# MAXI-BEAM® Power Blocks and Wiring Base

## Datasheet



**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

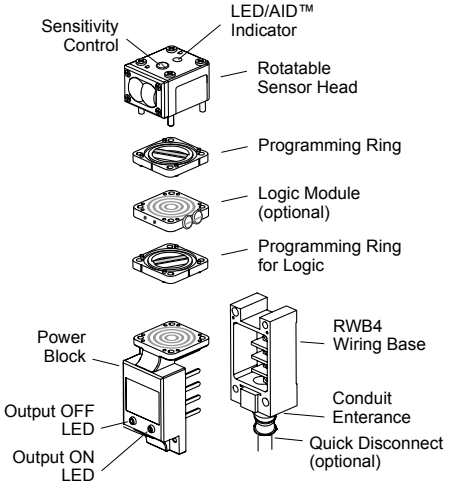
Banner MAXI-BEAM® sensors are highly versatile, self-contained, modularized photoelectric sensing controls that are ideally suited to industrial environments. The basic MAXI-BEAM is an ON/OFF switch consisting of three modules (sensor head, power block, and wiring base) and a unique, patented, rotatable 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.




## Models RPBT and RPBT-1

Use model RPBT-1 to power the model RSBE , RSBESR, or RSBEF emitter sensor head. RPBT-1 has an input range of 10 V dc to 30 V dc, and no switching elements.

| Models | Input | Output |
|---|---|---|
| **RPBT** | 10 V dc to 30 V dc, 20 mA exclusive of load; 10% maximum ripple | Bipolar; one open collector NPN and one PNP open collector transistor, 250 mA continuous, short circuit and reverse-polarity protected (both outputs).<br>On-state voltage drop:<br>• PNP output is less than 1 volt at 10 mA and less than 2 volts at 250 mA<br>• NPN output less than 200 millivolts at 10 mA and less than 1 volt at 250 mA<br>Off-state leakage current is less than 10 microamps. |
| **RPBT-1** | | |

*Figure 1. RPBT and RPBT-1—Schematic*

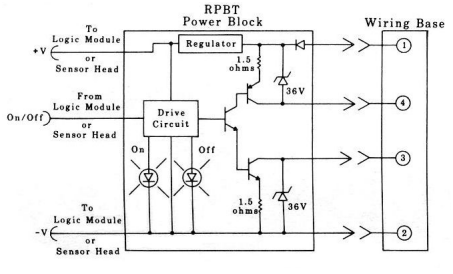
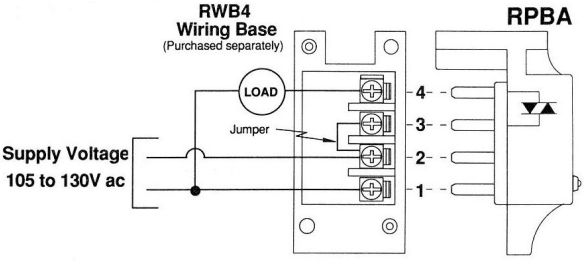



*Figure 2. RPBT and RPBT-1—Wiring Diagram*







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## Models RPBA & RPBA-1

Use model RPBA-1 to power the model RSBE, RSBESR, or RSBEF emitter sensor head. RPBA-1 has an input range of 105 V ac to 130 V ac, and no switching element. AC loads require up to 8.3 milliseconds to turn off in addition to the response time of the sensor head and delay logic (if any).

| Models | Input | Output |
|---|---|---|
| **RPBA** | 105 V ac to 130 V ac (50/60 Hz); 2 watts, exclusive of load | SPST solid state switch for ac, 3/4 amp. maximum (derated to 1/2 amp at 70 °C).<br>Maximum inrush is 10 amps for 1 second or 30 amps for one ac cycle (non-repeating).<br>On state voltage drop of less than 2.5 V ac at full load.<br>Off state leakage current is less than 100 microamps. |
| **RPBA-1** | | |

*Figure 3. RPBA & RPBA-1—Schematic*

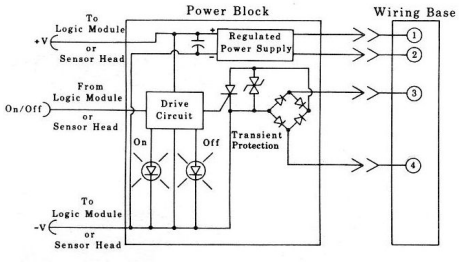
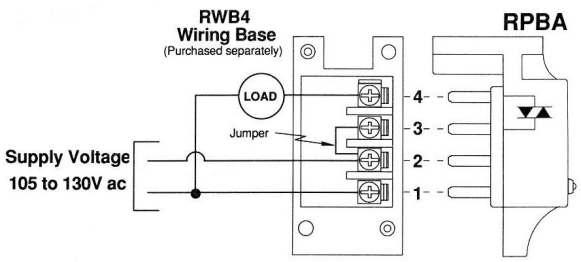



*Figure 4. RPBA & RPBA-1—Wiring Diagram*




**WARNING:** Connecting the voltage directly across pins 3 and 4 without a load present will destroy the switching element.

## Model RPBB-1

Use model RPBB-1 to power the model RSBE. RSBESR, or RSBEF emitter sensor head. RPBB-1 has an input range of 210 V AC to 260 V AC, and no switching element. AC loads require up to 8.3 milliseconds to tum off in addition to the response time of the sensor head and delay logic (if any).

| Models | Input | Output |
|---|---|---|
| **RPBB-1** | 210 V AC to 250 V AC (50/60 Hz); 2 watts, exclusive of load | SPST solid state switch for AC, 3/4 amp. maximum (derated to 1/2 amp at 70 °C).<br>Maximum inrush is 10 amps for 1 second or 30 amps for one AC cycle (non-repeating).<br>On state voltage drop of less than 2.5 V AC at full load.<br>Off state leakage current is less than 100 microamps. |

*Figure 5. RPBB-1—Schematic*

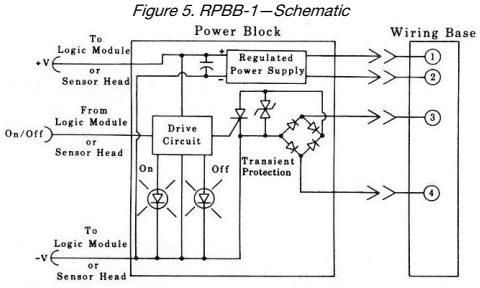
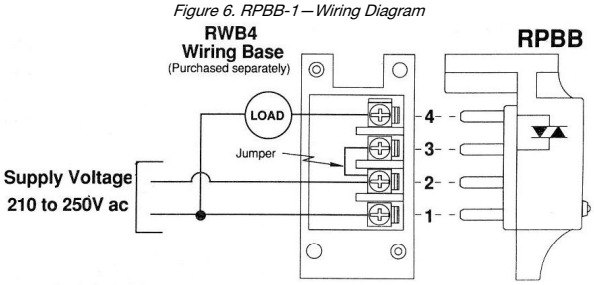



*Figure 6. RPBB-1—Wiring Diagram*




**WARNING:** Connecting the voltage directly across pins 3 and 4 without a load present will destroy the switching element.

The schematic and wiring diagram also apply to model **RPBB**, which is no longer available.

## Models R2PBA & R2PBB

Using a 2-wire power block requires programming the sensor head to 2W (2-wire) operating mode.

| Models | Input | Output |
|---|---|---|
| **R2PBA** | 105 V ac to 130 V ac (50/60 Hz), 2 watts exclusive of load | SPST solid-state switch for ac, 3/4 amp maximum (derated to 1/2 amp at 70 °C).<br>Maximum inrush is 10 amps for 1 second (non-repeating). |
| **R2PBB** | 210 V ac to 250 V ac (50/60 Hz), 2 watts exclusive of load | On-state voltage drop is 5.2 V rms at a 1/2 amp load; 14 V rms at a load of 10 milliamps.<br>Off-state leakage current is less than 1.7 milliamps (resistive or inductive load). |

*Figure 7. R2PBA & R2PBB—Schematic*

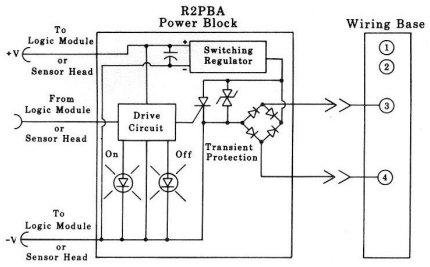
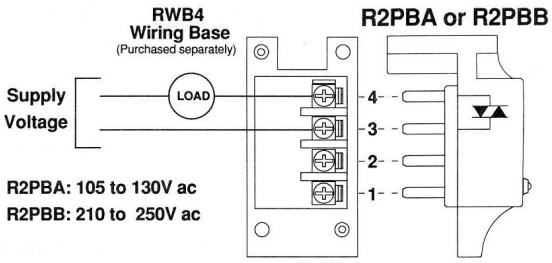



*Figure 8. R2PBA & R2PBB—Wiring Diagram*




**WARNING:** All components of a MAXI-BEAM 2-wire assembly will be destroyed if the load becomes a short circuit.

## Model RPBR

| Models | Input | Output |
|---|---|---|
| **RPBR** | 12 V ac to 250 V ac (50/60 Hz) or 12 V dc to 30 V dc, 40 mA exclusive of load at 30 V dc | SPST electromechanical relay; 250 V ac maximum, 30 V dc maximum, 5 amps maximum.<br>Peak switching voltage is 750 V ac (install MOV across contact if switching inductive load).<br>Mechanical life of relay is 10,000,000 operations.<br>Contact response time is 20 milliseconds, open and close. |

*Figure 9. RPBR—Schematic*

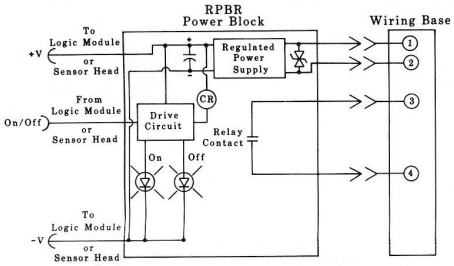
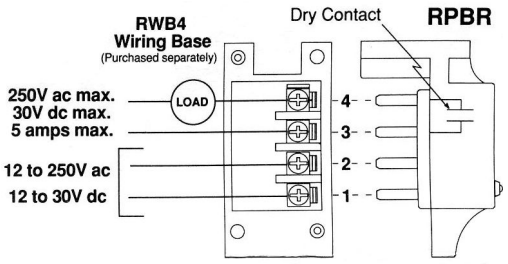



*Figure 10. RPBR—Wiring Diagram*




## Model RPBR2

| Models | Input | Output |
|---|---|---|
| **RPBR2** | 12 V ac to 250 V ac (50/60 Hz) or 12 V ac to 30 V dc, 40 mA exclusive of load at 30 V dc | SPDT electromechanical relay; 250 V ac maximum, 30 V dc maximum, 5 amps maximum.<br>Peak switching voltage is 750 V ac (install MOV across contact if switching inductive load).<br>Mechanical life of relay is 10,000,000 operations.<br>Contact response time is 20 milliseconds, open and close. |

*Figure 11. RPBR2—Schematic*

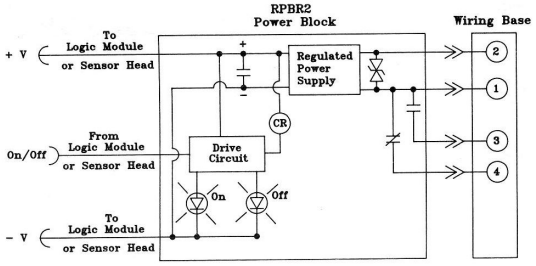
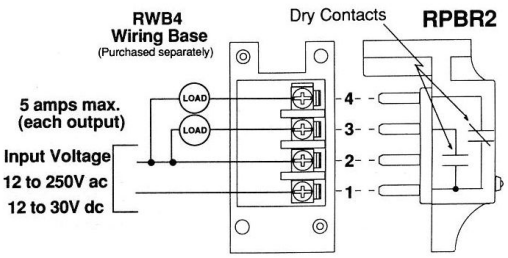



*Figure 12. RPBR2—Wiring Diagram*




## Model RPBU

| Models | Input | Output |
|---|---|---|
| **RPBU** | 12 V ac to 250 V ac (50/60 Hz) or 12 V dc to 30 V dc, 40 mA exclusive of load at 30 V dc | Optically-isolated SPST solid-state relay; 240 V ac or dc maximum, 100 mA maximum.<br>On-state voltage drop is 2 volts maximum at 100 mA (full rated load).<br>DC hookup is without regard to polarity. |

*Figure 13. RPBU—Schematic*

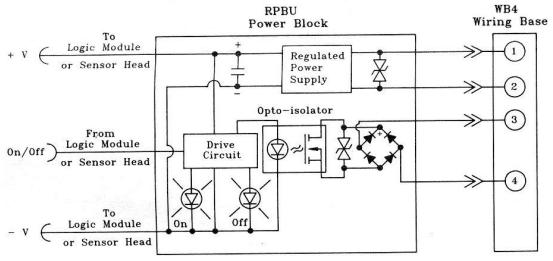
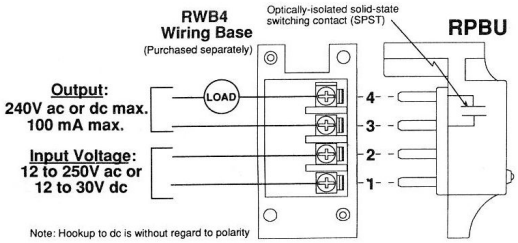



*Figure 14. RPBU—Wiring Diagram*




**WARNING:** Connecting voltage directly across pins 3 and 4 without a load present will destroy the switching element.

## Model RPBTLM Low Profile Power Block

Model RPBTLM is a miniature dc power block for MAXI-BEAM sensors. It may be used with any of the MAXI-BEAM sensor head models. It also allows timing logic modules to be added if needed.

The RPBTLM is supplied with stainless steel hardware used for assembly of the MAXI-BEAM components. Components simply bolt together, with no interwiring necessary. The screws supplied are extra-long, and serve as a means to mount the complete MAXI-BEAM sensor assembly to an object or surface.

The RPBTLM may be attached to its sensor head at any of four 90-degree increments to allow the best cable exit direction (front, rear, or either side). A logic module, if used, can be independently rotated in the same manner for easiest access to the timing adjustments.



Outputs are in the bipolar configuration: one NPN (current-sinking) and one PNP (current-sourcing). This design permits direct interfacing of the MAXIBEAM sensor to almost any type of dc logic input. Either output may be used alone, or both may be used simultaneously. The outputs may be configured for either normally open or normally closed operation using the sensor head (or logic module) programming ring.

Both outputs are rated for 150 milliamps, sufficient capacity for direct switching of most electromechanical dc loads such as relays and solenoids. The RPBTLM includes an LED indicator to show the output status.

The RPBTLM is completely solid-state and epoxy-encapsulated. It is gasketed to other MAXI-BEAM components by a quad-ring seal. Refer to the data sheets for MAXI-BEAM sensor heads (p/n 03416) and MAXI-BEAM logic modules (p/n 03417) or www.bannerengineering.com for complete information on the assembly and programming of MAXI-BEAM sensor components.

| Models | Input | Output |
|---|---|---|
| **RPBTLM** | 10 V dc to 30 V dc, 10% maximum ripple. | Output Configuration: Bipolar, one NPN (current-sinking) and one PNP (current sourcing) open-collector transistor switch.<br>Output Rating: 150 mA maximum each output at 25 °C (derated to 100 mA at 70 °C). Derate 1 mA per °C. |

*Figure 15. RPBTLM—Schematic*

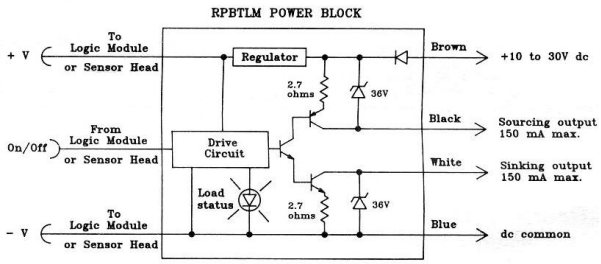
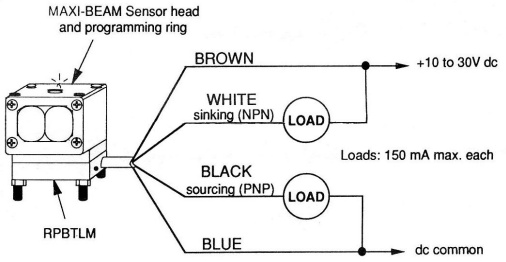



*Figure 16. RPBTLM—Wiring Diagram*




The RPBTLM powers the sensor head from a 10 V dc to 30 V dc supply. It contains output circuitry to allow an interface of the signal from the sensor head to a load or to a logic input.

The RPBTLM offers bipolar outputs: one NPN (current sinking) and one PNP (current sourcing). Either output may be used, or both outputs may be used at the same time. The switching capacity of each output is 150 mA maximum.

## Specifications

The following specifications include the RWB4 Wiring Base and all power block models listed in this datasheet except RPBTLM.

**False Pulse Suppression on Power-up**
All models

**Construction**
Reinforced molded PBT housing
Electronic components are fully epoxy encapsulated
O-ring seal between components

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

**Operating Temperature**
–40 °C to +70 °C (–40 °F to +158 °F), except RPBR and RPBR2 (see below)
**RPBR and RPBR2:** –40 °C to +50 °C (–40 °F to +122 °F)

**Certifications**

**Banner Engineering Europe** Park Lane, Culliganlaan 2F bus 3, 1831 Diegem, BELGIUM — Except RPBU, RPBR, RPBR2, RQB4

Except RPBU, RPBR2, RWB4

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**Required Overcurrent Protection**

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

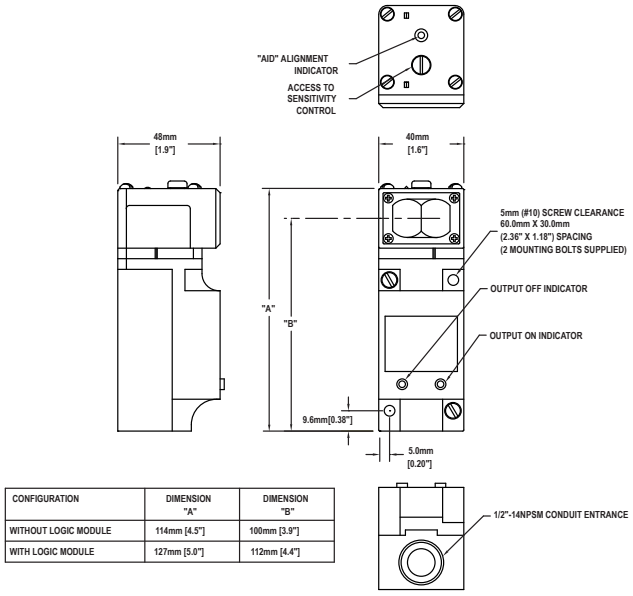
Overcurrent protection is required to be provided by end product application per the supplied table.
Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.
Supply wiring leads < 24 AWG shall not be spliced.
For additional product support, go to www.bannerengineering.com.

| 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 |

## Dimensions

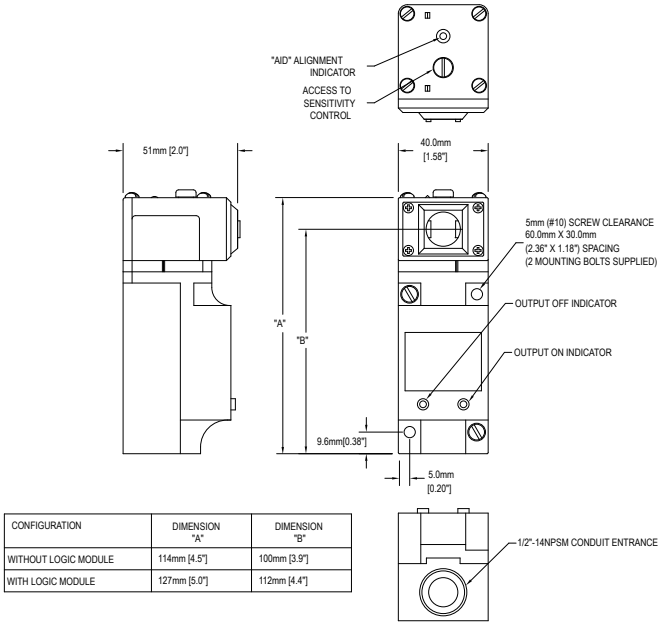
All measurements are listed in millimeters, unless noted otherwise.

*Figure 17. Dimensions for the C-CV-D-E-R-LV models*



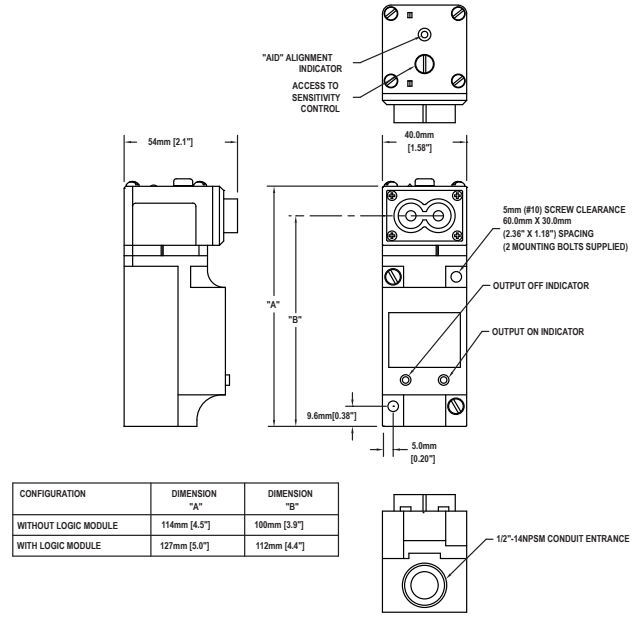

| CONFIGURATION | DIMENSION "A" | DIMENSION "B" |
|---|---|---|
| WITHOUT LOGIC MODULE | 114mm [4.5"] | 100mm [3.9"] |
| WITH LOGIC MODULE | 127mm [5.0"] | 112mm [4.4"] |

*Figure 18. 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 19. 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"] |

## Specifications: RPBTLM

**Input**
10 V dc to 30 V dc, 10% maximum ripple

**Output Configuration**
Bipolar, one NPN (current-sinking) and one PNP (current sourcing) open-collector transistor switch

**Output Rating**
150 mA maximum each output at 25 °C (derated to 100 mA at 70 °C). Derate 1 mA per °C

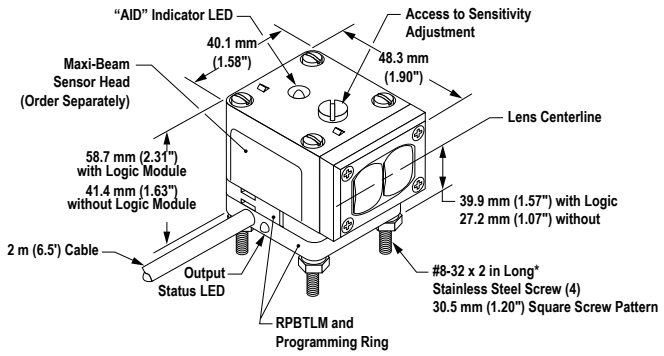
**Output Protection**
Protected against false pulse on power-up, inductive load transients, power supply polarity reversal, and continuous overload or short-circuit of outputs

**On-state Voltage Drop**
NPN output less than 200 millivolts at 10 mA and less than one volt at 150 mA
PNP output less than 1 volt at 10 mA and less than 2 volts at 150 mA

**Off-state Leakage Current**
Less than 1 microamp

**Certifications**

## Dimensions—RPBTLM




* Note: #8-32 x 2 1/2" long screws are also supplied with RPBTLM for assembly when a logic module is added.

# 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) |

## Banner Engineering Corp. Limited Warranty

Banner Engineering Corp. warrants its products to be free from defects in material and workmanship for one year following the date of shipment. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture which, at the time it is returned to the factory, is found to have been defective during the warranty period. This warranty does not cover damage or liability for misuse, abuse, or the improper application or installation of the Banner product.

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This Warranty is exclusive and limited to repair or, at the discretion of Banner Engineering Corp., replacement. **IN NO EVENT SHALL BANNER ENGINEERING CORP. BE LIABLE TO BUYER OR ANY OTHER PERSON OR ENTITY FOR ANY EXTRA COSTS, EXPENSES, LOSSES, LOSS OF PROFITS, OR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES RESULTING FROM ANY PRODUCT DEFECT OR FROM THE USE OR INABILITY TO USE THE PRODUCT, WHETHER ARISING IN CONTRACT OR WARRANTY, STATUTE, TORT, STRICT LIABILITY, NEGLIGENCE, OR OTHERWISE.**

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