

## Color Sensitivity

The effects of object reflectivity on cutoff distance, though small, may be important for some applications. 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. This behavior is known as color sensitivity.

For example, an excess gain of 1 (see page 5) for an object that reflects 1/10 as much light as the 90% white card is represented by the horizontal graph line at excess gain = 10. This line intersects the curve at approximately 190 mm. Thus, an object of this reflectivity results in a far limit cutoff of approximately 190 mm (7.5") for the 200 mm cutoff model, for example; and 190 mm represents the cutoff for this sensor and target.

The excess gain curves on page 5 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.

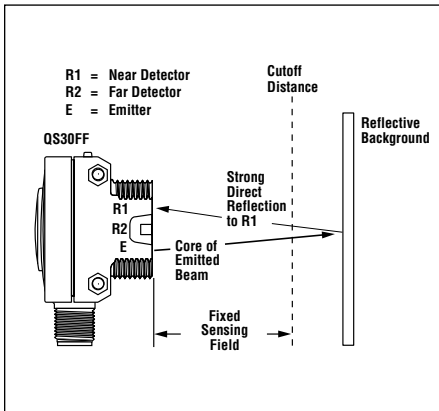


Figure 3. Reflective background – problem

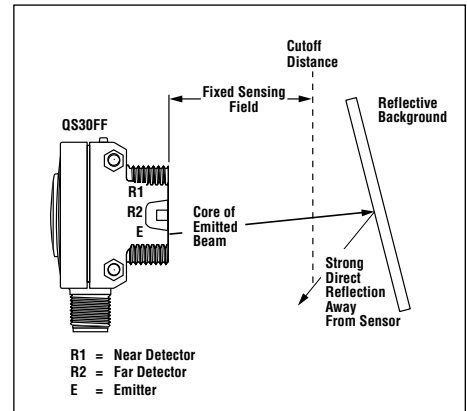


Figure 4. Reflective background – solution

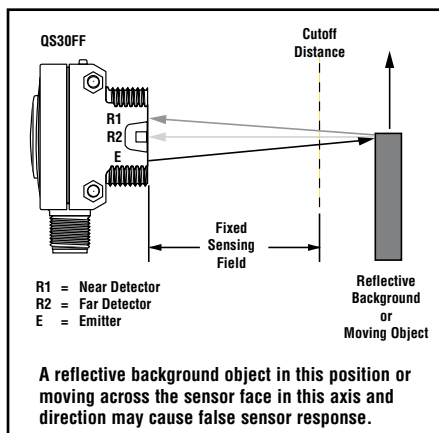


Figure 5. Object beyond cutoff – problem

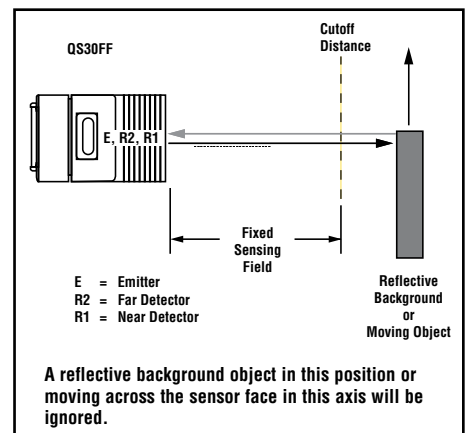


Figure 6. Object beyond cutoff – solution

# WORLD-BEAM® QS30 – DC Voltage

## Specifications

|                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Supply Voltage</b>                       | 10 to 30V dc (10% maximum ripple) at less than 40 mA, exclusive of load;<br>Protected against reverse polarity and transient voltages                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Output Configuration</b>                 | <b>Bipolar:</b> One current sourcing and one current sinking<br><b>Rating:</b> 100 mA maximum each output at 25°C<br><b>Off-state leakage current:</b> <b>NPN:</b> less than 200 µA<br><b>PNP:</b> less than 10 µA<br><b>ON-state saturation voltage:</b> <b>NPN:</b> less than 1.6V @ 100 mA<br><b>PNP:</b> less than 2.0V @ 100 mA<br>Protected against false pulse on power-up and continuous overload or short circuit of outputs                                                                                                                  |
| <b>Output Response</b>                      | <b>Opposed Mode:</b> 5 milliseconds ON and OFF<br><b>All others:</b> 2 milliseconds<br>NOTE: 100 millisecond delay on power-up; outputs do not conduct during this time                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Repeatability</b>                        | <b>Opposed Mode:</b> not applicable<br><b>All others:</b> 500 microseconds                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Cutoff Point Tolerance</b>               | <b>Fixed-Field only:</b> ± 5% of nominal cutoff distance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Adjustments</b>                          | Selectable Light/Dark Operate is achieved via the gray wire.<br><b>Opposed, Retroreflective, and Polarized Retroreflective models:</b><br><b>Light Operate</b> - Low (0 to 3V)*<br><b>Dark Operate</b> - High (open or 5 to 30V)*<br><b>Diffuse and Fixed-Field models:</b><br><b>Light Operate</b> - High (open or 5 to 30V)*<br><b>Dark Operate</b> - Low (0 to 3V)*<br><br><b>Diffuse, Retroreflective, and Polarized Retroreflective mode models (only):</b><br>Single-turn Sensitivity (Gain) adjustment potentiometer<br>* Input impedance 10 kΩ |
| <b>Indicators</b>                           | 2 LED indicators on sensor top:<br><b>Green ON steady:</b> Power ON<br><b>Green flashing:</b> Output overloaded (except receivers)<br><b>Yellow ON steady:</b> Light sensed<br><b>Yellow flashing:</b> Marginal excess gain (1.0 to 1.5x excess gain)<br><br>Large oval LED indicator on sensor back (except emitters):<br><b>Yellow ON steady:</b> Output conducting                                                                                                                                                                                  |
| <b>Construction</b>                         | ABS housing, rated IEC IP67; NEMA 6; Acrylic lens cover<br>3 mm mounting hardware included                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Connections</b>                          | 2 m (6.5') or 9 m (30') 5-wire PVC cable or 5-pin Euro-style integral QD connector                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Operating Conditions</b>                 | <b>Temperature:</b> -20° to +70° C (-4° to +158° F)<br><b>Relative Humidity:</b> 90% @ 50° C (non-condensing)                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Vibration and Mechanical Shock</b>       | All models meet Mil. Std. 202F requirements method 201A (vibration: 10 to 60 Hz max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2; 30G 11 ms duration, half sine wave.                                                                                                                                                                                                                                                                                                                                                   |
| <b>Application Tip for the QS30LV Model</b> | For best sensing reliability, targets should be a minimum of 0.5m from the sensor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Certifications</b>                       | Approvals in process                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |