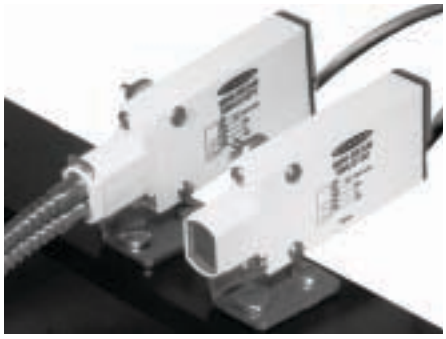
MINI-BEAM® Universal Voltage Series

Photoelectric sensors with electromechanical relay output

Installation Guide

Additional information on this product is immediately available online at **www.bannerengineering.com/69944**

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.

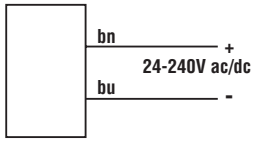


Sensing Mode		Range	LED	Model*
	Opposed Emitter	3 m (10')	Infrared 880 nm	SMU31E
	Opposed Receiver			SMU31R
	Opposed Emitter - Long Range	30 m (100')		SMU31EL
	Opposed Receiver - Long Range			SMU31RL
	Non-Polarized Retroreflective	5 m (15')	Visible Red 650 nm	SMU315LV
P	Polarized Retroreflective	10 mm to 3 m (0.4" to 10')		SMU315LP
	Diffuse	380 mm (15")	Infrared 880 nm	SMU315D
	Divergent Diffuse	130 mm (5")		SMU315W
	Convergent	16 mm (0.65") 1.3 mm (0.05") †	Visible Red 650 nm	SMU315CV
		43 mm (1.7") 3 mm (0.07") †		SMU315CV2
	Glass Fiber Optic	Range varies depending on sensing mode and fiber optics used	Infrared 880 nm	SMU315F
			Visible Red 650 nm	SMU315FV
	Plastic Fiber Optic			SMU315FP

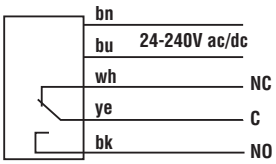
* Standard 2 m (6.5') cable models are listed. For **9 m (30') cable,** add suffix "**W/30**" to the model number (e.g., **SMU31E W/30**).

† Spot size (diameter of sensing beam) at focus.

Emitters



All Models Except Emitters



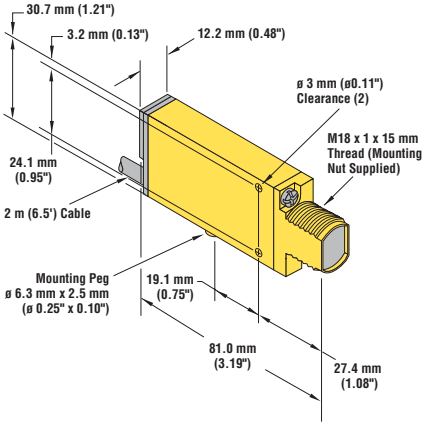
NOTES:

- Output Type for all models (except emitters) is SPDT Electromechanical Relay.
- Install transient suppressor (MOV) across contacts switching inductive loads.
- Connection of dc power is without regard to polarity.
- Maximum switching current is 3 amps (see specifications).

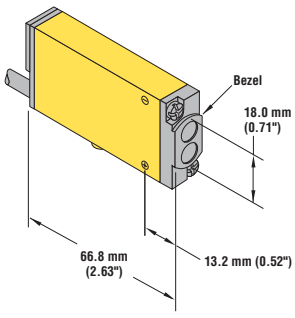
See Safety Use Warning on Back Page

Dimensions

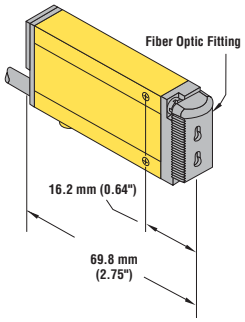
Models with suffix E, EL, R, RL, LV, LP, D, CV, and CV2



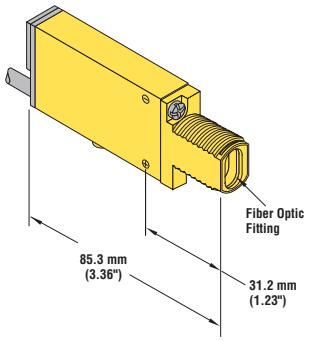
Model SMU315W



Model SMU315FP



Models with suffix F and FV



Installation and Alignment

MINI-BEAM sensors perform most reliably if they are properly aligned and securely mounted. For maximum mechanical stability, final-mount MINI-BEAM sensors through 18 mm diameter holes by their threaded barrel (where available), or use a mounting bracket. A complete selection of mounting brackets is available. Visit www.bannerengineering.com/69944, or contact the factory for information on mounting options.

Begin with line-of-sight positioning of the MINI-BEAM sensor to its emitter (opposed-mode sensing) or to its target (all other sensing modes). When using a retroreflective sensor, the target is the retroreflector ("retro target"). For diffuse or convergent sensing modes, the target is the object to be detected.

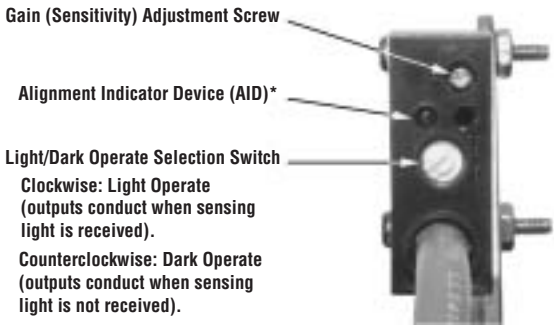
Apply power to the sensor (and to the emitter, if using the opposed mode). Advance the 15-turn Gain control to maximum (clockwise end of rotation), using a small flat-blade screwdriver. The Gain control is clutched at both ends to avoid damage, and will "free-wheel" when either endpoint is reached. See MINI-BEAM Sensor rear view illustration on page 2.

If the MINI-BEAM sensor is receiving its light signal, the red LED alignment indicator will be ON and flashing at a rate proportional to the signal strength (faster = more signal). Move the sensor (or move the retro target, if applicable) up-down-right-left (including angular rotation) to find the center of the movement zone within which the LED indicator remains ON. Reducing the Gain setting will reduce the size of the movement zone, and enable more precise alignment.

Repeat the alignment motions after each Gain reduction. When optimum alignment is acheived, mount sensor(s) (and the retro target, if applicable) solidly in that position. Increase the Gain to maximum.

Test the sensor by placing the object to be detected in the sensing position, then removing it. The Alignment Indicator LED should come ON when the sensing beam is established (Light condition), and go OFF when the beam is broken (Dark condition).

Sensor Rear View
(shown with gasketed acrylic cover removed)

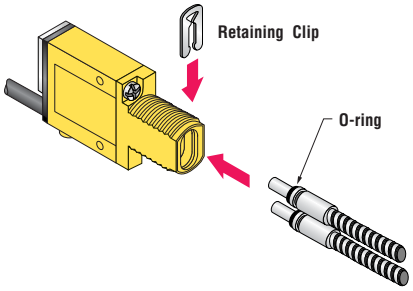


*U.S. Patent no. 4356393

Fiber Installation

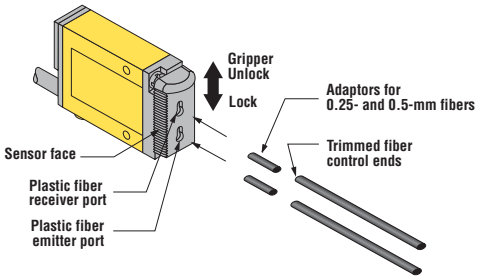
Glass Fiber Installation

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 front of the sensor, slide the U-shaped retaining clip (supplied with the sensor) into the slot in the sensor's barrel, until it snaps into place.

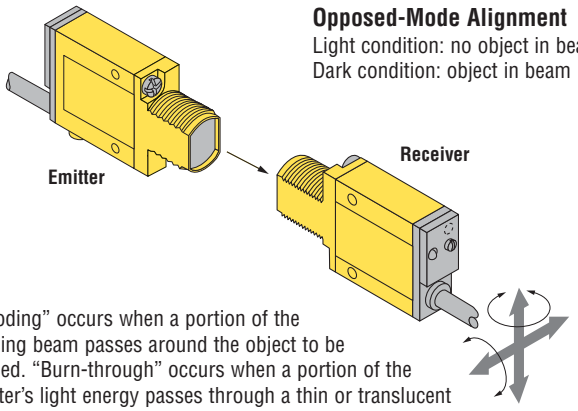


Plastic Fiber Installation

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.



Alignment Tips



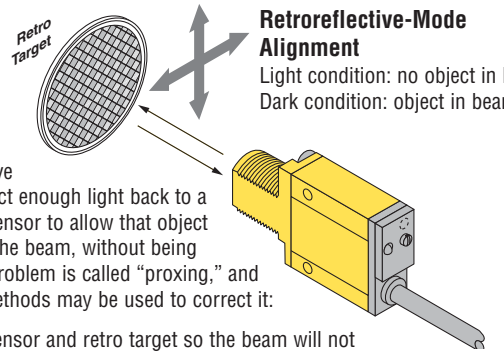
Opposed-Mode Alignment

Light condition: no object in beam
Dark condition: object in beam

"Flooding" occurs when a portion of the sensing beam passes around the object to be sensed. "Burn-through" occurs when a portion of the emitter's light energy passes through a thin or translucent object, and is sensed by the receiver.

To correct either problem, do one or more of the following to reduce the light energy:

- Reduce the Gain adjustment on the receiver.
- Add an aperture to one or both lenses. (MINI-BEAM apertures, available from Banner, fit neatly inside the lens assembly.)
- Intentionally misalign the emitter and receiver.

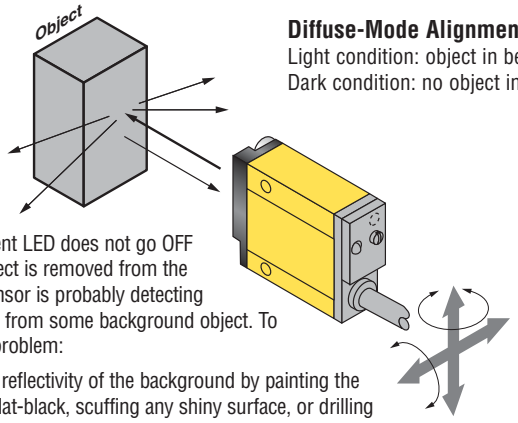


Retroreflective-Mode Alignment

Light condition: no object in beam
Dark condition: object in beam

A highly reflective object may reflect enough light back to a retroreflective sensor to allow that object to slip through the beam, without being detected. This problem is called "proxing," and the following methods may be used to correct it:

- Position the sensor and retro target so the beam will not strike a shiny surface perpendicular to the sensor lens.
- Reduce the Gain adjustment.
- Add a polarizing filter (for model SMU315LV).

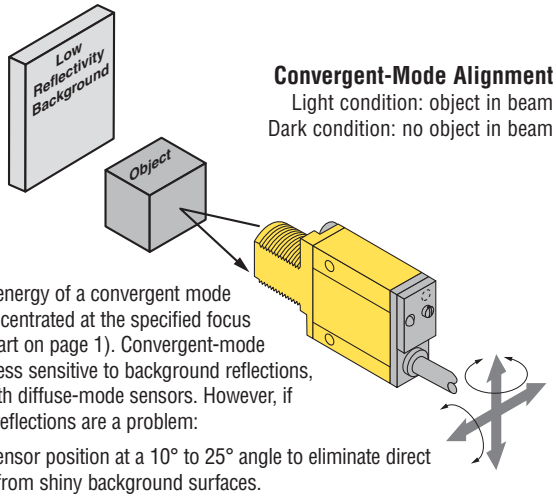


Diffuse-Mode Alignment

Light condition: object in beam
Dark condition: no object in beam

If the alignment LED does not go OFF when the object is removed from the beam, the sensor is probably detecting light reflected from some background object. To remedy this problem:

- Reduce the reflectivity of the background by painting the surface(s) flat-black, scuffing any shiny surface, or drilling a large hole, directly opposite the diffuse sensor.
- Move the sensor closer to the object to be detected and reduce the Gain adjustment. Rule of thumb for diffuse sensing: The distance to the nearest background object should be at least three times the sensing distance.



Convergent-Mode Alignment

Light condition: object in beam
Dark condition: no object in beam

The sensing energy of a convergent mode sensor is concentrated at the specified focus point (see chart on page 1). Convergent-mode sensors are less sensitive to background reflections, compared with diffuse-mode sensors. However, if background reflections are a problem:

- Skew the sensor position at a 10° to 25° angle to eliminate direct reflections from shiny background surfaces.
- Reduce the reflectivity of the background by painting the surface(s) flat-black, scuffing any shiny surface, or drilling a large hole, directly opposite the sensor.
- Reduce the Gain adjustment.

MINI-BEAM® Universal Voltage Sensors

Installation Guide

Specifications

Supply Voltage and Current
24 to 240V ac, 50/60 Hz or
24 to 240V dc (1.5 watts or 2.5 VA maximum)

Supply Protection Circuitry
Protected against transient voltages. DC hookup is without regard to polarity.

Output Configuration
SPDT (Single-Pole, Double Throw) (form C) electromechanical relay, ON/OFF output.

Output Rating
Maximum switching power (resistive load): 90W, 250VA
Maximum switching voltage (resistive load): 250V ac or 30V dc
Maximum switching current (resistive load): 3A
Minimum voltage and current: 5V dc, 10 mA
Mechanical life: 20,000,000 operations
Electrical life at full resistive load: 100,000 operations

Output Protection Circuitry
Protected against false pulse ON power-up.

Output Response Time
Closure time: 20 milliseconds max.
Release time: 20 milliseconds max.
Maximum switching speed: 25 operations per second

Repeatability
All sensing modes: 1millisecond

Adjustments
Light/Dark Operate select switch
15-turn slotted brass screw Gain (sensitivity) adjustment potentiometer
Located on rear panel, protected by a gasketed, clear acrylic cover (see above)

Indicators
Patented Alignment Indicator Device system (AID™) lights a rear-panel-mounted LED indicator whenever the sensor sees a "light" condition. 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 seal, acrylic lenses, and stainless steel screws.

Environmental Rating
Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 63, 12, and 13; IEC IP67.

Connections
PVC-jacketed 5-conductor (2-conductor for emitters) 2 m (6.5') or
9 m (30') unterminated cable.

Operating Conditions
Temperature: -20° to +55°C (-4° to +131°F)
Maximum relative humidity: 90% at 50°C (non-condensing)

Application Note
Install transient suppressor (MOV) across contacts switching inductive loads.

Additional information on this product is immediately available online at **www.bannerengineering.com/69944**

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For further assistance, contact a Banner Engineering Applications Engineer at (763) 544-3164 or (888) 373-6767.

BANNER®
more sensors, more solutions

WARNING . . . Not To Be Used for Personnel Protection

Never use these products as sensing devices for personnel protection. Doing so could lead to serious injury or death.
These sensors do NOT include the self-checking redundant circuitry necessary to allow their use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition. Consult your current Banner Safety Products catalog for safety products which meet OSHA, ANSI and IEC standards for personnel protection.

p/n 69944 Rev. A