Installation Instructions
45CRM Color Registration Mark Sensor

IMPORTANT: SAVE THESE INSTRUCTIONS FOR FUTURE USE.

Description

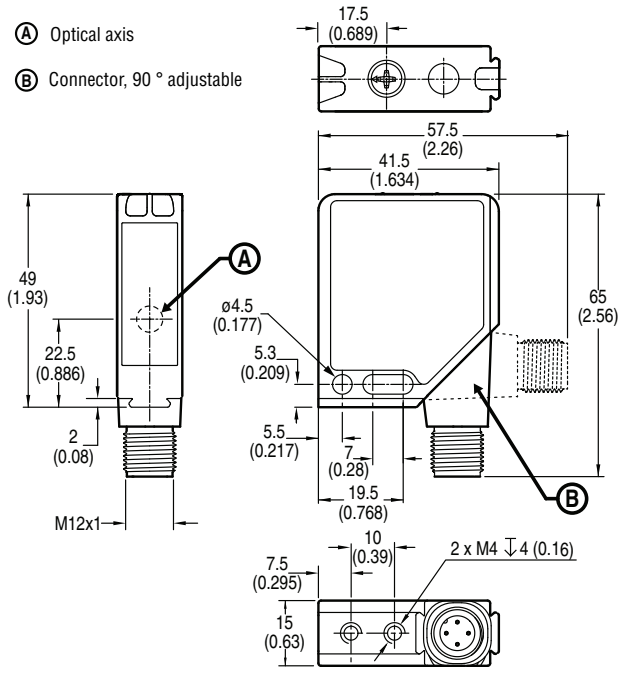
The 45CRM is a photoelectric contrast sensor that reliably detects registration marks on a web. This sensor features red, green, and blue (RGB) emitter LEDs. During the teach process the sensor determines which of the emitter LEDs maximizes the contrast between the registration mark and the web (background). The teach process is completed using a simple rotary switch.

The extremely fast response time enables the control system to precisely align web material within the machine, for example, lining up labels on a web with the cutting blade of the equipment prior to the label being placed on a bottle.

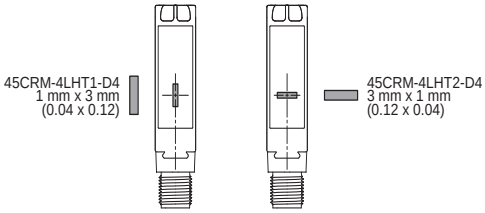
Features

- Three emitter LEDs (red, green, and blue)
- 40 µs response time
- Three simple setup methods: dynamic teach, static teach or IO-Link configurable
- Adjustable-position micro (M12) quick-disconnect (QD) for mounting flexibility

Dimensions [mm (in.)]



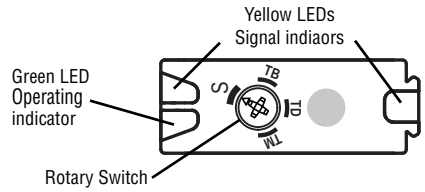
Light spot orientation [mm (in.)]



Specifications

Certifications	cULus Listed and CE Marked for all applicable devices
Environmental	
Operating Environment	IP67
Operating Temperature	-20...60°C (-4 ... 140° F)
Storage Temperature	-40...75°C (-40...167° F)
Vibration	10…55 Hz, 0.5 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 11 ms pulse duration, meets or exceeds IEC 60947-5-2
Optical	
Sensing Ranges	11 mm ± 2 mm (0.43 ± 0.079 in.)
Angle Deviation	max. ± 3°
Light Source	3 LEDs (red, green, blue)
Electrical	
Voltage	10...30V DC when operating in IO-Link mode: 18 ... 30V
Current Consumption	≤ 60 mA at 24V supply voltage
Sensor Protection	Short circuit, reverse polarity, and overload protection
IO-Link	
Protocol	IO-Link V1.0
Interface Type	IO-Link
Mode	COM 2 (38.4 kBaud)
Outputs	
Response Time	40 µs
Sensitivity Adjustment	Rotary switch
Output Type	2 x NPN/PNP complementary outputs
Output Mode	Light or dark operation
Output Leakage Current	≤ 100 µA per output
Discrete Output Rating	30V DC max./100 mA max.
Mechanical	
Housing Material	Die-cast zinc, nickel-plated
Lens Material	PMMA Luxacryl, clear
Connection Type	Micro QD (M12), 4-pin, 90° adjustable position

Controls and indicators



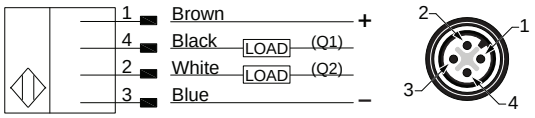
Mounting

Securely mount the sensor on a firm, stable surface or support for reliable operation. A mounting subject to excessive vibration or shifting may cause intermittent operation. A mounting bracket is available for installation convenience. Once securely mounted, the sensor can be wired per the wiring instructions in the next section.

IMPORTANT If the surface of the target object is shiny or reflective, orient the sensor so it is angled at approximately 10° to the surface.

Wiring

NPN or PNP (Push-Pull)



The 45LMS features complementary Push-Pull discrete outputs. This means the outputs always drive either 24V or 0V and can therefore be wired like either an NPN or a PNP sensor. For example, when the sensor detects a registration mark, output Q1 will go to 24V and output Q2 will go to 0V. If the sensor is wired for a PNP output, Q1 is ON when the sensor detects a mark and Q2 is OFF. If wired for an NPN output, Q1 is OFF when the sensor detects a mark and Q2 is ON.

The 45CRM photoelectric sensor is available with a micro QD (M12) for ease of installation and maintenance.

Rockwell Automation recommends the use of the 889 Series of cord sets and patch cords for quick-disconnect (QD) model sensors. All external wiring should conform to the National Electric Code and all applicable local codes.

Sensitivity adjustment overview

There are two simple teach methods for the 45CRM. The first method is Static Teach, which is intended for applications where the web can be stopped, or for more challenging applications. The second method is Dynamic Teach, which is well suited for applications where the web cannot be stopped for sensor implementation.

Alarm feature: The 45CRM also has an alarm feature that alerts the user via LEDs that the contrast taught is too low. The Green and Yellow LEDs will flash at 8 Hz for approximately 7 seconds. The sensor will revert to the last valid set-point for the mark and the background.

Static Teach Mode

The static teach process is used to teach the sensor when the web is not moving. It is sometimes required for more challenging applications, as it allows for a more precise setup of the sensor.

The user teaches the registration mark color and the background color separately. Either can be taught first. It is highly recommended to teach both every time in order to achieve the most reliable detection. However, it is not always necessary to teach both. For example, you have to teach only the new mark when the mark color changes but the background remains the same.

IMPORTANT When you change the Rotary Switch position, the new mode takes effect after a 2-second delay. The LEDs will not change state during this delay.

Teach Mark (TM)

Follow these steps to teach the mark:

1. Move the Rotary Switch to **TM** (The front Green and Yellow LEDs will flash simultaneously indicating the sensor is ready to be taught the mark.)
2. Place the mark in the light spot.
3. Move the Rotary Switch to **S** (or **TB)**. The 45CRM learns the color that is in the light spot when you move the Rotary Switch away from **TM**.
4. Continue to the next section.

Teach Background (TB)

Follow these steps to teach the background:

1. Move the Rotary Switch to **TB** (The front Green and Yellow LEDs will flash alternately, indicating the sensor is ready to be taught the background.)
2. Place the background in the light spot.
3. Move the Rotary Switch to **S** for normal operation. The 45CRM learns the color that is in the light spot when you move the Rotary Switch away from **TB**.

Dynamic Teach Mode

The dynamic mode is used to teach the sensor while the web is moving. The sensor automatically detects the background color and the mark color as each passes through the sensor's detection area (light spot). It selects the appropriate emitter LED color and sets the threshold so that the primary output turns on when the sensor detects a mark.

IMPORTANT When you change the Rotary Switch position, the new mode takes effect after a 2-second delay. The LEDs will not change state during this delay.

Teach Dynamic (TD)

Follow these steps to teach using dynamic mode:

1. Move the Rotary Switch to **TD.**
2. Verify that at least one registration mark passes through the light spot.
3. After a minimum of 2 seconds have elapsed, turn the Rotary Switch to **S** for normal operation.

If the sensor does not display the Alarm Feature, then the Dynamic Teach was successful.

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