



WTB16P-X01

W16

PHOTOELECTRIC SENSORS

SICK
Sensor Intelligence.



Ordering information

Type	part no.
WTB16P-X01	1131851

Other models and accessories → www.sick.com/W16

Illustration may differ



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 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 Ta = +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 indicatorStatic on: power onFlashing: IO-Link mode
	LED yellow	Status of received light beamStatic on: object presentStatic 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	✓, 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

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.

Circuit protection outputs	Reverse polarity protected Overcurrent and short-circuit protected
Response time	$\leq 500 \mu\text{s}$ 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 \rightarrow 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 \rightarrow 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
Dimensions (W x H x D)	26.7 mm x 81.5 mm x 55 mm
Connection	Cable with M12 male connector, 4-pin, 318 mm
Connection detail	
Deep-freeze property	Do not bend below 0 °C
Conductor size	0.14 mm ²
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 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 _{L1}	Switching output
Switching signal Q̄ _{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 status	Yes
Quality of teach	Yes

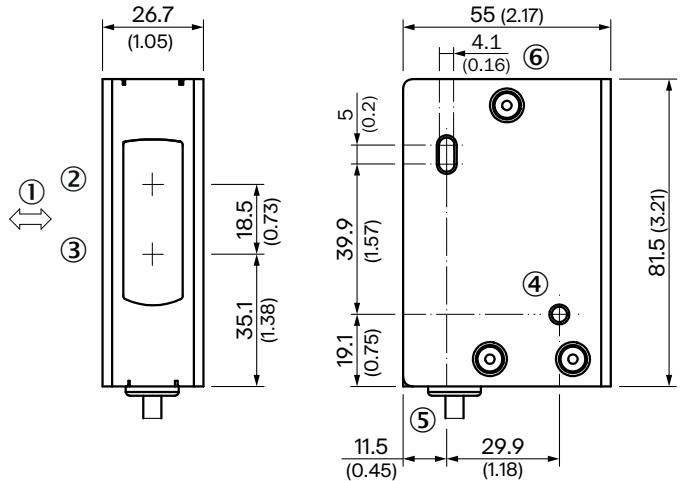
Certificates

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

Photobiological safety (DIN EN 62471) certificate



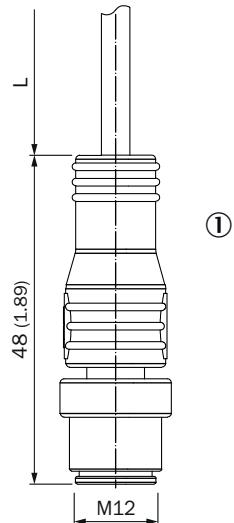
Dimensional drawing



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

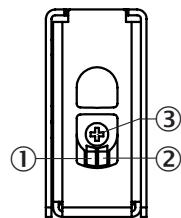
Dimensional drawing, connection



Dimensions in mm (inch)

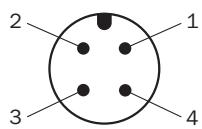
For length of cable (L), see technical data
① Cable with M12 male connector

display and adjustment elements

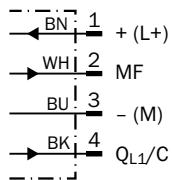


- ① LED indicator green
- ② LED indicator yellow
- ③ Teach-Turn adjustment

Connection type M12 male connector, 4-pin

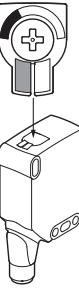


Connection diagram Cd-390

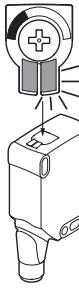


Truth table Push-pull: PNP/NPN - light switching Q

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	✗	⚡



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	⚡	✗



Light receive



Light receive indicator



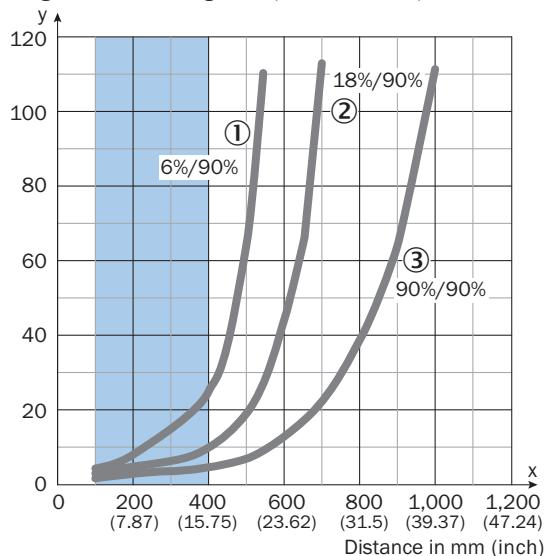
Load resistance to L+



Load resistance to M

Characteristic curve

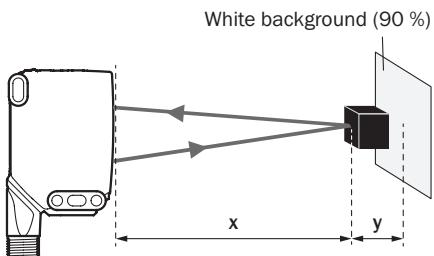
Minimum distance in mm (y) between the set sensing range and white background (90 % remission)



■ Recommended sensing range for the best performance

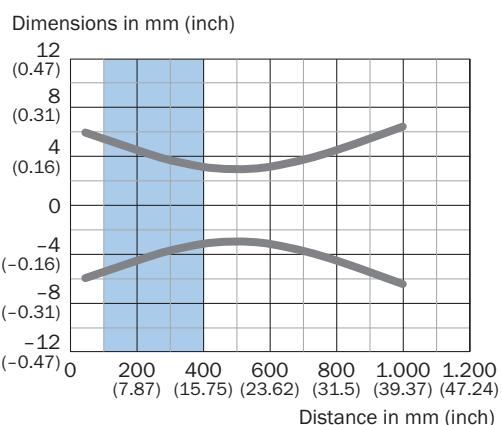
- ① Black object, 6% remission factor
- ② Gray object, 18% remission factor
- ③ White object, 90% remission factor

Example:
Safe suppression of the background

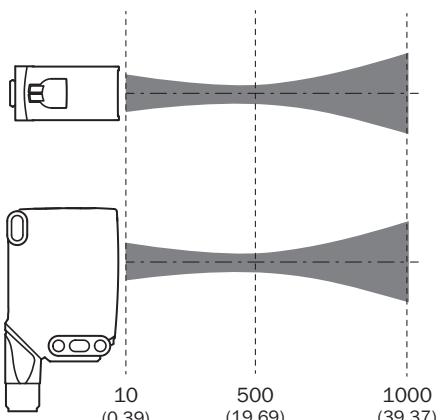


Black object (6 % remission)
Set sensing range $x = 400$ mm
Needed minimum distance to white background $y = 25$ mm

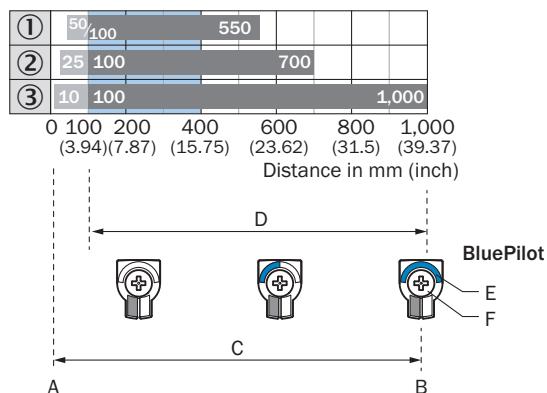
Light spot size WTB16P-xxxxx1xx, WTB16P-xxxxxAxx



■ 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

Recommended accessories

Other models and accessories → www.sick.com/W16

	Brief description	Type	part no.
Mounting systems			
	<ul style="list-style-type: none"> Description: Plate N02 for universal clamp bracket Material: Steel, zinc diecast Details: Zinc plated steel (sheet), Zinc die cast (clamping bracket) Items supplied: Universal clamp (5322626), mounting hardware Usable for: W4S-3 Glass, W10, W4SLG-3, W4S-3 Inox, W4S-3 Inox Glass, W9, W11-2, W12-3, W12-2 Laser, W12G, W12 Teflon, W16, W250, W250-2, PowerProx, W11G-2, TranspaTect, WTT12, UC12, P250, G6 Inox, W4S, W4SL-3V, W4SLG-3V, W4SL-3H 	BEF-KHS-N02	2051608
connectors and cables			
	<ul style="list-style-type: none"> Connection type head A: Female connector, M12, 4-pin, straight, A-coded Connection type head B: Flying leads Signal type: Sensor/actuator cable Cable: 5 m, 4-wire, PVC Description: Sensor/actuator cable, unshielded Application: Zones with chemicals, Uncontaminated zones 	YF2A14-050VB3XLEAX	2096235

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."

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