WORLD-BEAM® QS30 – Universal Voltage

Instruction Manual

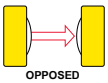
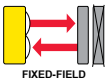
Self-Contained, Photoelectric Sensors in Universal-Style Housing

- Advanced one-piece photoelectric sensors with exceptional long-range optical performance
- Compact housing with mounting versatility via its popular 30 mm threaded barrel or side-mount holes
- 24 V to 250 V ac (50 Hz/60 Hz) and 12 V to 250 V dc operation with SPDT electromechanical relay output
- Tough ABS/polycarbonate blend housing is rated to IEC IP67, NEMA 6
- Easy-to-see sensor status indicators: two status LEDs visible from 360°; extra large Output indicator on the back of the sensor housing (except emitters) visible from long distances
- Opposed, polarized retroreflective, and fixed-field (200 mm, 400 mm, or 600 mm cutoff) models available
- 2 m integral cable and 152 mm quick-disconnect cable options

WARNING: Not To Be Used for Personnel Protection

Never use this device as a sensing device for personnel protection. Doing so could lead to serious injury or death. This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition.

Models

Sensing Mode	Model	Range	LED	Output
 OPPOSED	QS303E Emitter	60 m (200 ft)	Infrared, 875 nm Effective Beam: 18 mm (0.7 in)	-
	QS30VR3R Receiver	60 m (200 ft)	-	SPDT
 POLAR RETRO	QS30VR3LP	8 m (26 ft)[2]	Visible red, 630 nm	
 FIXED-FIELD	QS30VR3FF200	200 mm (7.9 in)	Visible red, 680 nm	
	QS30VR3FF400	400 mm (15.7 in)		
	QS30VR3FF600	600 mm (23.6 in)		

Fixed-Field Mode Overview

QS30 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 detection of 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.

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[1] Standard 2 m (6.5 ft) cable models are listed.
- For 9 m (30 ft) integral cable: add suffix "W/30" (for example, QS303E W/30).
- 5-pin Micro-style 152 mm (6 in) cable: add "QPMA" (for example, QS303EQPMA).

[2] Range is measured using a model BRT-84 retroreflector.

Fixed-Field Sensing – Theory of Operation

The QS30FF 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* on page 2. If the near detector's (R1) light signal is stronger than the far detector's (R2) light signal (see object A in the Figure below, closer than the cutoff distance), the sensor responds to the object. If the far detector's (R2) light signal is stronger than the near detector's (R1) light signal (see object B in the Figure below, beyond the cutoff distance), the sensor ignores the object.

The cutoff distance for model QS30FF sensors is fixed at 200, 400 or 600 millimeters (8 in, 16 in, or 24 in). Objects lying beyond the cutoff distance are usually ignored, even if they are highly reflective. However, under certain conditions, it is possible to falsely detect a background object (see *Background Reflectivity and Placement* on page 2).

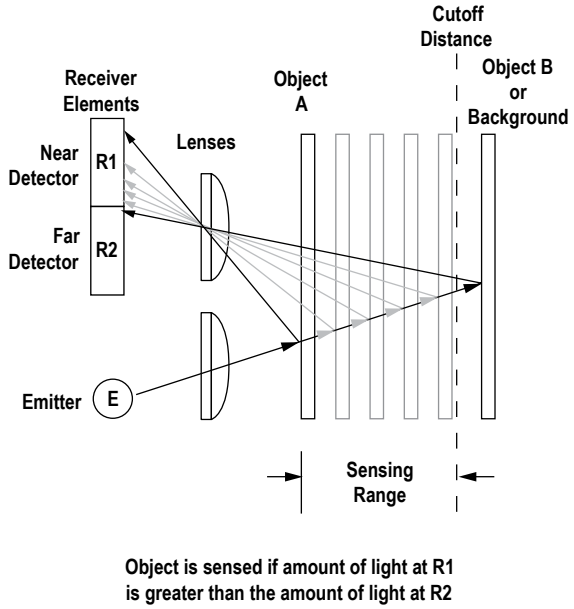

Figure 1. Fixed-Field Concept

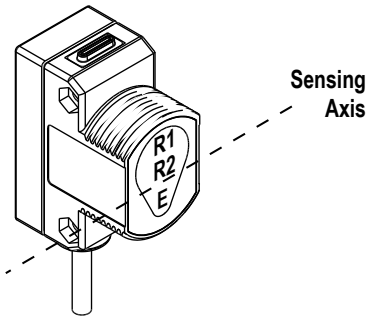

Figure 2. Fixed-Field Sensing Axis

In the drawings and information provided in this document, 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* on page 2. The sensing axis becomes important in certain situations, such as those illustrated in *Figure 5* on page 3 and *Figure 6* on page 3.

Device Setup

Sensing Reliability

For highest sensitivity, position the target for sensing at or near the point of maximum excess gain. See Performance Curves section for excess gain curves. Sensing at or near this distance makes the 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 guidelines improves 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 3* on page 3). Correct this problem by using a diffusely reflective (matte) background, or angling either the sensor or the background (in any plane) so the background does not reflect light back to the sensor (*Figure 4* on page 3). 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* on page 3), 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. Correct the problem by rotating the sensor 90° (*Figure 6* on page 3). 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.