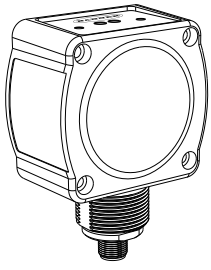
# Features

Radar-based dual-zone sensors for detecting moving and stationary targets



- Fourth generation  FMCW radar detects moving and stationary objects
- Two independent, adjustable sensing zones
- 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; no special license required
- 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

| Models | Maximum Range | Supply Voltage | Connection | Telecom Approval [1] | Output |
|---|---|---|---|---|---|
| QT50R-US-AF2 | 24 m (78 feet) | 12 to 30 V DC | 5-wire 2 m (6.5 ft) Integral cable | Telecom approved for US, Canada and Brazil | DIP-switch-selectable NPN or PNP and N.O. or N.C. |
| QT50R-EU-AF2 | | | | Telecom approved for Europe, UK, Australia, New Zealand, China, and Japan | |
| QT50R-KR-AF2 | | 12 to 24 V DC | | Telecom approved for South Korea | |
| QT50R-TW-AF2 | | 12 to 30 V DC | | Telecom approved for Taiwan | |

Cabled models only are listed. To order the integral 5-pin M12 quick-disconnect fitting, add suffix "**Q**" to the model number (for example, **QT50R-xx-AF2Q**). Quick-disconnect models require a mating cordset; see "Quick Disconnect (QD) Cordsets " on page 6.

# Overview

The R-GAGE sensor emits a well-defined beam of high-frequency radio waves from an internal antenna. Some of this emitted energy is reflected back to the receiving antenna. Signal processing electronics determine the distance from the sensor to the object based on the time delay of the return signal. The sensor can be configured to two independent sensing zones.

The two sensing zones are factory pre-set to default distances; they can be reconfigured for different distances using the DIP switches on the back of the sensor. The sensor is plug-in ready for immediate operation.

The sensitivity was pre-calibrated at the factory, assuming that the sensing field will be clear of obstacles. The sensitivity can be adjusted using the DIP switches on the back of the sensor.

[1] For additional countries, contact Banner Engineering.

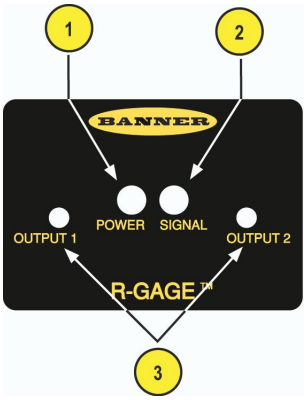
Original Instructions
26-Mar-25

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187234
p/n: 187234 Rev. E

ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

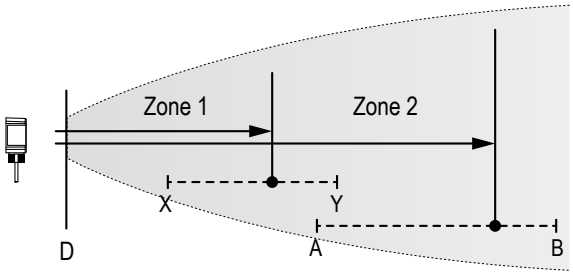
*GAGE Features*




1. **Power LED:** Green (power ON)
2. **Signal Strength LED**: Red, flashes in proportion to signal strength. Steady on at 4x excess gain. Only indicates signal amplitude, not target distance.
3. **Output LEDs:** Yellow (output energized) / Red (configuration)

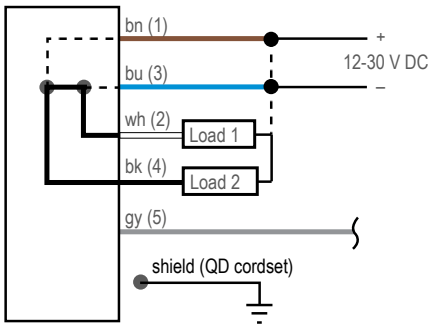
Access the DIP switches behind the threaded cap on the sensor back (not shown)

*R-GAGE Sensing Zone Distances*




| | | EU, KR Models | TW, US Models |
|---|---|---|---|
| X | Minimum Zone 1 Distance | 3 m (9.8 ft) | 3.5 m (11.5 ft) |
| Y | Maximum Zone 1 Distance | 12 m (39.4 ft) | 12 m (39.4 ft) |
| A | Minimum Zone 2 Distance | 8 m (26.2 ft) | 8 m (26.2 ft) |
| B | Maximum Zone 2 Distance | 24 m (78.7 ft) | 24 m (78.7 ft) |
| D | Dead Zone[2] | | |

# Wiring




**Wiring Key:**

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

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

# Sensor Configuration

Configure the sensor using the DIP switches. Use the included spanner to open the screw-off cover and access the DIP switches.

[2] 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.


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

## DIP Switch Functions

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

| Switch | Function |
|---|---|
| 1, 2, 3 | Zone 1 and Zone 2 distance pairs |
| 4, 5 | Sensitivity |
| 6 | Dual NPN/PNP output functionality |
| 7 | Normally Open/Normally Closed output functionality |
| 8 | Response Speed |

## Distance Settings

* Default settings

| Switch 1 | Switch 2 | Switch 3 | EU, KR Models | TW, US Models | All |
|---|---|---|---|---|---|
| | | | Zone 1 | Zone 1 | Zone 2 |
| 0 | 0 | 0 | 3 m (9.8 ft) | 3.5 m (11.5 ft) | 8 m (26.2 ft) |
| 0 | 0 | 1 | 4 m (13.1 ft) | 4 m (13.1 ft) | 10 m (32.8 ft) |
| 0 | 1 | 0 | 6 m (19.7 ft) | 6 m (19.7 ft) | 12 m (39.4 ft) |
| 0 * | 1 * | 1 * | 8 m (26.2 ft) | 8 m (26.2 ft) | 16 m (52.5 ft) |
| 1 | 0 | 0 | 8 m (26.2 ft) | 8 m (26.2 ft) | 20 m (65.6 ft) |
| 1 | 0 | 1 | 10 m (32.8 ft) | 10 m (32.8 ft) | 20 m (65.6 ft) |
| 1 | 1 | 0 | 10 m (32.8 ft) | 10 m (32.8 ft) | 24 m (78.7 ft) |
| 1 | 1 | 1 | 12 m (39.4 ft) | 12 m (39.4 ft) | 24 m (78.7 ft) |

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

## Sensitivity Selection

* Default settings

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

## Output Configuration

* Default settings

| Switch 6 | NPN / PNP | Switch 7 | NO / NC |
|---|---|---|---|
| 0* | NPN | 0* | NO |
| 1 | PNP | 1 | NC |

## Response Speed

* Default settings

| Switch 8 | On Total | Off Total | Total |
|---|---|---|---|
| 0 | 30 | 70 | 100 |

Continued on page 4


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Continued from page 3

| Switch 8 | On Total | Off Total | Total |
|---|---|---|---|
| 1* | 50 | 300 | 350 |

# Windows

The R-GAGE sensor can be placed behind a glass or a plastic window, but the configuration must be tested and the distance from the sensor to the window must be determined and controlled prior to installation. There is typically a 20% signal reduction when the sensor is placed behind a window.

Polycarbonate at 4 mm thickness performs well in most situations, but the performance depends on filler materials. Thinner (1 to 3 mm) windows have high reflection. The amount of reflection depends on the material, thickness, and distance from the sensor to the window.

Locate the sensor in a position of minimum reflection from the window, which will repeat every 6.1 mm of distance between the sensor and the window. The positions of maximum reflection from the window repeat between the minimums, and decrease in effect until the window is approximately 150 mm (5.9 in) away. Consult the factory for pre-tested window materials which can be used at any distance without issue.

Additionally, the face of the window should be protected from flowing water and ice by use of a flow diverter or hood directly above the window. Falling rain or snow in the air in front of the window, light water mist, or small beads on the face of the window are typically not an issue. However, a thick, continuous surface of water or ice directly on the face of the window can be detected as a dielectric boundary.

# Specifications

**Range**

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

**Detectable Objects**

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

**Operating Principle**

Frequency-modulated continuous-wave (FMCW) radar

**Operating Frequency**

US, TW Models: 24.075–24.175 GHz, ISM Band

EU, KR Models: 24.050–24.250 GHz, ISM Band

**Supply Voltage**

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

For KR models: 12 V DC to 24 V DC, less than 100 mA exclusive of load

**Supply Protection Circuitry**

Protected against reverse polarity and transient overvoltages

**Delay at Power-up**

Less than 2 seconds

**Output Configuration**

DIP switch 6 selects dual NPN (default) or dual PNP operation; DIP switch 7 selects N.O. (default) or N.C. operation; 150mA each

- **Zone 1 output:** white wire
- **Zone 2 output:** black wire

**Output Protection**

Protected against short circuit conditions

**Response Time**

DIP switch 8 selects 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

**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 quick disconnect fitting. Quick disconnect models require a mating cordset

**Certifications**

CE

ETSI/EN 300 440

FCC part 15

RSS-210

ANATEL Category II

CMIIT Category G

ARIB STD T-73

KC mark - MSIP/RRA

NCC

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.

This device contains licence-exempt transmitters(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.


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Cet appareil contient des émetteurs/récepteurs exemptés de licence conformes à la norme Innovation, Sciences, et Développement économique Canada. L'exploitation est autorisée aux deux conditions suivantes:

1. L'appareil ne doit pas produire de brouillage.
2. L'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

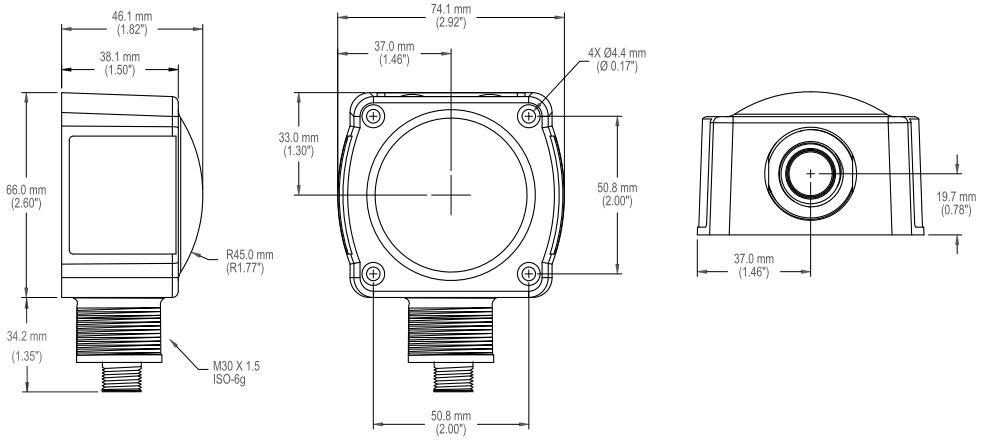
| | |
|---|---|
| Modelo: QT50R*****(*)<br>0385-11-4042<br>ANATEL<br>(01) 07898928882296 | Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados. |

## SRD24-IO3B24100.2TR0.1 South Korea Class A Certification

A 급 기기 ( 업무용 방송통신기자재 )

이 기기는 업무용 (A 급 ) 으로 전자파적합기기로
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바라며 , 가정외의 지역에서 사용하는 것을 목
적으로 합니다 .

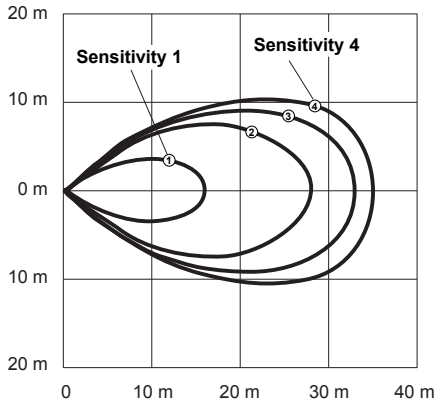
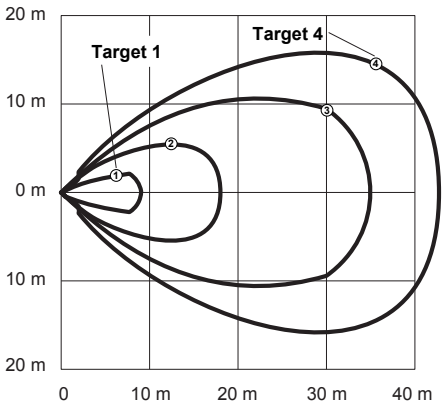
## Dimensions





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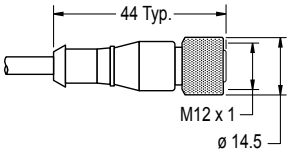
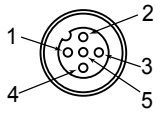
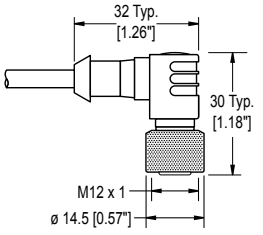
# Beam Patterns

| Typical Beam Pattern (with BRTR-CC20E Radar Target, Radar Cross Section = 50 $m^2$) | Typical Beam Pattern (with four different targets) at the highest sensitivity level |
|---|---|
| Left-Right Beam Pattern<br><br><br>1–4: Indicates sensitivity level | Left-Right Beam Pattern<br><br><br>1. Weak Object (Radar cross section = 0.25 $m^2$)<br>2. Car (Radar cross section = 3 $m^2$)<br>3. Large Truck (Radar cross section = 50 $m^2$)<br>4. Passenger Train (Radar cross section = 300 $m^2$) |

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

# Accessories

## Quick Disconnect (QD) Cordsets

| 5-Pin Single-Ended M12 Female Shielded Cordsets | | | | |
|---|---|---|---|---|
| **Model** | **Length** | **Style** | **Dimensions** | **Pinout (Female)** |
| **MQDEC2-506** | 2 m (6.56 ft) | Straight |  | <br>1 = Brown<br>2 = White<br>3 = Blue<br>4 = Black<br>5 = Gray |
| **MQDEC2-515** | 5 m (16.4 ft) | | | |
| **MQDEC2-530** | 9 m (29.5 ft) | | | |
| **MQDEC2-550** | 15 m (49.2 ft) | | | |
| **MQDEC2-575** | 23 m (75.44 ft) | | | |
| **MQDEC2-5100** | 30.5 m (100 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) | | | |
| **MQDEC2-575RA** | 23 m (75.44 ft) | | | |
| **MQDEC2-5100RA** | 31 m (101.68 ft) | | | |

Pin 5 is not used.


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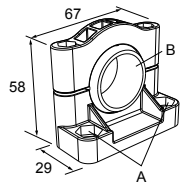
## Mounting Brackets

All measurements are listed in millimeters, unless noted otherwise. The measurements provided are subject to change.

**SMB30SC**

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

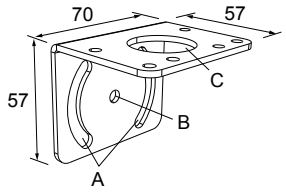
**Hole center spacing:** A=ø 50.8
**Hole size:** A=ø 7.0, B=ø 30.0




**SMB30MM**

- 12-gauge stainless steel bracket with curved mounting slots for versatile orientation
- Clearance for M6 (¼ in) hardware
- Mounting hole for 30 mm sensor

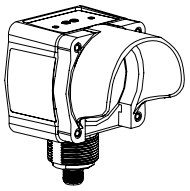
**Hole center spacing:** A = 51, A to B = 25.4
**Hole size:** A = 42.6 × 7, B = ø 6.4, C = ø 30.1




## Weather Deflectors and Shields

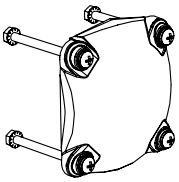
**QT50RCK Weather Deflector**

- 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



## Banner Engineering Corp Limited Warranty

Banner Engineering Corp. warrants its products to be free from defects in material and workmanship for one year following the date of shipment. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture which, at the time it is returned to the factory, is found to have been defective during the warranty period. This warranty does not cover damage or liability for misuse, abuse, or the improper application or installation of the Banner product.

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