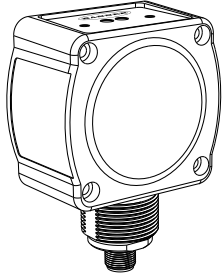


## Datasheet

Radar-based sensors for detecting moving and stationary targets



- FMCW 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



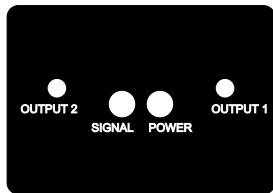
**WARNING:**

- **Do not use this device for personnel protection**
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction can cause either an energized (on) or de-energized (off) 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)

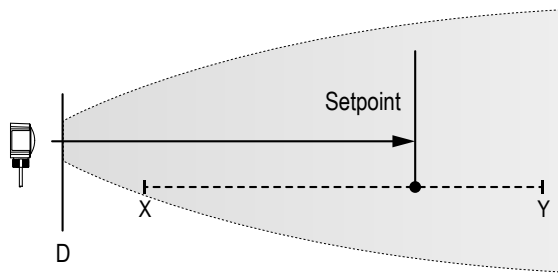
The R-GAGE sensor emits a well-defined beam of high-frequency radio waves from an internal antenna. Some of this emitted energy reflects back to the receiving antenna. Signal processing electronics in the sensor determine the distance from the sensor to the object based on the time delay of the return 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).

<sup>1</sup> • Integral 2 m (6.5 ft) unterminated cable models are listed.  
 • To order the 5-pin M12 integral quick disconnect model, add the suffix "Q" to the model number. However, the Q is added before the last hyphen. For example, **QT50R-xx-AFHQ-FL**.  
 • Models with a quick disconnect require a mating cordset. See [Quick Disconnect \(QD\) Cordsets](#) on p. 5.

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





		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.



**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)

<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

Switch 4	Switch 5	Sensitivity
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

Switch 6	Normally Open/Normally Closed
0*	Normally open
1	Normally closed

## \* Default settings

## 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 V DC 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 m to 24 m (3.3 ft 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

**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

**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**

IP67

**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

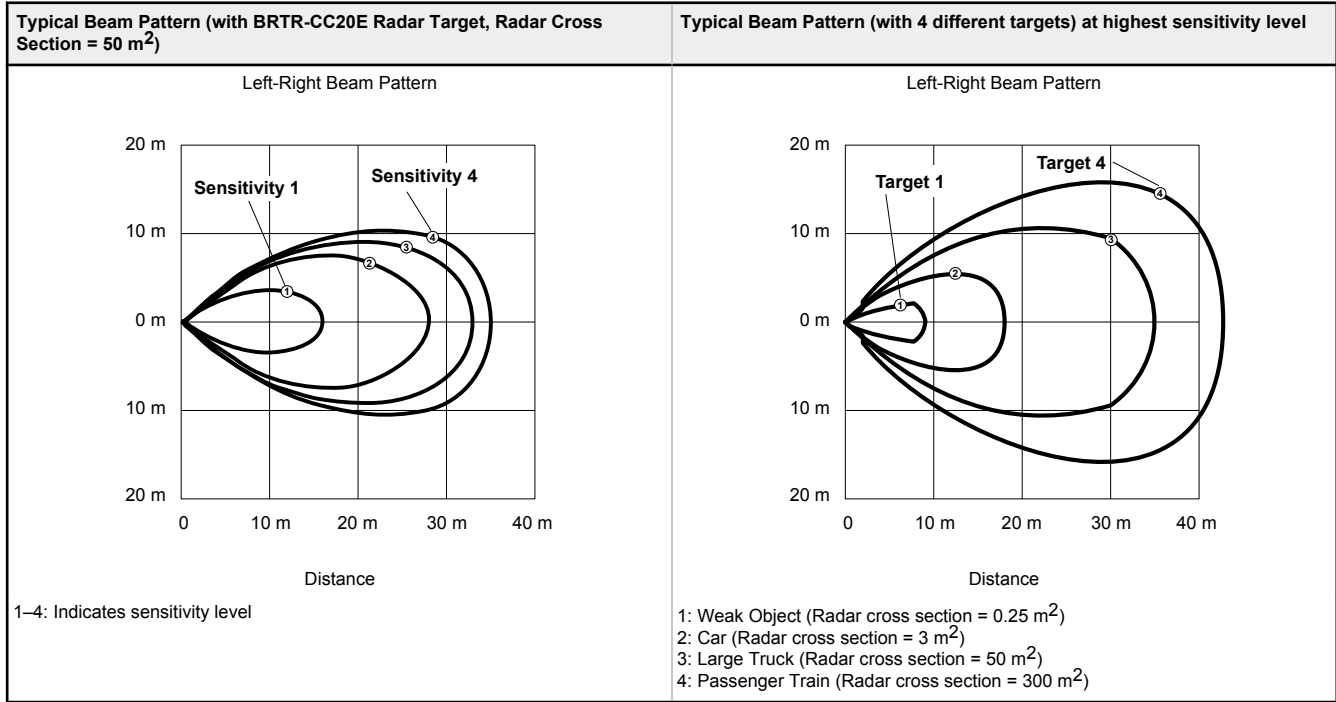
Country of Origin: USA

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.

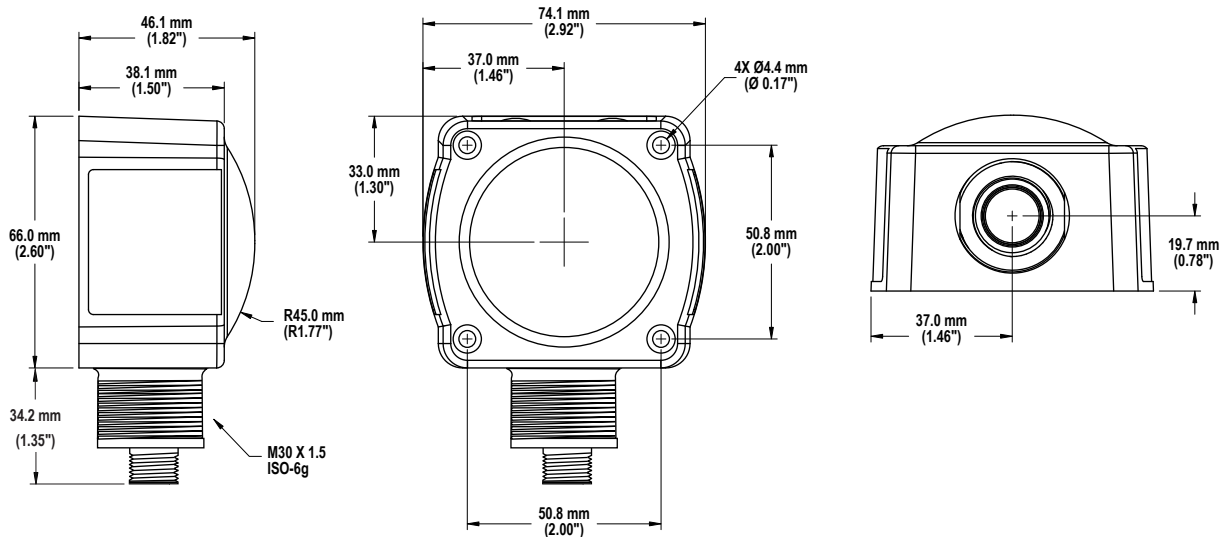
Cet appareil est conforme aux CNR exempts de licence d'Industrie Canada. Son fonctionnement est soumis aux deux conditions suivantes: (1) Ce dispositif ne peut causer des interférences; et (2) Ce dispositif doit accepter toute interférence, y compris les interférences qui peuvent entraîner un mauvais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

### Beam Pattern

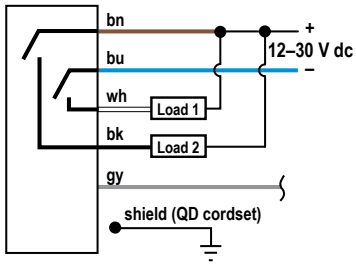


**Note:** The effective beam pattern depends on the sensitivity level and target properties.

### Dimensions



## Wiring



There is no connection to the gray (gy) wire.



**Note:** Banner recommends that the shield wire (quick-disconnect cordsets only) be connected to earth ground or dc common. Shielded cordsets are recommended for all quick-disconnect models.

## Accessories

### Quick Disconnect (QD) Cordsets

5-Pin Threaded M12 Cordsets with Shield—Single Ended				
Model	Length	Style	Dimensions	Pinout (Female)
MQDEC2-506	2 m (6.56 ft)	Straight		<p>1 = Brown 2 = White 3 = Blue 4 = Black 5 = Gray</p>
MQDEC2-515	5 m (16.4 ft)			
MQDEC2-530	9 m (29.5 ft)			
MQDEC2-550	15 m (49.2 ft)			
MQDEC2-506RA	2 m (6.56 ft)	Right-Angle		
MQDEC2-515RA	5 m (16.4 ft)			
MQDEC2-530RA	9 m (29.5 ft)			
MQDEC2-550RA	15 m (49.2 ft)			



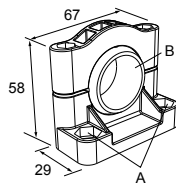
**Note:** Pin 5 is not used.

## Mounting Brackets

All measurements are listed in millimeters, unless noted otherwise.

### SMB30SC

- Swivel bracket with 30 mm mounting hole for sensor
- Black reinforced thermoplastic polyester
- Stainless steel mounting and swivel locking hardware included

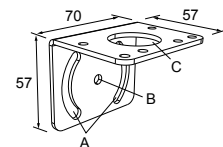


**Hole center spacing:** A =  $\varnothing$  50.8

**Hole size:** A =  $\varnothing$  7.0, B =  $\varnothing$  30.0

### SMB30MM

- 12-ga. stainless steel bracket with curved mounting slots for versatile orientation
- Clearance for M6 ( $\frac{1}{4}$  in) hardware
- Mounting hole for 30 mm sensor



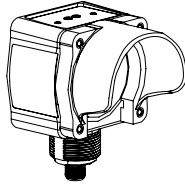
**Hole center spacing:** A = 51, A to B = 25.4

**Hole size:** A = 42.6 x 7, B =  $\varnothing$  6.4, C =  $\varnothing$  30.1

## Weather Deflectors and Shields

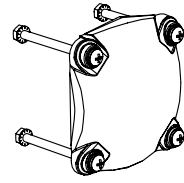
### QT50RCK Weather Deflector

- Required if the R-GAGE is exposed to rain or snow
- Prevents buildup of water or ice from interfering with sensor performance



### QT50RWS Weather Shield

- Coated to help repel water and maximize signal strength
- Hardware included for easy installation and replacement



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For patent information, see [www.bannerengineering.com/patents](http://www.bannerengineering.com/patents).