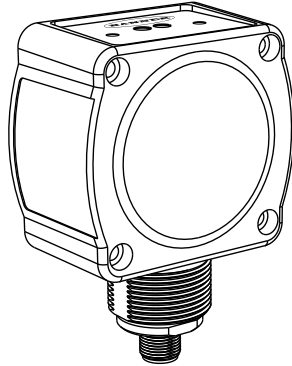


## Datasheet

Radar-based sensors for detecting moving and stationary targets



- FMCW (true-presence) radar detects moving and stationary objects
- Adjustable sensing field — ignores objects beyond setpoint
- Easy setup and configuration of range, sensitivity, and output with simple DIP switches
- Sensing functions are unaffected by wind, falling rain or snow, fog, humidity, air temperatures, or light
- Sensor operates in Industrial, Scientific, and Medical (ISM) telecommunication band
- Rugged IP67 housing withstands harsh environments

Protected by US patents



**CAUTION:** Make No Modifications to this Product

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



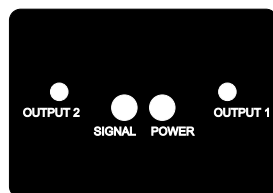
**WARNING:** Not To Be Used for Personnel Protection

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

Model <sup>1</sup>	Maximum Range	Connection	Supply Voltage	Telecom Approval <sup>2</sup>	Output
QT50R-US-AFH-FL	24 m (78 ft)	5-wire 2 m (6.5 ft) integral cable	12 to 30 V dc	Telecom approved for US and Canada	Bipolar NPN/PNP DIP-switch-selectable N.O. or N.C
QT50R-EU-AFH-FL				Telecom approved for Europe, UK, Australia, New Zealand, China, and Japan	

## Overview



Output 1 and 2 LEDs: Yellow (output energized); Red (configuration)  
 Power LED: Green (power ON)  
 Signal LED: Red (flashes in proportion to the signal strength)

Access the DIP switches behind the threaded cap on the sensor back (not shown)

<sup>1</sup>

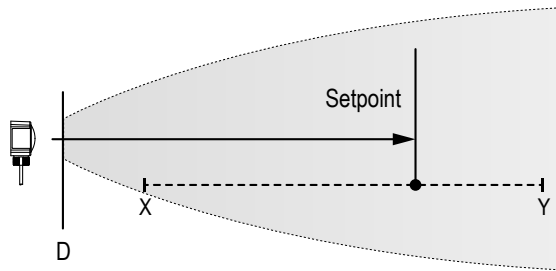
- Standard 2 m (6.5 ft) cable models are listed.
- To order the 5-pin M12/Euro-style quick disconnect model, add the suffix "Q". However, the Q is added before the last hyphen. For example, QT50R-xx-AFHQ-FL.
- Models with a quick disconnect (QD) connector require a mating cordset. See [Quick Disconnect \(QD\) Cordsets](#) on page 5.

<sup>2</sup> For additional countries, contact Banner Engineering.



The R-GAGE sensor emits a well-defined beam of high-frequency radio waves from an internal antenna. Some of this emitted energy reflects back to the receiving antenna. Signal processing electronics in the sensor determine the distance from the sensor to the object based on the time delay of the return signal. The sensor can be configured (via DIP switches) to sense objects up to a specific distance, ignoring objects beyond this distance (also called background suppression).

R-GAGE setpoint distances, minimum and maximum (sensor will detect objects up to setpoint and ignore objects beyond the setpoint).



		EU Models	US Models
X	Minimum setpoint distance	2 m (6.6 ft)	3.5 m (11.5 ft)
Y	Maximum setpoint distance	24 m (78.7 ft)	24 m (78.7 ft)
D	Dead Zone <sup>3</sup>		

## Sensor Configuration

The sensing zone distance, sensitivity, and output configuration can be selected via the DIP switches on the back of the sensor. Use the included spanner to open the screw-off cover on the back of the sensor and access the DIP switches.



**Important:** Tighten the DIP switch cover a full quarter turn after contact to maintain the watertight seal.

## DIP Switch Functions

Switch	Function
1, 2, 3	Sensing distance (detects objects from sensor face to this point)
4, 5	Sensitivity (higher sensitivity sees weaker objects and has a larger beam pattern)
6	Normally open/normally closed output functionality
7, 8	Response Speed

DIP switch 1 is on the left and DIP switch 8 is on the right.

## Distance Settings

Switch 1	Switch 2	Switch 3	Distance	
			EU Models	US Models
0	0	0	2 m (6.6 ft)	3.5 m (11.5 ft)
0	0	1	3 m (9.8 ft)	4 m (13.1 ft)
0	1	0	4 m (13.1 ft)	5 m (16.4 ft)
0	1	1	6 m (19.7 ft)	6 m (19.7 ft)
1*	0*	0*	8 m (26.2 ft)	8 m (26.2 ft)
1	0	1	12 m (39.4 ft)	12 m (39.4 ft)
1	1	0	16 m (52.5 ft)	16 m (52.5 ft)
1	1	1	24 m (78.7 ft)	24 m (78.7 ft)

\* Default settings



**NOTE:** Highest sensitivity is achieved only if sensing distance is 8 m (26.2 ft) or less.

<sup>3</sup> Typical dead zone: 0.4 m (1.3 ft) for moving and 1.0 m (3.3 ft) for stationary targets, but varies with target reflectivity



NOTE: Near-field sensitivity boost is enabled when set to 4 m (13.1 ft) or less.

## Sensitivity Selection

Switch 4	Switch 5	Sensitivity
0*	0*	4 (Highest)
0	1	3 (High)
1	0	2 (Medium)
1	1	1 (Low)

\* Default settings



NOTE: Use the sensitivity selection to ignore unwanted weak reflections within the field of view, and not to narrow the beam width. Narrow-beam R-GAGE sensor models are available.

## Output Configuration

\* Default settings

Switch 6	NO/NC
0*	NO
1	NC

## Response Time

Switch 7	Switch 8	On Total (ms)	Off Total (ms)	Total (ms)
0	0	1000	1000	2000
0*	1*	2000	1000	3000
1	0	1000	2000	3000
1	1	2000	6000	8000

\* Default settings

## Specifications

### Supply Voltage

12 to 30 V dc, less than 100 mA, exclusive of load

### Range

The sensor is able to detect a proper object (see Detectable Objects) from 1 to 24 m (3.3 to 78.7 ft), depending on target

### Detectable Objects

Objects containing metal, water, or similar high-dielectric materials

### Operating Principle

Frequency modulated continuous-wave (FMCW) radar

### Operating Frequency

US Models: 24.075–24.175 GHz, ISM Band  
EU Models: 24.050–24.250 GHz, ISM Band

### Maximum Output Power

ERP: 3.3 mW, 5 dBm  
EIRP: 100 mW, 20 dBm

### Supply Protection Circuitry

Protected against reverse polarity and transient overvoltages

### Indicators

Power LED: Green (power ON)

Signal Strength LED: Red, flashes in proportion to signal strength. Steady on at 4x excess gain. Only indicates signal amplitude, not target distance.

Output LEDs: Yellow (output energized) / Red (configuration)

### Adjustments

DIP-switch-configurable sensing distance, sensitivity, response time, and output configuration

### Construction

Housing: ABS/polycarbonate

Lightpipes: Acrylic

Access Cap: Polyester

### Output Protection

Protected against short circuit conditions

### Operating Temperature

–40 °C to +65 °C (–40 °F to +149 °F)

### Environmental Rating

IEC IP67

Delay at Power-up  
 Less than 2 seconds

Output Configuration  
 Bipolar NPN/PNP output, 150mA; DIP switch 6 selects N.O. (default) or N.C. operation

Response Time  
 DIP switches 7 & 8 select ON/OFF response time

Connections  
 Integral 5-wire 2 m (6.5 ft) cable or M12 Euro-style QD fitting. QD models require a mating cordset

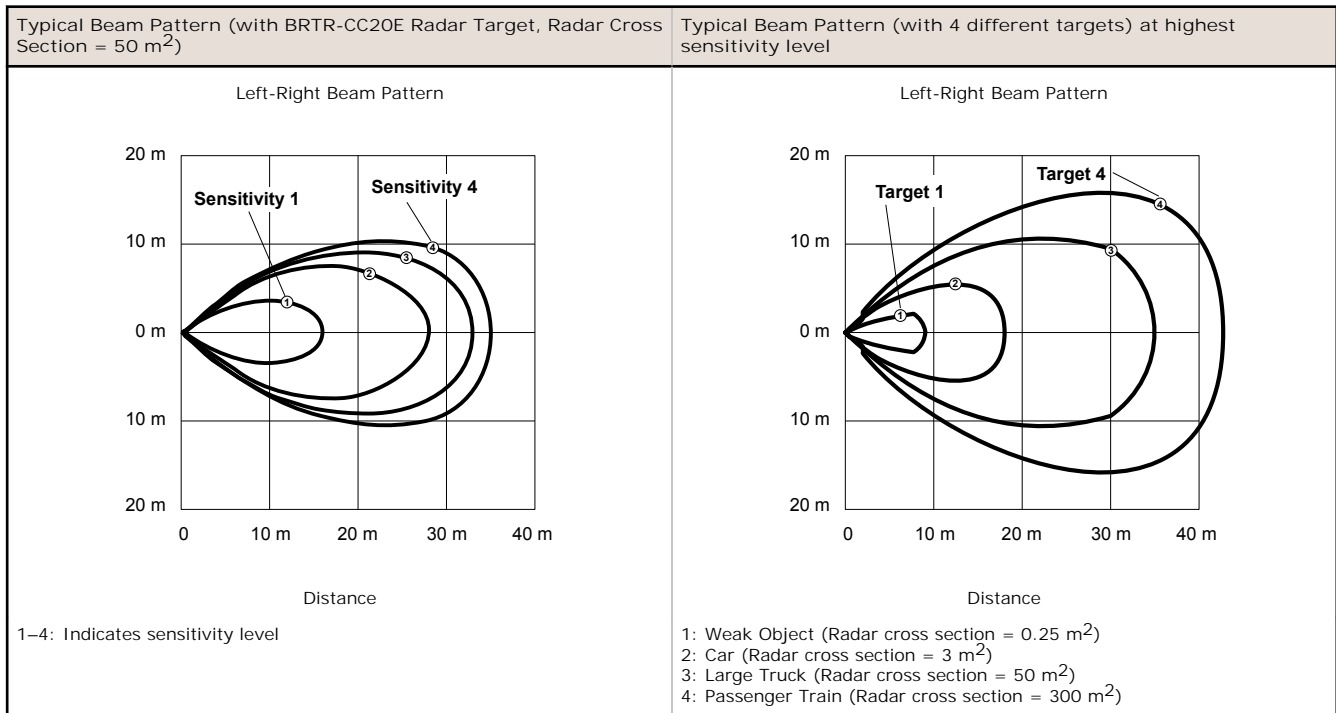
Certifications  
 ETSI/EN 300 440  
 FCC part 15  
 RSS-210  
 CMIIT Category G  
 ARIB STD T-73  
 for others, contact Banner Engineering  
 Country of Origin: USA

FCC ID: UE3QT50RUS—This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

IC: 7044A-QT50RCA—This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

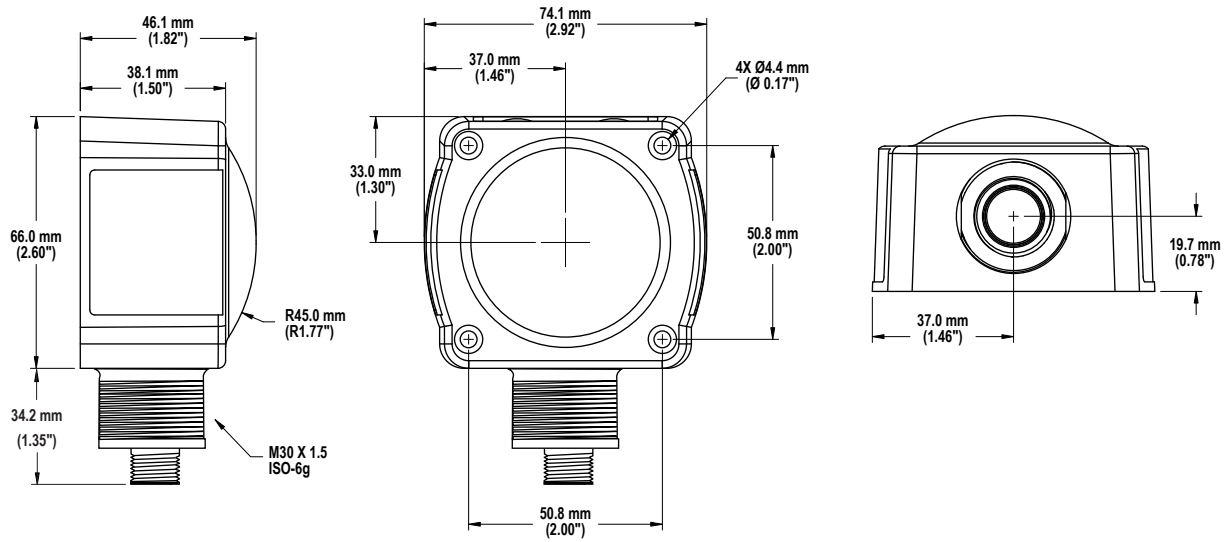
Cet appareil est conforme aux CNR exempts de licence d'Industrie Canada. Son fonctionnement est soumis aux deux conditions suivantes: (1) Ce dispositif ne peut causer des interférences; et (2) Ce dispositif doit accepter toute interférence, y compris les interférences qui peuvent entraîner un mauvais fonctionnement de l'appareil.

### Beam Pattern

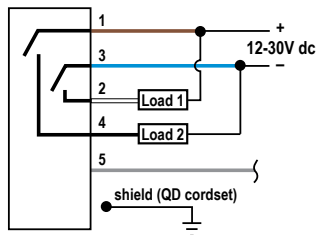


NOTE: The effective beam pattern depends on the sensitivity level and target properties.

## Dimensions



## Wiring



### Wiring Key:

- 1 = Brown
- 2 = White
- 3 = Blue
- 4 = Black
- 5 = Gray (Do not connect)



NOTE: Banner recommends that the shield wire (QD cordsets only) be connected to earth ground or dc common. Shielded cordsets are recommended for all QD models.

## Accessories

### Quick Disconnect (QD) Cordsets

5-Pin Threaded M12/Euro-Style Cordsets—with Shield				
Model	Length	Style	Dimensions	Pinout (Female)
MQDEC2-506	1.83 m (6 ft)	Straight		
MQDEC2-515	4.57 m (15 ft)			
MQDEC2-530	9.14 m (30 ft)			
MQDEC2-550	15.2 m (50 ft)			

5-Pin Threaded M12/Euro-Style Cordsets—with Shield				
Model	Length	Style	Dimensions	Pinout (Female)
MQDEC2-506RA	1.83 m (6 ft)	Right-Angle		
MQDEC2-515RA	4.57 m (15 ft)			
MQDEC2-530RA	9.14 m (30 ft)			
MQDEC2-550RA	15.2 m (50 ft)			



NOTE: Pin 5 is not used.

## Mounting Brackets

All measurements are in mm

<p><b>SMB30SC</b></p> <ul style="list-style-type: none"> <li>Swivel bracket with 30 mm mounting hole for sensor</li> <li>Black reinforced thermoplastic polyester</li> <li>Stainless steel mounting and swivel locking hardware included</li> </ul> <p>Hole center spacing: A=ø 50.8 Hole size: A=ø 7.0, B=ø 30.0</p>		<p><b>SMB30MM</b></p> <ul style="list-style-type: none"> <li>12-ga. stainless steel bracket with curved mounting slots for versatile orientation</li> <li>Clearance for M6 (¼ in) hardware</li> <li>Mounting hole for 30 mm sensor</li> </ul> <p>Hole center spacing: A = 51, A to B = 25.4 Hole size: A = 42.6 x 7, B = ø 6.4, C = ø 30.1</p>	
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## Weather Deflector

<p><b>QT50RCK</b></p> <ul style="list-style-type: none"> <li>Required if the R-GAGE is exposed to rain or snow</li> <li>Prevents buildup of water or ice from interfering with sensor performance</li> </ul>	
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