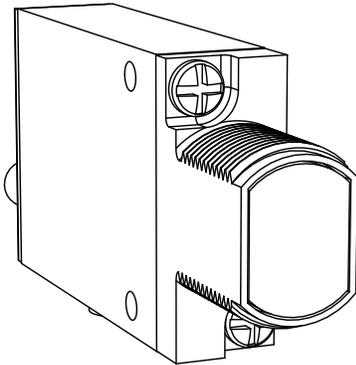


# MINI-BEAM Expert Series Installation Guide

Microprocessor-based TEACH mode photoelectric sensors<sup>1</sup>



Additional information on this product is immediately available online at [www.bannerengineering.com/55214](http://www.bannerengineering.com/55214)

View or download additional information, including excess gain curves, beam patterns and accessories. For further assistance, contact a Banner Engineering Applications Engineer at (763) 544-3164 or (888) 373-6767.



**WARNING: Not To Be Used for Personnel Protection**  
 Never use this device as a sensing device for personnel protection. Doing so could lead to serious injury or death. This device does NOT include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition.

<sup>1</sup> U.S. patent(s) issued or pending

## Retroreflective Models

| Sensing Mode   | Model *   | Range or Focus                         | Supply Voltage | Output Type     |
|--|-----------|--|----------------|-----------------|
| Retroreflective, 650 nm visible red                          | SME312LV  | 5 m (15 ft)**                          | 10 to 30V dc   | Bipolar NPN/PNP |
| Polarized retroreflective, 650 nm visible red                | SME312LP  | 10 mm to 3 m** (0.4 in to 10 ft)       |                |                 |
| Polarized retroreflective, 650 nm visible red (clear object) | SME312LPC | 1 m (3.3 ft) with supplied reflector** |                |                 |

\*\* Sensing ranges vary according to the efficiency and reflective area of the retroreflector(s) used. (Retroreflective tape is not recommended for use with Clear Object Detection models.) See *Accessories* and the Banner Engineering catalog for more information.

## Diffuse Models

| Sensing Mode                       | Model *  | Range or Focus  | Supply Voltage | Output Type     |
|------------------------------------|----------|-----------------|----------------|-----------------|
| Diffuse, 880 nm infrared           | SME312D  | 380 mm (15 in)  | 10 to 30V dc   | Bipolar NPN/PNP |
| Diffuse, 650 nm visible red        | SME312DV | 1100 mm (43 in) |                |                 |
| Divergent Diffuse, 880 nm infrared | SME312W  | 130 mm (5 in)   |                |                 |

## Convergent Models

| Sensing Mode                         | Model *   | Range or Focus  | Supply Voltage | Output Type     |
|--------------------------------------|-----------|---|----------------|-----------------|
| Convergent, 650 nm visible red       | SME312CV  | 16 mm (0.65 in)<br>Spot Size at Focus: 1.3 mm (0.05 in) | 10 to 30V dc   | Bipolar NPN/PNP |
|                                      | SME312CV2 | 43 mm (1.7 in)<br>Spot Size at Focus: 3.0 mm (0.12 in)  |                |                 |
| Convergent, 525 nm visible green     | SME312CVG | 16 mm (0.65 in)<br>Spot Size at Focus: 1.0 mm (0.04 in) |                |                 |
| Convergent, 475 nm visible blue      | SME312CVB | 16 mm (0.65 in)   |                |                 |
| Convergent, 450-650 nm visible white | SME312CVW | Spot Size at Focus: 1.8 mm (0.07 in)                    |                |                 |



**Glass Fiber Optic Models**

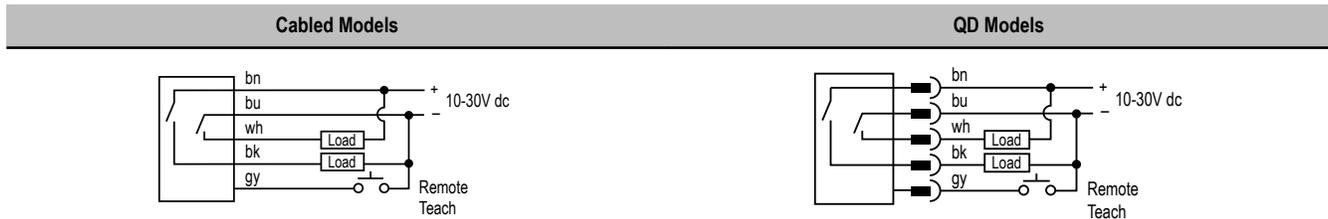
| Sensing Mode                                | Model *   | Range or Focus                                     | Supply Voltage | Output Type     |
|---|-----------|--|----------------|-----------------|
| Glass Fiber Optic, 880 nm infrared          | SME312F   | Range varies by sensing mode and fiber optics used | 10 to 30V dc   | Bipolar NPN/PNP |
| Glass Fiber Optic, 650 nm visible red       | SME312FV  |  |                |                 |
| Glass Fiber Optic, 525 nm visible green     | SME312FVG |  |                |                 |
| Glass Fiber Optic, 475 nm visible blue      | SME312FVB |  |                |                 |
| Glass Fiber Optic, 450-650 nm visible white | SME312FVW |  |                |                 |

**Plastic Fiber Optic Models**

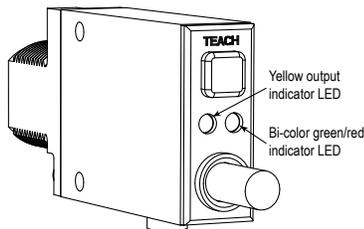
| Sensing Mode                                  | Model *   | Range or Focus                                     | Supply Voltage | Output Type     |
|---|-----------|--|----------------|-----------------|
| Plastic Fiber Optic, 650 nm visible red       | SME312FP  | Range varies by sensing mode and fiber optics used | 10 to 30V dc   | Bipolar NPN/PNP |
| Plastic Fiber Optic, 525 nm visible green     | SME312FPG |  |                |                 |
| Plastic Fiber Optic, 475 nm visible blue      | SME312FPB |  |                |                 |
| Plastic Fiber Optic, 450-650 nm visible white | SME312FPW |  |                |                 |

\* Standard 2 m (6.5 ft) cable models are listed. To order the 9 m (30 ft) cable model, add suffix "W/30" to the model number (e.g., SME312LV W/30.) To order the 5-pin Euro-style QD models, add suffix "QD" (e.g., SME312LVQD). Models with a QD connector require a mating cable.

**Wiring**



**Overview**



MINI-BEAM® Expert™ is a complete family of sensors, all housed in the popular, robust and compact rectangular housing. Their large push button and easy-to-see indicators provide easy configuration, alignment, and monitoring during use.

**Status Indicators**

Normal sensor operation is called RUN mode. Sensor configuration (setting the sensitivity threshold and selecting output ON and OFF conditions) is performed in TEACH mode. The two LED indicators (bi-color green/red and yellow) have distinct roles in the two operation modes. If contrast is marginal, the bi-color indicator will flash green to indicate instability. If this occurs, reconfigure or realign the sensor, or clean the sensor or fiber lenses.

The Signal Strength indicator is Banner's exclusive AID™ (Alignment Indicating Device). Its pulse rate increases as the received light signal strength increases (during programming). This feature simplifies accurate alignment during TEACH mode, and gives a relative indication of sensing contrast between the light and dark conditions.

| LED            | RUN Mode   | TEACH Mode |
|----------------|--|------------|
| Solid green    | Power is on  |            |
| Flashing green | Sensed light level is approaching sensing threshold* |            |

| LED        | RUN Mode               | TEACH Mode   |
|------------|------------------------|--|
| Solid red  |                        | Sensor "sees" its own modulated light source; pulse rate is proportional to the received light signal strength** |
| Yellow on  | Outputs conducting     | Ready to TEACH output ON condition   |
| Yellow off | Outputs not conducting | Ready to TEACH output OFF condition  |

\* This is the Stability indicator, which signals when maintenance, realignment, or reconfiguration is needed during RUN mode.

\*\* The faster the pulse rate, the stronger the light signal.

### Remote Configuration

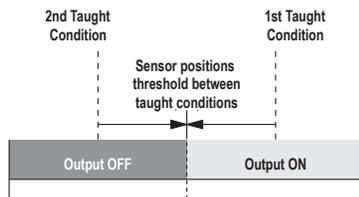
The remote function may be used to configure the sensor remotely or to disable the push button for security. Connect the gray wire of the sensor to ground (0V dc), with a remote programming switch connected between them. Pulse the remote line according to the diagrams in the configuration procedures. The length of the individual programming pulses is equal to the value T where: 0.04 seconds ≤ "T" ≤ 0.8 seconds

### Troubleshooting

If the MINI-BEAM Expert's Power LED alternately flashes red/green, this indicates a microprocessor memory error. To clear the error, re-teach the sensor or cycle the power ON and OFF and re-teach the sensor. If this does not solve the problem, or if it occurs frequently, replace the sensor.

### Static Teach

The two sensing conditions may be presented in either order. The condition presented first is the condition for which the output will energize (the "Output ON" target).



Sensitivity is automatically set (and optimized) when teaching the sensor the ON and OFF conditions.

When the push button is clicked, the sensor samples each sensing condition and registers it into memory. After the second sensing condition is registered, the MINI-BEAM Expert automatically sets the sensitivity to the optimum value for the application, and then returns to RUN mode.

Push button (0.04 seconds ≤ "Click" ≤ 0.8 seconds); Remote line (0.04 seconds ≤ "T" ≤ 0.8 seconds)

1. Access TEACH mode.

| Method                 | Action   |
|------------------------|--|
| <b>Via push button</b> | Press and hold push button until the bi-color (green/red) indicator begins to flash red, or turns OFF. |
| <b>Via remote line</b> | No action required; sensor is ready for 1st sensing condition.   |

Push button method only: The yellow LED is on. The red LED pulses to indicate relative received signal strength. The sensor is ready for the output ON condition.

2. Teach the first sensing condition.

| Method                 | Action  |
|------------------------|---|
| <b>Via push button</b> | Present the first sensing condition and click the push button.        |
| <b>Via remote line</b> | Present the first sensing condition and single-pulse the remote line. |

The yellow LED is off. The red LED pulses to indicate relative signal strength. The sensor registers the output ON condition and is ready for the output OFF condition.

3. Teach the second sensing condition and return to RUN mode.

| Method                 | Action   |
|------------------------|--|
| <b>Via push button</b> | Present the second sensing condition and click the push button.        |
| <b>Via remote line</b> | Present the second sensing condition and single-pulse the remote line. |

If the teach is accepted the green LED is on (or flashes if the signal is close to the switching threshold) and the yellow LED is off until the sensing condition changes; the sensor registers the output OFF condition, positions the threshold, and returns to RUN mode.

If the teach is not accepted, the yellow LED is on and the red LED pulses to indicate the relative received signal strength. The sensor returns to its wait state and is ready for the first sensing condition.

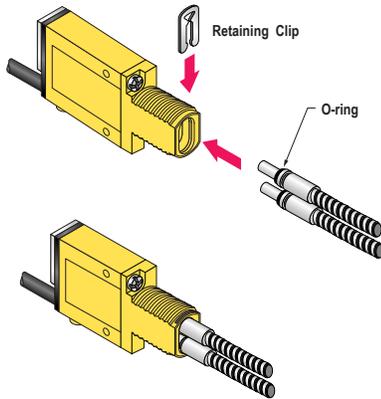
NOTE: The sensor returns to RUN mode if the first TEACH condition is not registered within 90 seconds. TEACH mode may be cancelled before either the first or second condition by holding the push button depressed for more than two seconds.

### Enabling or Disabling the Push Button

In addition to its programming function, the remote line may be used to disable the push buttons for security. Disabling the push buttons prevents undesired tampering with the sensor configuration settings.

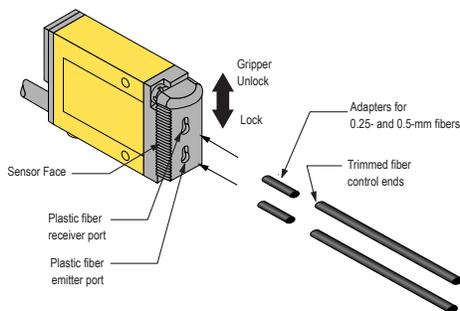
1. Connect the sensor's gray wire.
2. Four-pulse the remote line to enable or disable the push button.  
The sensor toggles between enable and disable settings and returns to RUN mode.

## Glass Fiber Installation



1. Install the O-ring (supplied with the fiber) on each fiber end, as shown in the drawing.
2. While pressing the fiber ends firmly into the ports on the sensor front, slide the U-shaped retaining clip (supplied with the sensor) into the slot in the sensor's barrel, until it snaps into place.

## Plastic Fiber Installation



1. With supplied fiber cutter, make a clean cut at control ends of fibers.
2. Unlock the fiber gripper as shown below. Apply appropriate fiber adaptors prior to fiber insertion, if needed.
3. Gently insert the prepared fiber ends into the ports, as far as they will go.
4. Slide the fiber gripper back to lock, as shown below.

## Specifications

| General   | Outputs  |
|---|--|
| <p><b>Supply Voltage and Current</b><br/>10 to 30V dc (10% maximum ripple) at less than 45 mA, exclusive of load</p> <p><b>Supply Protection Circuitry</b><br/>Protected against reverse polarity and transient voltages</p> <p><b>Adjustments</b><br/>Push-button TEACH mode sensitivity setting; remote TEACH mode input is provided</p> <p><b>Indicators</b><br/>Two LEDs: yellow and bi-color green/red</p> <p><b>Construction</b><br/>Reinforced thermoplastic polyester housing, totally encapsulated, o-ring seal, acrylic lenses, and stainless steel screws.</p> <p><b>Connections</b></p> | <p><b>Output Configuration</b><br/>Bipolar: One current sourcing (PNP) and one current sinking (NPN) open-collector transistor</p> <p><b>Output Rating</b><br/>150 mA maximum each output at 25° C, derated to 100 mA at 70° C (derate ≈1 mA per °C)<br/>Off-state leakage current: less than 5 µA at 30V dc<br/>ON-state saturation current: less than 1V at 10 mA; less than 1.5V at 150 mA</p> <p><b>Output Protection Circuitry</b><br/>Protected against false pulse on power-up and continuous overload or short-circuit of outputs</p> <p><b>Output Response Time</b></p> |

**General**

PVC-jacketed 5-conductor 2 m (6.5 ft) or 9 m (30 ft) unterminated cable, or 5-pin Euro-style quick-disconnect (QD) fitting are available. QD cables are ordered separately.

**Application Notes**

The first condition presented during TEACH mode becomes the output ON condition.

**Outputs**

Sensors will respond to either a "light" or a "dark" signal of 500 microseconds or longer duration, 1 kHz max. NOTE: 1 second delay on power-up; outputs do not conduct during this time.

**Repeatability**

100 microseconds (all models)

**Environmental**

**Rating**

Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 6, 12, and 13; IEC IP67

**Operating Conditions**

Temperature: -20° to +70° C (-4° to +158° F)

Max. Relative Humidity: 90% at 50° C (non-condensing)

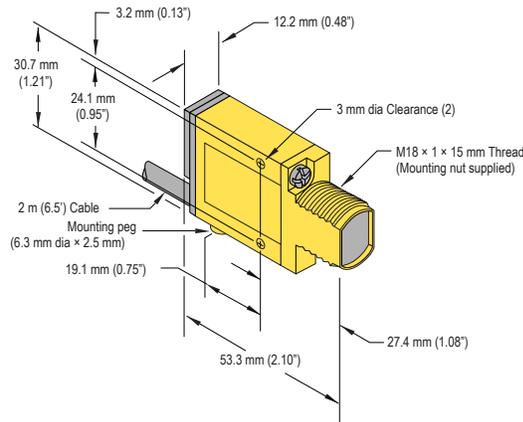
**Certifications**



**Dimensions**

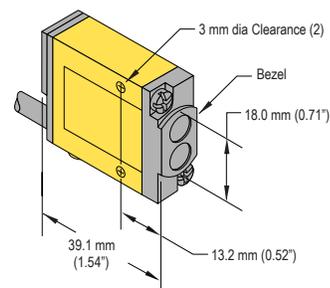
**Cabled Models**

(Suffix E, EL, EPD, R, RL, RPD, LV, LVAG, LP, LPC, D, C, C2, CV, CV2, CVG, CV2G, CVB, CV2B, CVW)

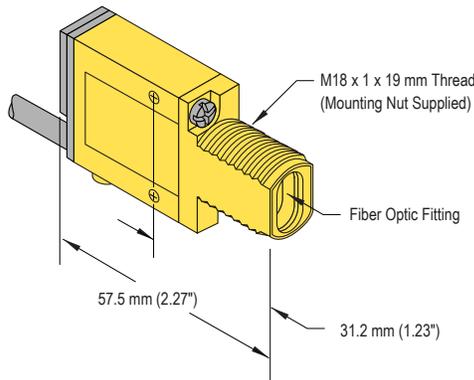


**Divergent Diffuse Models**

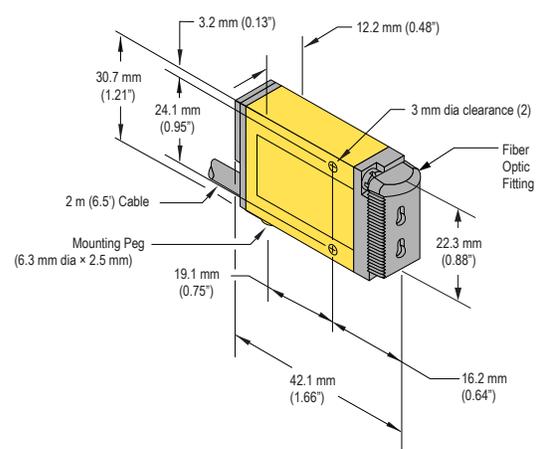
(Suffix DBZ and W)



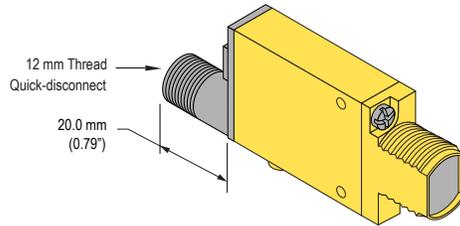
**Glass Fiber Models**  
(Suffix F, FV, FVB, FVG, FVV)



**Plastic Fiber Models**  
(Suffix FP, FPB, FPG, FPH, FPW)



## QD Models



### Banner Engineering Corp Limited Warranty

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