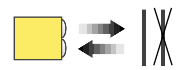
BANNER
the photoelectric specialist

EZ-BEAM® S18 Series Fixed-Field Sensors – AC

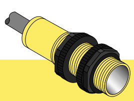
Plastic 18 mm Barrel-style Photoelectric Sensors with AC Output

EZ-BEAM S18 Series Features

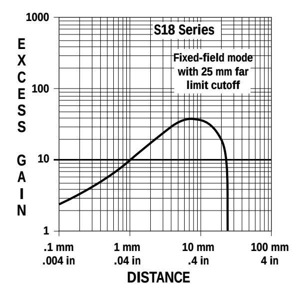
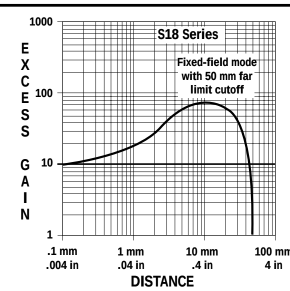
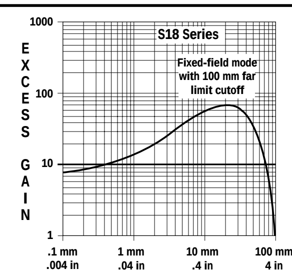
- 18 mm threaded-barrel sensor
- 20 to 250V ac (3-wire hookup); SPST solid-state switch output, maximum load 300 mA
- Easy to use; no adjustments are necessary
- Models with far-limit cutoff of 25, 50 or 100 mm
- Choice of integral cable or Micro-style quick disconnect connector
- Epoxy-encapsulated circuitry; IEC IP67 (NEMA 6P) construction for harsh sensing environments
- Brackets available for a wide array of mounting options



Infrared, 880 nm



EZ-BEAM S18 Series Fixed-Field AC Models

Models	Cutoff Point	Cable*	Supply Voltage	Output Type	Excess Gain Performance based on 90% reflectance white test card
With 25 mm Far Limit Cutoff					
S18AW3FF25 **S18AW3FF25Q1**	25 mm (1 in)	2 m (6.5') 4-Pin Micro-style QD	20-250V ac	Light Operate	
S18RW3FF25 **S18RW3FF25Q1**		2 m (6.5') 4-Pin Micro-style QD		Dark Operate	
With 50 mm Far Limit Cutoff					
S18AW3FF50 **S18AW3FF50Q1**	50 mm (2 in)	2 m (6.5') 4-Pin Micro-style QD	20-250V ac	Light Operate	
S18RW3FF50 **S18RW3FF50Q1**		2 m (6.5') 4-Pin Micro-style QD		Dark Operate	
With 100 mm Far Limit Cutoff					
S18AW3FF100 **S18AW3FF100Q1**	100 mm (4 in)	2 m (6.5') 4-Pin Micro-style QD	20-250V ac	Light Operate	
S18RW3FF100 **S18RW3FF100Q1**		2 m (6.5') 4-Pin Micro-style QD		Dark Operate	

* 9 m (30') cables are available by adding suffix **"W/30"** to the model number of any cabled sensor (e.g., **S18AW3FF25 W/30**).
A model with a QD connector requires an optional mating cable. See page 5 for more information.

EZ-BEAM S18 Series Fixed-Field Sensors – AC Output

The excess gain curves on page 1 show excess gain vs. sensing distance for S18 Series fixed-field sensors with 25-, 50- and 100-millimeter cutoffs. Maximum excess gain for the 25-mm models occurs at a lens-to-object distance of about 7 mm; for the 50-mm models, at about 10 mm; and for the 100-mm models, at about 20 mm. Sensing at or near these distances will make maximum use of each sensor's available sensing power.

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

These excess gain curves were generated using a white test card of 90% reflectance. Objects with reflectivity of less than 90% reflect less light back to the sensor, and thus require proportionately more excess gain in order to be sensed with the same reliability as more reflective objects. When sensing an object of very low reflectivity, it may be especially important to sense it at or near the distance of maximum excess gain.

The effects of object reflectivity on cutoff distance, though small, may be important for some applications. Sensing of objects of less than 90% reflectivity causes the cutoff distances to be "pulled" slightly closer to the sensor. For example, an excess gain of 1 for an object that reflects 1/10 as much light as the 90% white card is represented by the heavy horizontal graph line at excess gain = 10. An object of this reflectivity results in far limit cutoffs of approximately 20, 40 and 70 mm (for 25-, 50- and 100-mm cutoff models, respectively).

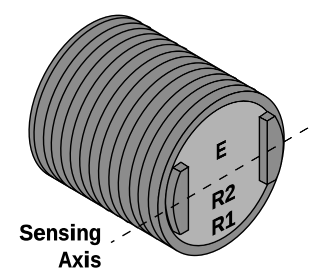
Objects with reflectivity greater than 90% return more light to the sensor. For this reason, highly reflective backgrounds or background objects such as mirrors, polished metal, and other sources of specular reflections require special consideration. If it is necessary to use a highly reflective background, it should be placed as far beyond the cutoff distance as possible and angled to direct reflected light away from the sensor (see below and page 3).

EZ-BEAM S18 Series Fixed-Field Sensor Setup Tips

General

For highest sensitivity, the sensor-to-object distance should be such that the object will be sensed at or near the point of maximum excess gain (see excess gain curve and information above). The background must be placed beyond the cutoff distance. Following these two guidelines makes it possible to detect objects of low reflectivity, even against close-in reflective backgrounds.

In the drawings and discussion on this page and page 3, 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. In Figures 2, 3, and 4, these elements align vertically; in Figure 5, they align horizontally. Note how the position of the tabs on the front of the sensor helps to define the sensing axis of the sensor (Figure 1, right). The sensing axis becomes important in situations like those illustrated in Figures 4 and 5.



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 1. Sensing axis

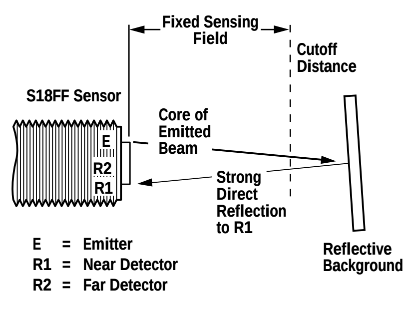


Figure 2. Reflective background – problem

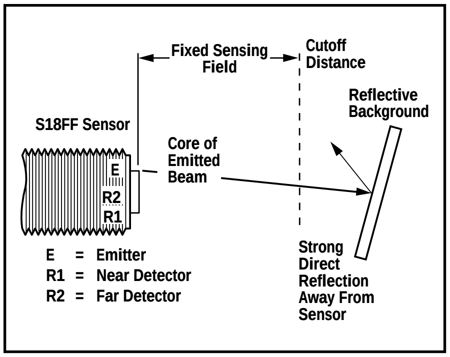


Figure 3. Reflective background – solution

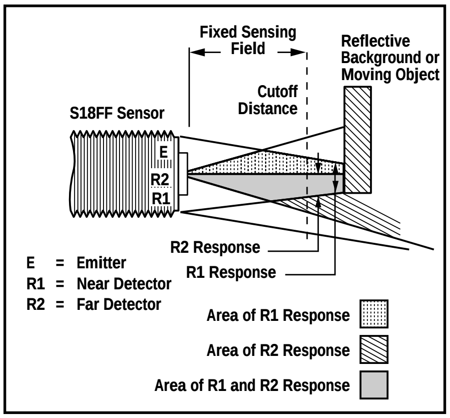


Figure 4. Object beyond cutoff – problem

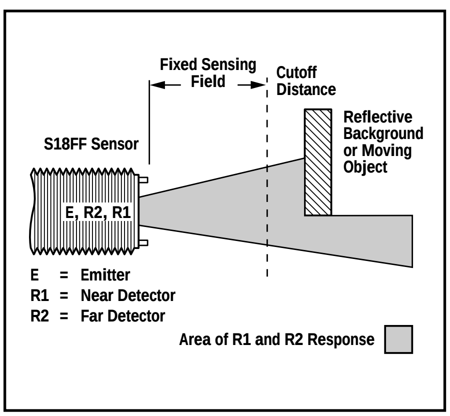


Figure 5. Object beyond cutoff – solution

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 (R1) than to the far detector (R2). The result is a false ON condition (Figure 2). Use of a diffusely-reflective (matte) background will cure this problem. Other possible solutions are to either angle the sensor or angle the background (in any plane) so that the background does not reflect back to the sensor (see Figure 3).

An object beyond the cutoff distance, either moving or stationary (and when positioned as shown in Figure 4), can cause unwanted triggering of the sensor because it reflects more light to the near detector than to the far detector. The problem is easily remedied by rotating the sensor 90° (Figure 5) to align the sensing axis horizontally. 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.

Unwanted triggering of the sensor from an object beyond the cutoff can also be caused by attempting to sense a small object that is moving perpendicular to the sensor face, or by an object moving through the off-center position shown in Figure 4. Making the object larger, centering the sensor relative to the object, or rotating the sensor to place the sensing axis perpendicular to the longer dimension of the object (Figure 5) will solve the problem.

EZ-BEAM S18 Series AC Specifications

Supply Voltage and Current	20 to 250V ac (50/60 Hz). Average current 20 mA. Peak current: 200 mA at 20V ac, 500 mA at 120V ac, 750 mA at 250V ac
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	SPST solid-state AC switch; Three-wire hookup; Choose light operate or dark operate models; **Light operate models:** Output conducts when the sensor sees its own (or the emitter's) modulated light **Dark operate models:** Output conducts when sensor sees dark
Output Rating	300 mA maximum (continuous) Fixed-field models: derate 5 mA/°C above +50°C (122°F); **Inrush capability** 1 amp for 20 milliseconds, non-repetitive **Off-state leakage current** <100 microamps **On-state voltage drop** 3V at 300 mA ac; 2V at 15 mA ac
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	16 milliseconds ON and OFF NOTE: 100 millisecond delay on power-up; outputs do not conduct during this time
Repeatability	4 milliseconds; repeatability and response are independent of signal strength.
Indicators	Two LEDs: Green and Yellow **Green glowing steadily** power to sensor is ON **Yellow glowing steadily** sensor sees light **Yellow flashing** excess gain marginal (1-1.5x) in light condition
Construction	Housing is thermoplastic polyester; acrylic lens, S18s come with two jam nuts
Environmental Rating	Rated NEMA 6P (IEC IP67)
Connections	2 m (6.5') or 9 m (30') attached cable, or 4-pin Micro-style quick-disconnect (QD) fitting
Operating Conditions	**Temperature:** -40° to +70°C (-40° to 158°F) **Maximum relative humidity:** 90% at 50°C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06" acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	CE, CSA®, UL LISTED