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|------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--|
|  <p><b>BANNER®</b><br/>more sensors, more solutions</p> | <p><b>MINI-BEAM® dc-Voltage Series</b></p> <p><i>Self-contained photoelectric sensors</i></p> |  |
|------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--|



Glass Fiber  
Optic sensor

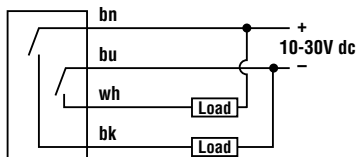


Convergent-mode  
sensor

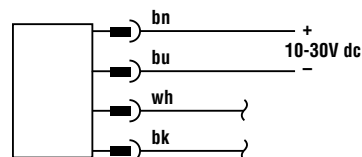
Emitters with Attached Cable



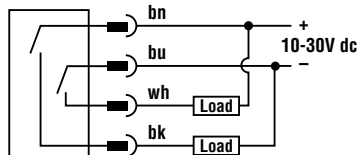
All Other Models  
with Attached Cable



Emitters with Quick Disconnect  
(4-Pin Euro-Style)



All Other Models with Quick Disconnect  
(4-Pin Euro-Style)



NOTES: Output Type for all models is  
Bipolar NPN/PNP. Load  
150 mA max., each output.

| Sensing Mode                                                                                                                                                               |                                                  | Range                                                                                                                                           | LED                     | Model*    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------|
|                                                                                           | Opposed Emitter                                  | 3 m (10')                                                                                                                                       | Infrared<br>880 nm      | SM31E     |
|                                                                                                                                                                            | Opposed Receiver                                 |                                                                                                                                                 |                         | SM31R     |
|                                                                                                                                                                            | Opposed Emitter - Long Range                     | 30 m (100')                                                                                                                                     |                         | SM31EL    |
|                                                                                                                                                                            | Opposed Receiver - Long Range                    |                                                                                                                                                 |                         | SM31RL    |
|                                                                                                                                                                            | Opposed Emitter<br>Clear Plastic Detection       | 0 to 300 mm (0 to 12")<br>Actual range varies,<br>depending on the light<br>transmission properties<br>of the plastic material<br>being sensed. | Visible Red<br>650 nm   | SM31EPD   |
|                                                                                                                                                                            | Opposed Receiver<br>Clear Plastic Detection      |                                                                                                                                                 |                         | SM31RPD   |
|                                                                                           | Non-Polarized<br>Retroreflective                 | 5 m (15')                                                                                                                                       | Visible Red<br>650 nm   | SM312LV   |
|                                                                                           | Polarized<br>Retroreflective                     | 50 mm to 2 m<br>(2" to 7')                                                                                                                      |                         | SM312LVAG |
|                                                                                                                                                                            | Extended-Range<br>Polarized Retroreflective      | 10 mm to 3 m<br>(0.4' to 10')                                                                                                                   |                         | SM312LP   |
|                                                                                           | Diffuse                                          | 380 mm (15")                                                                                                                                    | Infrared<br>880 nm      | SM312D    |
|                                                                                                                                                                            |                                                  | 300 mm (12")                                                                                                                                    |                         | SM312DBZ  |
|                                                                                                                                                                            | Divergent Diffuse                                | 130 mm (5")                                                                                                                                     |                         | SM312W    |
|                                                                                         | Convergent                                       | 16 mm (0.65") Focus                                                                                                                             | Visible Red<br>650 nm   | SM312C    |
|                                                                                                                                                                            |                                                  | 43 mm (1.7") Focus                                                                                                                              |                         | SM312C2   |
|                                                                                                                                                                            |                                                  | 16 mm (0.65") Focus                                                                                                                             | Visible Red<br>650 nm   | SM312CV   |
|                                                                                                                                                                            |                                                  | 43 mm (1.7") Focus                                                                                                                              |                         | SM312CV2  |
|                                                                                                                                                                            |                                                  | 16 mm (0.65") Focus                                                                                                                             | Visible Blue<br>475 nm  | SM312CVB  |
|                                                                                                                                                                            |                                                  | 49 mm (1.9") Focus                                                                                                                              |                         | SM312CV2B |
|                                                                                                                                                                            |                                                  | 16 mm (0.65") Focus                                                                                                                             | Visible Green<br>525 nm | SM312CVG  |
|                                                                                                                                                                            |                                                  | 49 mm (1.9") Focus                                                                                                                              |                         | SM312CV2G |
| <br> | Glass Fiber Optic                                | Range varies, depending<br>on sensing mode and<br>fiber optics used.                                                                            | Infrared<br>880 nm      | SM312F    |
|                                                                                                                                                                            |                                                  |                                                                                                                                                 | Visible Red<br>650 nm   | SM312FV   |
|                                                                                                                                                                            |                                                  |                                                                                                                                                 | Visible Blue<br>475 nm  | SM312FVB  |
|                                                                                                                                                                            |                                                  |                                                                                                                                                 | Visible Green<br>525 nm | SM312FVG  |
|                                                                                                                                                                            | Plastic Fiber Optic                              |                                                                                                                                                 | Visible Red<br>650 nm   | SM312FP   |
|                                                                                                                                                                            |                                                  |                                                                                                                                                 | Visible Blue<br>475 nm  | SM312FPB  |
|                                                                                                                                                                            |                                                  |                                                                                                                                                 | Visible Green<br>525 nm | SM312FPG  |
|                                                                                                                                                                            |                                                  |                                                                                                                                                 | Visible Red<br>650 nm   | SM312FPH  |
|                                                                                                                                                                            | Special High-Power Option<br>Plastic Fiber Optic |                                                                                                                                                 |                         |           |

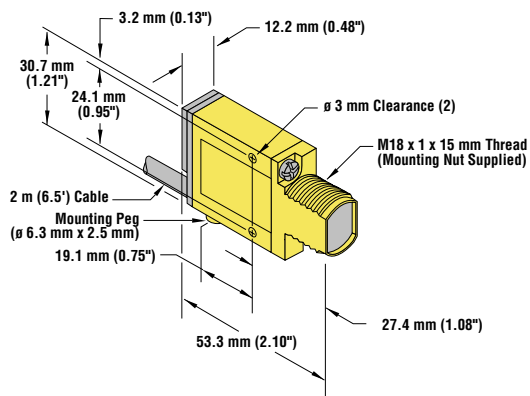
\*Standard 2 m (6.5') cable models are listed.

- 9 m (30') cable: add suffix "W/30" (e.g., SM31EW/30).
- 4-pin Euro QD models: add suffix "QD" (e.g., SM31EQD).
- 150 mm (6") QD Pigtail: add suffix "QDP" (e.g., SM31EQDP).

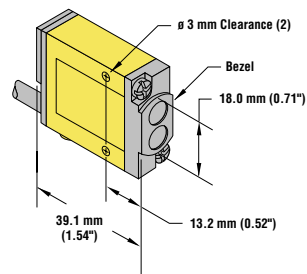
For 0.3 ms response: add suffix "MHS" (eg., SM31EMHS).

### Dimensions

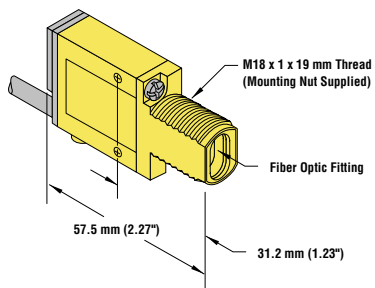
Models with suffix E, EL, EPD, R, RL, RPD, LV, LVAG, LP, D, C, C2, CV, CV2, CVG, CV2G, CVB, and CV2B



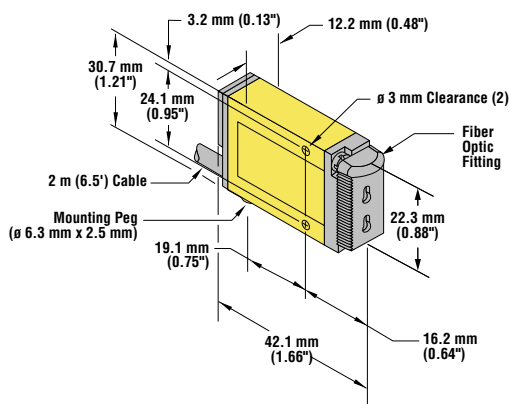
Models with suffix DBZ and W



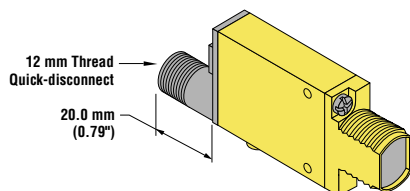
Models with suffix F, FV, FVB, and FVG



Models with suffix FP, FPB, FPG, and FPH

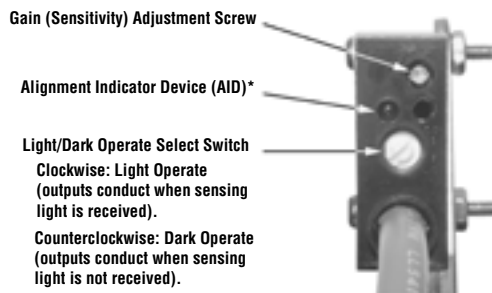


### QD Models



### Sensor Features

(shown with gasketed acrylic cover removed)



\*U.S. Patent no. 4356393

**NOTE:** Please observe proper ESD precautions (grounding) when adjusting gain pot or LO/DO switch.

## Specifications

**Supply Voltage and Current** 10 to 30V dc (10% maximum ripple) at less than 25 mA (exclusive of load)

### Supply Protection Circuitry

Protected against reverse polarity and transient voltages

### Output Configuration

Bipolar: One current sourcing (PNP) and one current sinking (NPN) open collector transistor

### Output Rating

150 mA maximum each output at 25° C, derated to 100 mA at 70° C (derate  $\approx$  1 mA per ° C)

**OFF-state leakage current:** less than 1 microamp

**Output saturation voltage (PNP output):** < 1 volt at 10 mA, < 2 volts at 150 mA

**Output saturation voltage (NPN output):** < 200 millivolts at 10 mA, < 1 volt at 150 mA

### Output Protection Circuitry

Protected against false pulse on power-up and continuous overload or short-circuit of outputs

### Output Response Time

Sensors will respond to either a "light" or "dark" signal of 1 millisecond or longer duration, 500 Hz maximum. Modification for 0.3 millisecond response is available (MHS-suffix models; these models also feature reduced sensitivity range and reduced repeatability.)

NOTE: Outputs are non-conducting during 100 millisecond delay on power-up.

### Repeatability

**Opposed:** 0.14 milliseconds

**Non-Polarized and Polarized Retro, Diffuse, Convergent, Glass Fiber Optic, and Plastic Fiber Optic:** 0.3 milliseconds

Response time and repeatability specifications are independent of signal strength.

### Adjustments

Light/Dark Operate Select switch

15-turn slotted brass screw Gain (sensitivity) adjustment potentiometer (clutched at both ends of travel)

Located on the rear panel, protected by a gasketed, clear acrylic cover.

### Indicators

Patented alignment Indicator Device system (AID™, US patent #4356393) lights a rear-panel-mounted LED indicator when the sensor sees light. Its pulse rate is proportional to the light signal strength (the stronger the signal, the faster the pulse rate).

### Construction

Reinforced thermoplastic polyester housing, totally encapsulated, o-ring sealing, acrylic lenses, stainless steel screws

### Environmental Rating

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

### Connections

PVC-jacketed 4-conductor 2 m (6.5') or 9 m (30') cables, or 4-pin Euro-style QD fitting; QD cables available separately.

### Operating Conditions

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

**Maximum relative humidity:** 90% at 50°C (non-condensing)

### Application Note

The NPN (current sinking) output of dc MINI-BEAM sensors is directly compatible as an input to Banner logic modules, including all non-amplified MAXI-AMP and MICRO-AMP modules. MINI-BEAMs are TTL compatible.

### Certifications

