SensorsX

SX-OMPRB Series

Integrated High-Speed Color Mark Sensor

Industrial Optical Sensor — Color Sensor



20 µs Response Time (25 kHz)	**13 ± 3 mm** Detection Range (0.51 ± 0.12 in)	**NPN / PNP / PP** Control Output + RS485 Modbus
IP65 Ingress Protection	**R / G / B LED** Light Source (665 / 520 / 465 nm)	**12 – 24 V DC** Power Supply

Registration Mark Detection | Minute Color Difference Detection | Color Patch Detection on Conveyors

■ PRODUCT OVERVIEW

The SensorsX SX-OMPRB series is an integrated RGB color mark sensor for detecting registration marks and color differences. It automatically selects the illumination color and provides a response time of 20 µs with a switching frequency of 25 kHz. The sensing distance is 13 ± 3 mm.
C mode detects targets using color components and brightness, while I mode uses brightness. SET-button teach-in and manual threshold adjustment support setup for target and background discrimination. An RS-485 interface provides Modbus communication.



■ KEY FEATURES

◆ **RGB Light Source** Automatic selection of RGB three-color light source	◆ **High-Speed Response** 20 µs response time, a switching frequency of 25 kHz
◆ **RS485 Communication**	◆ **High Resolution** Reliable detection of minute color differences

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■ TYPICAL APPLICATIONS

- Detecting registration marks
- Detecting minute color differences
- Detecting color patches on targets on a conveyor belt

■ PERFORMANCE SPECIFICATIONS

Detection	
Detection Range	13 mm ± 3 mm (0.51 in ± 0.12 in)
Light Source	Red LED (665 nm) / Green LED (520 nm) / Blue LED (465 nm)
Spot Size	1.2 mm × 4.8 mm (0.05 in × 0.19 in)
Spot Orientation	Longitudinal direction
Response	
Response Time	20 µs
Switching Frequency	25 kHz

■ ELECTRICAL SPECIFICATIONS

Power	
Power Supply	12 – 24 V DC, ripple (P-P): 10 % max.
Current Consumption	≤ 20 mA at 24 V
Output Signal	
Control Output	NPN / PNP / PP open collector, 24 V, ≤ 100 mA, residual voltage ≤ 2 V
Electrical Connection	
Cable / Connector	Cable (6-wire), Φ4.0 mm (Φ0.16 in), 2 m (6.56 ft)
Protection	
Protection Circuits	Power reverse-polarity protection, output overcurrent protection, surge protection

■ ENVIRONMENTAL SPECIFICATIONS

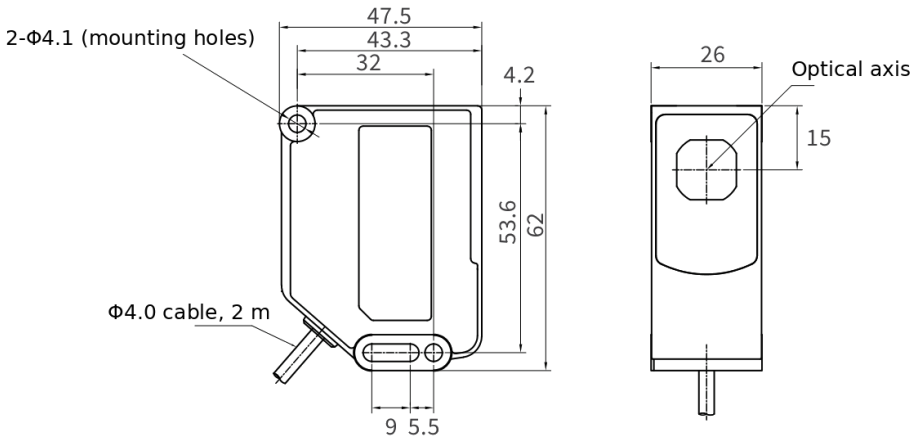
Temperature & Humidity	
Ambient Temperature	−20 to +50 °C (−4 to +122 °F), no freezing
Relative Humidity	35 to 85 % RH, no condensation
Mechanical & Environmental	
Ingress Protection	IP65
Ambient Illumination	Incandescent lamp: ≤ 10,000 lx; Sunlight: ≤ 20,000 lx
Shock Resistance	1000 m/s², 6 times each in X, Y, Z directions
Vibration Resistance	10 to 55 Hz, double amplitude 1.5 mm (0.06 in), 2 h each in X, Y, Z directions
Weight & Housing	
Housing Material	Plastic
Optical Lens	PMMA
Weight	70 g (2.47 oz)

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■ COMMUNICATION PROTOCOLS

RS485	
Protocol	MODBUS
Baud Rate	9,600 / 19,200 / 38,400 / 115,200 bps
Serial Settings	1 start bit, 8 data bits, 1 stop bit, no parity

■ MECHANICAL DIMENSIONS

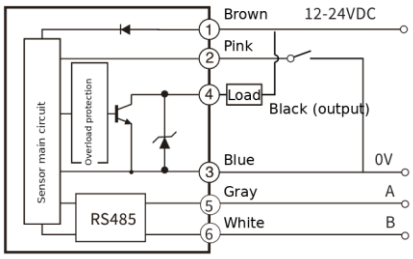


※ *All dimensions in mm.*

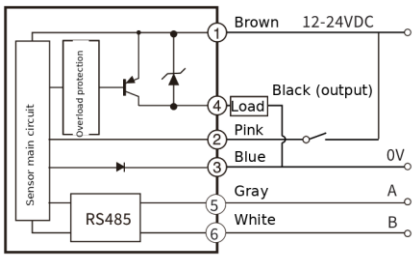
■ WIRING DIAGRAM

Input / Output Wiring — NPN and PNP

NPN

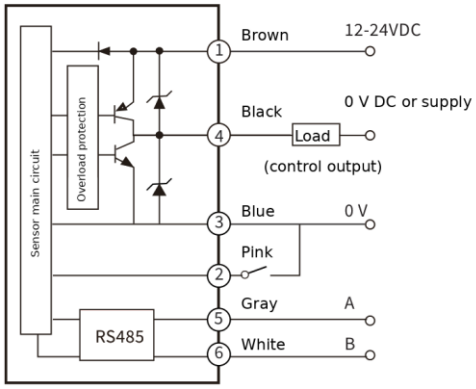


PNP



Input / Output Wiring — PP

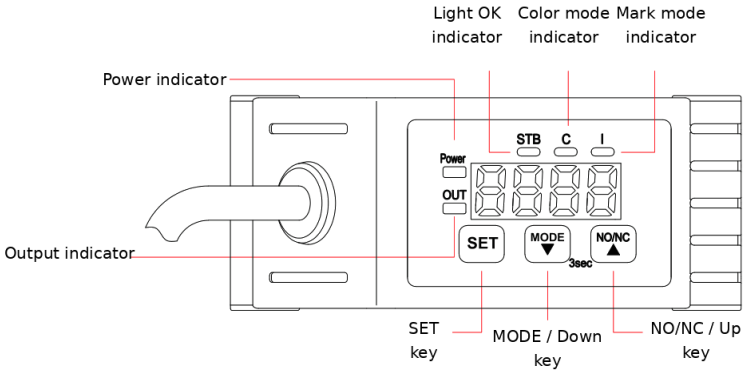
PP



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■ OPERATION & SETTINGS

Part Names

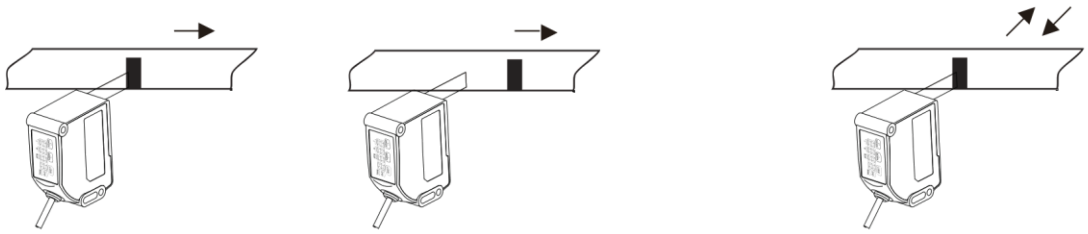


Operation — Setting the Switching Threshold

Suitable for manually positioning the object to be detected, e.g. mark and background.

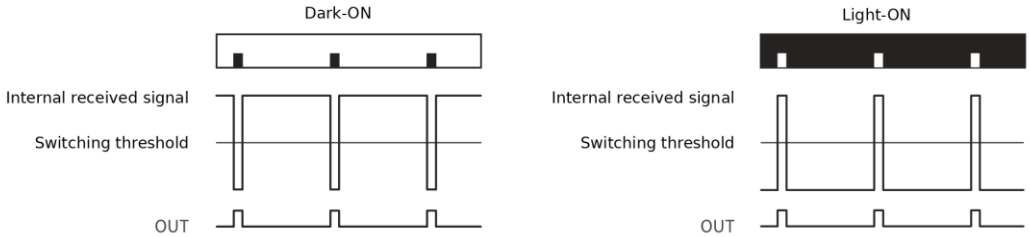
1. Two-point setting (target and background)

2. One-point setting (target only)



1. Two-point setting (target and background): Align the light spot with the target color and press [SET] once to confirm the target; the OUT LED flashes. Align the light spot with the background color and press [SET] again to confirm the background; the OUT LED stops flashing.
2. One-point setting (target only): Align the light spot with the target color and press [SET] once to confirm the target; the OUT LED flashes. Then press and hold [SET] while moving the target back and forth; after releasing, the OUT LED stops flashing.

Example



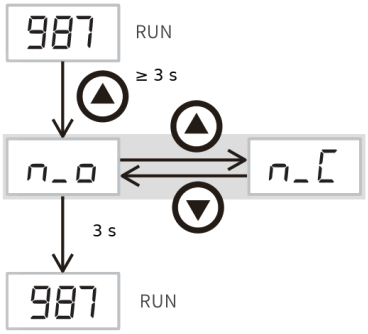
Switching Characteristics

- Automatically selects the optimal emission light (RGB).
- Static teach-in: Light-ON / Dark-ON setting is determined by the teaching sequence.
- Key lock (enable / disable): press and hold the set key for more than 10 s.
- Teach-in failure: OUT flashes, and all LEDs on the bar graph (green) flash.

Basic Setting — Switching Output Logic (N.O. / N.C.)

Set N.O. / N.C.: “n_o” — output when the target is detected; “n_C” — no output when the target is detected.

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Detection Modes

Detection Mode / Description	
C mode	Detection by color components (R, G, B) + brightness
I mode	Detection by brightness

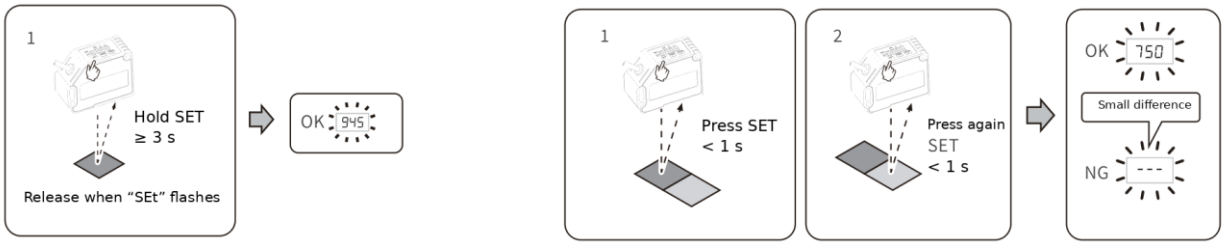
Sensitivity Adjustment — C Mode

Display values

- Match score: displays the degree of match between the “color” of the target set as reference and the “color” of the target currently being detected. Display range: 0 to 999 (the closer the match, the larger the value).
- Set value (threshold): the degree of match with the reference “color” at which a target is judged to be the same “color” is displayed as the threshold. To confirm or manually fine-tune the set value, refer to the confirm / adjust set value procedure. ※ The value displayed flashing after tuning is the set value.

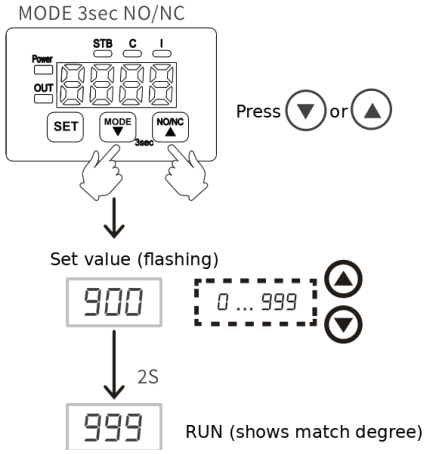
Setting sensitivity (choose one of the following 2 methods)

- One-point teach-in (detecting 1 specified “color”): align with the target and press and hold SET for 3 s.
- Two-point teach-in (discriminating between 2 “colors”): align with the target and press SET, then align with the background and press SET.



Adjusting the set value

After setting, if missed detections or false triggers occurs when detecting the target, the set value can be adjusted manually.



Sensitivity Adjustment — I Mode

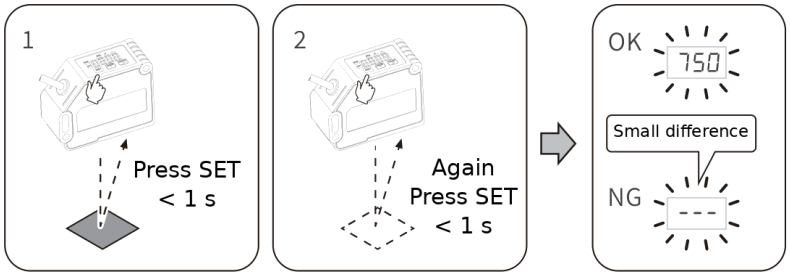
Display values

- Brightness value: displays the current brightness value.
- Set value: the amount of received light at which a target is judged to be present is displayed as the threshold. To confirm or manually fine-tune the value, refer to the confirm / adjust set value procedure. ※ The value displayed flashing after tuning is the set value.

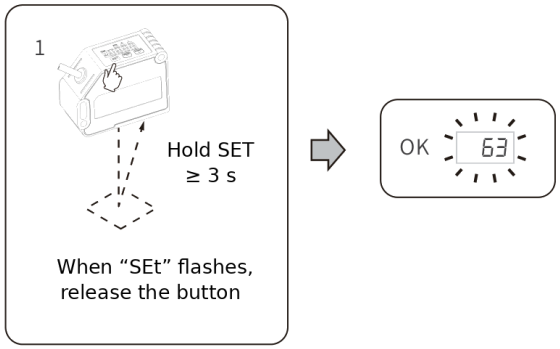
Setting sensitivity

- Two-point teach-in (basic): the first setting is the target; the second setting is the background.

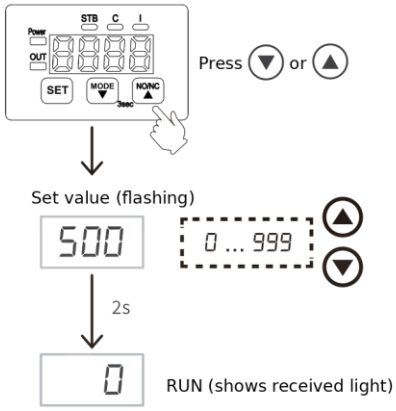
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- Maximum sensitivity tuning (when sensitivity is to be set to maximum).



Confirming / adjusting the set value



■ ORDERING INFORMATION — SX-OMPRB

Complete model number example: SX-OMPRB13M1

Detection Range	
13	13 ± 3 mm (0.51 ± 0.12 in)
Output	
M	NPN / PNP / PP + Modbus
Electrical Connection	
1	Cable
Customized (Optional)	
D	Customized — specify requirements in order remarks

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