



DATA SHEET

WLA16P-X01

W16
Photoelectric sensors

SICK

Sensor Intelligence



Illustration may differ

PHOTOELECTRIC SENSORS

WLA16P-X01

ORDERING INFORMATION

Type	part no.
WLA16P-X01	1131853

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



DETAILED TECHNICAL DATA

FEATURES

Functional principle	Photoelectric retro-reflective sensor	
Functional principle detail	Without reflector minimum distance (autocollimation/coaxial optics)	
Sensing range		
Sensing range min.		0 m
Sensing range max.		10 m
Maximum distance range from reflector to sensor (operating reserve 1)		0 m ... 10 m
Recommended distance range from reflector to sensor (operating reserve 3,75)		0 m ... 7 m
Reference reflector		Reflector PL80A
Recommended sensing range for the best performance		0 m ... 7 m
Polarisation filter	Yes	
Emitted beam		
Light source	PinPoint LED	
Type of light	Visible red light	
Shape of light spot	Point-shaped	
Light spot size (distance)	Ø 80 mm (5 m)	
Maximum dispersion of the emitted beam around the standardized transmission axis (squint angle)	< +/- 1.0° (at T _U = +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		
IO-Link	For configuring the sensor parameters and Smart Task functions	
Display		
LED blue	BluePilot: Alignment aid	
LED green	Operating indicator Static on: power on Flashing: IO-Link mode	
LED yellow	Status of received light beam	

	Static on: object not present Static off: object present Flashing: Below the 1.5 function reserve
Special applications	Detecting objects wrapped in film, Explosive areas

SAFETY-RELATED PARAMETERS

MTTF _D	690 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	0x80016C
DeviceID DEC	8388972
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	<table> <tr> <td>Number</td><td>2 (Complementary)</td></tr> <tr> <td>Type</td><td>Push-pull: PNP/NPN</td></tr> <tr> <td>Switching mode</td><td>Light/dark switching</td></tr> <tr> <td>Signal voltage PNP HIGH/LOW</td><td>Approx. U_B - 2.5 V / 0 V</td></tr> <tr> <td>Signal voltage NPN HIGH/LOW</td><td>Approx. U_B / < 2.5 V</td></tr> <tr> <td>Output current I_{max}</td><td>≤ 100 mA</td></tr> <tr> <td>Circuit protection outputs</td><td>Reverse polarity protected Overcurrent and short-circuit protected</td></tr> <tr> <td>Response time</td><td>≤ 500 μs ²⁾</td></tr> <tr> <td>Repeatability (response time)</td><td>150 μs</td></tr> <tr> <td>Switching frequency</td><td>1,000 Hz ³⁾</td></tr> </table>	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⁾
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Pin/Wire assignment	<table> <tr> <td>Function of pin 4/black (BK)</td><td>Digital output, light switching, object present → output Q_{L1} LOW; IO-Link communication C ⁴⁾</td></tr> <tr> <td>Function of pin 4/black (BK) – detail</td><td>The pin 4 function of the sensor can be configured Additional possible settings via IO-Link</td></tr> <tr> <td>Function of pin 2/white (WH)</td><td>Digital output, dark switching, object present → output Q̄_{L1} HIGH ⁴⁾</td></tr> <tr> <td>Function of pin 2/white (WH) – detail</td><td>The pin 2 function of the sensor can be configured</td></tr> </table>	Function of pin 4/black (BK)	Digital output, light switching, object present → output Q _{L1} LOW; 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 Q̄ _{L1} HIGH ⁴⁾	Function of pin 2/white (WH) – detail	The pin 2 function of the sensor can be configured												
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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
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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 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: 750 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.

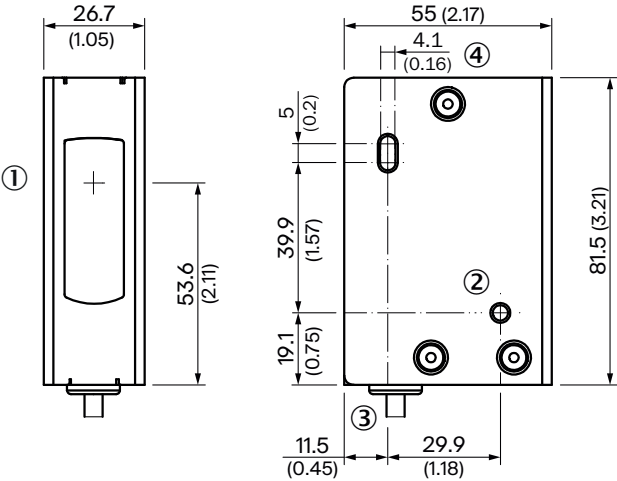
DIAGNOSIS

Device status	Yes
Quality of teach	Yes
Quality of run	Yes, Contamination display

CERTIFICATES

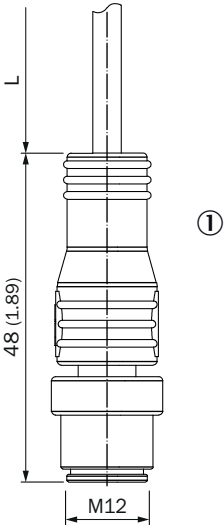
EU declaration of conformity	✓
UK declaration of conformity	✓
ACMA declaration of conformity	✓
Moroccan declaration of conformity	✓
China RoHS	✓
China Compulsory Product Certification (CCC) exempt	✓
cULus certificate	✓
Photobiological safety (DIN EN 62471) certificate	✓

DIMENSIONAL DRAWING



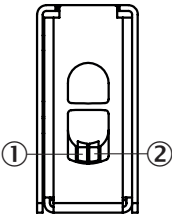
- Dimensions in mm (inch)
- ① Center of optical axis
 - ② Mounting hole, Ø 5.2 mm
 - ③ Connection
 - ④ display and adjustment elements

DIMENSIONAL DRAWING, CONNECTION



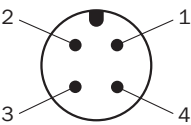
- Dimensions in mm (inch)
- For length of cable (L), see technical data
- ① Cable with M12 male connector

DISPLAY AND ADJUSTMENT ELEMENTS

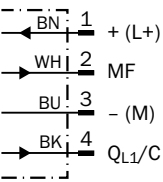


- ① LED indicator green
- ② LED indicator yellow

CONNECTION TYPE M12 MALE CONNECTOR, 4-PIN



CONNECTION DIAGRAM CD-390



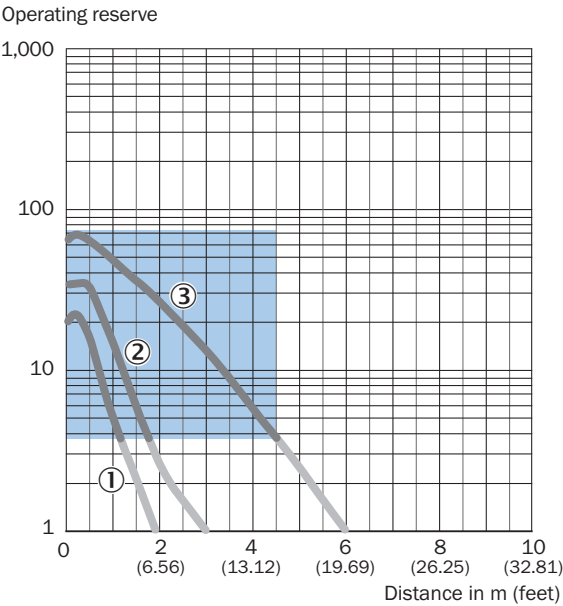
TRUTH TABLE PUSH-PULL: PNP/NPN – DARK SWITCHING $\bar{Q}$

	Dark switching $\bar{Q}$ (normally 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

	Light switching 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	⚡	✗

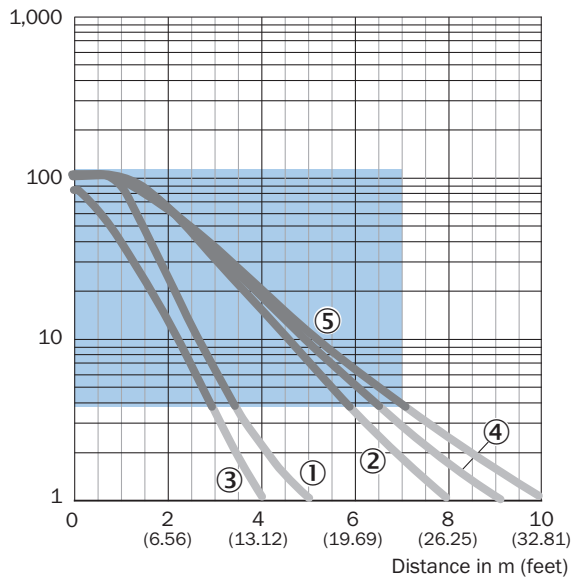
CHARACTERISTIC CURVE REFLECTIVE TAPE



- Recommended sensing range for the best performance
- ① Reflective tape REF-DG (50 x 50 mm)
 - ② Reflective tape REF-IRF-56 (50 x 50 mm)
 - ③ Reflective tape REF-AC1000 (50 x 50 mm)

CHARACTERISTIC CURVE STANDARD REFLECTORS

Operating reserve

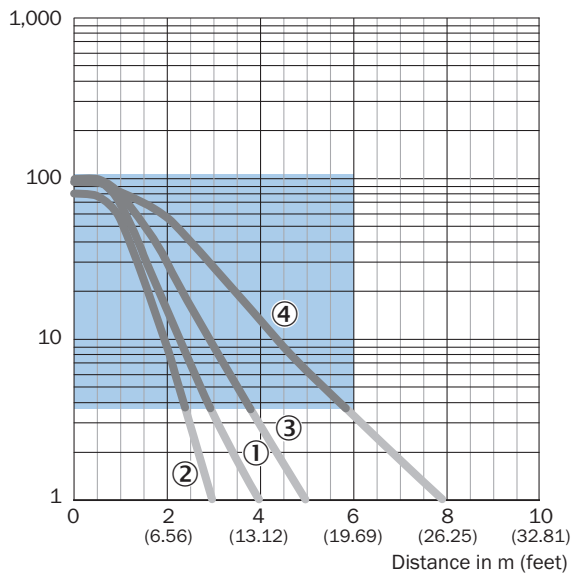


Recommended sensing range for the best performance

- ① Reflector PL22
- ② Reflector P250, PL30A
- ③ Reflector PL20A
- ④ Reflector PL40A
- ⑤ Reflector PL80A, C110A

CHARACTERISTIC CURVE FINE TRIPLE REFLECTORS

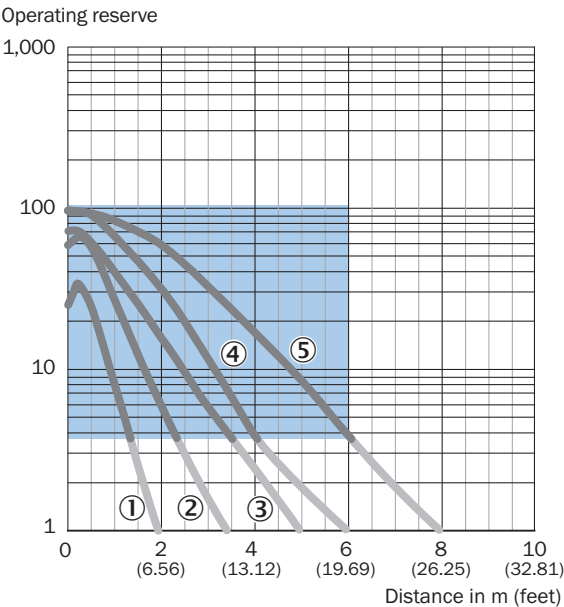
Operating reserve



Recommended sensing range for the best performance

- ① PL10FH-1 reflector
- ② PL10F reflector
- ③ Reflector PL20F
- ④ Reflector P250F

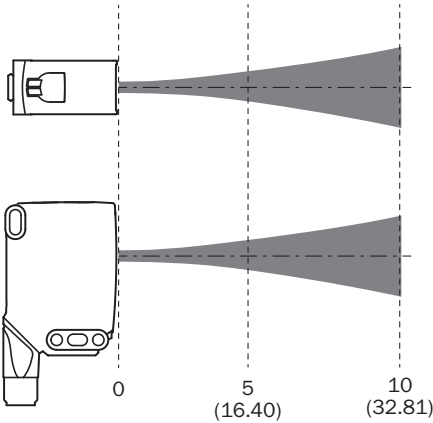
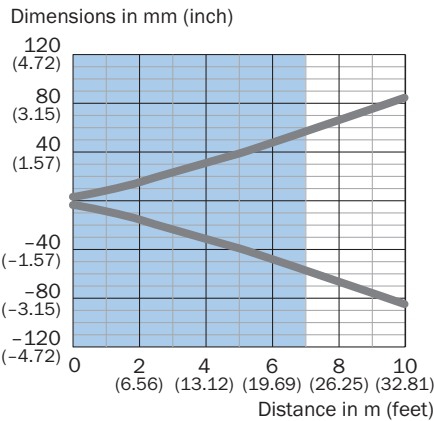
CHARACTERISTIC CURVE CHEMICAL-RESISTANT REFLECTORS



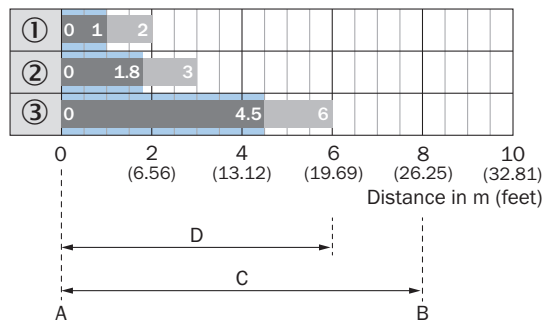
Recommended sensing range for the best performance

- ① PL10F CHEM reflector
- ② Reflector PL20 CHEM
- ③ Reflector P250 CHEM
- ④ Reflector P250H
- ⑤ Reflector PL40A Antifog

LIGHT SPOT SIZE WLA16P-XXXXX1XX



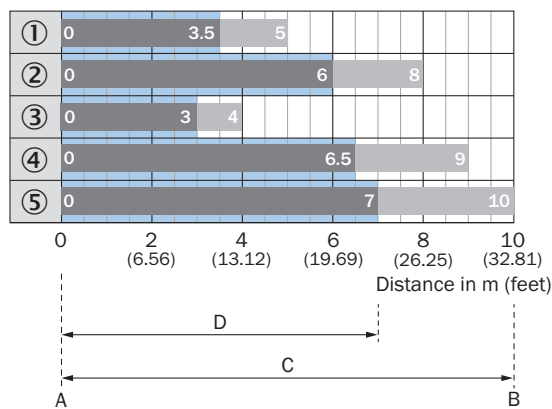
Recommended sensing range for the best performance

SENSING RANGE DIAGRAM REFLECTIVE TAPE

Recommended sensing range for the best performance

WLA16P-xxxxx1xx

1	Reflective tape REF-DG (50 x 50 mm)
2	Reflective tape REF-IRF-56 (50 x 50 mm)
3	Reflective tape REF-AC1000 (50 x 50 mm)
A	Sensing range min. in m
B	Sensing range max. in m
C	Maximum distance range from reflector to sensor (operating reserve 1)
D	Recommended distance range from reflector to sensor (operating reserve 3,75)

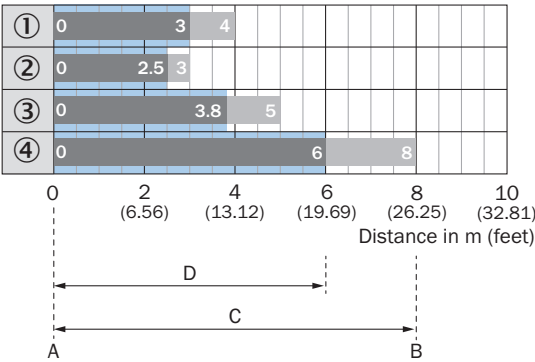
SENSING RANGE DIAGRAM STANDARD REFLECTORS

Recommended sensing range for the best performance

WLA16P-xxxxx1xx

1	Reflector PL22
2	Reflector P250, PL30A
3	Reflector PL20A
4	Reflector PL40A
5	Reflector PL80A, C110A
A	Sensing range min. in m
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SENSING RANGE DIAGRAM FINE TRIPLE REFLECTORS

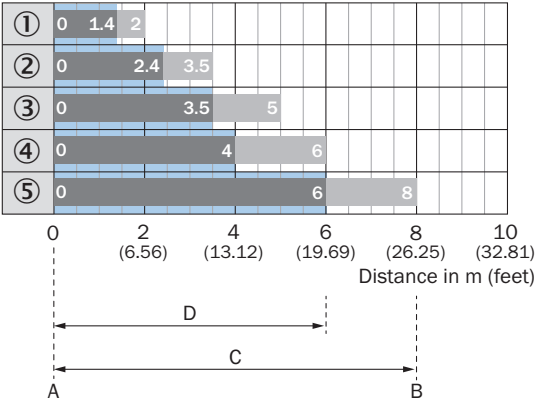


Recommended sensing range for the best performance

WLA16P-xxxxx1xx

1	PL10FH-1 reflector
2	PL10F reflector
3	Reflector PL20F
4	Reflector P250F
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B	Sensing range max. in m
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SENSING RANGE DIAGRAM CHEMICAL-RESISTANT REFLECTORS



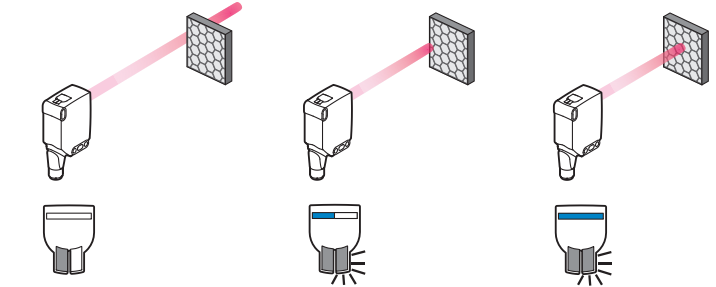
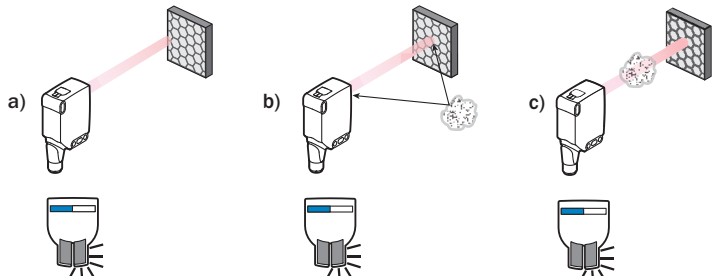
Recommended sensing range for the best performance

WLA16P-xxxxx1xx

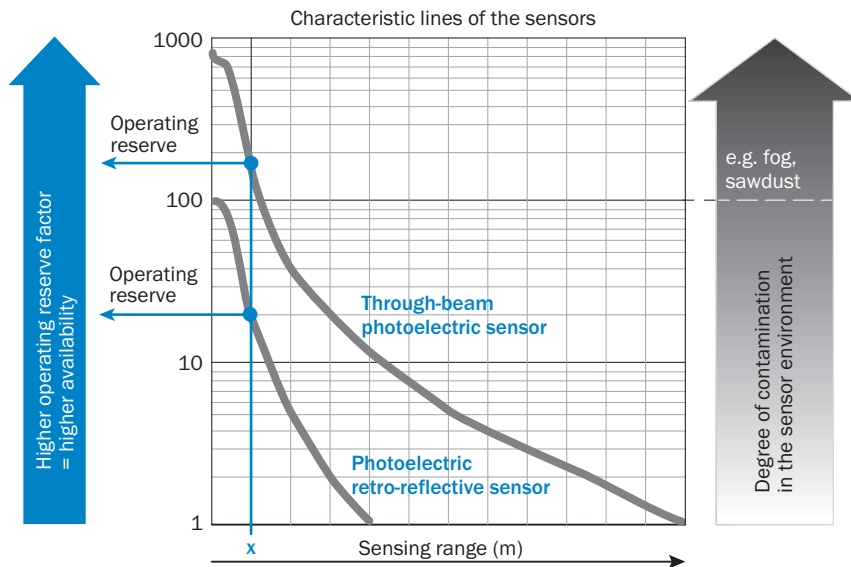
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2	Reflector PL20 CHEM
3	Reflector P250 CHEM
4	Reflector P250H
5	Reflector PL40A Antifog
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FUNCTIONS OPERATION NOTE

BluePilot: Blue indicator LEDs with double benefits

Easy and quick sensor alignment with the help of the LED indicator All blue LEDs illuminate - optimum alignment - highest possible operating reserve	WLA photoelectric retro-reflection sensor alignment 
Service note A reduction in sensor availability is displayed by a decrease of the blue LEDs. Possible causes: a) insufficient alignment b) contamination of the optical surfaces c) particles in the light beam	

FUNCTIONS OPERATION NOTE



At a sensing range of „x“ the photoelectric retro-reflective and through-beam photoelectric sensors have different operating reserves (see blue arrow). The higher the operating reserve factor, the better the sensor can compensate the contamination in the air or in the light beam and on the optical surfaces (front screen, reflector), i.e. the sensor has the maximum availability, otherwise the sensor switches due to pollution although there is no object in the path of the light beam.

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/1131853



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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

SICK
Sensor Intelligence