BANNER®
more sensors, more solutions

T18 Sensors – ac-Voltage Series

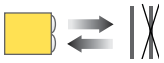
Self-contained ac-operated sensors

EZ BEAM

Features

- Featuring EZ-BEAM® technology, the specially-designed optics and electronics provide reliable sensing without the need for adjustments (most models)
- "T" style plastic housing with 18 mm threaded lens mount
- Models available in opposed, retroreflective, diffuse and fixed-field modes
- Completely epoxy-encapsulated to provide superior durability, even in harsh sensing environments to IP69K
- Innovative dual-indicator system takes the guesswork out of sensor performance monitoring
- 20 to 250V ac (3-wire hookup); SPST solid-state switch output, maximum load 300 mA

Models

Sensing Mode		Range	LED	Output	Model*
	**Opposed**	20 m (66')	Infrared 950 nm	–	**T183E**
				LO	**T18AW3R**
				DO	**T18RW3R**
	**Retroreflective†** with Gain Control	2 m (79")		LO	**T18AW3L**
				DO	**T18RW3L**
	**Polarized Retroreflective†**		Visible Red 680 nm	LO	**T18AW3LP**
				DO	**T18RW3LP**
	**Diffuse** with Gain Control	300 mm (12")	Infrared 880 nm	LO	**T18AW3D**
				DO	**T18RW3D**
	**Fixed-Field**	25 mm (1") cutoff		LO	**T18AW3FF25**
				DO	**T18RW3FF25**
		50 mm (2") cutoff		LO	**T18AW3FF50**
				DO	**T18RW3FF50**
		100 mm (4") cutoff		LO	**T18AW3FF100**
				DO	**T18RW3FF100**

* Standard 2 m (6.5') cable models are listed.
- **9 m (30') cable:** add suffix **"W/30"** (e.g., **T183E W/30**).
- **4-pin Micro-style QD models:** add suffix **"Q1"** (e.g., **T183EQ1**). A model with a QD connector requires a mating cable. (See page 7.)

† Use polarized models when shiny objects will be sensed.

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.

Fixed-Field Mode Overview

T18 Series self-contained fixed-field sensors are small, powerful, infrared diffuse mode sensors with far-limit cutoff (a type of background suppression). Their high excess gain and fixed-field technology allow them to detect objects of low reflectivity, while ignoring background surfaces.

The cutoff distance is fixed. Backgrounds and background objects must *always* be placed beyond the cutoff distance.

Fixed-Field Sensing – Theory of Operation

The T18FF compares the reflections of its emitted light beam (E) from an object back to the sensor's two differently aimed detectors, R1 and R2 (see Figure 1). If the near detector (R1) light signal is stronger than the far detector (R2) light signal (see object A, closer than the cutoff distance), the sensor responds to the object. If the far detector (R2) light signal is stronger than the near detector (R1) light signal (see object B, beyond the cutoff distance), the sensor ignores the object.

The cutoff distance for model T18FF sensors is fixed at 25, 50 or 100 millimeters (1", 2", or 4"). Objects lying beyond the cutoff distance usually are ignored, even if they are highly reflective. However, it is possible to falsely detect a background object, under certain conditions (see Background Reflectivity and Placement).

In the drawings and discussion on these pages, the letters E, R1, and R2 identify how the sensor's three optical elements (Emitter "E", Near Detector "R1", and Far Detector "R2") line up across the face of the sensor. The location of these elements defines the sensing axis (see Figure 2). The sensing axis becomes important in certain situations, such as those illustrated in Figures 5 and 6.

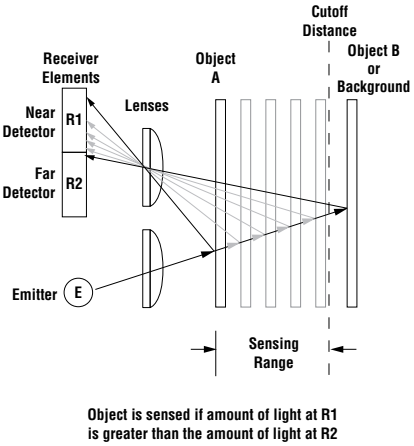


Figure 1. Fixed-field concept

Sensor Setup

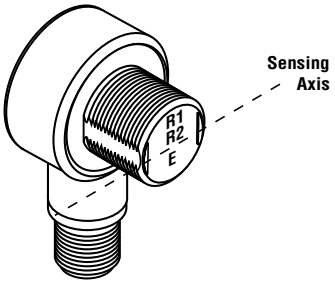
Sensing Reliability

For highest sensitivity, position the target object for sensing at or near the point of maximum excess gain. The excess gain curves for these products are shown on page 5. They show excess gain vs. sensing distance for sensors with 25 mm, 50 mm, and 100 mm (1", 2", and 4") cutoffs. Maximum excess gain for the 25 mm models occurs at a lens-to-object distance of about 7 mm; for 50 mm models, at about 10 mm; and for the 100 mm models, at about 20 mm. Sensing at or near this distance will make maximum use of each sensor's available sensing power. The background must be placed beyond the cutoff distance. (Note that the reflectivity of the background surface also may affect the cutoff distance.) Following these two guidelines will improve sensing reliability.

Background Reflectivity and Placement

Avoid mirror-like backgrounds that produce specular reflections. False sensor response will occur if a background surface reflects the sensor's light more strongly to the near detector, or "sensing" detector (R1), than to the far detector, or "cutoff" detector (R2). The result is a false ON condition (Figure 3). To cure this problem, use a diffusely reflective (matte) background, or angle either the sensor or the background (in any plane) so the background does not reflect light back to the sensor (see Figure 4). Position the background as far beyond the cutoff distance as possible.

An object beyond the cutoff distance, either stationary (and when positioned as shown in Figure 5), or moving past the face of the sensor in a direction perpendicular to the sensing axis, can cause unwanted triggering of the sensor if more light is reflected to the near detector than to the far detector. The problem is easily remedied by rotating the sensor 90° (Figure 6). The object then reflects the R1 and R2 fields equally, resulting in no false triggering. A better solution, if possible, may be to reposition the object or the sensor.



As a general rule, the most reliable sensing of an object approaching from the side occurs when the line of approach is parallel to the sensing axis.

Figure 2. Fixed-field sensing axis

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