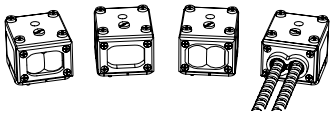
# MAXI-BEAM® Sensor Heads

## Datasheet



- Modular design for easy exchange of all sensing components and wiring logic
- Interchangeable AC or DC power blocks
- Opposed, polarized and non-polarized retroreflective, diffuse, convergent, fixed-field, and glass or plastic fiber optic sensing modes available
- Interchangeable sensing heads with 90° increment rotation
- Optional output timing logic modules with programming ring
- Quad-ring sealed components resist dirt, dust, and moisture
- Banner Engineering's Alignment Indicating Device (AID) for indication of signal strength
- 15-turn potentiometer for manual adjustment of sensitivity
- Range up to 90 m
- Logic modules offer ON-delay, OFF-delay, ON/OFF-delay, One Shot, and Delayed One Shot output switching logic, depending on model
- Logic modules also offer 0.01 s to 1 s, 0.5 s to 15 s, or 0.1 s to 1 s delay, depending on model
- Power blocks plug into required RWB4 wiring base and feature two LED indicators for output and input status

**WARNING:**

- **Do not use this device for personnel protection**
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction can cause either an energized (on) or de-energized (off) output condition.

## Overview

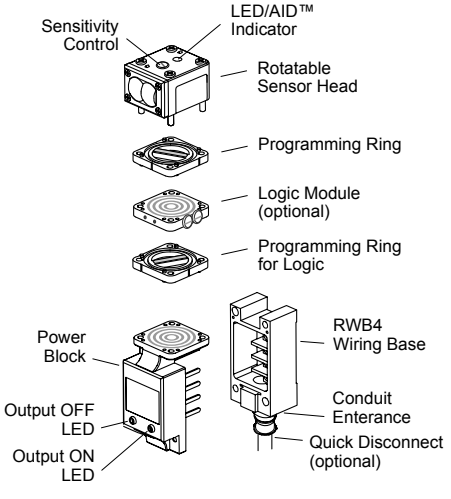
Banner MAXI-BEAM® sensors are highly versatile, self-contained, modularized photoelectric sensing controls that are ideally suited to industrial environments. The basic MAXI-BEAM is an ON/OFF switch consisting of three modules (sensor head, power block, and wiring base) and a unique, patented, rotatable programming ring that enables you to program your choice of light or dark operate mode, sensing range, and response time.

MAXI-BEAM sensor heads have an easily-accessible multi-turn sensitivity control for precise adjustment of system gain. Interchangeable sensor heads are rotatable in 90-degree increments and are available in retroreflective, diffuse, opposed, convergent, fixed-field proximity, and fiberoptic sensing modes. Each sensor head also includes Banner's exclusive, patented AID™ circuit (Alignment Indicating Device, US Patent no. 4356393), which features an LED alignment indicator that lights whenever the sensor sees its own modulated light source, and pulses at a rate proportional to the strength of the received light signal.

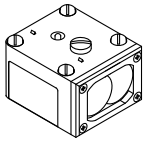
A wide selection of MAXI-BEAM power block modules is available to interface the sensor head to the circuit to be controlled. The plug-in design of the wiring base enables easy exchange of the entire sensing electronics without disturbing field wiring.

Optional customer-installable logic modules easily convert the basic ON/OFF MAXI-BEAM into either a one-shot or delay logic function control, with several programmable timing ranges for each function.

MAXI-BEAM sensors are ruggedly constructed of molded PBT to NEMA standards 1, 3, 4, 12, and 13, and have interchangeable molded acrylic lenses. Modules simply snap and bolt together, with no interwiring necessary. Module interfaces are o-ring and quad-ring sealed for the ultimate in dust, dirt, and moisture resistance.




## MAXI-BEAM Opposed Mode Emitter (E) and Receiver (R)



MAXI-BEAM emitters have a visible red "tracer beam". This beam is non-active, and is used as a means of visual alignment during installation. A retroreflector temporarily attached to the receiver lens provides an effective target for the tracer beam during alignment. The narrow beam of the RSBESR/RSBRSR pair is ideal for sensing small parts (effective beam diameter is 3.6 mm (0.14 in).

One emitter and one receiver are required for use.

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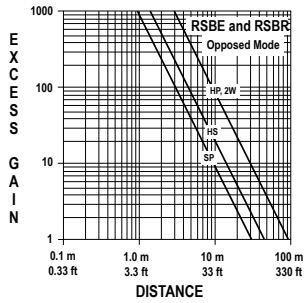
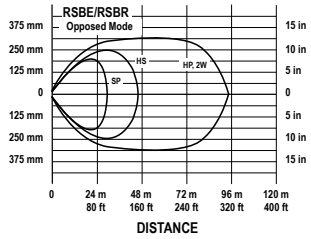
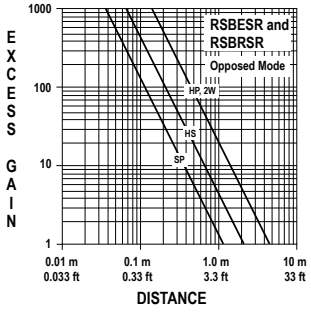
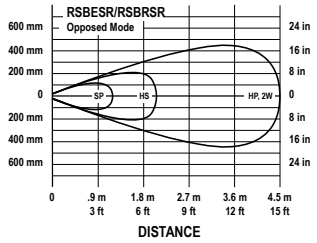
ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

| Models | Range | Sensing Beam | Effective Beam | Response | Repeatability |
|---|---|---|---|---|---|
| RSBE<br>RSBR | 90 m (300 feet) in HP (high power) and 2W (2 wire) modes | Infrared, 880 nm with a visible red tracer beam | 0.5-inch diameter | HP, 2W mode: 10 ms on/ 5 ms off<br>HS mode: 1 ms on/0.5 ms off<br>SP mode: 0.3 ms on/off | HP, 2W= 1.4 ms<br>HS = 0.1 ms<br>SP = 0.04 ms |
| RSBESR<br>RSBRSR | 4.5 m (15 feet ) in HP (high power) and 2W (2 wire) modes | Infrared, 880 nm | N/A | HP, 2W modes: 10 ms on/5 ms off<br>HS mode: 1 ms on/0.5 ms off<br>SP mode: 0.3 ms on/off | HP, 2W= 1.4 ms<br>HS = 0.1 ms<br>SP = 0.04 ms |

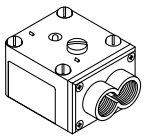


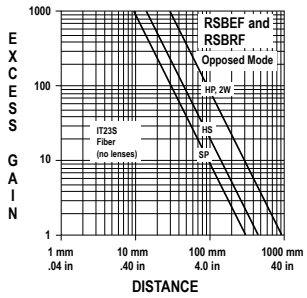



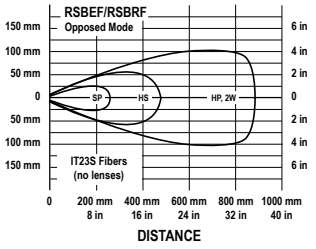

## MAXI-BEAM Opposed Fiber Optic Mode (Glass Fibers)



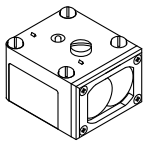
This sensor pair is designed for opposed mode operation using Banner glass fiber optics. Maximum range (HP mode) using L9 lenses is 12 feet. Maximum range using L16F lenses is 50 feet. One emitter and one receiver are required for use.

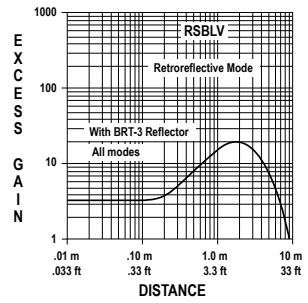
| Models | Range | Sensing Beam | Response | Repeatability |
|---|---|---|---|---|
| **RSBEF**<br>**RSBRF** | See the excess gain curves | Infrared, 880 nm | HP, 2W modes: 10 ms<br>HS mode: 1 ms<br>SP mode: 0.3 ms on/off | HP, 2W = 3.3 ms<br>HS = 0.3 ms<br>SP = 0.1 ms |

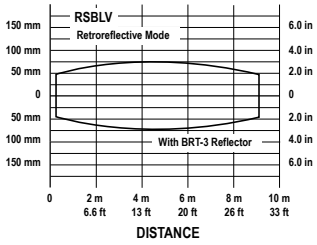


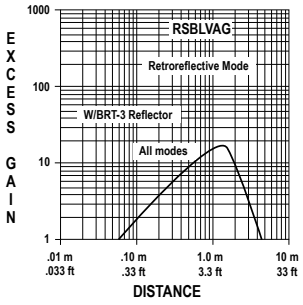



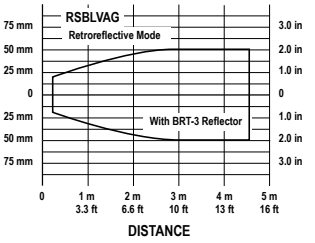

## Retroreflective Mode

| | Models | Range | Sensing Beam | Response | Repeatability |
|---|---|---|---|---|---|
|  | **RSBLV** | 152 mm to 9 m (6 in to 30 ft) in all program modes | Visible red, 650 nm | HP, 2W, SP modes: 4 ms<br>HS mode: 1 ms | HP, 2W, SP = 1.3 ms<br>HS = 0.3 ms |
| | **RSBLVAG** (anti-glare filter) | 305 mm to 4.5 m (1 ft to 15 ft) in all program modes | Visible red, 650 nm, with polarizing filter | HP, 2W, SP modes: 4 ms<br>HS mode: 1 ms | HP, 2W,SP = 1.3 ms<br>HS = 0.3 ms |

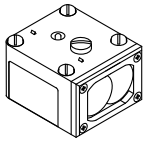


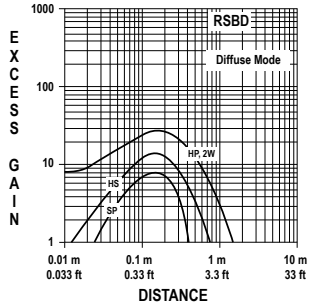



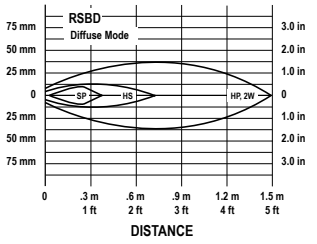



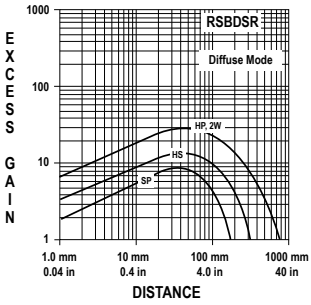



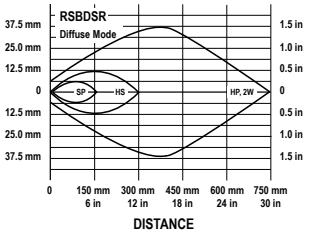

## Diffuse Mode

| | Models | Range | Sensing Beam | Response | Repeatability |
|---|---|---|---|---|---|
|  | **RSBD** | 1.5 m (5 ft ) in HP and 2W modes | Infrared, 880 nm | HP, 2W modes: 10 ms<br>HS mode: 1 ms<br>SP mode: 0.3 ms | HP, 2W= 3.3 ms<br>HS = 0.3 ms<br>SP = 0.1 ms |
| | **RSBDSR** (short range) | 762 mm (30 in) in HP and 2W modes | Infrared, 880 nm | HP, 2W modes: 10 ms<br>HS mode: 1 ms<br>SP mode: 0.3 ms | HP, 2W= 3.3 ms<br>HS =0.3 ms<br>SP =0.1 ms |

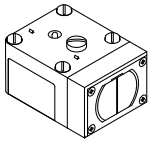


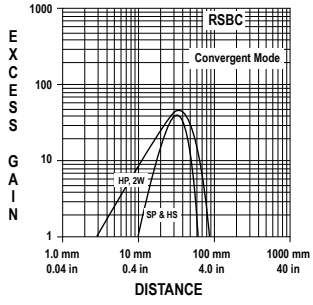

## Convergent Mode

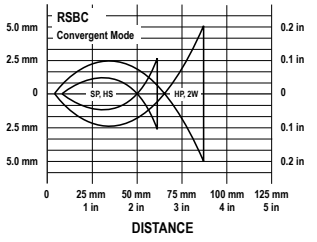


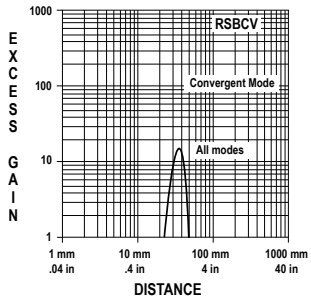
**RSBC:** Powerful infrared beam reliably senses objects of low reflectivity. Ideal for counting the flow of radiused products at a fixed distance from the sensor.

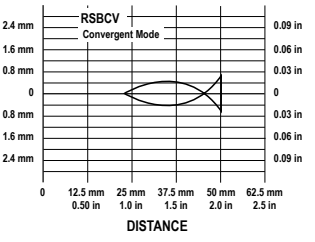
**RSBCV:** Powerful visible red beam with precise .06 inch diameter sensing spot. Useful in many high-contrast color registration applications.

| Models | Focus | Sensing Beam | Response | Repeatability |
|---|---|---|---|---|
| **RSBC** | 38 mm (1.5 in) | Infrared, 940 nm | HP, 2W modes: 10 ms<br>HS mode: 1 ms<br>SP mode: 0.3 ms | HP, 2W= 3.3 ms<br>HS = 0.3 ms<br>SP= 0.1 ms |
| **RSBCV** | 38 mm (1.5 in)<br>The performance is equal in all program modes | Visible red, 650 nm | HP, 2W, SP modes: 4 ms<br>HS mode: 1 ms | HP, 2W, SP= 1.3 ms<br>HS = 0.3 ms |

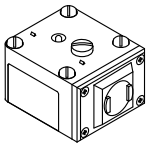


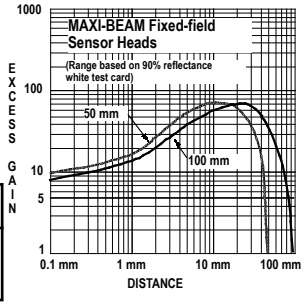
## Fixed-Field Mode



Fixed-field sensor heads have an emitter element and two differently-aimed receiver elements. This creates a high-gain sensing field able to detect objects of low reflectivity, and a sharp far-limit sensing cutoff of 50mm (2 inches) or 100mm (4 inches) which ignores backgrounds beyond cutoff.

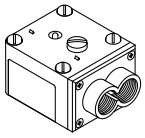
These sensors are ideal for detecting a part or surface that is only a fraction of an inch in front of another surface.

RSBFFs may not be used with 2-wire power blocks.




| Models | Far Limit Cutoff | Sensing Beam | Response | Repeatability |
|---|---|---|---|---|
| **RSBFF50** | 50 mm | Infrared, 880 nm | HP mode: 10 ms | HP mode: 3.3 ms |
| **RSBFF100** | 100 mm | | | |

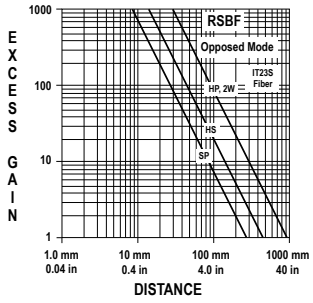
## Fiber Optic Mode (Glass Fibers)

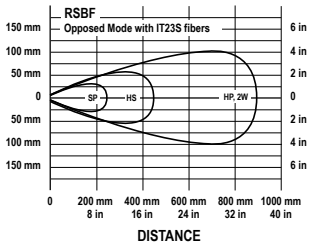


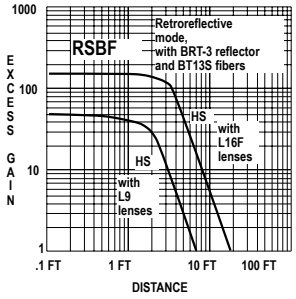
**Note:** If the retroreflective sensing mode is used in conjunction with the HP or 2W program mode, the GAIN control must be reduced from the factory setting to avoid optical feedback from the lens assembly.

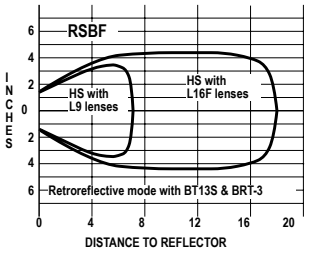
For information on the complete line of Banner glass fiber optics, go to www.bannerengineering.com.

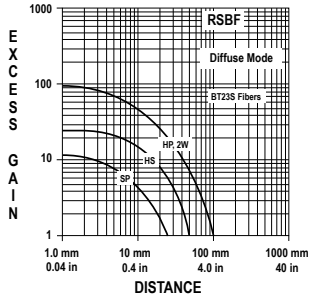
| Models | Modes | Range | Sensing Beam | Response | Repeatability |
|---|---|---|---|---|---|
| **RSBF** | Opposed mode | See the excess gain curves | Infrared, 880 nm | HP, 2W modes: 10 ms<br>HS mode: 1 ms<br>SP mode: 0.3 ms | HP, 2W= 3.3 ms<br>HS = 0.3 ms<br>SP = 0.1 ms |
| | Retroreflective mode | | | | |
| | Diffuse mode | | | | |

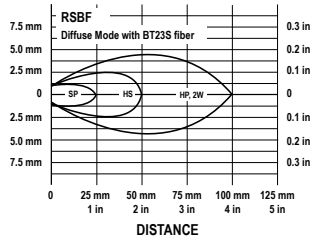


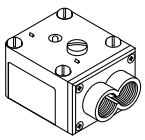



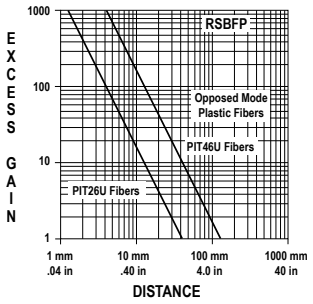

## Fiber Optic Mode

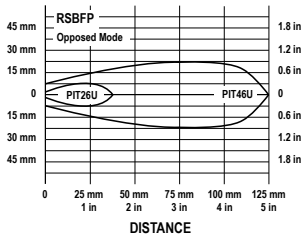


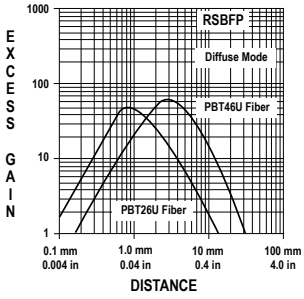
Model RSBFP is a visible-light sensor head designed for use with plastic fiber optics. It is compatible with all standard Banner plastic fiber optic assemblies (see Banner product catalog). In order to function properly, the RSBFP must be programmed for the "HS" response mode. The RSBFP is not for use with glass fiber optics (instead use model RSBF or RSBFV). The model RSBFP will function only when programmed for the "HS" response mode. The model RSBFP will not operate with 2-wire power blocks (models R2PBA and R2PBB).

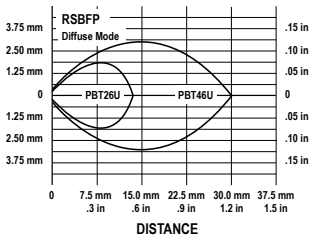
For information on the complete line of Banner plastic fiber optics, go to www.bannerengineering.com.

| Models | Mode | Range | Sensing Beam | Response | Repeatability |
|---|---|---|---|---|---|
| **RSBFP** | Opposed | See the excess gain curves | Visible red, 650 nm | HS mode only, 1 ms on/off | HS = 0.3 ms |
| | Diffuse | | | | |

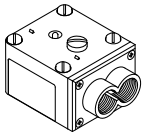


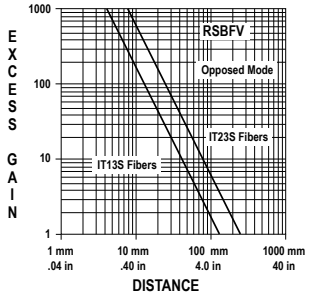



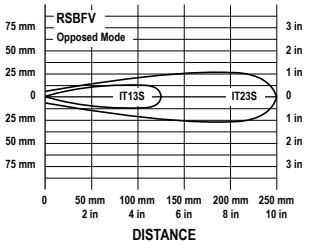

## Fiber Optic Models (Glass Fiber, Visible Sensing Beam)

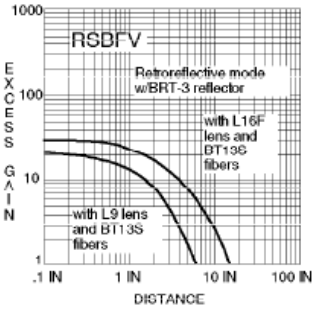


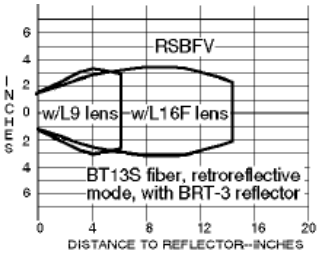
The model RSBFV will function only when programmed for the "HS" response mode. The model RSBFV will not operate with 2-wire power blocks (models R2PBA and R2PBB). Model RSBFV is a visible-light sensor head designed for use with glass fiber optics. It is compatible with all standard Banner glass fiber optic assemblies (see www.bannerengineering.com). To function properly, the RSBFV must be programmed for the "HS" response mode. The RSBFV is not for use with plastic fiber optics (instead use RSBFP). For information on the complete line of Banner glass fiber optics, go to www.bannerengineering.com.

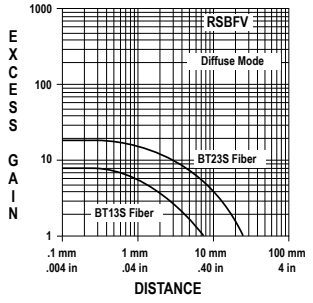
| Models | Modes | Range | Sensing Beam | Response | Repeatability |
|---|---|---|---|---|---|
| **RSBFV** | Opposed mode | See the excess gain curves | Visible red, 650 nm | HS mode only, 1 ms on/off | HS = 0.3 ms |
| | Retroreflective mode | | | | |
| | Diffuse mode | | | | |

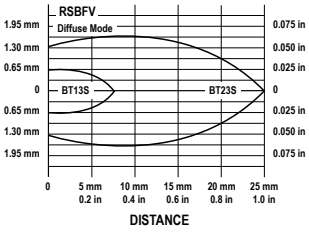


## Program the Sensor Head

Program MAXI-BEAM sensor heads for sensor response time (and range) and for LIGHT/DARK operate.

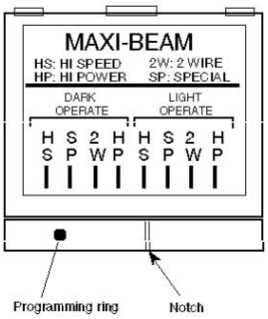
Each sensor head is supplied with a programming ring which attaches below the sensor head by a system of pegs. There are four programming notches around the perimeter of the ring. To program the sensor head, find the notch that will align with the desired program combination (see figure).

**Note:** The programming ring may have to be turned upside-down to align the notch with the program.

If LIGHT OPERATE is selected, the MAXI-BEAM output will energize on a dark-to-light transition. If DARK OPERATE is selected, the MAXI BEAM output will energize on a light-to-dark transition. In the illustration, the MAXI-BEAM is set for high speed (HS) operation in the LIGHT OPERATE output state. See the information about each individual sensor head for the response time and range associated with each setting (HP, 2W, HS, SP).

**Note:** When programming the RSBE, RSBSER, or RSBEF emitter, select the mode that is programmed for the receiver. **EXCEPTION:** If the receiver is programmed for the 2-wire (2W) mode, select high power (HP) on the emitter.

*Figure 1. Sensor Head and Programming Ring*




## Sensor Head Specifications

**Sensitivity Adjustment**
15-turn clutched control
Easily accessible, located on top of the sensor head beneath a watertight gasketed screw-cover
Rotate clockwise to increase sensitivity

**Alignment Indicator**
Red LED on top of sensor head. Banner's exclusive AID™ circuit [1] lights the LED whenever the sensor sees its own modulated light source, and pulses the LED at a rate proportional to the strength of the received light signal

**False Pulse Suppression on Power-up**
100 ms delay on power-up

**Response Time and Repeatability**
See models tables. The response time and repeatability are independent of signal strength.

**Certifications**

**Banner Engineering Europe** Park Lane, Culliganlaan 2F bus 3, 1831 Diegem, BELGIUM

**Turck Banner LTD** Blenheim House, Blenheim Court, Wickford, Essex SS11 8YT, Great Britain

IND. CONT. EQ. 447Y

**Construction**
Reinforced molded PBT housing, molded acrylic lenses, o-ring and quad-ring gasketed components. Electronic components are fully epoxy encapsulated.

**Environmental Rating**
NEMA 1, 3, 4, 12, and 13.

**Operating Temperature**
–40 °C to +70 °C (–40 °F to +158 °F)

**Required Overcurrent Protection**

**WARNING:** Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

Overcurrent protection is required to be provided by end product application per the supplied table.
Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.
Supply wiring leads < 24 AWG shall not be spliced.
For additional product support, go to www.bannerengineering.com.

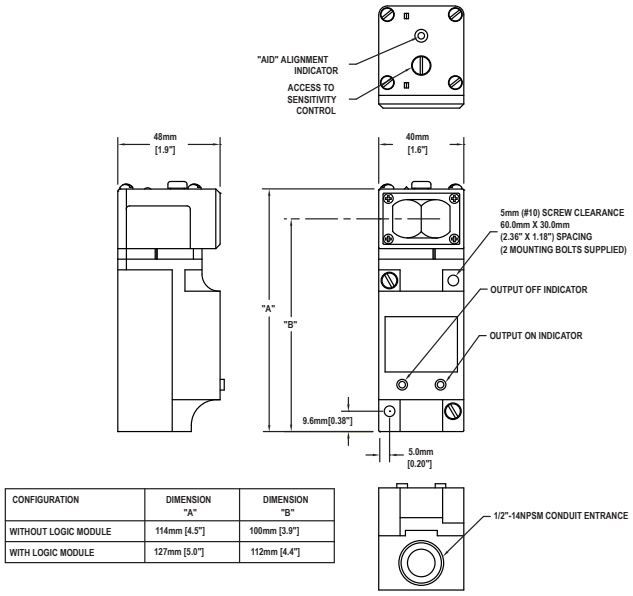
| Supply Wiring (AWG) | Required Overcurrent Protection (Amps) |
|---|---|
| 20 | 5.0 |
| 22 | 3.0 |
| 24 | 2.0 |
| 26 | 1.0 |
| 28 | 0.8 |
| 30 | 0.5 |

[1] US patent no. 4356393

## Dimensions

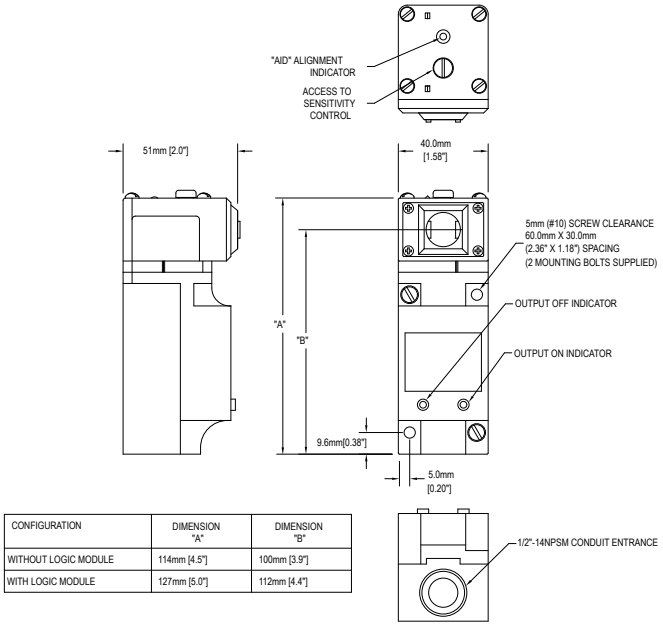
All measurements are listed in millimeters, unless noted otherwise.

*Figure 2. Dimensions for the C-CV-D-E-R-LV models*



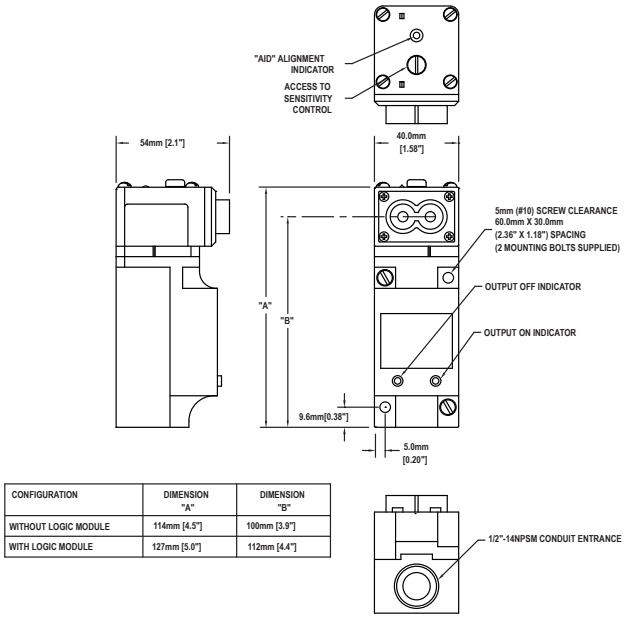

| CONFIGURATION | DIMENSION "A" | DIMENSION "B" |
|---|---|---|
| WITHOUT LOGIC MODULE | 114mm [4.5"] | 100mm [3.9"] |
| WITH LOGIC MODULE | 127mm [5.0"] | 112mm [4.4"] |

*Figure 3. Dimensions for the FF models*




| CONFIGURATION | DIMENSION "A" | DIMENSION "B" |
|---|---|---|
| WITHOUT LOGIC MODULE | 114mm [4.5"] | 100mm [3.9"] |
| WITH LOGIC MODULE | 127mm [5.0"] | 112mm [4.4"] |

*Figure 4. Dimensions for the fiber models*




| CONFIGURATION | DIMENSION "A" | DIMENSION "B" |
|---|---|---|
| WITHOUT LOGIC MODULE | 114mm [4.5"] | 100mm [3.9"] |
| WITH LOGIC MODULE | 127mm [5.0"] | 112mm [4.4"] |

## Schematics

*Figure 5. Functional Schematic*

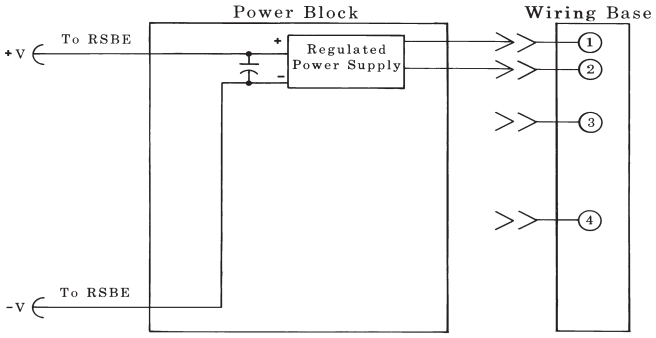
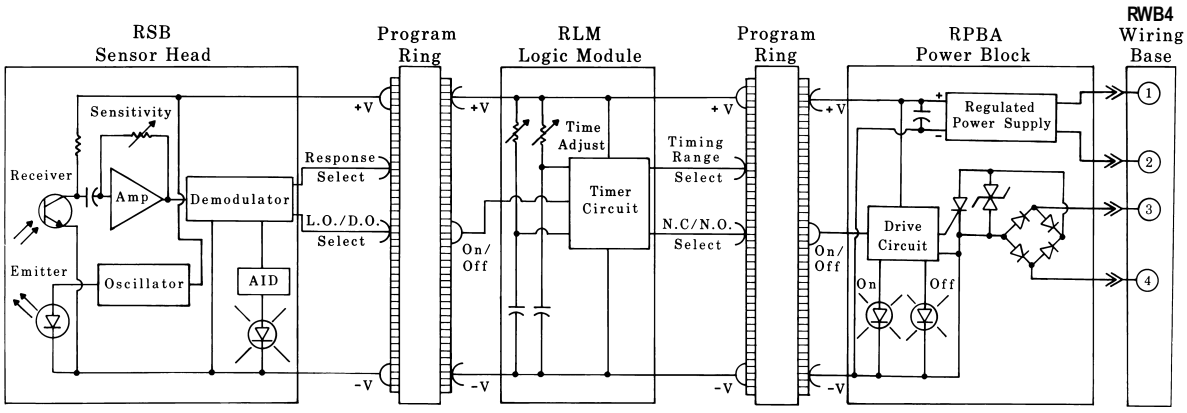



*Figure 6. Composite Functional Schematic*




## Ordering Information

To order a MAXI-BEAM, follow these steps:

1. Select a sensor head module.
2. Select a power block module.
3. Select a wiring base. The wiring base is purchased separately from the power block.
4. Select a logic module (if needed).
5. Select accessories as needed (see www.bannerengineering.com).

## Sensor Head Models

Sensor head modules are described in datasheet p/n 03416.

| Model | Sensing Type | Range |
|---|---|---|
| **RSBE** and **RSBR** | Opposed mode | 91.4 m (300 ft) |
| **RSBESR** and **RSBRSR** | Opposed mode (short range; narrow beam) | 4.6 m (15 ft) |
| **RSBLV** | Retroreflective mode | 9.1 m (30 ft) |
| **RSBLVAG** | Retroreflective mode (anti-glare filter) | 4.6 m (15 ft) |
| **RSBD** | Long range diffuse proximity mode | 1.5 m (5 ft) |
| **RSBDSR** | Short-range diffuse proximity mode | 762 mm (30 in) |
| **RSBCV** | Visible red convergent mode, | Focus at: 38.1 mm (1.5 in) |
| **RSBC** | Infrared convergent mode | Focus at: 38.1 mm (1.5 in) |

| Model | Sensing Type | Range |
|---|---|---|
| **RSBF** | Infrared fiber optic; for glass fibers | Varies depending on the fiber optics used |
| **RSBFV** | Visible red fiber optic; for glass fibers | |
| **RSBEF** and **RSBRF** | Infrared fiber optic opposed mode; for glass fibers | |
| **RSBFP** | Visible red fiber optic; for plastic fibers | |
| **RSBFF50** | Fixed-field proximity | Sharp far-limit cutoff at 50 mm (2 in) |
| **RSBFF100** | | Sharp far-limit cutoff at 100 mm (3.9 in) |

## Power Block Module Models

Power Block modules are described in datasheet p/n 03418.

| Model | Supply Voltage | Output Type |
|---|---|---|
| **RPBT** | 10–30 V dc | one sinking and one sourcing solid-state output |
| **RPBT-1** | | for use with RSBE, ESR, EF emitters (no output circuit) |
| **RPBTLM** | 10–30 V dc<br>Low-profile power block (requires no RWB4 wiring base) | |
| **RPBA** | 105–130 V ac (50/60 Hz) | SPST solid-state output |
| **RPBA-1** | | for use with emitter (no output circuit) |
| **R2PBA**, 2-wire operation | | SPST solid-state output |

| Model | Supply Voltage | Output Type |
|---|---|---|
| **RPBB** | 210 V ac to 250 V ac (50/60 Hz) | SPST solid-state output |
| **RPBB-1** | | use with emitter (no output circuit) |
| **R2PBB**, 2-wire operation | | SPST solid-state output |
| **RPBU** | 12–250 V ac or 12–30 V dc | SPST solid-state output (ac or dc) |
| **RPBR** | 12–250 V ac (50/60 Hz) or 12–30 V dc | SPST E/M relay output |
| **RPBR2** | | SPDT E/M relay output |

## Wiring Base Models

Wiring Base modules are described in datasheet p/n 03418.

| Model | Description |
|---|---|
| **RWB4** | 4-terminal wiring base for all models (except RPBTLM) |

## Logic Module Models

Logic modules are described in datasheet p/n 03417.

| Model | Description |
|---|---|
| **RLM5** | On/Off delay (both functions adjustable up to 15 seconds) |
| **RLM8** | Delayed One-Shot (delay and pulse adjustable up to 15 seconds) |

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