

WTM12F-34161220A00ZDZZZZZZZZZZ1

The logo for SICK Sensor Intelligence. The word "SICK" is in a large, bold, blue sans-serif font. To its right, the words "Sensor Intelligence" are written in a smaller, blue sans-serif font.



Illustration may differ

PHOTOELECTRIC SENSORS

WTM12F-34161220A00ZDZZZZZZZZ

ORDERING INFORMATION

Type	part no.
WTM12F-34161220A00ZDZZZZZZZZ1	1152369

Further device versions and accessories at 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 (factory setting) 2 Foreground suppression 3 Two Value Teach-in 4 Two independent switching points 5 Window Mode 6 ApplicationSelect

¹⁾ 90% remission factor.
²⁾ Equivalent to 3 σ .
³⁾ See repeatability characteristic lines.
⁴⁾ See accuracy curve.

		M manual / measurement
Sensing range	Sensing range min.	10 mm (mode 1, 3, 4, 5) 0 mm (mode 2) 10 mm (Mode 1, 3, 4, 5 combined with 6) 0 mm (Mode 2 and 6 combined)
	Sensing range max.	600 mm (mode 1, 3, 4, 5) 500 mm (mode 2) 800 mm (Mode 1, 3, 4, 5 combined with 6) 700 mm (Mode 2 and 6 combined)
	Adjustable switching threshold for background suppression	40 mm ... 600 mm (mode 1, 3, 4, 5) 40 mm ... 800 mm (Mode 1, 3, 4, 5 combined with 6)
	Adjustable switching threshold for foreground suppression	40 mm ... 500 mm (mode 2) 40 mm ... 700 mm (Mode 2 and 6 combined)
	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%)	1 mm, at a distance of 200 mm (mode 1, 3, 4, 5) 1 mm, at a distance of 300 mm (Mode 1, 3, 4, 5 combined with 6)
	Minimum object height at set sensing range in front of black background (6% remission factor)	1 mm, at a distance of 200 mm (mode 2) 2 mm, at a distance of 300 mm (Mode 2 and 6 combined)
	Recommended sensing range for the best performance	50 mm ... 320 mm
	Distance value	
	Measuring range	50 mm ... 600 mm
Emitted beam	Repeatability	0,2 mm ... 3,2 mm ^{1) 2) 3)}
	Accuracy	2 mm ... 52 mm ^{1) 4)}
	Distance value output	Via IO-Link
	Resolution	0.1 mm
	Update rate of the distance value	8 ms
Focus position	Light source	PinPoint Pro LED
	Type of light	Visible red light
	Shape of light spot	Rectangular
	Light spot size (distance)	8 mm x 7 mm (200 mm)
	Maximum dispersion of the emitted beam around the standardized transmission axis (squint angle)	< +/- 1.0° (at T _u = +23 °C)
Key LED figures		200 mm
Smallest detectable object (MDO) typ.	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		0.2 mm, at a distance of 200 mm, mode 1, 3, 4, 5 0.2 mm, at a distance of 200 mm, mode 2 0.2 mm, at a distance of 200 mm, Mode 1, 3, 4, 5 combined with 6 0.2 mm, at a distance of 200 mm, Mode 2 and 6 combined Object with 90% remission factor (complies with standard white according to DIN 5033)
	Teach-Turn adjustment	BluePilot For adjusting the sensing range with mode selection

¹⁾ 90% remission factor.²⁾ Equivalent to 3 σ .³⁾ See repeatability characteristic lines.⁴⁾ See accuracy curve.

	IO-Link	For configuring the sensor parameters and Smart Task functions
Display		
	LED blue	BluePilot: Display of mode, display of output states Q _{L1} (LED 3 permanently on) and Q _{L2} (LED 5 permanently on)
	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 features		MultiMode

¹⁾ 90% remission factor.
²⁾ Equivalent to 3 σ.
³⁾ See repeatability characteristic lines.
⁴⁾ See accuracy curve.

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	16 Bit
Process data structure A	Bit 0 = switching signal Q _{L1} Bit 1 = switching signal Q _{L2} Bit 2 ... 15 = Current receiver level (live)
Process data structure B	Bit 0 ... 15 = Distance value 0.1 mm (live)
VendorID	26
DeviceID HEX	0x8003A5
DeviceID DEC	8389541
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

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.

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 protected Short-circuit protected</td></tr> <tr> <td>Response time</td><td> $\leq 330 \mu s$ (mode 1, 2, 3) ²⁾ $\leq 1,000 \mu s$ (mode 4, 5) ²⁾ $\leq 15 ms$ (Mode 1, 2, 3 combined with 6) ²⁾ $\leq 30 ms$ (Mode 4, 5 combined with 6) ²⁾ </td></tr> <tr> <td>Repeatability (response time)</td><td> $100 \mu s$ (mode 1, 2, 3) ²⁾ $350 \mu s$ (mode 4, 5) ²⁾ $5 ms$ (Mode 1, 2, 3 combined with 6) ²⁾ $10 ms$ (Mode 4, 5 combined with 6) ²⁾ </td></tr> <tr> <td>Switching frequency</td><td> $1,500 Hz$ (mode 1, 2, 3) ³⁾ $500 Hz$ (mode 4, 5) ³⁾ $30 Hz$ (Mode 1, 2, 3 combined with 6) ³⁾ $15 Hz$ (Mode 4, 5 combined with 6) 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 protected Short-circuit protected	Response time	$\leq 330 \mu s$ (mode 1, 2, 3) ²⁾ $\leq 1,000 \mu s$ (mode 4, 5) ²⁾ $\leq 15 ms$ (Mode 1, 2, 3 combined with 6) ²⁾ $\leq 30 ms$ (Mode 4, 5 combined with 6) ²⁾	Repeatability (response time)	$100 \mu s$ (mode 1, 2, 3) ²⁾ $350 \mu s$ (mode 4, 5) ²⁾ $5 ms$ (Mode 1, 2, 3 combined with 6) ²⁾ $10 ms$ (Mode 4, 5 combined with 6) ²⁾	Switching frequency	$1,500 Hz$ (mode 1, 2, 3) ³⁾ $500 Hz$ (mode 4, 5) ³⁾ $30 Hz$ (Mode 1, 2, 3 combined with 6) ³⁾ $15 Hz$ (Mode 4, 5 combined with 6) ³⁾
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	$\leq 330 \mu s$ (mode 1, 2, 3) ²⁾ $\leq 1,000 \mu s$ (mode 4, 5) ²⁾ $\leq 15 ms$ (Mode 1, 2, 3 combined with 6) ²⁾ $\leq 30 ms$ (Mode 4, 5 combined with 6) ²⁾																				
Repeatability (response time)	$100 \mu s$ (mode 1, 2, 3) ²⁾ $350 \mu s$ (mode 4, 5) ²⁾ $5 ms$ (Mode 1, 2, 3 combined with 6) ²⁾ $10 ms$ (Mode 4, 5 combined with 6) ²⁾																				
Switching frequency	$1,500 Hz$ (mode 1, 2, 3) ³⁾ $500 Hz$ (mode 4, 5) ³⁾ $30 Hz$ (Mode 1, 2, 3 combined with 6) ³⁾ $15 Hz$ (Mode 4, 5 combined with 6) ³⁾																				
Pin/Wire assignment	<table> <tr> <td>Function of pin 4/black (BK)</td><td>Digital output, light switching, object present → output QL1 HIGH (Mode 1, 3, 4, 5, 6) ⁴⁾ Digital output, dark switching, object present → output $\bar{Q}L1$ HIGH (Mode 2) ⁴⁾ IO-Link communication C</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 $\bar{Q}L1$ LOW (Mode 1, 3, 5, 6) ⁴⁾ Digital output, light switching, object present → output QL1 LOW (Mode 2) ⁴⁾ Digital output, light switching, object present → output QL2 HIGH (Mode 4) ⁴⁾</td></tr> <tr> <td>Function of pin 2/white (WH) – detail</td><td>The pin 2 function of the sensor can be configured Additional possible settings via IO-Link</td></tr> </table>	Function of pin 4/black (BK)	Digital output, light switching, object present → output QL1 HIGH (Mode 1, 3, 4, 5, 6) ⁴⁾ Digital output, dark switching, object present → output $\bar{Q}L1$ HIGH (Mode 2) ⁴⁾ 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, dark switching, object present → output $\bar{Q}L1$ LOW (Mode 1, 3, 5, 6) ⁴⁾ Digital output, light switching, object present → output QL1 LOW (Mode 2) ⁴⁾ Digital output, light switching, object present → output QL2 HIGH (Mode 4) ⁴⁾	Function of pin 2/white (WH) – detail	The pin 2 function of the sensor can be configured Additional possible settings via IO-Link												
Function of pin 4/black (BK)	Digital output, light switching, object present → output QL1 HIGH (Mode 1, 3, 4, 5, 6) ⁴⁾ Digital output, dark switching, object present → output $\bar{Q}L1$ HIGH (Mode 2) ⁴⁾ 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, dark switching, object present → output $\bar{Q}L1$ LOW (Mode 1, 3, 5, 6) ⁴⁾ Digital output, light switching, object present → output QL1 LOW (Mode 2) ⁴⁾ Digital output, light switching, object present → output QL2 HIGH (Mode 4) 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)	15.6 mm x 49.5 mm x 43.1 mm														
Connection	Cable with plug, M12, 4-pin, 318 mm														
Connection detail	<table> <tr> <td>Deep-freeze property</td><td>Do not bend below 0 °C</td></tr> <tr> <td>Conductor size</td><td>0.14 mm²</td></tr> <tr> <td>Cable diameter</td><td>Ø 3.4 mm</td></tr> <tr> <td>Length of cable (L)</td><td>270 mm</td></tr> <tr> <td>Length of male connector</td><td>48 mm</td></tr> <tr> <td>Bending radius</td><td>For flexible use > 12 x cable diameter</td></tr> <tr> <td>Bending cycles</td><td>1,000,000</td></tr> </table>	Deep-freeze property	Do not bend below 0 °C	Conductor size	0.14 mm ²	Cable diameter	Ø 3.4 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
Deep-freeze property	Do not bend below 0 °C														
Conductor size	0.14 mm ²														
Cable diameter	Ø 3.4 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	<table> <tr> <td>Housing</td><td>Metal, zinc diecast</td></tr> <tr> <td>Front screen</td><td>Plastic, PMMA</td></tr> <tr> <td>Cable</td><td>Plastic, PVC</td></tr> </table>	Housing	Metal, zinc diecast	Front screen	Plastic, PMMA	Cable	Plastic, PVC								
Housing	Metal, zinc diecast														
Front screen	Plastic, PMMA														
Cable	Plastic, PVC														

Male connector	Plastic, VISTAL®
Weight	Approx. 94 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 (mode 1, 2, 3) ¹⁾ SIO Logic: 450 Hz (mode 4, 5) ¹⁾ SIO Logic: 30 Hz (Mode 1, 2, 3 combined with 6) ¹⁾ SIO Logic: 15 Hz (Mode 4, 5 combined with 6) ¹⁾ IOL: 1200 Hz (mode 1, 2, 3) ²⁾ IOL: 450 Hz (mode 4, 5) ²⁾ IOL: 30 Hz (Mode 1, 2, 3 combined with 6) ²⁾ IOL: 15 Hz (Mode 4, 5 combined with 6) ²⁾
Response time	SIO Logic: 390 µs (mode 1, 2, 3) ¹⁾ SIO Logic: 1000 µs (mode 4, 5) ¹⁾ SIO Logic: 15 ms (Mode 1, 2, 3 combined with 6) ¹⁾ SIO Logic: 30 ms (Mode 4, 5 combined with 6) ¹⁾ IOL: 420 µs (mode 1, 2, 3) ²⁾ IOL: 1000 µs (mode 4, 5) ²⁾ IOL: 15 ms (Mode 1, 2, 3 combined with 6) ²⁾ IOL: 30 ms (Mode 4, 5 combined with 6) ²⁾
Repeatability	SIO Logic: 140 µs (mode 1, 2, 3) ¹⁾ SIO Logic: 400 µs (mode 4, 5) ¹⁾ SIO Logic: 5 ms (Mode 1, 2, 3 combined with 6) ¹⁾ SIO Logic: 10 ms (Mode 4, 5 combined with 6) ¹⁾ IOL: 170 µs (mode 1, 2, 3) ²⁾

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

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

		IOL: 450 µs (mode 4, 5) ²⁾
		IOL: 5 ms (Mode 1, 2, 3 combined with 6) ²⁾
		IOL: 10 ms (Mode 4, 5 combined with 6) 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.

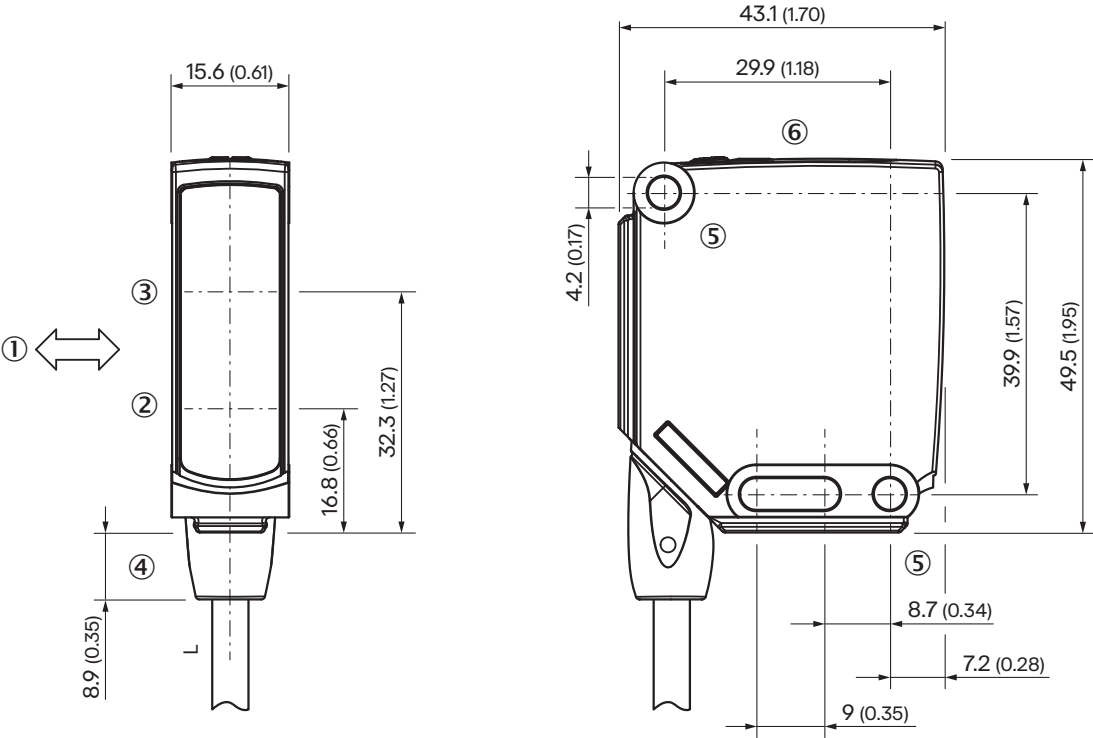
DIAGNOSIS

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
Quality of run		Yes, Contamination display

CERTIFICATES

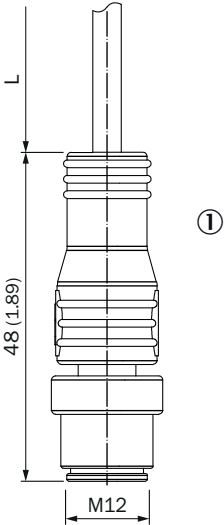
EU declaration of conformity	✓
UK declaration of conformity	✓
ACMA declaration of conformity	✓
Moroccan declaration of conformity	✓
China RoHS	✓
China Compulsory Product Certification (CCC) exempt	✓
ECOLAB certificate	✓
cULus certificate	✓
IO-Link certificate	✓
Photobiological safety (IEC EN 62471)	✓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

DIMENSIONAL DRAWING, SENSOR

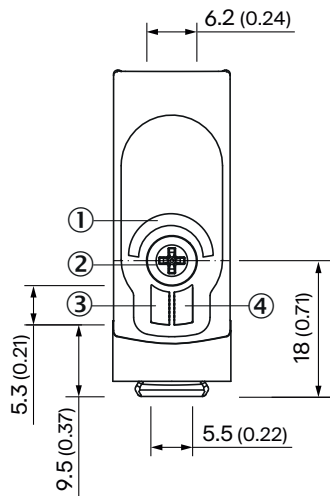


- Dimensions in mm (inch)
- ① Standard direction of the material being detected
 - ② Center of optical axis, sender
 - ③ Center of optical axis, receiver
 - ④ Connection
 - ⑤ Mounting hole, Ø 4.2 mm
 - ⑥ display and adjustment elements

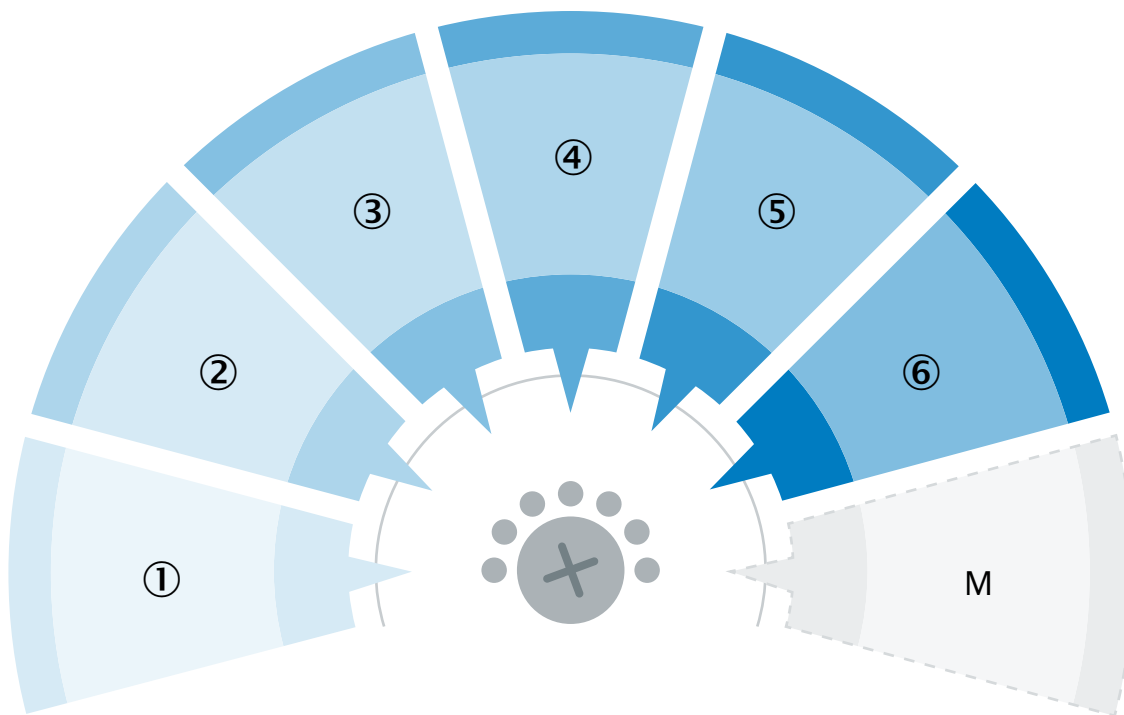
DIMENSIONAL DRAWING, CONNECTION



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

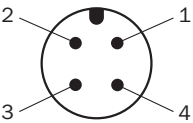
DISPLAY AND ADJUSTMENT ELEMENTS

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

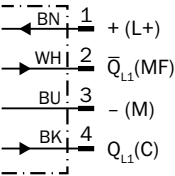
DISPLAY AND SETTING DETAIL**MultiMode settings**

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

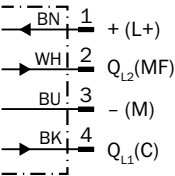
CONNECTION TYPE M12 MALE CONNECTOR, 4-PIN



CONNECTION DIAGRAM CD-598 (MODE 1, 2, 3, 5, 6)



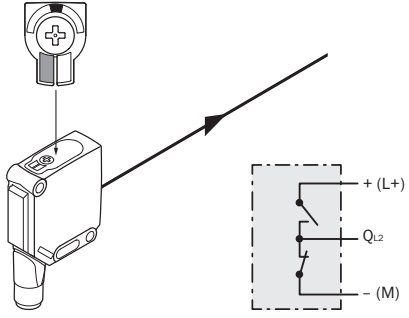
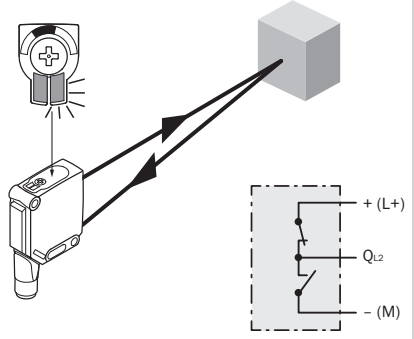
CONNECTION DIAGRAM CD-597 (MODE 4)



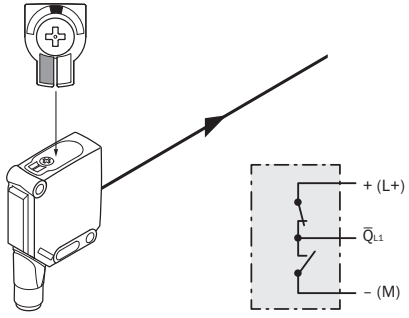
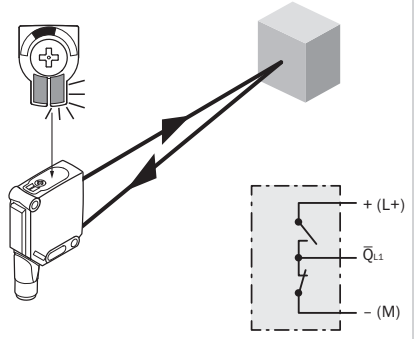
TRUTH TABLE PUSH-PULL: PNP/NPN – DARK SWITCHING $\bar{Q}_{L2}$ (MULTIMODE 4)

	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	⚡	✗

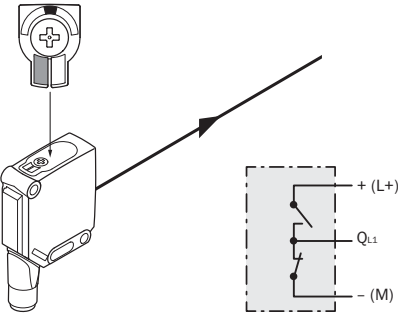
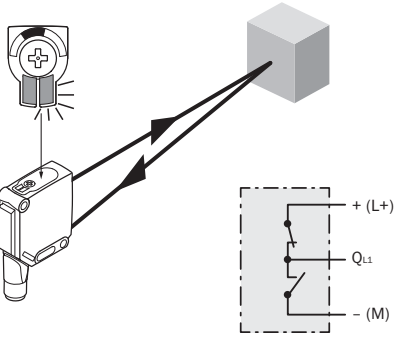
TRUTH TABLE PUSH-PULL: PNP/NPN - LIGHT SWITCHING Q_{L2} (MULTIMODE 4)

	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	✗	⚡
		

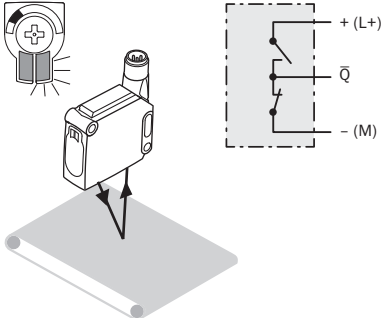
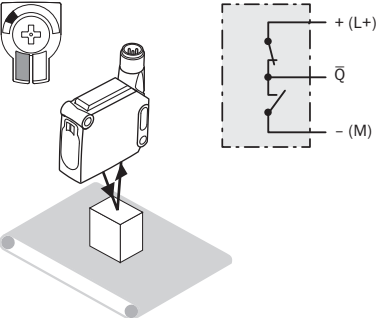
TRUTH TABLE PUSH-PULL: PNP/NPN - DARK SWITCHING $\bar{Q}_{L1}$ (MULTIMODE 4)

	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	⚡	✗
		

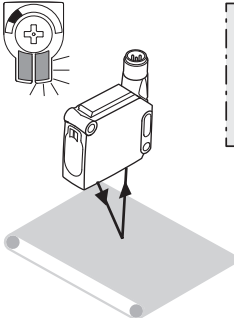
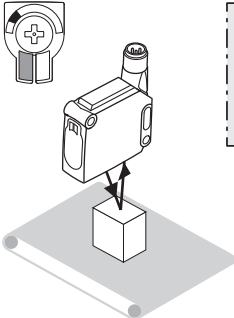
TRUTH TABLE PUSH-PULL: PNP/NPN - LIGHT SWITCHING Q_{L1} (MULTIMODE 4)

	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	✕	⚡
		

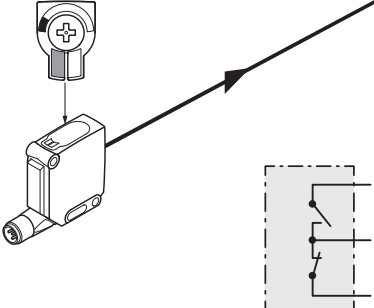
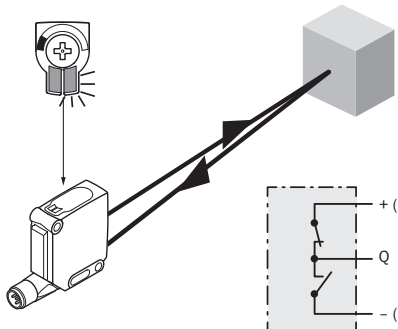
TRUTH TABLE PUSH-PULL: PNP/NPN - DARK SWITCHING Q̄ (MULTIMODE 2)

	Dark switching Q̄ (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	✕	⚡
		

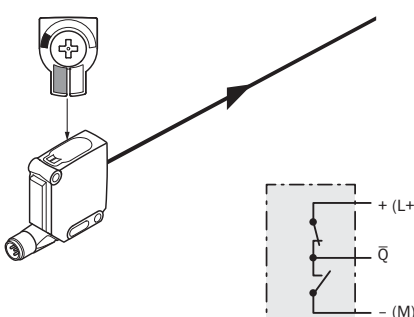
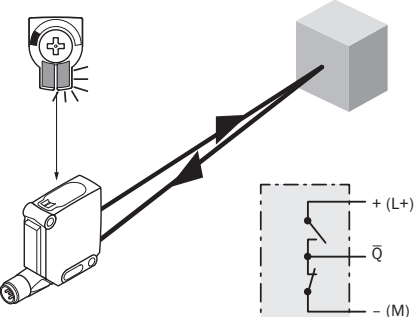
TRUTH TABLE PUSH-PULL: PNP/NPN - LIGHT SWITCHING Q (MULTIMODE 2)

	Light switching Q (normally 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	⚡	✗
		

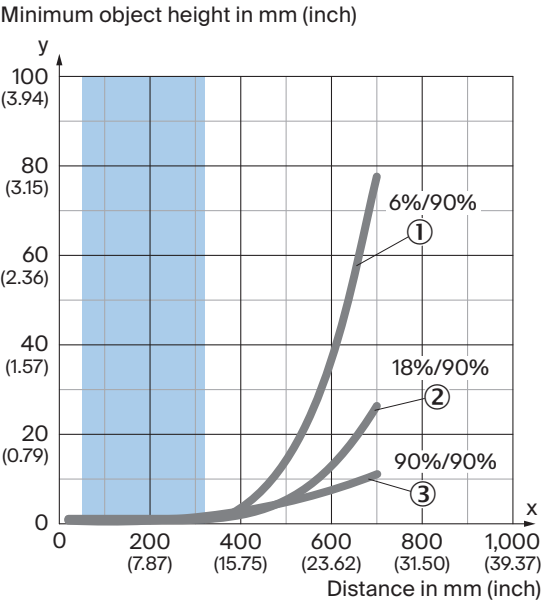
TRUTH TABLE PUSH-PULL: PNP/NPN - LIGHT SWITCHING Q (MULTIMODE 1, 3, 5, 6)

	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 – DARK SWITCHING $\bar{Q}$ (MULTIMODE 1, 3, 5, 6)

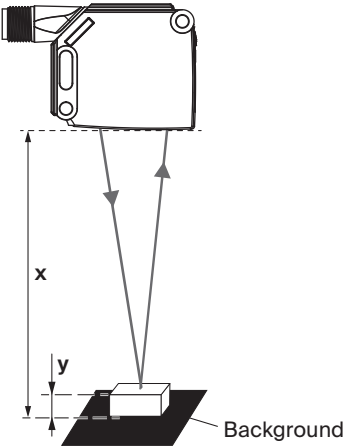
	Dark switching $\bar{Q}$ (normally closed (upper switch), normally open (lower switch))	
	Object not present → Output HIGH	Object present → Output LOW
Light receive	✗	✓
Light receive indicator	✗	☀
Load resistance to L+	✗	⚡
Load resistance to M	⚡	✗
		

CHARACTERISTIC CURVE MODE 2 AND 6 COMBINED (HIGHPRECISION/LONGRANGE MODE)



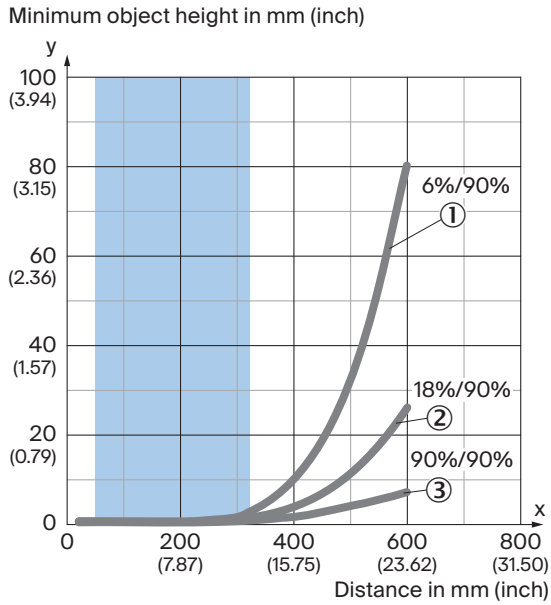
- Recommended sensing range for the best performance
- ① Black background, 6% remission factor
 - ② Sensing range on gray, 18% remission factor
 - ③ White background, 90% remission factor

Example:
Reliable detection of the object



Black background (6 % remission factor)
Distance of sensor to background x = 300 mm
Required minimum object height y = 2 mm
For all objects regardless of their colors

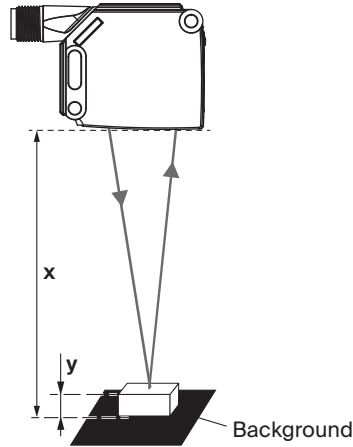
CHARACTERISTIC CURVE MODE 2 AND 6 COMBINED (BALANCED MODE)



Recommended sensing range for the best performance

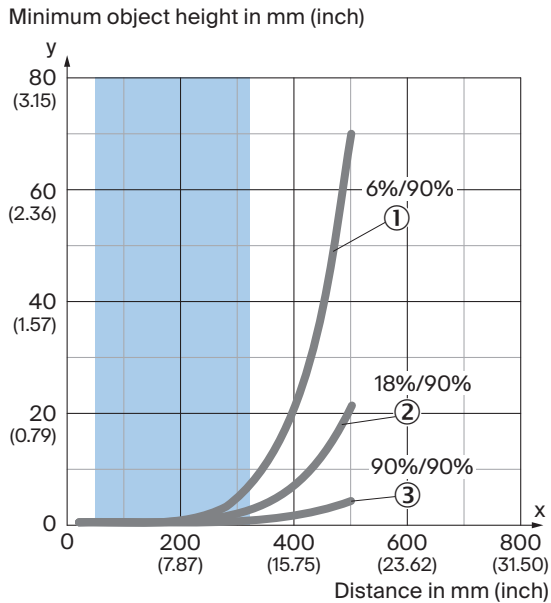
- ① Black background, 6% remission factor
- ② Sensing range on gray, 18% remission factor
- ③ White background, 90% remission factor

Example:
Reliable detection of the object



Black background (6 % remission factor)
Distance of sensor to background $x = 300$ mm
Required minimum object height $y = 2$ mm
For all objects regardless of their colors

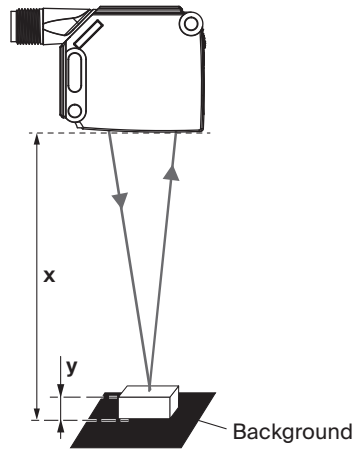
CHARACTERISTIC CURVE MODE 2



Recommended sensing range for the best performance

- ① Black background, 6% remission factor
- ② Sensing range on gray, 18% remission factor
- ③ Sensing range on white, 90% remission factor

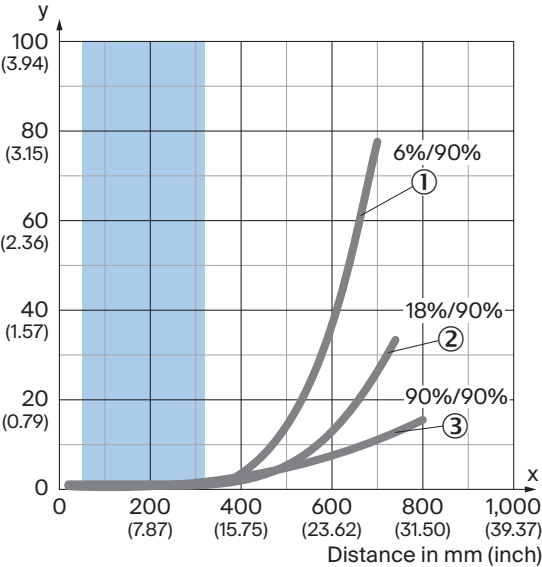
Example:
Reliable detection of the object



Black background (6 % remission factor)
Distance of sensor to background $x = 200$ mm
Required minimum object height $y = 1$ mm
For all objects regardless of their colors

CHARACTERISTIC CURVE MODE 1, 3, 4, 5 COMBINED WITH 6 (HIGHPRECISION/LONGRANGE MODE)

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



Example:
Safe suppression of the background

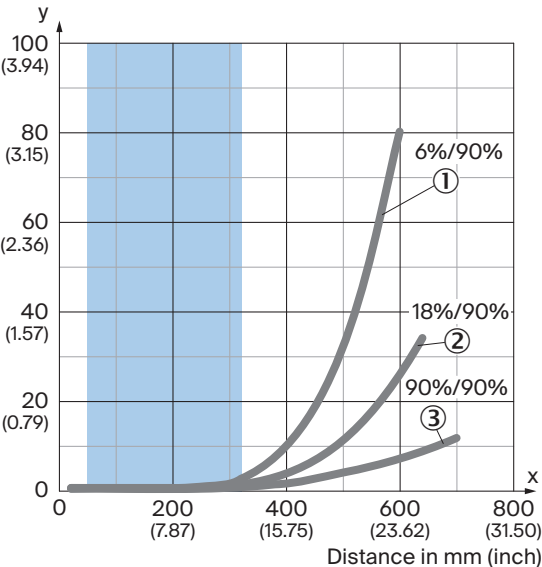
The diagram shows a sensor unit on the left and a white background on the right. A black object is placed between them. The distance from the sensor to the object is x, and the distance from the object to the background is y. Arrows indicate the sensor's field of view.

White background (90 %)

Black object (6 % remission)
Set sensing range x = 300 mm
Needed minimum distance to white background y = 1 mm

CHARACTERISTIC CURVE MODE 1, 3, 4, 5 COMBINED WITH 6 (BALANCED MODE)

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



Example:
Safe suppression of the background

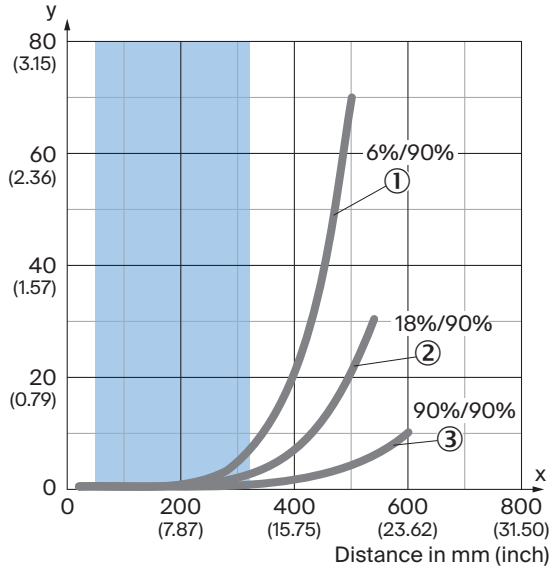
The diagram shows a sensor unit on the left and a white background on the right. A black object is placed between them. The distance from the sensor to the object is x, and the distance from the object to the background is y. Arrows indicate the sensor's field of view.

White background (90 %)

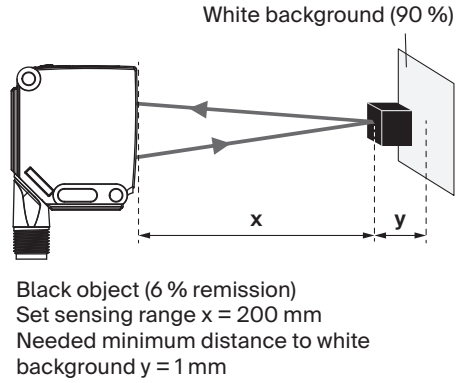
Black object (6 % remission)
Set sensing range x = 300 mm
Needed minimum distance to white background y = 2 mm

CHARACTERISTIC CURVE MODE 1, 3, 4, 5

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



Example:
Safe suppression of the background

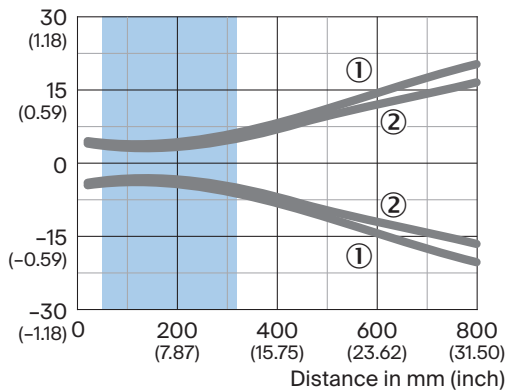


Recommended sensing range for the best performance

- ① Sensing range on black, 6% remission factor
- ② Sensing range on gray, 18% remission factor
- ③ Sensing range on white, 90% remission factor

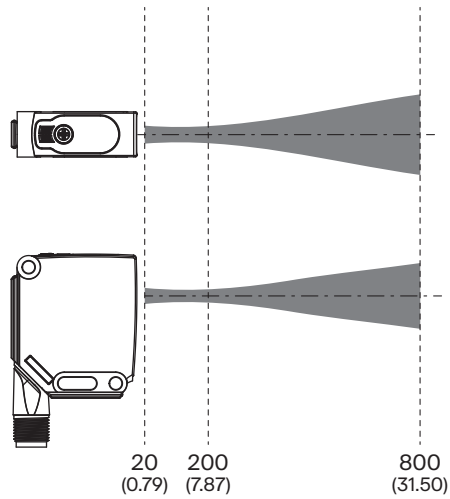
LIGHT SPOT SIZE

Dimensions in mm (inch)

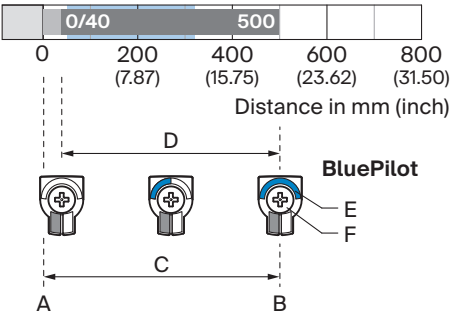


Recommended sensing range for the best performance

- ① Light spot horizontal
- ② Light spot vertical



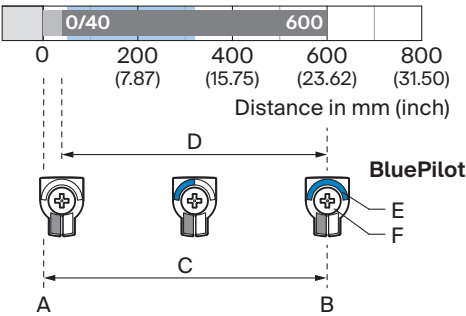
SENSING RANGE DIAGRAM MODE 2



Recommended sensing range for the best performance

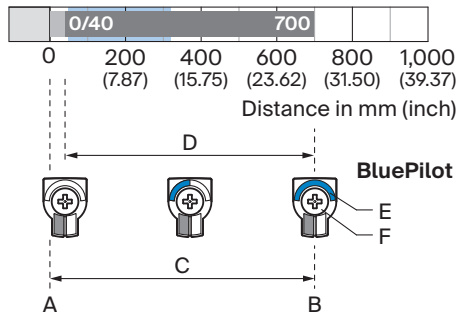
A	Sensing range min. in mm
B	Sensing range max. in mm
C	Field of view
D	Adjustable switching threshold for foreground suppression
E	Sensing range indicator
F	Teach-Turn adjustment

SENSING RANGE DIAGRAM MODE 2 AND 6 COMBINED (BALANCED MODE)



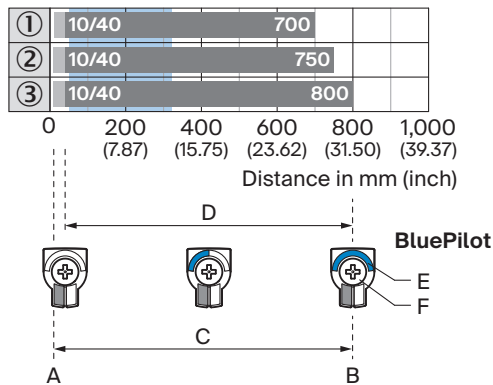
Recommended sensing range for the best performance

A	Sensing range min. in mm
B	Sensing range max. in mm
C	Field of view
D	Adjustable switching threshold for foreground suppression
E	Sensing range indicator
F	Teach-Turn adjustment

SENSING RANGE DIAGRAM MODE 2 AND 6 COMBINED (HIGHPRECISION/LONGRANGE MODE)

Recommended sensing range for the best performance

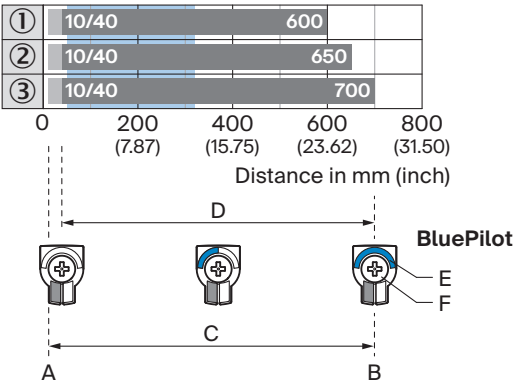
A	Sensing range min. in mm
B	Sensing range max. in mm
C	Field of view
D	Adjustable switching threshold for foreground suppression
E	Sensing range indicator
F	Teach-Turn adjustment

SENSING RANGE DIAGRAM MODE 1, 3, 4, 5 COMBINED WITH 6 (HIGHPRECISION/LONGRANGE MODE)

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

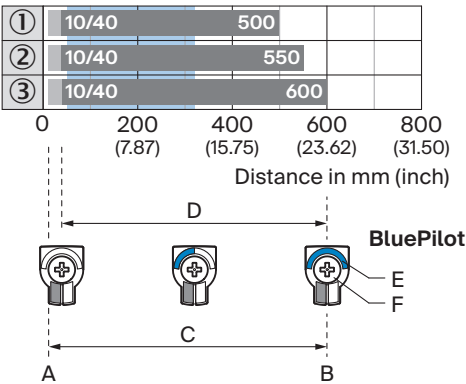
SENSING RANGE DIAGRAM MODE 1, 3, 4, 5 COMBINED WITH 6 (BALANCED MODE)



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



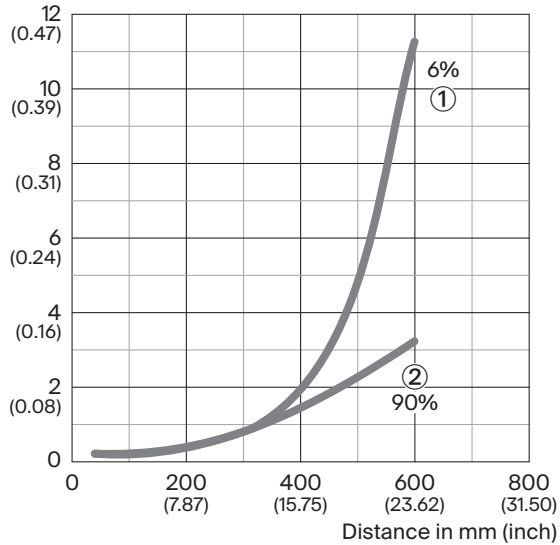
Recommended sensing range for the best performance

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

REPEATABILITY

Repeatability in mm (inch)

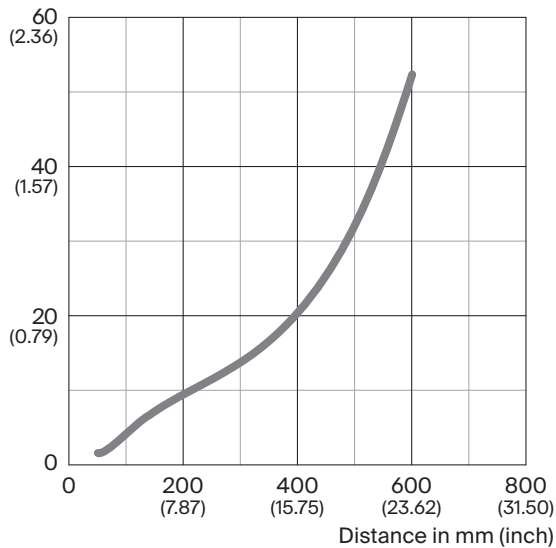


① 6% remission factor, on black

② 90% remission factor, on white

ACCURACY

Accuracy in mm (inch)



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/1152369



SICK AG
WALDKIRCH
GERMANY
SICK.COM

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