommended sensing range for the best performance
- ① Black object, 6% remission factor
 - ② Gray object, 18% remission factor
 - ③ White object, 90% remission factor

LIGHT SPOT SIZE WTB16P-XXXXX1XX, WTB16P-XXXXXAXX

Dimensions in mm (inch)



Recommended sensing range for the best performance

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/1131851



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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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