

Installation Instructions

PHOTOSWITCH® Bulletin 42CM Metal Body 18mm Cylindrical

IMPORTANT: SAVE THESE INSTRUCTIONS FOR FUTURE USE.

IMPORTANT *Eye Safe Class 1 Laser.* This notice applies only to 42CM Laser models.

Description

The 42CM is a family of photoelectric sensors intended for heavy duty industrial applications. They are packaged in an industry standard 18mm cylindrical metal housing.

Five possible modes of sensing with a standard LED light source include transmitted beam, diffuse, retroreflective, polarized retroreflective, and background suppression, allowing the 42CM to be used in a variety of complex applications. The 42CM is also available with an optional Laser light source in three modes including transmitted beam, polarized retroreflective, and diffuse. This option allows the 42CM to be used in applications requiring a very small light beam or where sensor alignment is difficult.

Indication of target presence is provided through a discrete NPN or PNP output which is compatible with most measurement and control circuits found in today's factory automation systems. Outputs are short-circuit protected.

Features

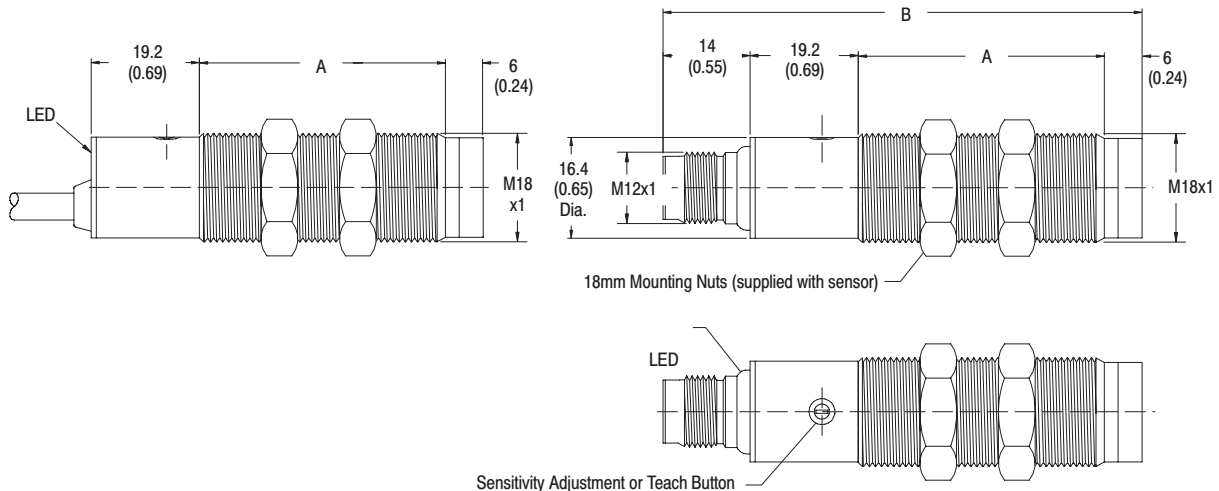
- Short circuit protection
- Reverse polarity protection
- NPN or PNP outputs
- L.O. or D.O.
- Metal body
- Optional Class 1 laser source
- Laser models feature remote and local teach

Dimensions—mm (inches)

Dimension	Standard Light Source Background Suppression—mm (in)	Laser Receiver mm (in)	Other Laser Models—mm (in)
A	42.5mm (1.67in)	42.7mm (1.68in)	57.5mm (2.26in)
B	81.7mm (3.22in)	82.8mm (3.26in)	97.7mm (3.85in)

General Specifications

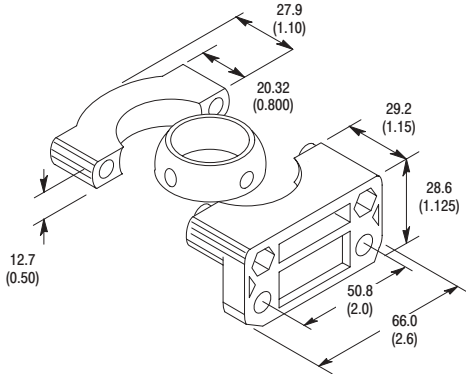
	Standard Light Source (42CM-⊗1... and 42CM-⊗2...)	Laser (42CM-⊗8...)
Light Source	Infrared 880nm or visible red 660nm	Class 1 Laser 650nm
Unit Protection	Reverse polarity, output short-circuit and overload protection (SCP)	
Supply Voltage	10–30V DC	
Current Consumption	30mA maximum	25mA max
Output Type	NPN or PNP	
Output Mode	Light or dark operate selectable	
Output Rating	100mA	
Response Time	2ms 0.5ms (Background suppression)	1.25ms (Diffuse, Pol. Retro.) 1ms (Trans. Beam)
Sensitivity Adjustment	Potentiometer	Button (Diffuse, Pol. Retro) Potentiometer (Trans. Beam)
Housing Material	Nickel-plated brass	
Lens Material	PMMA/PC	
LED Indicators	Yellow output	
Connection Types	2m cable, 4-pin DC micro QD	
Supplied Accessories	18mm fastening nuts (Cat. No. 871T-N4)	
Optional Accessories	Mounting brackets, reflectors, cordsets	
Operating Environment	IP 67, Type 1 enclosure	
Vibration	10–55Hz, 0.5mm amplitude, Meets or exceeds IEC 60947-5-2	
Shock	30g with 11ms pulse duration, Meets or exceeds IEC 60947-5-2	
Operating Temperature	-25°C to +70°C (-13°F to +158°F)	-10°C to +55°C (+14°F to +131°F)
Relative Humidity	29 to 90%	15 to 95%
Ambient Light Immunity	3000 Lx	5000 Lx
Approvals	cULus and CE marked for all applicable directives	



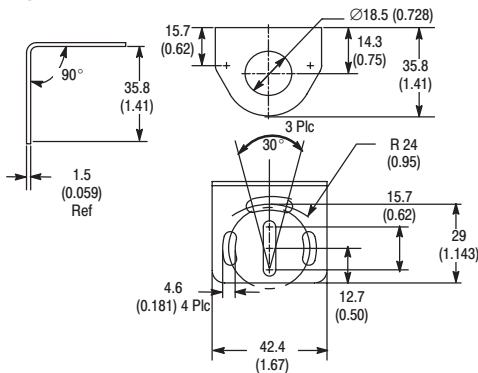
Installation

The 42C* Series sensor must be mounted on a firm, stable surface or support. A mounting which is subject to excessive vibration or shifting may cause intermittent operation. For installation convenience, Rockwell Automation offers the following mounting bracket.

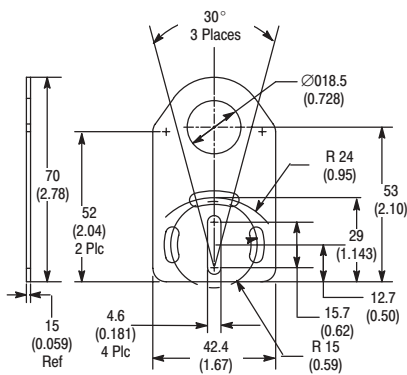
Swivel/Tilt Bracket #60-2649



Right Angle Bracket #60-2657



Straight Bracket #60-2656



Alignment and Sensitivity Adjustment

Standard LED Light Source Models

Diffuse

Adjust the sensitivity to the maximum setting by turning the sensitivity potentiometer clockwise. Aim the sensor at the object to be detected until the output indicator on the control turns *On* (light operate) or *Off* (dark operate). To be certain that the beam is centered, sweep the beam on the object in the horizontal plane and determine the position the output indicator turns *On* and then *Off*. Set the beam halfway between both positions. Do the same in the vertical plane.

Remove the object to be detected from in front of the sensor. If the sensor remains *On* reduce the sensitivity to eliminate background signals. Restore the object being detected and check if the output indicator turns *On* again. It may be necessary to move the sensor closer to detect darker or smaller objects.

Retroreflective/Polarized Retroreflective

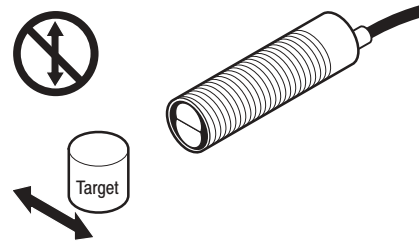
It is recommended to set the sensitivity at the maximum by turning the potentiometer clockwise (factory default). Aim the sensor on the reflector until the output indicator on the sensor turns *On* (light operate) or *Off* (dark operate). To be certain that the beam is centered, sweep the beam on the reflector in the horizontal plane and determine the position the output indicator turns *On* and then *Off*. Set the beam halfway between both positions. Do the same in the vertical plane. Break the beam with the object to be detected and check to see if the output indicator turns *Off*. It may be necessary to use a smaller sized reflector to detect small objects. Restore the beam by removing the object and check to see if the output indicator turns *On* again. For shiny objects angle the sensor so that the beam is not perpendicular to the object. For highly reflective materials use a polarized retroreflective sensor.

Transmitted Beam

Aim the receiver at the light source until the output indicator on the receiver turns *On* (light operate) or *Off* (dark operate). To be certain the beam is centered, sweep the beam across the receiver in the horizontal plane and determine the position the output indicator turns *On* and then *Off*. Set the beam halfway between both positions. Do the same in the vertical plane.

Background Suppression

Position the sensor so that the object to be detected is less than the rated sensing distance and the background to be suppressed is more than the rated sensing distance. Check that the Yellow LED is *On* when the object is present and *Off* when the object is not present (for Dark Operate the LED is *Off* when the object is present).



Note: Due to the detection method, targets traveling horizontal to the sensor's optics are detected. Targets traveling vertically may not be accurately detected. For reliable background suppression, a minimum separation distance of 6mm (0.24in) is recommended between the target and the backgrounds.

Laser Models

Diffuse

Aim the sensor at the object to be detected. The light beam should be perpendicular to the surface of the object for best results. Press the teach button or connect pin 2 (white wire) to ground for 2–5 seconds until the yellow LED turns back *On*. The turn-on point for the sensor is set to 50% of the detected light signal (the standard sensitivity adjustment). Remove the object and check that the yellow LED has switched off. If the yellow LED is still *On* or *Flashing*, fine sensitivity adjustment is required.

Fine adjustment: Follow the same process as above except continue holding the teach button or pin 2 (white wire) to ground for 8 seconds, until the yellow LED starts *Flashing*. The turn-on point for the sensor is set to just below the detected light signal. Remove the object and check that the yellow LED has switched *Off*.

Polarized Retroreflective

Install the sensor and reflector so that the light beam is perpendicular to the surface of the reflector. Press the teach button or connect pin 2 (white wire) to ground for 2-5 seconds until the yellow LED turns back *On*. The turn-on point for the sensor is set to 50% of the detected light signal (the standard sensitivity adjustment). Place the target object in position and check that the LED has turned *Off*. If the yellow LED is still *On* or *Flashing*, fine sensitivity adjustment is required.

Fine adjustment: (Recommended for semi-transparent objects.) Follow the same process as above except continue holding the teach button or pin 2 (white wire) to ground for 8 seconds, until the yellow LED starts *Flashing*. The turn-on point for the sensor is set to just below the detected light signal. For further fine tuning, slightly vary the alignment by sweeping the beam across the reflector horizontally and

vertically until the yellow LED turns *On* constantly or the frequency of the *Flashing* decreases. Repeat the fine adjustment procedure until it is no longer possible to vary the frequency of the LED flashes. Place the target object in position and check that the LED has turned *Off*.

Transmitted Beam

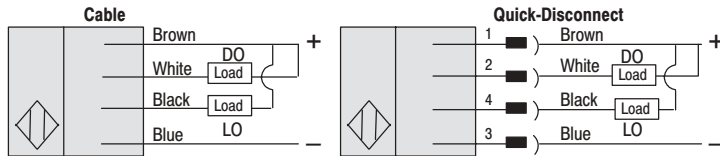
Turn the sensitivity adjustment clockwise until it stops turning to set the maximum light response. Aim the receiver at the light source until the yellow LED on the receiver turns *On* constantly. The emitter, beam, and receiver should be in a straight line. To be certain the beam is centered, sweep the beam across the receiver in the horizontal plane and between both positions. Do the same in the vertical plane. Use the object to be detected to break the beam and check that the yellow LED has turned *Off*. If not, remove the object and turn the sensitivity adjustment counter-clockwise until the yellow LED turns *On* constantly. Use the object to be detected to break the beam and check that the yellow LED has turned *Off*.

Laser inhibit (TB emitter models only): Connect pin 2 (black wire) to ground to turn off the laser emitter without turning off the sensor. This can emulate the presence of an object or be used to disable the sensor when not in use.

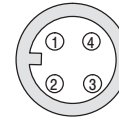
Wiring LED Light Source Models

Diffuse

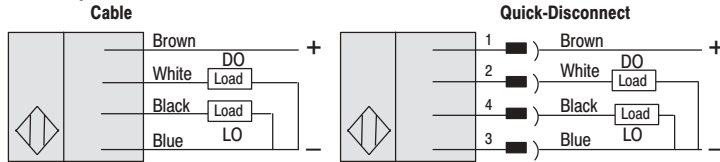
NPN Output



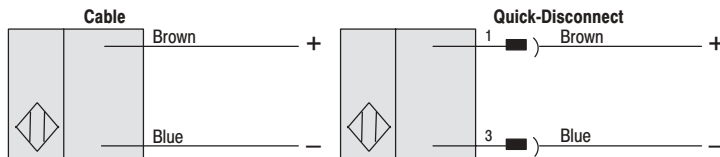
Face View Male Receptacle (Sensor) DC Micro



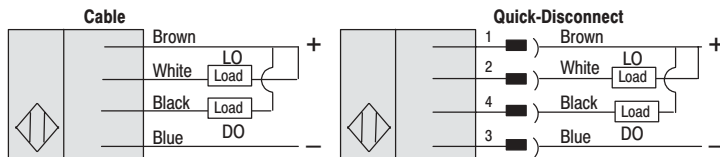
PNP Output



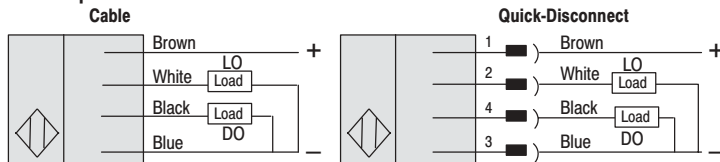
Transmitted Beam, Retroreflective, Polarized Retroreflective



NPN Output



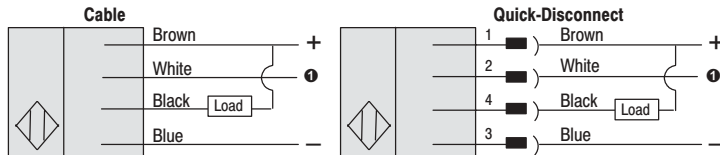
PNP Output



Wiring (continued)

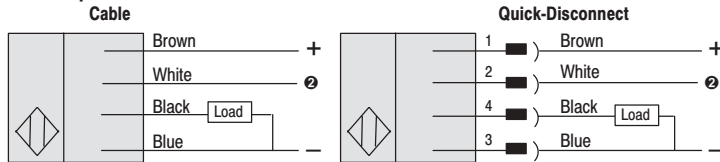
Background Suppression and Laser Transmitted Beam Receiver

NPN Output



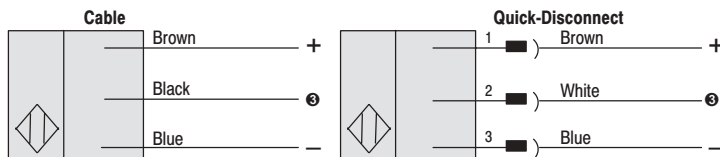
① Open circuit or tie white (2) and brown (1) conductors together for LO. Tie white (2) and blue (3) conductors together for DO.

PNP Output



② Tie white (2) and brown (1) conductors together for LO. Open circuit or tie white (2) and blue (3) conductors together for DO.

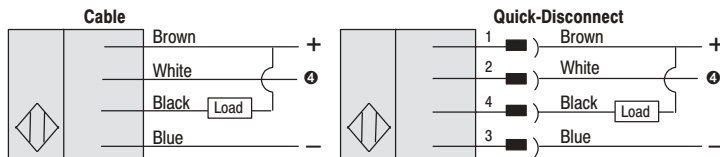
Laser Transmitted Beam Emitter



③ Black (2) open circuit to enable Laser. Tie black (2) to blue (3) to disable Laser.

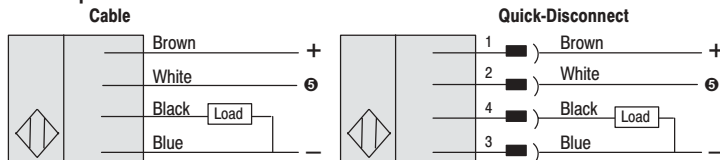
Laser Diffuse, Polarized Retroreflective

NPN Output



④ Tie white (2) and brown (1) conductors together for DO. White (2) open circuit for LO.

PNP Output



⑤ Tie white (2) and brown (1) conductors together for DO. White (2) open circuit for LO.

Accessories

Description	Catalog Number		Description	Catalog Number		Description	Catalog Number	
Reflector, 0.76mm (3in) Diameter with Center Mount Hole	92-39		2m (6.5ft) Micro QD Cordset	889D-F4AC-2		Reflector, 38.1mm (1.5in) Rectangular Micro Cube	92-118	

⑥ Using the Micro Cube style reflectors such as the 92-118 will significantly increase the sensing distance of polarized retroreflective laser sensors.