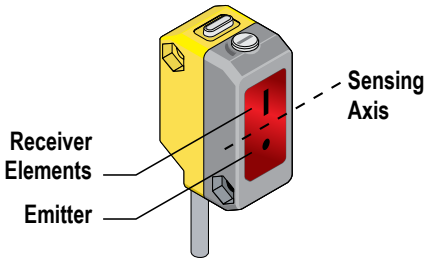
Sensor Setup

Setting the Cutoff Distance

The cutoff distance for the QS18AF models may be adjusted between 20 mm and 100 mm (0.8 in to 4 in); for QS18LAF models, between 30 mm and 150 mm (1.2 in to 6 in); and for QS18LAF250 models, between 50 mm and 250 mm (2 in to 10 in).

To properly set the cutoff point, position the lightest possible background to be used, at the closest position it will come to the sensor during use. Using a small screwdriver in the adjustment screw, adjust the cutoff distance until the threshold is reached and the yellow Light Sensed indicator changes state. (If the indicator never comes ON, the background is beyond the maximum sensing distance and will be ignored.) Repeat the procedure, using the darkest target, placed in its most distant position for sensing. Adjust the cutoff approximately midway between the two positions (*Figure 4* on page 3).



When an object approaches from the side, the most reliable sensing usually occurs when the line of approach is parallel to the sensing axis.

Figure 3. Sensing Axis

Sensing Reliability

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. The excess gain curves show excess gain vs. sensing distance for the minimum and maximum cutoff settings. Maximum excess gain for model QS18VN6AF100 at a 20 mm cutoff occurs at a lens-to-object distance of about 7 mm, for example. The background must be placed beyond the cutoff distance; more reflective backgrounds should be placed even farther back. Following these two guidelines will maximize sensing reliability.

Background Reflectivity and Placement

Avoid mirror-like backgrounds that produce specular reflections. A false sensor response occurs if a background surface reflects the sensor's light more to the near detector (R1) than to the far detector (R2). The result is a false ON condition (*Figure 5* on page 4). To correct 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 6* on page 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 7* on page 4) or moving past the face of the sensor in a direction perpendicular to the sensing axis, may 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 8* on page 4). 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.

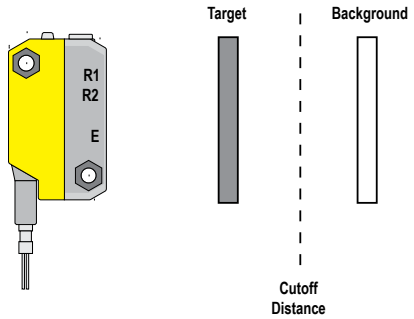


Figure 4. Set cutoff distance approximately midway between the farthest target and the closest background

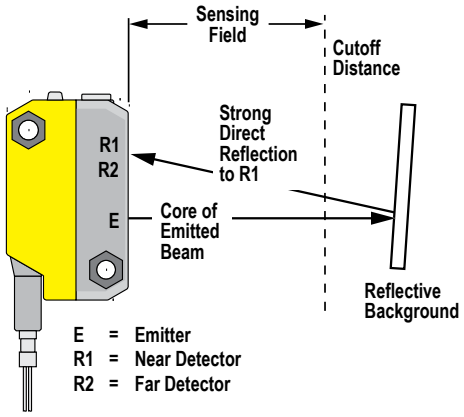


Figure 5. Reflective background – problem

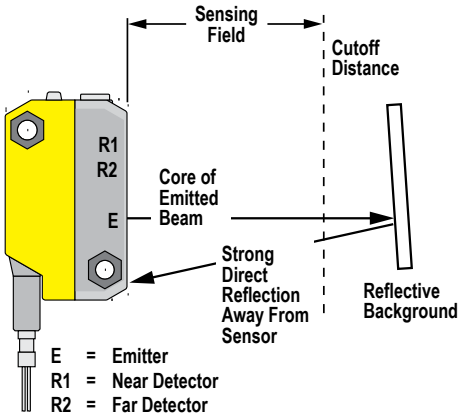


Figure 6. Reflective background – solution

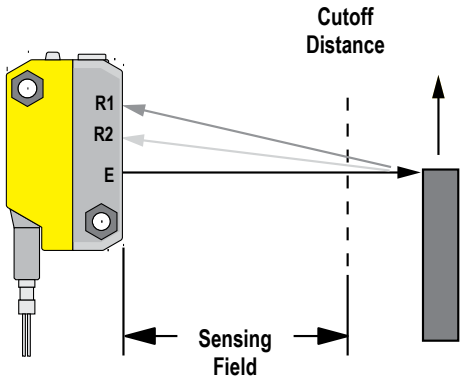


Figure 7. Object beyond cutoff – problem

A reflective background object in this position or moving across the sensor face in this axis and direction may cause false sensor response.

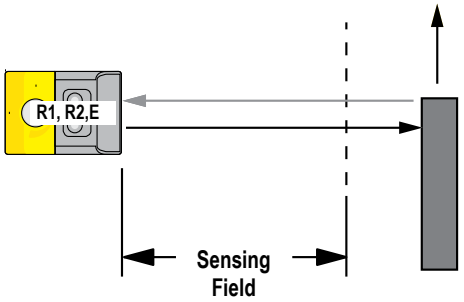


Figure 8. Object beyond cutoff – solution

A reflective background object in this position or moving across the sensor face in this axis will be ignored.

Color Sensitivity

The effects of object reflectivity on cutoff distance, though small, may be important for some applications.

The 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.

It is expected that at any given cutoff setting, the actual cutoff distance for lower reflectance targets will be slightly shorter than for higher reflectance targets (see the cutoff point deviation graphs). This behavior is known as color sensitivity.

In the cutoff point deviation graphs, the percentage of deviation indicates a change in the cutoff point for either 18% gray or 6% black targets, relative to the cutoff point set for a 90% reflectance white test card.

For example, in *Figure 9* on page 5, the cutoff point decreases 10% for a 6% reflectance black target when the cutoff point is adjusted for 100 mm (4 in) using a 90% reflectance white test card. In other words, the cutoff point for the black target is 90 mm (3.6 in) for this setting.