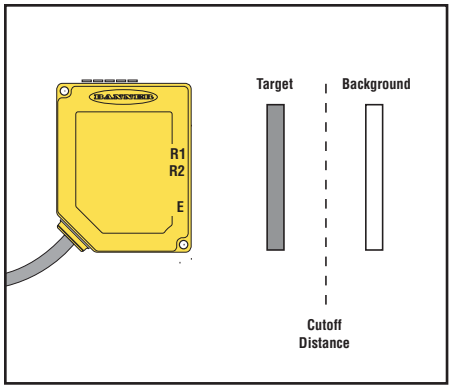


Figure 4. Set cutoff distance approximately midway between the farthest target and the closest background

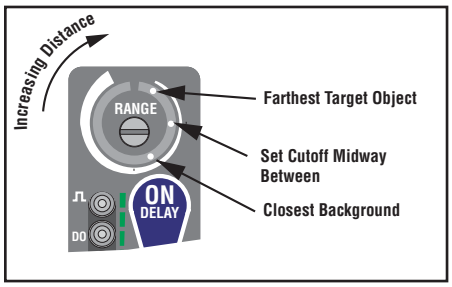


Figure 5. Setting the cutoff distance

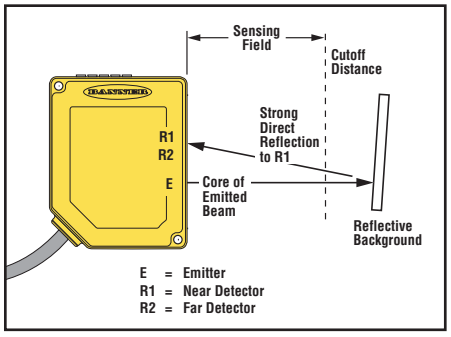


Figure 6. Reflective background – problem

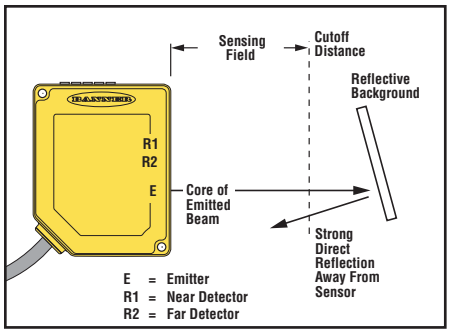


Figure 7. Reflective background – solution

Sensor Setup

Setting the Cutoff Distance

The cutoff distance for Q60AFV sensors may be adjusted between 200 mm and 1000 mm (8" to 40").

To maximize contrast, position the lightest possible background to be used, at the closest position it will come to the sensor during use (Figure 4). Using a small screwdriver in the adjustment screw, adjust the cutoff distance until the threshold is reached and the green Light Sensed indicator changes state. (If the indicator never comes ON, the background is beyond the maximum sensing cutoff and will be ignored.) Note the position of the rotating cutoff position indicator at this position. Then repeat the procedure, using the darkest target, placed in its most distant position for sensing. Adjust the cutoff so that the indicator is midway between the two positions (Figure 5).

NOTE: Setting the cutoff distance adjustment screw to its maximum clockwise position places the receiver lens directly in front of the receiver elements and results in the Q60 performing as a long-range diffuse sensor.

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 on page 1 show excess gain vs. sensing distance for 200 mm and 1 m cutoffs. Maximum excess gain for a 200 mm cutoff occurs at a lens-to-object distance of about 150 mm, and for a 1 m cutoff, at about 400 mm. 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.

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 6). Use of a diffusely-reflective (matte) background will cure this problem. Other possible solutions are to angle either the sensor or the background (in any plane) so that the background does not reflect back to the sensor (see Figure 7).

An object beyond the cutoff distance, either moving or stationary (and when positioned as shown in Figure 8), 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 9) to align the sensing axis horizontally. The object then reflects the R1 and R2 fields equally, resulting in no false triggering.

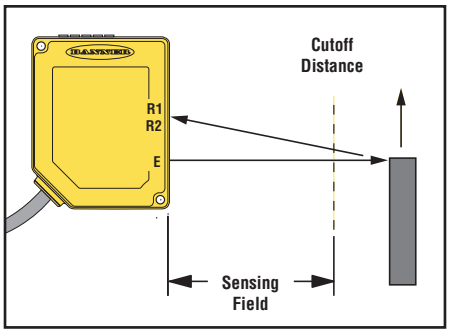


Figure 8. Object beyond cutoff distance — problem

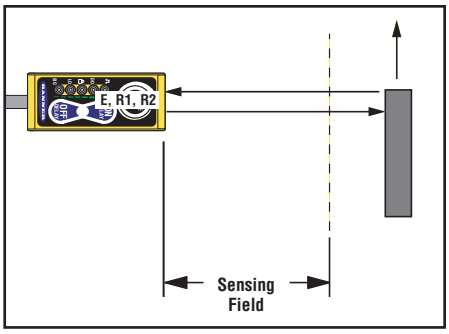


Figure 9. Object beyond cutoff distance — solution

Color Sensitivity

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

The excess gain curves on page 1 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 Figure 10). This behavior is known as color sensitivity.

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% reflective white test card.

For example, the cutoff point decreases 4% for a 6% reflectance black target when the cutoff point is adjusted for 1000 mm (40") using a 90% reflectance white test card. In other words, the cutoff point for the black target is 960 mm (38") for this setting.

Setting the Output Delay

The output of the Q60AFV sensor may be delayed between 0.008 and 16 seconds, in any of 72 increments. Delay is indicated on the 5-segment light bar using single LED segments or combinations of them, in varying stages of intensity. Major increments, displayed by a single full-intensity LED, are shown in Figure 13.

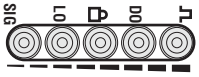
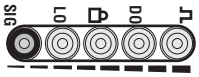
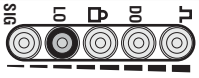
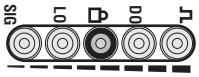
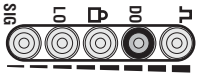
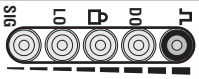
Step #	Delay Time	LED Status
0	No Delay	
8	0.062 second	
24	0.250 second	
40	1.00 second	
56	4.0 seconds	
72	16 seconds	

Figure 13. ON/OFF Delay options

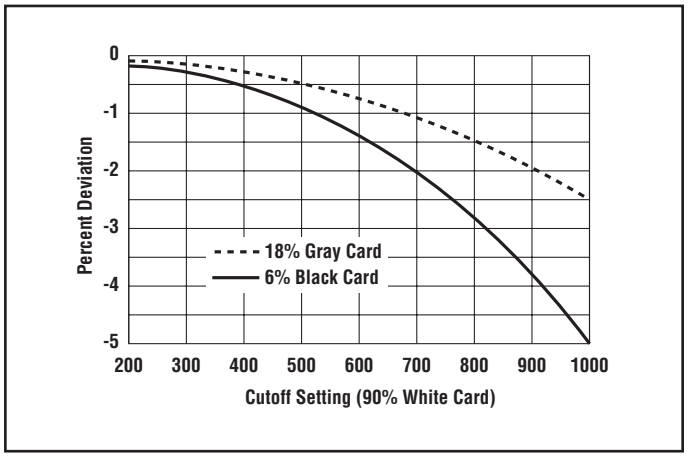


Figure 10. Q60V Cutoff point deviation

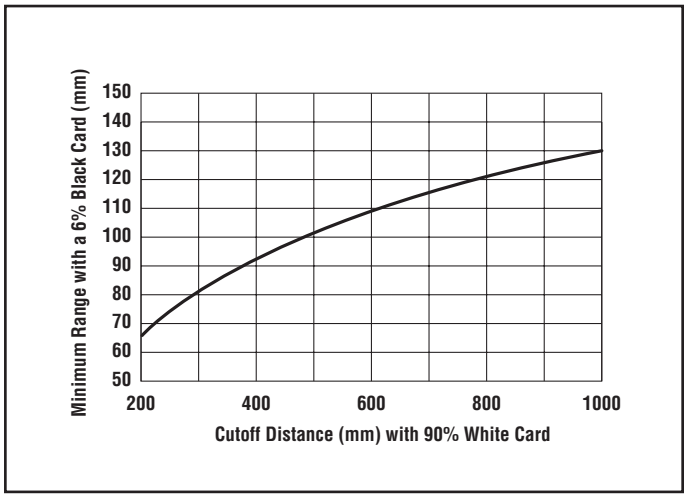


Figure 11. Q60V minimum range vs. cutoff setting

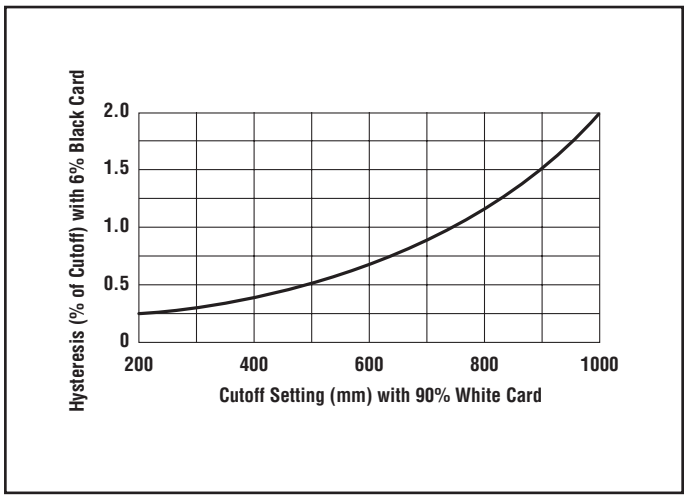


Figure 12. Q60V hysteresis