



WTM12L-24161120A00

W12

PHOTOELECTRIC SENSORS

SICK
Sensor Intelligence.



Illustration may differ



Ordering information

Type	part no.
WTM12L-24161120A00	1125113

Other models and accessories → www.sick.com/W12

Detailed technical data

Features

Functional principle		Photoelectric proximity sensor
Functional principle detail		Background suppression, Foreground suppression, MultiMode, distance value
MultiMode		1 Background suppression 2 Foreground suppression 3 Two Value Teach-in 4 Two independent switching points 5 Window 6 ApplicationSelect M manual / measurement
Sensing range		
	Sensing range min.	80 mm (mode 1, 3, 4, 5)
		0 mm (mode 2)
		80 mm (mode 1 and 6 combined)
	Sensing range max.	850 mm (mode 1, 3, 4, 5)
		350 mm (mode 2)
		1,200 mm (mode 1 and 6 combined)
Adjustable switching threshold for background suppression		90 mm ... 850 mm (mode 1, 3, 4, 5)

1) 90% remission factor.
2) Equivalent to 1 σ .
3) See repeatability characteristic lines.
4) Do not intentionally look into the laser beam. Never point the laser beam at people's eyes.

Adjustable switching threshold for foreground suppression	90 mm ... 1,200 mm (mode 1 and 6 combined)
	100 mm ... 350 mm (mode 2)
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%)	6 mm, at a distance of 250 mm (mode 1, 3, 4, 5)
	6 mm, at a distance of 650 mm (mode 1 and 6 combined)
Minimum object height at set sensing range in front of black background (6% remission factor)	2.2 mm, at a distance of 150 mm (mode 2)
Recommended sensing range for the best performance	100 mm ... 300 mm (mode 1, 3, 4, 5)
	100 mm ... 200 mm (mode 2)
	100 mm ... 700 mm (mode 1 and 6 combined)
Distance value	
Measuring range	100 mm ... 850 mm
Resolution	1 mm
Repeatability	0,1 mm ... 6 mm ^{1) 2) 3)}
Accuracy	Typ. 6.0 mm at 100 ... 200 mm distance ¹⁾
	Typ. 12 mm at 200 ... 400 mm distance ¹⁾
	Typ. 30 mm at 400 ... 800 mm distance ¹⁾
Distance value output	Via IO-Link
Update rate of the distance value	20 ms
Emitted beam	
Light source	Laser
Type of light	Visible red light
Shape of light spot	Ellipse shape
Light spot size (distance)	2.2 mm x 1.2 mm (300 mm)
Maximum dispersion of the emitted beam around the standardized transmission axis (squint angle)	< +/- 1.0° (at Ta = +23 °C)
Key laser figures	
Normative reference	EN 60825-1:2014, IEC 60825-1:2014
Laser class	1 ⁴⁾
Wave length	655 nm
Pulse duration	4 µs
Maximum pulse power	< 6.74 mW
Average service life	50,000 h at T _U = +25 °C
Smallest detectable object (MDO) typ.	
	2.5 mm, at a distance of 300 mm, mode 1, 3, 4, 5
	2.5 mm, at a distance of 200 mm, mode 2
	1.3 mm, at a distance of 650 mm, mode 1 and 6 combined

¹⁾ 90% remission factor.

²⁾ Equivalent to 1 σ.

³⁾ See repeatability characteristic lines.

⁴⁾ Do not intentionally look into the laser beam. Never point the laser beam at people's eyes.

- 1) 90% remission factor.
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MTTF_D	280 years
DC_{avg}	0 %
T_M (mission time)	10 years

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 = Current receiver level (live)
	VendorID	26
	DeviceID HEX	0x8002CC
	DeviceID DEC	8389324
Compatible master port type	A	
SIO mode support	Yes	

Supply voltage U_B	10 V DC ... 30 V DC ¹⁾
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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.

Ripple	≤ 5 V
Usage category	DC-12 (According to EN 60947-5-2) DC-13 (According to EN 60947-5-2)
Current consumption	≤ 14 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	≤ 500 μs (mode 1, 2, 3) ²⁾ ≤ 1,000 μs (mode 4, 5) ²⁾ ≤ 15 ms (mode 1 and 6 combined) ²⁾
Repeatability (response time)	150 μs (mode 1, 2, 3) ²⁾ 350 μs (mode 4, 5) ²⁾ 5 ms (mode 1 and 6 combined) ²⁾
Switching frequency	1,000 Hz (mode 1, 2, 3) ³⁾ 500 Hz (mode 4, 5) ³⁾ 30 Hz (mode 1 and 6 combined) ³⁾
Pin/Wire assignment	
BN 1	+ (L+)
WH 2	$\bar{Q}_{L1}$ /MF Digital output, dark switching, object present → output $\bar{Q}_{L1}$ LOW (Mode 1, 3, 5, 6) ⁴⁾ The pin 2 function of the sensor can be configured Digital output, light switching, object present → output $\bar{Q}_{L1}$ LOW (Mode 2) ⁴⁾ Additional possible settings via IO-Link Digital output, light switching, object present → output $\bar{Q}_{L2}$ HIGH (Mode 4) ⁴⁾
BU 3	- (M)
BK 4	$\bar{Q}_{L1}$ /C Digital output, light switching, object present → output $\bar{Q}_{L1}$ HIGH (Mode 1, 3, 4, 5, 6) ⁴⁾ The pin 4 function of the sensor can be configured Digital output, dark switching, object present → output $\bar{Q}_{L1}$ HIGH (Mode 2) ⁴⁾ Additional possible settings via IO-Link IO-Link communication C

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.

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

Enclosure rating	IP66 (EN 60529) IP67 (EN 60529) IP69 (EN 60529)
Ambient operating temperature	–20 °C ... +55 °C
Ambient temperature, storage	–40 °C ... +70 °C
Warm-up time	< 15 min, Where T _u is under –10 °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 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: 900 Hz (mode 1, 2, 3) ¹⁾ SIO Logic: 450 Hz (mode 4, 5) ¹⁾ SIO Logic: 30 Hz (mode 1 and 6 combined) ¹⁾ IOL: 800 Hz (mode 1, 2, 3) ²⁾ IOL: 450 Hz (mode 4, 5) ²⁾ IOL: 30 Hz (mode 1 and 6 combined) ²⁾

2) Use of Smart Task functions with IO-Link communication function.

Response time	Mode 1, 2, 3 ¹⁾
	SIO Logic: 1100 µs (mode 4, 5) ¹⁾
	SIO Logic: 15 ms (mode 1 and 6 combined) ¹⁾
	IOL: 600 µs (mode 1, 2, 3) ²⁾
	IOL: 1100 µs (mode 4, 5) ²⁾
Repeatability	IOL: 15 ms (mode 1 and 6 combined) ²⁾
	SIO Logic: 200 µs (mode 1, 2, 3) ¹⁾
	SIO Logic: 400 µs (mode 4, 5) ¹⁾
	SIO Logic: 5 ms (mode 1 and 6 combined) ¹⁾
	IOL: 250 µs (mode 1, 2, 3) ²⁾
Switching signal	IOL: 450 µs (mode 4, 5) ²⁾
	IOL: 5 ms (mode 1 and 6 combined) ²⁾
	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

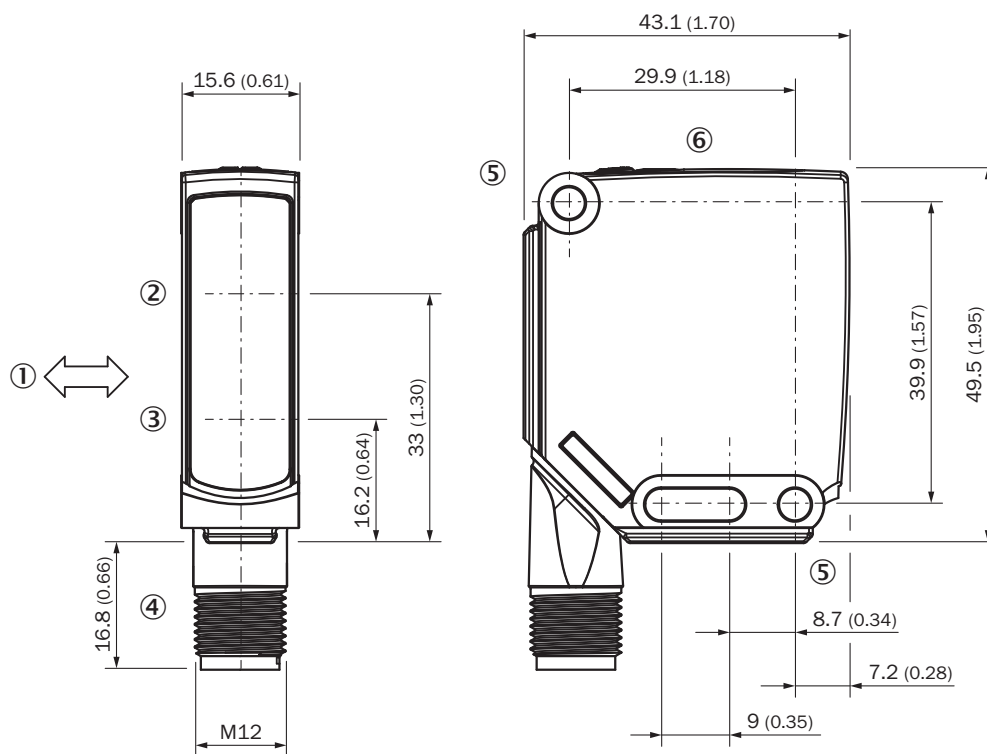
Classifications

ECLASS 5.0	27270904
ECLASS 5.1.4	27270904
ECLASS 6.0	27270904
ECLASS 6.2	27270904
ECLASS 7.0	27270904
ECLASS 8.0	27270904
ECLASS 8.1	27270904
ECLASS 9.0	27270904
ECLASS 10.0	27270904
ECLASS 11.0	27270904
ECLASS 12.0	27270903
ETIM 5.0	EC002719
ETIM 6.0	EC002719
ETIM 7.0	EC002719
ETIM 8.0	EC002719
UNSPSC 16.0901	39121528

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	✓
Laser safety (IEC 60825-1) declaration of manufacturer	✓
Information according to Art. 3 of Data Act (Regulation EU 2023/2854)	✓

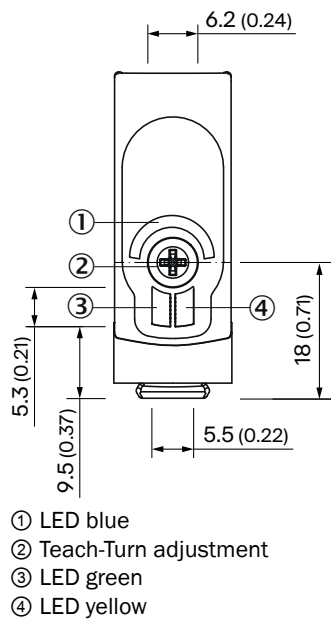
Dimensional drawing



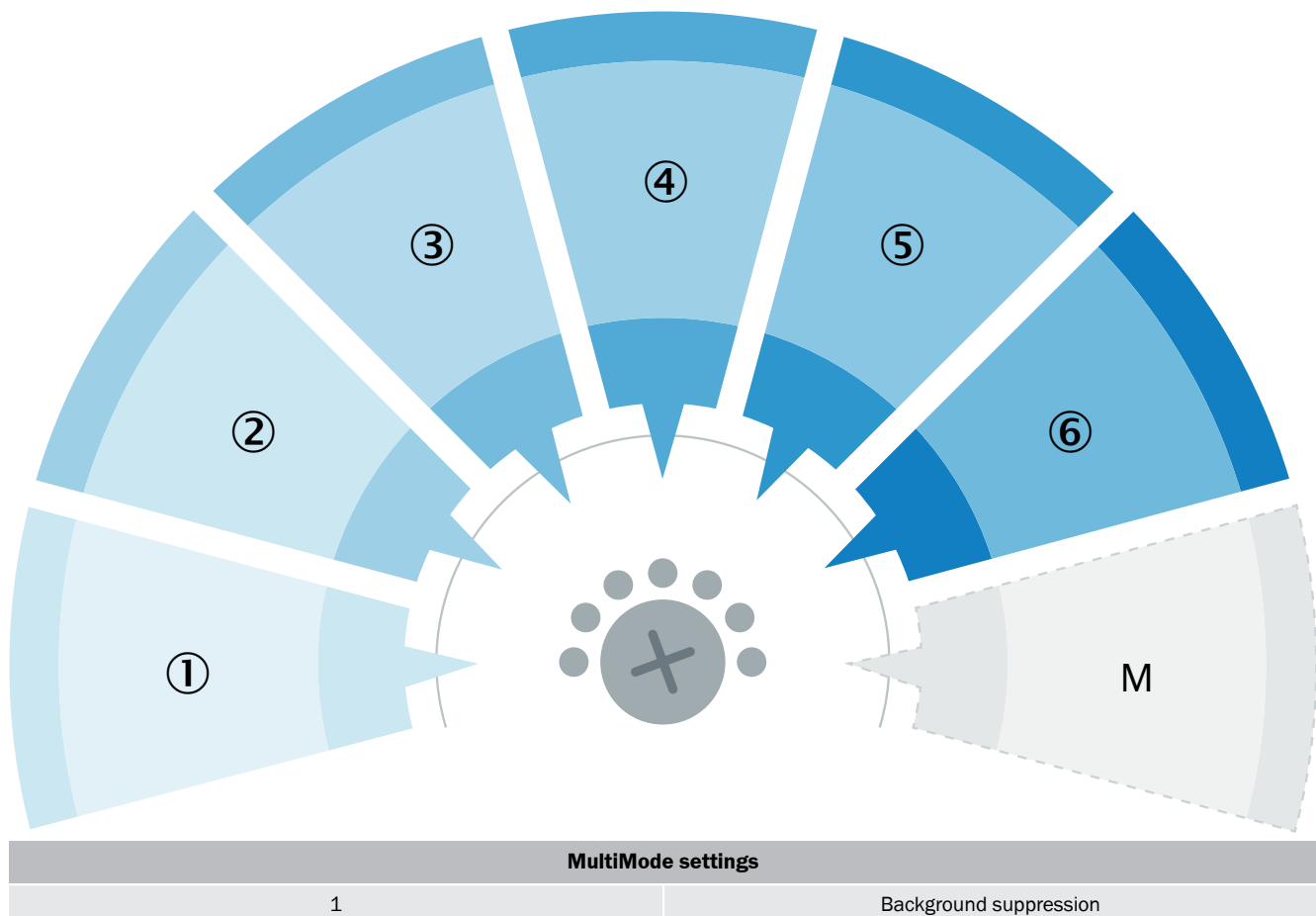
Dimensions in mm (inch)

- ① Standard direction of the material being detected
- ② Center of optical axis, receiver
- ③ Center of optical axis, sender
- ④ Connection
- ⑤ Mounting hole, $\varnothing$ 4.2 mm
- ⑥ display and adjustment elements

display and adjustment elements

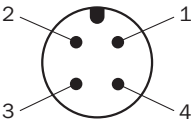


Display and setting detail

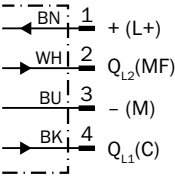


MultiMode settings	
2	Foreground suppression
3	Two Value Teach-in
4	Two independent switching points
5	Window
6	ApplicationSelect
M	Manual / measurement

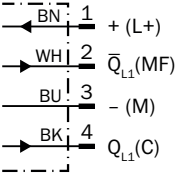
Connection type M12 male connector, 4-pin



Connection diagram Cd-597 (Mode 4)



Connection diagram Cd-598 (Mode 1, 2, 3, 5, 6)



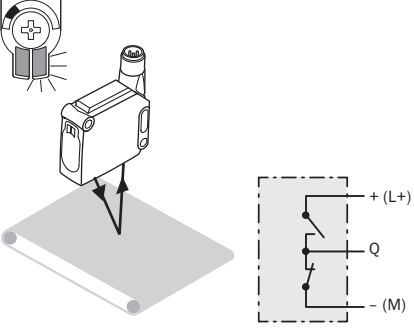
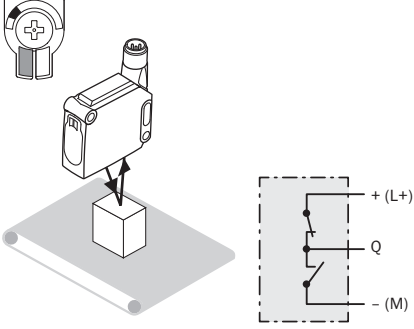
Truth table Push-pull: PNP/NPN – dark switching $\bar{Q}$ (MultiMode 1, 3, 5, 6)

	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	⚡	✗

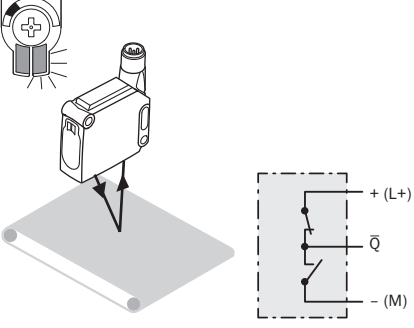
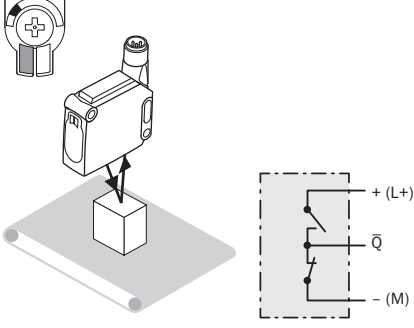
Truth table Push-pull: PNP/NPN – light switching Q (MultiMode 1, 3, 5, 6)

	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	✗	⚡

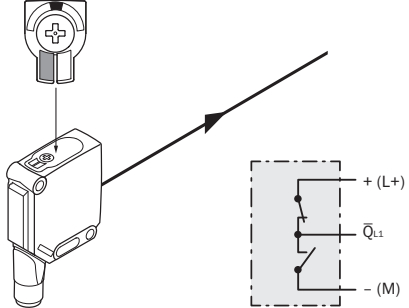
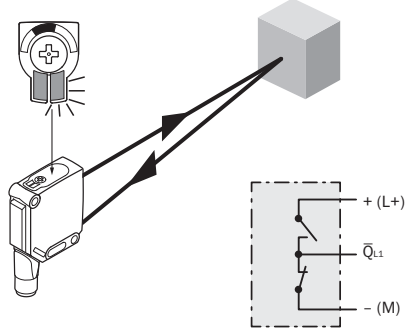
Truth table Push-pull: PNP/NPN – light switching Q (MultiMode 2)

	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	✗	⚡
		

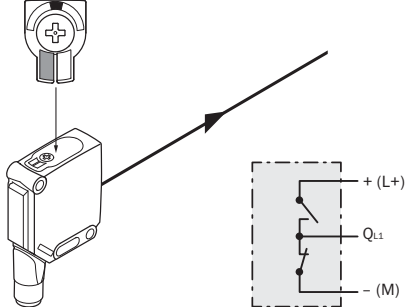
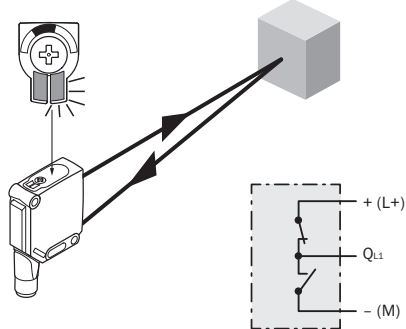
Truth table Push-pull: PNP/NPN – dark switching $\bar{Q}$ (MultiMode 2)

	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	⚡	✗
		

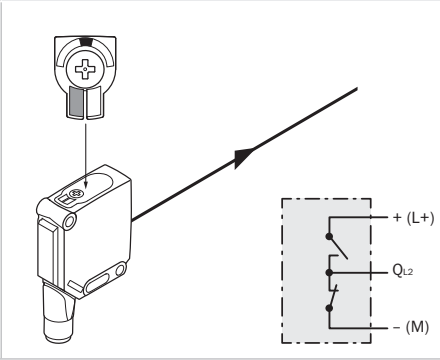
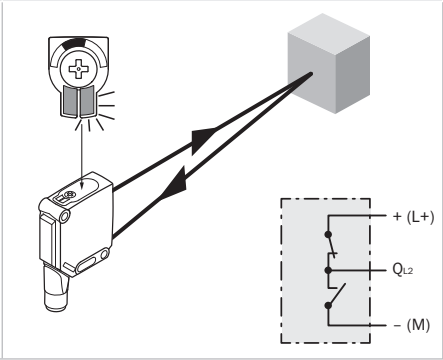
Truth table Push-pull: PNP/NPN – dark switching $\bar{Q}_{L1}$ (MultiMode 4)

	Dark switching $\bar{Q}_{L1}$ (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	⚡	✗
		

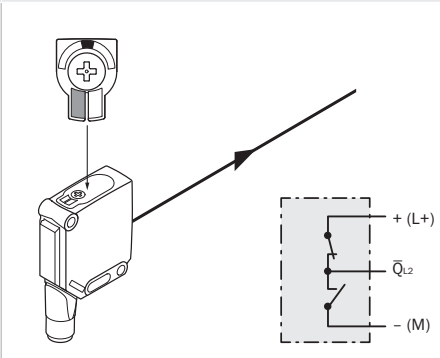
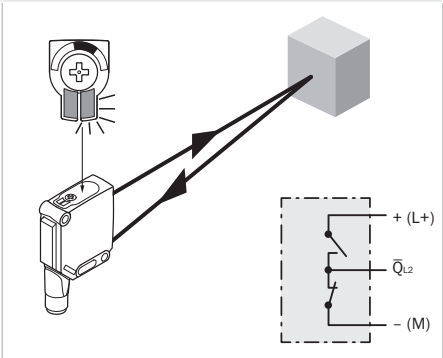
Truth table Push-pull: PNP/NPN – light switching Q_{L1} (MultiMode 4)

	Light switching 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_{L2} (MultiMode 4)

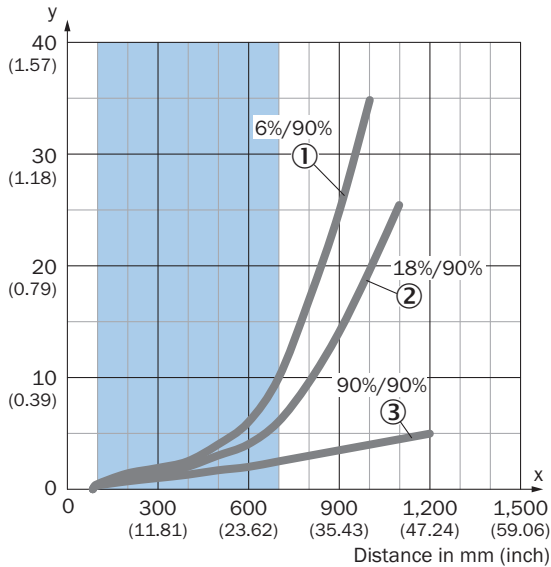
	Light switching Q_{L2} (normally open (upper switch), normally closed (lower switch))	
	Object not present → Output LOW	Object present → Output HIGH
Light receive	✗	✓
Light receive indicator	✗	☀
Load resistance to L+	⚡	✗
Load resistance to M	✗	⚡
		

Truth table Push-pull: PNP/NPN – dark switching $\bar{Q}_{L2}$ (MultiMode 4)

	Dark switching $\bar{Q}_{L2}$ (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 Mode 1 and 6 combined

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

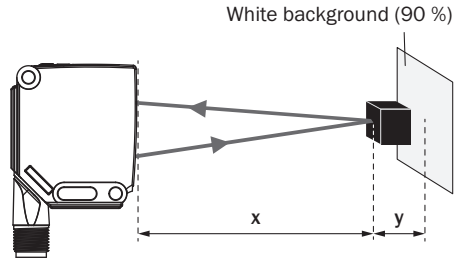


Recommended sensing range for the best performance

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

Example:

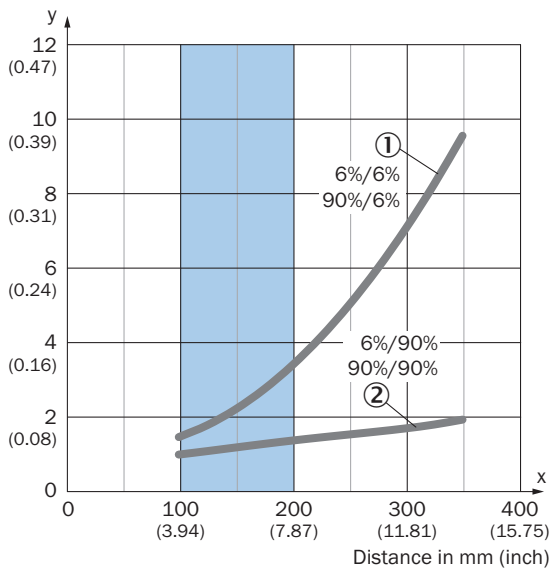
Safe suppression of the background



Black object (6 % remission)
Set sensing range $x = 650$ mm
Needed minimum distance to white background $y = 6$ mm

Characteristic curve Mode 2

Minimum object height in mm (inch)

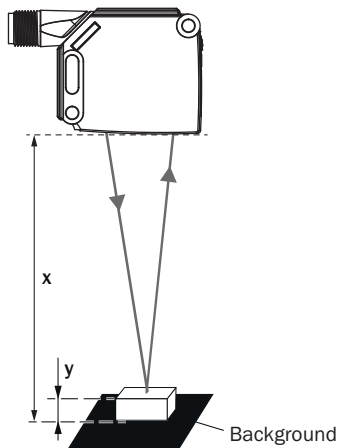


Recommended sensing range for the best performance

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

Example:

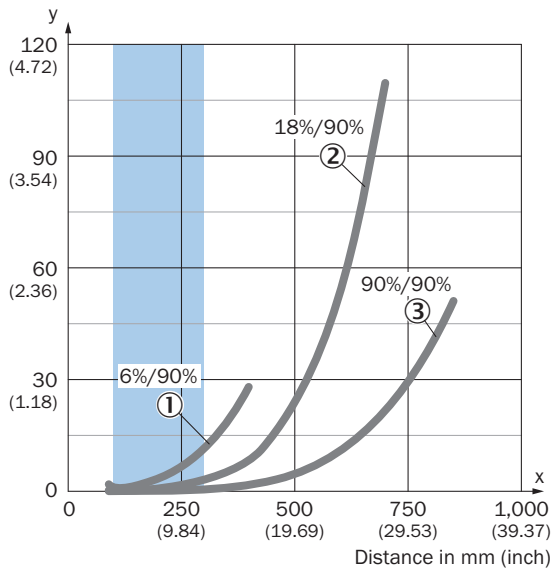
Reliable detection of the object



Black background (6 % remission factor)
Distance of sensor to background $x = 150$ mm
Required minimum object height $y = 2.2$ mm
For all objects regardless of their colors

Characteristic curve Mode 1, 3, 4, 5

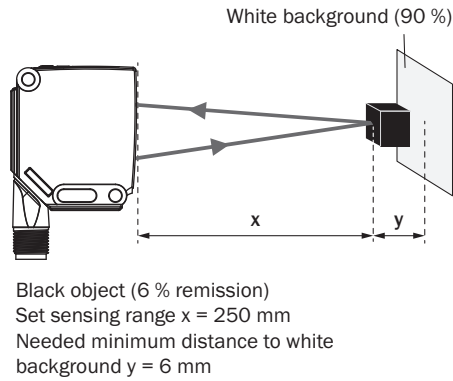
Minimum distance in mm (y) between the set sensing range and white background (90 % remission)



Recommended sensing range for the best performance

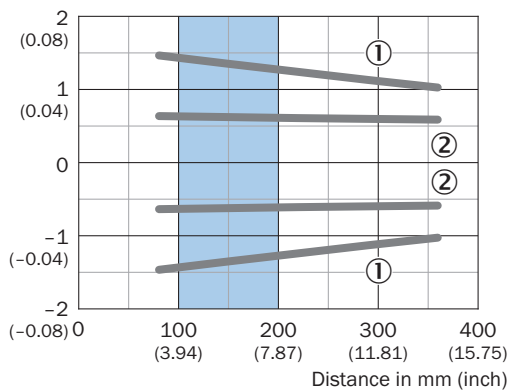
- ① Black object, 6% remission factor
- ② Gray object, 18% remission factor
- ③ White object, 90% remission factor

Example:
Safe suppression of the background



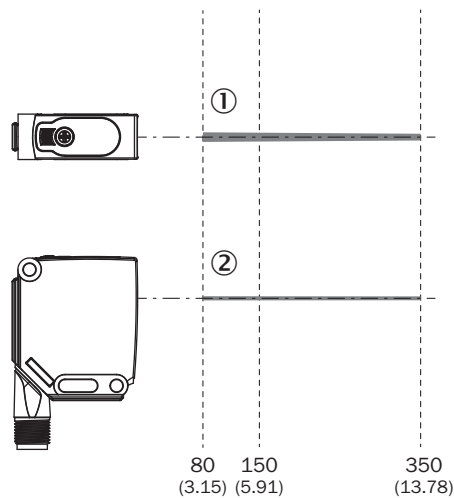
Light spot size Mode 2

Dimensions in mm (inch)



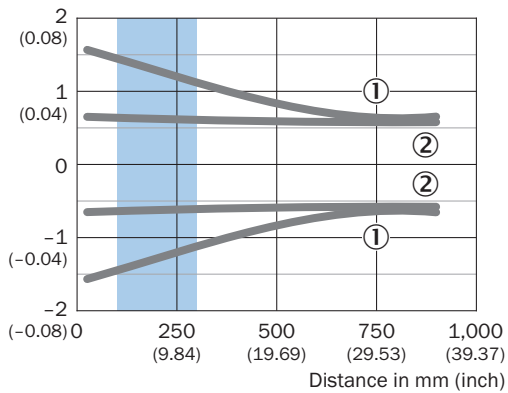
Recommended sensing range for the best performance

- ① Light spot horizontal
- ② Light spot vertical



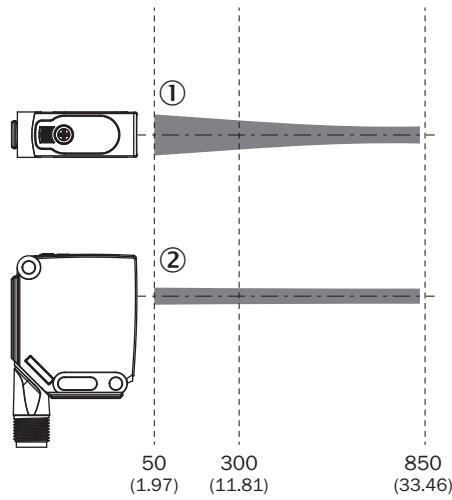
Light spot size Mode 1, 3, 4, 5

Dimensions in mm (inch)



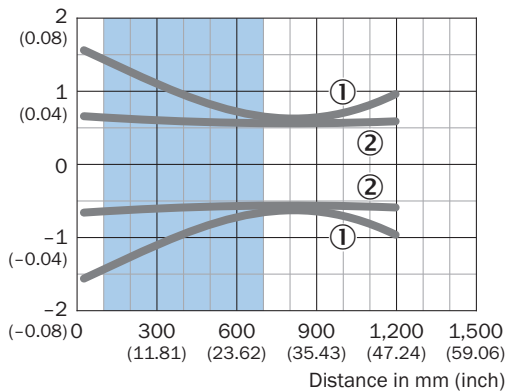
Recommended sensing range for the best performance

- ① Light spot horizontal
- ② Light spot vertical



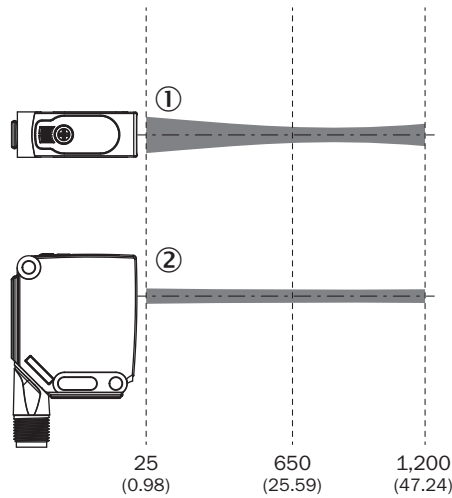
Light spot size Mode 1 and 6 combined

Dimensions in mm (inch)

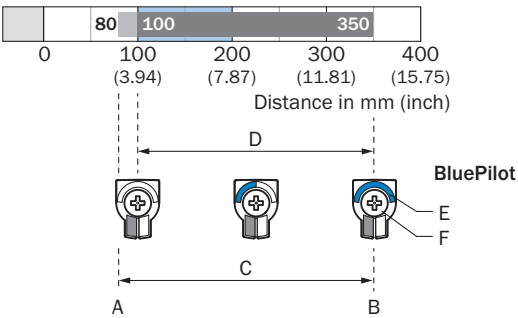


Recommended sensing range for the best performance

- ① Light spot horizontal
- ② Light spot vertical



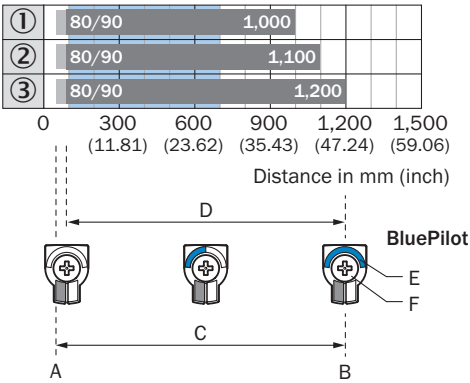
Sensing range diagram Mode 2



Recommended sensing range for the best performance

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

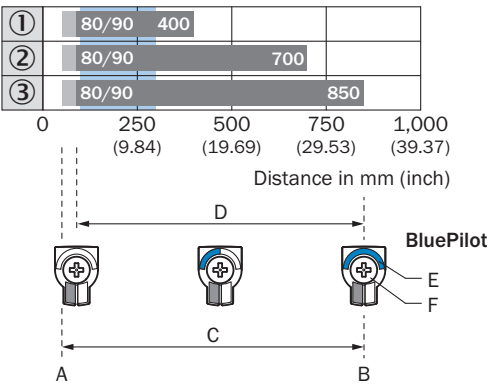
Sensing range diagram Mode 1 and 6 combined



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

Sensing range diagram Mode 1, 3, 4, 5

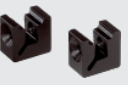
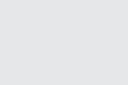


Recommended sensing range for the best performance

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/W12

	Brief description	Type	part no.
Mounting systems			
	Description: Plate N03 for universal clamp bracket, zinc coated Material: Steel, zinc diecast Details: Zinc plated steel (sheet), Zinc die cast (clamping bracket) Items supplied: Universal clamp (5322626), mounting hardware Usable for: UC12, W14-2, W18-2, W18-3, W11-2, W12-3, W12-2 Laser, W12G, W12 Teflon, W16, W24-2 Ex, PowerProx, W11G-2, TranspaTect, W18-3 Ex, W24-2, PL50A, PL80A, PL40A, P250	BEF-KHS-N03	2051609
	Description: Clamping block for dovetail mounting Material: Aluminum Details: Aluminum (anodised) Items supplied: Mounting hardware included Suitable for: W11-2, W12-3	BEF-KH-W12	2013285
	Description: Mounting bracket, large Material: Stainless steel Details: Stainless steel Items supplied: Mounting hardware included Suitable for: W11-2, W12-3, W16	BEF-WG-W12	2013942
	Material: Aluminum Details: Aluminum Items supplied: Including mounting material (sensor) and mounting material (bracket) Usable for: Adapter plate for W23L/W27L to W12L	BEF-AP-W12	2127742
connectors and cables			
	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
	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, PUR, halogen-free Description: Sensor/actuator cable, unshielded Application: Uncontaminated zones, Zones with oils and lubricants, Robot, Drag chain operation	YF2A14-050UB3XLEAX	2095608

	Brief description	Type	part no.
network devices			
		SIG300-0A0GAA100	1131014
		SIG300-0A04AA100	1131011
		SIG300-0A05AA100	1131012
		SIG300-0A06AA100	1131013

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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.

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