R-GAGE™ QT50R Series Sensor

Radar-Based Vehicle Detection Sensor

Features

- Reliably detects vehicles and trains based on frequency-modulated continuous-wave (FMCW) radar technology
- Detects objects up to 7.2 m (24') away using a fixed background reference target up to 8 m (26') away
- Detection is unaffected by wind or changing air temperatures
- Easy to set up using sealed push button or remote wire
- Operates in Industrial, Scientific, and Medical (ISM) telecommunication band; no special license required
- 15 to 30V dc operation
- Rugged IP67 housing for harsh environments

Models

Models*	Sensing Range	Cable	Telecom Approval	Output
QT50R	**Objects:** 0.5 to 7.2 m (1.6' to 24') **Background:** 4 to 8 m (13' to 26')	5-wire, 2 m (6.5') cable	ETSI/EN 300 440 (EU except UK and France)	Bipolar NPN and PNP
QT50RQ		5-pin Euro-style integral QD		
QT50RUS		5-wire, 2 m (6.5') cable	FCC Part 15 (USA)	
QT50RUSQ		5-pin Euro-style integral QD		

* For 9 m cable, add suffix "**W/30**" to the model number of the cabled sensor (e.g., **QT50R W/30**). A QD model requires a mating cable. See page 7.

WARNING . . . Not To Be Used for Personnel Protection

Never use these products as sensing devices for personnel protection. Doing so could lead to serious injury or death.

These sensors do NOT include the self-checking redundant circuitry necessary to allow their use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition. Consult your current Banner Safety Products catalog for safety products which meet OSHA, ANSI and IEC standards for personnel protection.

Overview

The R-GAGE sensor emits high-frequency radio waves from an internal antenna, which forms a well-defined beam. Some of this emitted energy is reflected back to the receiving antenna. Signal processing electronics determine the distance from the sensor to the vehicle based on the time delay of the return signal. The sensor is configured to operate like a retroreflective photoelectric sensor. See Figure 3.

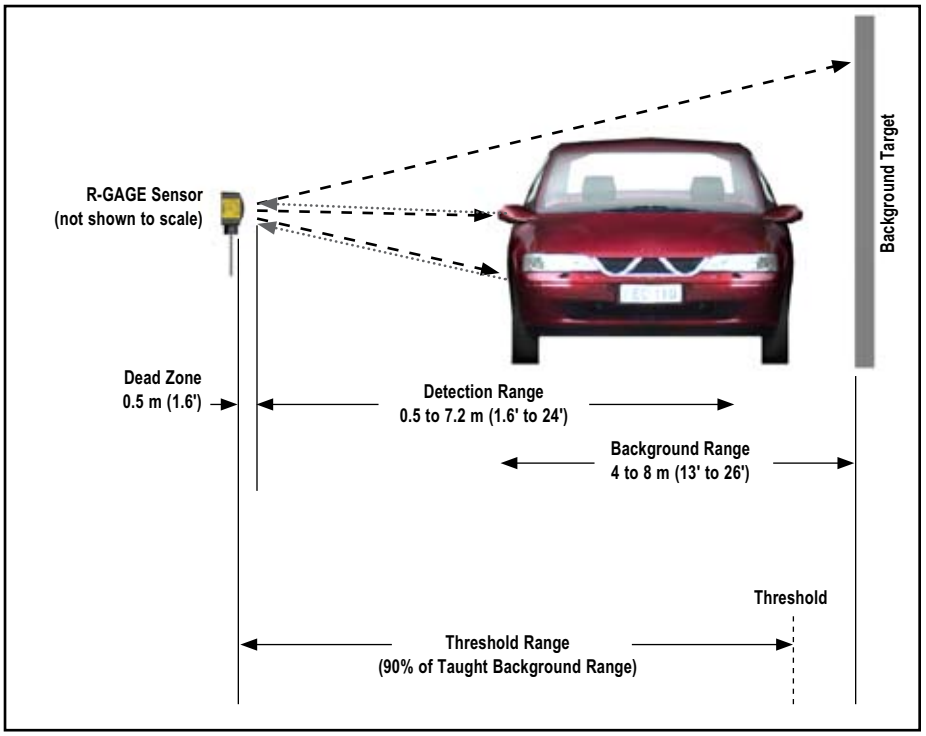
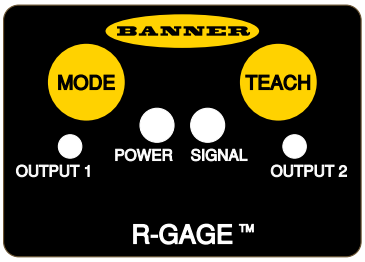


Figure 3. Threshold automatically placed at 90% of distance to background target that is taught



NOTE: The MODE button on this model is not functional.

Figure 1. R-GAGE features

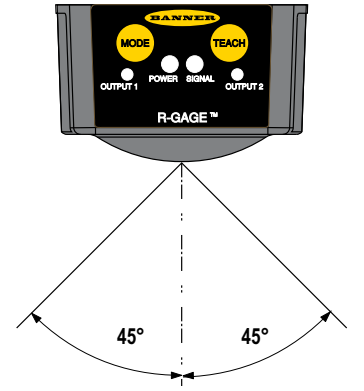


Figure 2. R-GAGE field of view

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Sensor Programming

1. Mount the sensor securely. Align the sensor with the background target, making the face of the Sensor as parallel as possible to the background target.

   In programming mode (only after the TEACH push button is pressed), the red Signal LED will flash faster as the alignment improves; solid ON is best. If the red Signal LED does not flash, then the background target is not sufficient and a different target must be used, such as a metal plate or a corner cube reflector.

2. Verify that the area between the sensor and the background is clear, and follow the programming procedure in the table below.

General Notes on Programming

- Once the sensor enters TEACH mode, it will default to the previous settings and exit TEACH mode after one minute.
- To exit TEACH mode and return to the previous settings, push and hold the TEACH push button (or pulse the remote line) for more than two seconds.

	Procedure		Result
	Push Button	**Remote Line** **0.02 sec. < T < 0.8 sec.**	
Programming Mode	• Push and hold TEACH push button until Output LEDs turn ON Red 	• No action required; sensor is ready to be aligned and programmed	**Power LED:** OFF **Output LEDs:** ON Red **Signal LED:** Flashes faster as background signal strength increases (i.e., as alignment improves); solid ON is best
TEACH Background Reference Target	• Press and release TEACH push button 	• Pulse the remote line 	**Teach Accepted** **Power LED:** ON **Output LEDs:** OFF **Signal LED:** ON solid **Teach Unacceptable** **Power LED:** OFF **Output LEDs:** ON Sensor defaults to program mode.

Setup Procedure for Tunnel Train Detection

1. Mount the sensor such that Y is 1/3 of X, and align the sensor so the center of the beam strikes the corner of the tunnel beyond the far rail, as shown in Figure 4.
2. Make sure the area between the sensor and the background is clear, and press the TEACH button until the Output LEDs turn ON red.
3. Align the sensor. The red Signal LED will flash faster as alignment improves; solid ON is best.
4. Press the TEACH button again. The Output LEDs turn OFF, and the red Signal LED turns ON.
5. Verify proper setup by blocking the beam. The Output LEDs should turn ON yellow.

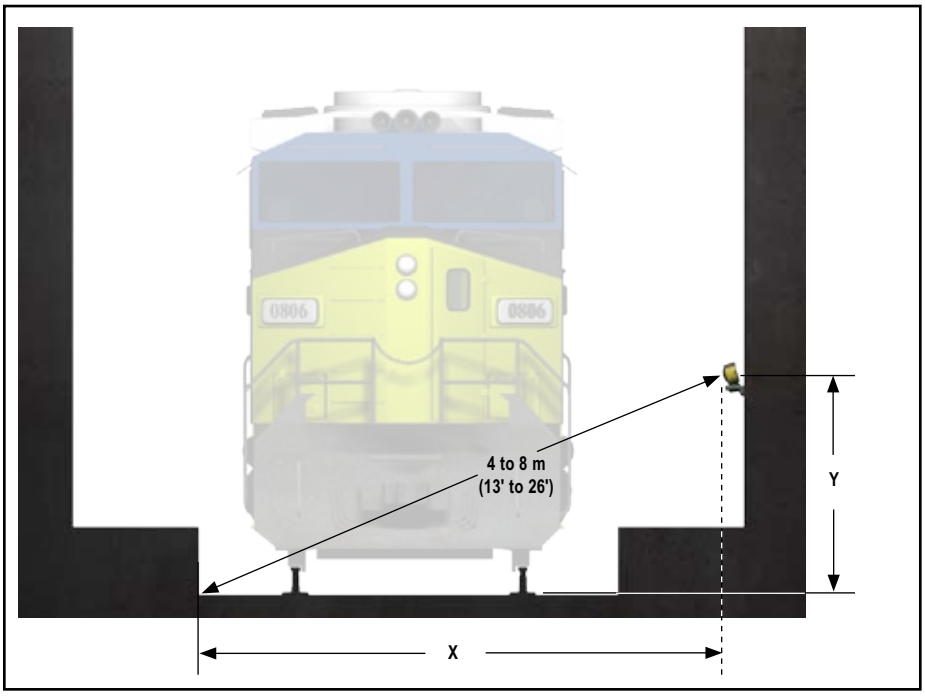

Figure 4. Setup for tunnel train detection

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CAUTION . . .
Make No Modifications to this Sensor

Any modifications to this sensor not expressly approved by Banner Engineering could void the user's authority to operate the sensor. **Contact the Factory for more information.**

Status Indicators

Power LED	Indicates
OFF	Power is OFF.
ON Green	Power is ON.

Signal LED		Indicates
TEACH Mode (signal strength indicator for background)	OFF	Background target is not sufficient; use a different target.
	ON Red (flashing)	Frequency of flash indicates alignment. LED flashes faster as alignment improves; solid ON indicates best alignment.
RUN Mode (alignment indicator for background target taught)	OFF	Background target is not being sensed.
	ON Red (flashing)	Frequency of flash is proportional to background target taught; solid ON indicates best alignment.

Output LEDs	Indicate
ON Red	In TEACH mode.
ON Yellow	In RUN mode; target is sensed and outputs are conducting.

Specifications

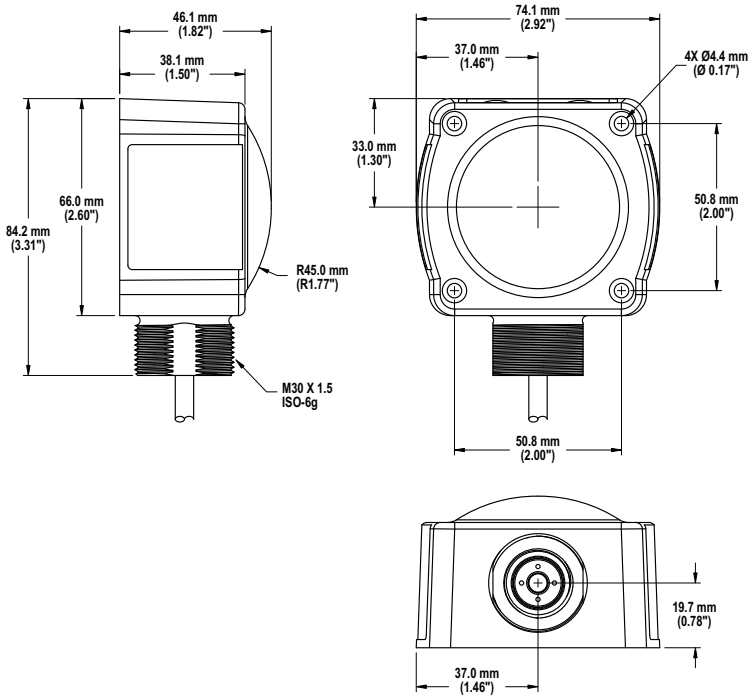
Specifications are subject to change without notice.

Range	Sensor will detect a 1 m x 1 m metal plate at a distance of up to 7.2 m (24') when set up with a suitable background target.
Detectable Objects	Objects containing metal or other high-dielectric material
Operating Principle	Frequency-modulated continuous-wave (FMCW) radar
Operating Frequency	24.05 to 24.25 GHz, ISM Band (varies slightly with national telecom regulations)
Supply Voltage	15 to 30V dc
Supply Protection Circuitry	Protected against reverse polarity and transient overvoltages
Delay at Power-up	Less than 1.5 seconds
Output Configuration	Bipolar NPN and PNP outputs, 150 mA (derate 1 mA per °C above 25° C)
Output Protection	Protected against short circuit conditions
Indicators	**Power LED:** Green **Signal Strength LED:** Red **Output LEDs:** Yellow/Red See "Status Indicators" above.
Adjustments	TEACH programming button for setting background reference
Operating Temperature	-20° to 55° C (-4° to 131° F)
Environmental Rating	IEC IP67; NEMA 6
Connections	2 m (6.5') or 9 m (30') 5-conductor, shielded, PVC-jacketed attached cable or integral 5-pin Euro-style QD
Certifications	CE and ETSI/EN 300 440 or FCC Part 15, depending on model

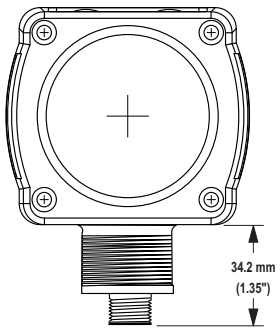
R-GAGE™ QT50R Series Sensors

Dimensions

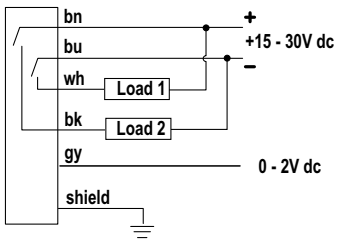
Cabled Models



QD Models



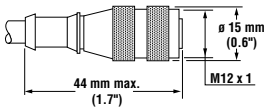
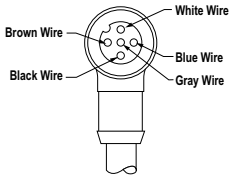
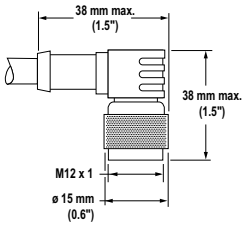
Hookup



NOTES:

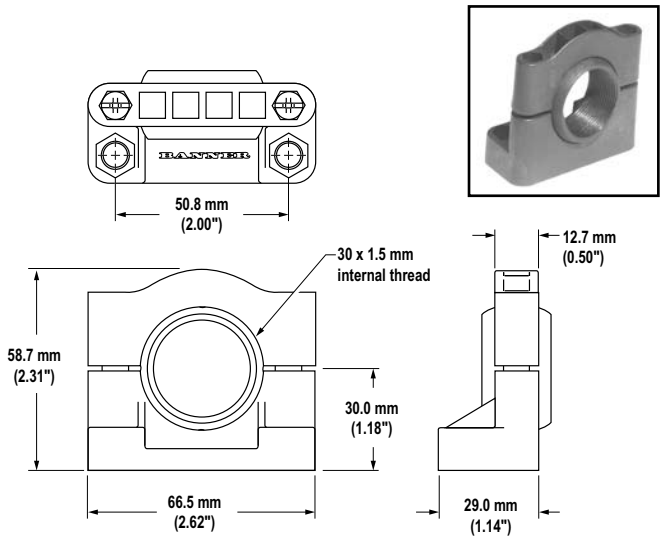
- **Cable and QD hookups are functionally identical.**
- **It is recommended that the shield wire be connected to earth ground or dc common. Shielded cordsets are recommended for all QD models.**

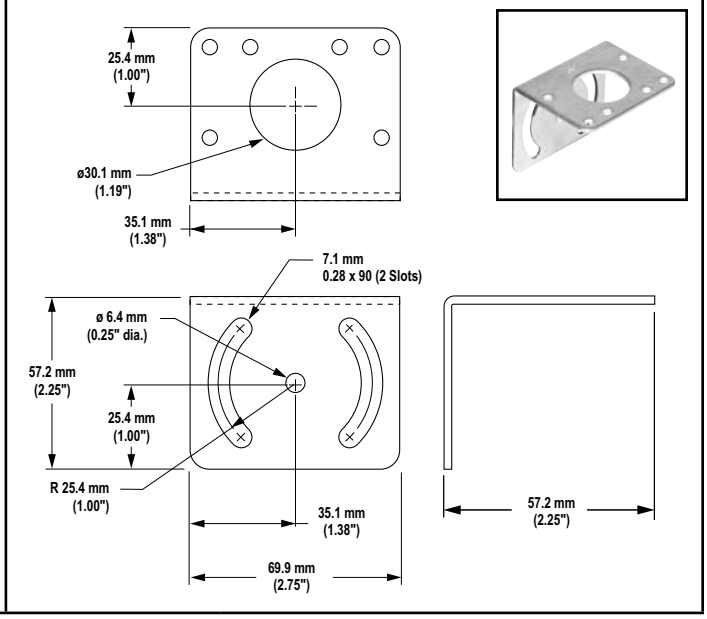
Quick-Disconnect (QD) Cables

Style	Model	Length	Dimensions	Pinout
5-Pin Euro-style Straight with shield	**MQDEC2-506** **MQDEC2-515** **MQDEC2-530**	2 m (6.5') 5 m (15') 9 m (30')		
5-Pin Euro-style Right-angle with shield	**MQDEC2-506RA** **MQDEC2-515RA** **MQDEC2-530RA**	2 m (6.5') 5 m (15') 9 m (30')		

Mounting Brackets

SMB30SC	• 30 mm split clamp with swivel, black reinforced thermoplastic polyester • Stainless steel hardware included	**SMB30MM**	• 30 mm, 11-gauge, stainless steel bracket with curved mounting slots for versatile orientation • Clearance for M6 (1/4") hardware





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more sensors, more solutions

WARRANTY: Banner Engineering Corp. warrants its products to be free from defects for one year. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture found to be defective at the time it is returned to the factory during the warranty period. This warranty does not cover damage or liability for the improper application of Banner products. This warranty is in lieu of any other warranty either expressed or implied.

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