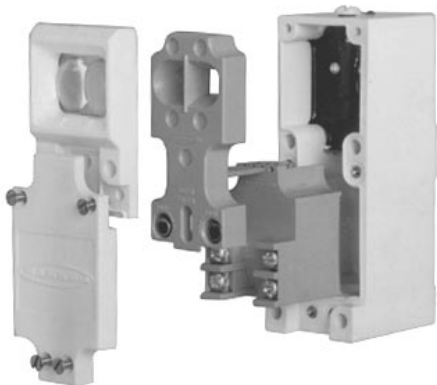
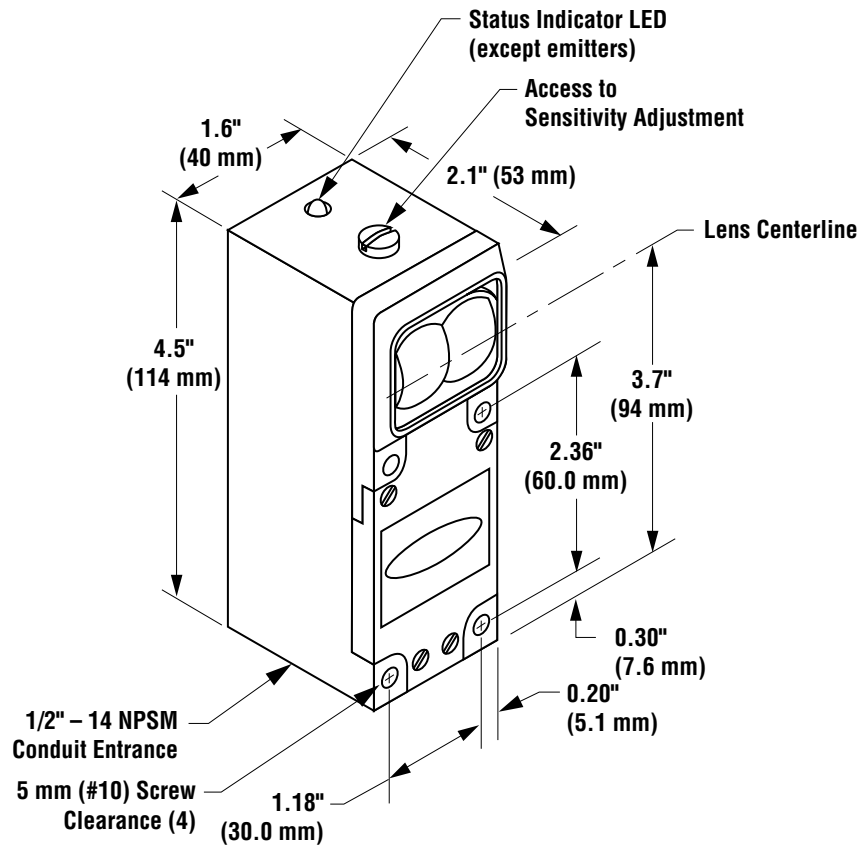




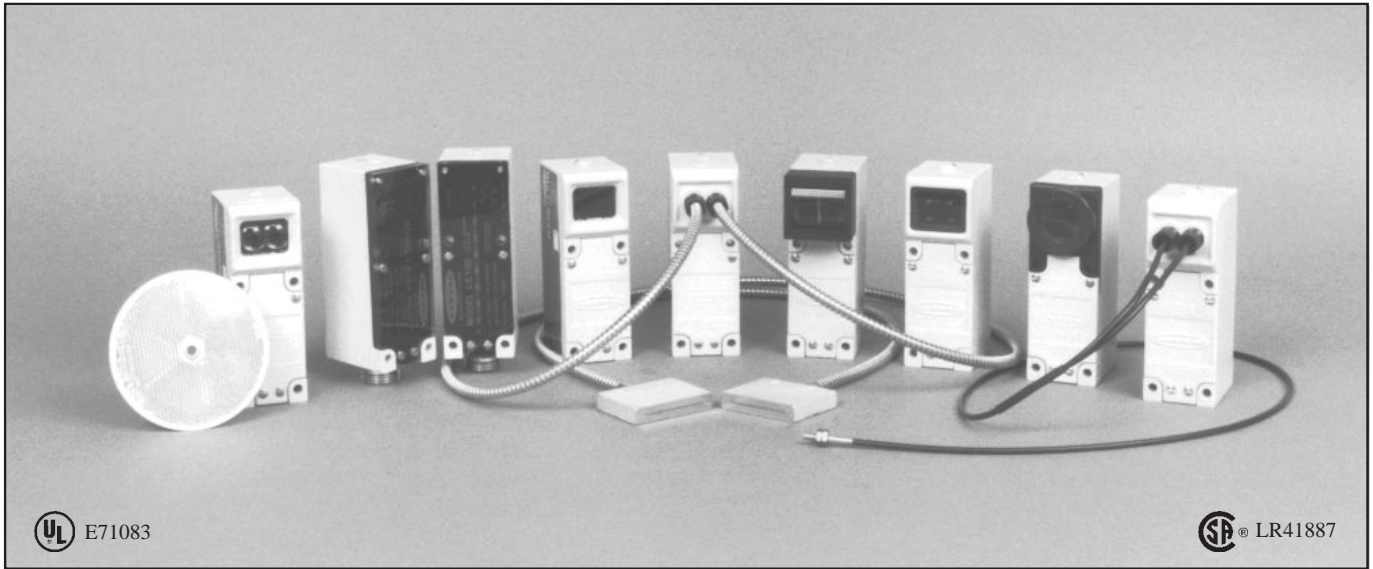
MULTI-BEAM[®] Sensors

Compact modular self-contained photoelectric sensing controls



- Modular design with interchangeable components (scanner blocks, power blocks, and logic timing modules); over 5,000 sensor configurations possible
- *Scanner blocks* for opposed, retro, diffuse, convergent, and fiber optic sensing modes (including high-gain models)
- *Power blocks* for ac or dc operation, including 2-wire ac operation
- *Logic modules* to support a wide variety of delay, pulse, limit, and rate sensing logic functions
- Most scanner blocks include Banner's exclusive, patented AID™ (Alignment Indicating Device) system, which lights a top-mounted indicator 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.

MULTI-BEAM[®] Sensors



UL E71083

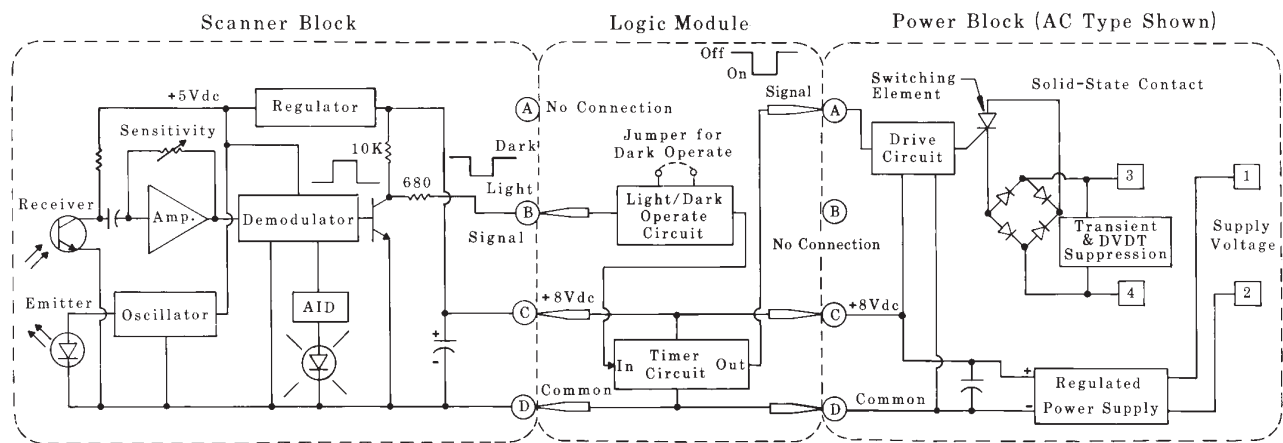
SP[®] LR41887

Banner MULTI-BEAM[®] sensors are compact *modular* self contained photoelectric switches. Each MULTI-BEAM consists of three components: scanner block, power block, and logic module. The *scanner block* contains the complete modulated photoelectric amplifier as well as the emitter and receiver optoelements. It also contains the sensing optics and the housing for the other two modules. The *power block* provides the interface between the scanner block and the external circuit. It contains a power supply for the MULTI-BEAM plus a switching device to interface the circuit to be controlled. The *logic module* interconnects the power block and scanner block both electrically and mechanically. It provides the desired timing logic function (if any), plus the ability to program the output for either light- or dark-operate. The emitters of MULTI-BEAM emitter-receiver pairs do not require a logic module. Emitter scanner blocks are supplied with a blade-pin to interconnect the scanner block and power block. This modular design, with field-replaceable power block and logic module, permits over 5,000 sensor configurations, resulting in exactly the right sensor for any photoelectric application.

There are two families of MULTI-BEAM sensors: 3- and 4-wire, and 2-wire. Three- and four-wire MULTI-BEAMS offer the greatest selection of sensor configurations. They permit either ac or dc operation and offer the fastest response times and the greatest sensing ranges. Two-wire MULTI-BEAMS are used in ac-powered applications where simplicity and convenience of wiring are important. They are physically *and* electrically interchangeable with heavy-duty limit switches.

The circuitry of all MULTI-BEAM components is encapsulated within rugged, corrosion-resistant VALOX[®] housings, which meet or exceed NEMA 1, 3, 12, and 13 ratings. Most MULTI-BEAM scanner blocks include Banner's patented Alignment Indicating Device (AID[™]) which lights a top-mounted LED when the sensor sees its own modulated light source and pulses the LED at a rate proportional to the received light signal. Most MULTI-BEAM sensor assemblies are UL listed and certified by CSA (see power block listings). All MULTI-BEAM components (except power block models 2PBR and 2PBR2) are totally solid-state for unlimited life.

Composite Functional Schematic, 3- and 4-wire Sensors



Selection of MULTI-BEAM Components

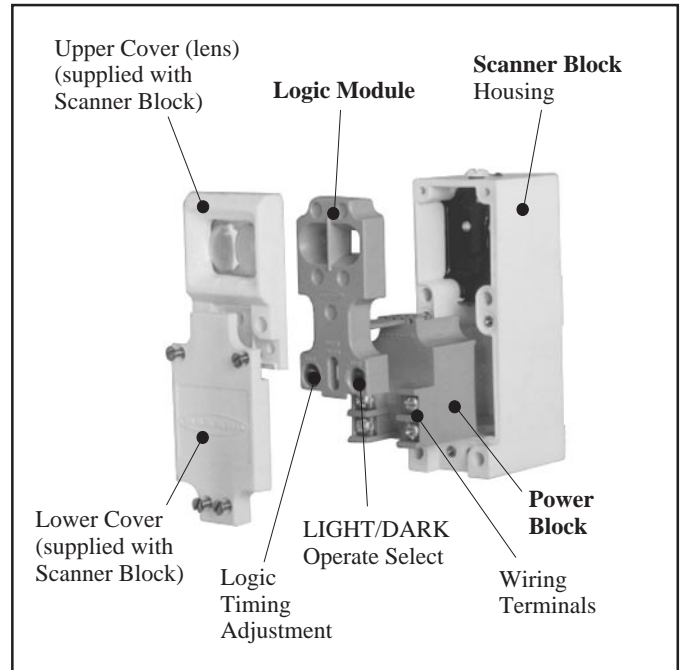
MULTI-BEAM sensors are made up of three components: scanner block, power block, and logic module. This is true for all MULTI-BEAMs with the exception of opposed mode emitter units which require only a power block (no logic module).

The first decision in the component selection process is to determine which family of MULTI-BEAM sensors is appropriate for the application: 3- and 4-wire, or 2-wire.

Next, decide which scanner block (within the selected family) is best for the application. The guidelines in the catalog introduction will help you to determine the best sensing mode. Then narrow the choice by comparing the specifications listed in the following charts and on the pages referenced in the charts.

Finally, choose a power block and logic module to complete the MULTI-BEAM assembly. Components snap together without inter-wiring to form a complete photoelectric sensing system that meets your exact requirements while maintaining the simplicity of a self-contained sensor.

If you have any questions about selecting MULTI-BEAM components, please contact your Banner sales engineer or call Banner's Applications Department at (612) 544-3164 during normal business hours.



3- and 4-wire Systems (pages 6 through 23)

| Scanner Blocks | Model | Sensing Mode | Range | Response | Page |
|---------------------------|--|--|-----------------|-----------------|-------|
| | SBE & SBR1 | Opposed: high speed | 150 feet | 1 millisecond | p. 7 |
| | SBED & SBRD1 | Opposed: high speed, narrow beam | 10 feet | 1 millisecond | p. 7 |
| | SBEX & SBRX1 | Opposed: high power, long range | 700 feet | 10 milliseconds | p. 7 |
| | SBEV & SBRV1 | Opposed: visible beam | 100 feet | 10 milliseconds | p. 7 |
| | SBEXD & SBRXD1 | Opposed: high power, wide beam angle | 30 feet | 10 milliseconds | p. 7 |
| | SBLV1 | Retroreflective: high speed, visible beam | 30 feet | 1 millisecond | p. 8 |
| | SBLVAG1 | Retroreflective: polarized beam (anti-glare) | 15 feet | 1 millisecond | p. 8 |
| | SBL1 | Retroreflective: high speed, infrared beam | 30 feet | 1 millisecond | p. 8 |
| | SBLX1 | Retroreflective: high power, long range | 100 feet | 10 milliseconds | p. 8 |
| | SBD1 | Diffuse (proximity): high speed | 12 inches | 1 millisecond | p. 9 |
| | SBDL1 | Diffuse (proximity): medium range | 24 inches | 1 millisecond | p. 9 |
| | SBDX1 | Diffuse (proximity): high power, long range | 6 feet | 10 milliseconds | p. 9 |
| | SBDX1MD | Diffuse (proximity): wide beam angle | 24 inches | 10 milliseconds | p. 9 |
| | SBCV1 | Convergent beam: high speed, visible red | 1.5-inch focus | 1 millisecond | p. 10 |
| | SBCVG1 | Convergent beam: high speed, visible green | 1.5-inch focus | 1 millisecond | p. 10 |
| | SBC1 | Convergent beam: high speed, infrared | 1.5-inch focus | 1 millisecond | p. 10 |
| | SBC1-4 | Convergent beam: high speed, infrared | 4-inch focus | 1 millisecond | p. 10 |
| | SBC1-6 | Convergent beam: high speed, infrared | 6-inch focus | 1 millisecond | p. 10 |
| SBCX1 | Convergent beam: high power, infrared | 1.5-inch focus | 10 milliseconds | p. 10 | |
| SBCX1-4 | Convergent beam: high power, infrared | 4-inch focus | 10 milliseconds | p. 10 | |
| SBCX1-6 | Convergent beam: high power, infrared | 6-inch focus | 10 milliseconds | p. 10 | |
| SBEF & SBRF1 | Opposed fiber optic (glass fibers): high speed | see specs | 1 millisecond | p. 11 | |
| SBEXF & SBRXF1 | Opposed fiber optic (glass fibers): high power | see specs | 10 milliseconds | p. 11 | |
| SBFX1 | Fiber optic (glass fibers): high power, infrared | see specs | 10 milliseconds | p. 11 | |
| SBF1 | Fiber optic (glass fibers): high speed, infrared | see specs | 1 millisecond | p. 12 | |
| SBF1MHS | Fiber optic (glass fibers): very high speed | see specs | 0.3 millisecond | p. 12 | |
| SBFV1 | Fiber optic (glass fibers): visible red | see specs | 1 millisecond | p. 13 | |
| SBFVG1 | Fiber optic (glass fibers): visible green | see specs | 1 millisecond | p. 13 | |
| SBAR1 | Ambient light receiver | see specs | 10 milliseconds | p. 14 | |
| SBAR1GH | Ambient light receiver: high gain | see specs | 10 milliseconds | p. 14 | |
| SBAR1GHF | Ambient light receiver: for glass fiber optics | see specs | 10 milliseconds | p. 14 | |

MULTI-BEAM 3- & 4-WIRE SCANNER BLOCKS

DESCRIPTION

MULTI-BEAM 3- & 4-wire scanner blocks offer a complete complement of sensing modes. There are 3 or more models for each sensing mode, resulting in a choice of exactly the right sensor for any application. The high power models (10 millisecond response time) offer greater optical sensing power than any other industrial sensors.

SPECIFICATIONS

SUPPLY VOLTAGE: input power and output connections are made via a 3- or 4-wire power block (see pages 15 to 20).

RESPONSE TIME: 1 millisecond ON and OFF, except high gain models with "X" suffix and ambient light receivers which are 10 milliseconds ON and OFF.

REPEATABILITY OF RESPONSE: see individual sensor specs.

SENSITIVITY ADJUSTMENT: easily accessible, located on top of scanner block beneath o-ring gasketed screw cover. 15-turn clutched control (rotate clockwise to increase gain).

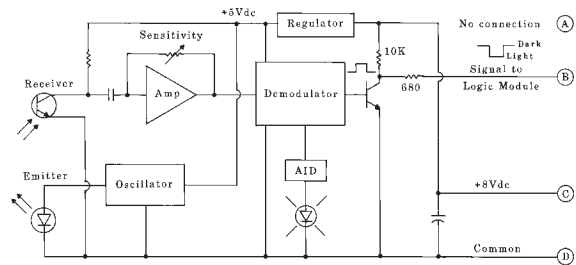
ALIGNMENT INDICATOR: red LED on top of scanner block. Banner's exclusive, patented Alignment Indicating Device (AID™) circuit lights the LED whenever the sensor detects its own modulated light source, and pulses the LED at a rate proportional to the received light level.

CONSTRUCTION: reinforced VALOX® housing with components totally encapsulated. Stainless steel hardware. Meets NEMA standards 1, 3, 12, and 13.

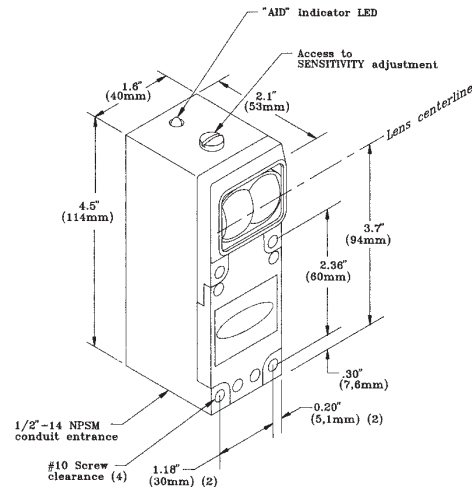
OPERATING TEMPERATURE RANGE: -40 to +70 degrees C (-40 to +158 degrees F).

VALOX® is a registered trademark of General Electric Company.

Functional Schematic, 3- and 4-wire Scanner Block



Dimensions, 3- and 4-wire Scanner Block



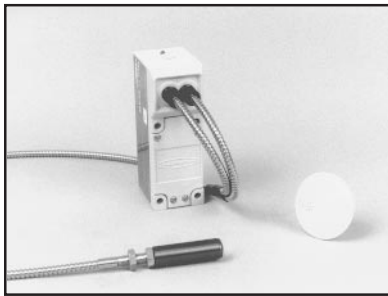
MULTI-BEAM 3- & 4-wire Scanner Blocks

Sensing Mode

Models

Excess Gain

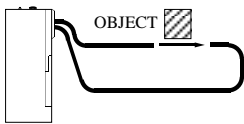
Beam Pattern



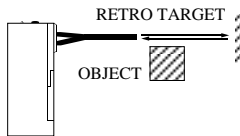
FIBER OPTIC Mode (glass fiber optics)

HIGH-SPEED SCANNER BLOCK

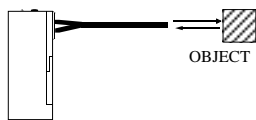
OPPOSED MODE



RETROREFLECTIVE MODE



DIFFUSE MODE



SBF1

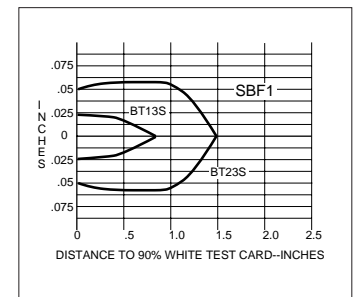
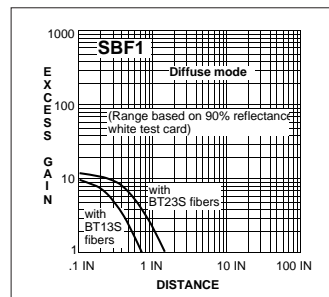
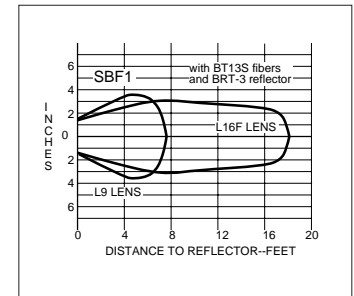
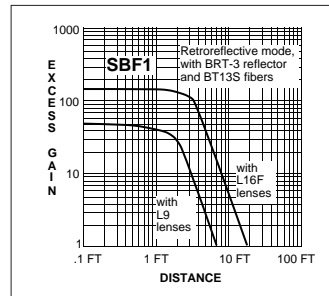
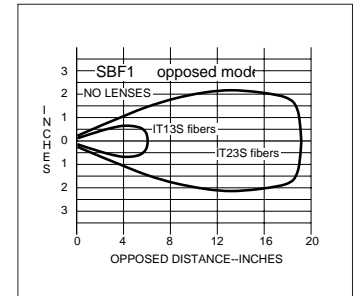
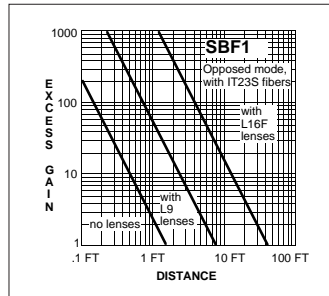
Range: see excess gain curves
Response: 1ms on/off
Repeatability: 0.3ms
Beam: infrared, 940nm

Fiber optic information:

IT13S: individual assembly .06in. (1.5mm) dia. bundle
IT23S: individual assembly .12 in. (3mm) dia. bundle
BT13S: bifurcated assembly, .06 in. (1.5mm) dia. bundle
BT23S: bifurcated assembly, .12 in. (3mm) dia. bundle

L9: .5in. (12mm) dia. lens
L16F: 1.0 in. (25mm) dia. lens

For information on the complete line of glass fiber optics, see Banner product catalog.

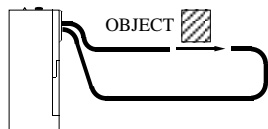


Fiber optics are often used to sense small parts. Small parts or narrow profiles which move at a high rate of speed can require sensors with fast response times for reliable detection. High speed fiber optic sensors are ideal for sensing gear or sprocket teeth or other targets in applications involving counters or shift registers for position control. Selection of the fiber optic sensing tip should involve matching the effective beam of the fiber to the profile of the part to be sensed to maximize the time that the part is sensed and/or the time between adjacent parts. Combining the best selection of fiber tip geometry with a high speed sensor will result in a highly repeatable position sensing system. The model BT13S fiber optic assembly used with a model L9 or L16F lens and a high speed scanner block is an excellent system for retroreflective code reading or for almost any short range retroreflective sensing application. Response time of a MULTI-BEAM sensor is also a function of the power block. For this reason, only power blocks which switch dc (e.g. PBT, PBP, PBO, PBAT, etc) should be used if the fast response time of the scanner block is to be utilized.

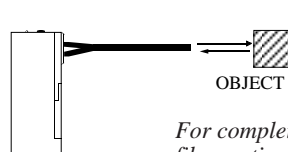
FIBER OPTIC Mode (glass fiber optics)

VERY HIGH-SPEED SCANNER BLOCK

OPPOSED MODE



DIFFUSE MODE



SBF1MHS

Range: see excess gain curves
Response: 300 microseconds on/off
Repeatability: 100 microseconds
Beam: infrared, 940nm

NOTE: gain curves illustrate that faster response comes at the expense of lower gain.

For complete information on glass fiber optic assemblies and accessories, see Banner product catalog.

