Sure Cross® MultiHop H6 Data Radio

Datasheet

The Sure Cross® wireless system is a radio frequency network with integrated I/O that operates in most environments to eliminate the need for wiring runs. Wireless MultiHop data radio networks are formed around a MultiHop master and one or more slaves and extend the range of a Modbus or other serial communication network. Use the MultiHop H6 and H6D radios to convert Banner 1-wire serial sensors into a wireless input that can be used in a tree or mesh type MultiHop network.

Benefits

- Deliver factory automation or IIoT solutions by connecting any Banner 1-wire serial sensor for applications such as:
  - Ultrasonic distance measurement for tank level monitoring, distance sensing, etc
  - Vibration and temperature monitoring for predictive maintenance motor health
  - Temperature and humidity monitoring for energy management, process monitoring, etc

- MultiHop networks are self-healing, auto-routing RF networks with multiple hops that extend the network’s range and improve link performance

- Large D cell battery in the H6 gives extended battery life on a tree or mesh type MultiHop network

- 10–30 V dc powered H6D eliminates the need for battery replacement and handles continuous data sampling and reporting

- External antenna gives the option to extend antennas to proper location and/or replace with a higher dB gain antenna

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Important: Please download the complete Sure Cross® MultiHop Data Radio technical documentation, available in multiple languages, from www.bannerengineering.com for details on the proper use, applications, Warnings, and installation instructions of this device.

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Important: Por favor descargue desde www.bannerengineering.com toda la documentación técnica de los Sure Cross® MultiHop Data Radio, disponibles en múltiples idiomas, para detalles del uso adecuado, aplicaciones, advertencias, y las instrucciones de instalación de estos dispositivos.

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Important: Veuillez télécharger la documentation technique complète des Sure Cross® MultiHop Data Radio sur notre site www.bannerengineering.com pour les détails sur leur utilisation correcte, les applications, les notes de sécurité et les instructions de montage.

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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.

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Important:

- Never operate a 1 Watt radio without connecting an antenna
- Operating 1 Watt radios without an antenna connected will damage the radio circuitry.
- To avoid damaging the radio circuitry, never apply power to a Sure Cross® Performance or Sure Cross MultiHop (1 Watt) radio without an antenna connected.
Important:

- Electrostatic discharge (ESD) sensitive device
- ESD can damage the device. Damage from inappropriate handling is not covered by warranty.
- Use proper handling procedures to prevent ESD damage. Proper handling procedures include leaving devices in their anti-static packaging until ready for use; wearing anti-static wrist straps; and assembling units on a grounded, static-dissipative surface.

Models

<table>
<thead>
<tr>
<th>Models</th>
<th>Frequency</th>
<th>Power</th>
<th>I/O</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX80DR9M-H6</td>
<td>900 MHz ISM Band</td>
<td>Battery integrated into the housing</td>
<td>Inputs: 1-Wire serial interface for one 1-wire serial sensing device</td>
</tr>
<tr>
<td>DX80DR2M-H6</td>
<td>2.4 GHz ISM Band</td>
<td>10 V DC to 30 V DC</td>
<td></td>
</tr>
<tr>
<td>DX80DR9M-H6D</td>
<td>900 MHz ISM Band</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DX80DR2M-H6D</td>
<td>2.4 GHz ISM Band</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Configuration Instructions

Setting Up Your MultiHop Network

To set up and install your wireless MultiHop network, follow these steps:

1. If your radios have DIP switches, configure the DIP switches of all devices.
2. Connect the sensors to the MultiHop radios if applicable.
3. Apply power to all devices.
4. If your MultiHop radio has rotary dials, set the MultiHop Radio (Slave) ID. If your MultiHop radio has no rotary dials, continue to the next step.
5. Form the wireless network by binding the slave and repeater radios to the master radio. If the binding instructions are not included in this datasheet, refer to the quick start guide or product manual.
6. Observe the LED behavior to verify the devices are communicating with each other.
7. Configure any I/O points to use the sensors connected to the Sure Cross devices.
8. Conduct a site survey between the MultiHop radios. If the site survey instructions are not included in this datasheet, refer to the product manual.
9. Install your wireless sensor network components. If the installation instructions are not included in this datasheet, refer to the product manual.

For additional information, refer to one of the following documents:
- MultiHop Data Radio Quick Start Guide: 152653
- MultiHop Data Radio Instruction Manual: 151317
- MultiHop Register Guide: 155289

Configure the DIP Switches

Before changing DIP switch positions, disconnect the power. For devices with batteries integrated into the housing, remove the battery(ies) for at least one minute to reboot the device. You may also triple-click button 2, then double-click button 2 to reset the device without removing the battery. Any changes made to the DIP switches are not recognized until after power is cycled to the device.

Access the Internal DIP Switches

Follow these steps to access the internal DIP switches.

1. Unscrew the four screws that mount the cover to the bottom housing.
2. Remove the cover from the housing without damaging the ribbon cable or the pins the cable plugs into.
3. Gently unplug the ribbon cable from the board mounted into the bottom housing. For integrated battery models (no ribbon cable), C housing models (ribbon cable is glued down), and Class I, Division 2 certified devices (ribbon cable is glued down), skip this step.
4. Remove the black cover plate from the bottom of the device’s cover. The DIP switches are located behind the rotary dials.
5. Make the necessary changes to the DIP switches.
6. Place the black cover plate back into position and gently push into place.
7. If necessary, plug the ribbon cable in after verifying that the blocked hole lines up with the missing pin.
8. Mount the cover back onto the housing.

DIP Switch Settings (MultiHop M-H6 Model)

<table>
<thead>
<tr>
<th>Device Settings</th>
<th>Switches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial line baud rate 19200 OR User defined receiver slots</td>
<td>1 2 3 4 5 6 7 8</td>
</tr>
</tbody>
</table>
Device Settings

<table>
<thead>
<tr>
<th>Switches</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial line baud rate 38400 OR 32 receiver slots</td>
<td>OFF</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serial line baud rate 9600 OR 128 receiver slots</td>
<td>ON</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serial line baud rate Custom OR 4 receiver slots</td>
<td>ON *</td>
<td>ON *</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parity: None</td>
<td>OFF</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parity: Even</td>
<td>OFF</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parity: Odd</td>
<td>ON</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disable serial (low power mode) and enable the receiver slots select for switches 1-2</td>
<td>ON *</td>
<td>ON *</td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Transmit power</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>900 MHz radios: 1.00 Watt (30 dBm)</td>
<td>OFF *</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.4 GHz radios: 0.065 Watts (18 dBm) and 60 ms frame</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transmit power</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>900 MHz radios: 0.25 Watts (24 dBm)</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.4 GHz radios: 0.065 Watts (18 dBm) and 40 ms frame</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application mode: Modbus</td>
<td>OFF*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application mode: Reserved</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MultiHop radio setting: Repeater</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MultiHop radio setting: Master</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MultiHop radio setting: Slave</td>
<td>ON *</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MultiHop radio setting: Reserved</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Default configuration

Application Mode

**Modbus** mode uses the Modbus protocol for routing packets. In Modbus mode, a routing table is stored in each parent device to optimize the radio traffic. This allows for point to point communication in a multiple data radio network and acknowledgement/retry of radio packets. To access a radio’s I/O, the radios must be running in Modbus mode.

Baud Rate and Parity

The baud rate (bits per second) is the data transmission rate between the device and whatever it is physically wired to. Set the parity to match the parity of the device you are wired to.

Disable Serial

Disable an unused local serial connection to reduce the power consumption of a data radio powered from the solar assembly or from batteries. All radio communications remain operational.

Receiver Slots

The number of receiver slots indicates the number of times out of 128 slots/frames the radio can transmit to its parent radio. Setting a slave’s receiver slots to four reduces the total power consumption by establishing that the slave can only transmit to its parent four times per 128 slots.

Transmit Power Levels/Frame Size

The 900 MHz data radios can be operated at 1 watt (30 dBm) or 0.250 watt (24 dBm). For most models, the default transmit power is 1 watt. For 2.4 GHz radios, the transmit power is fixed at 0.065 watt (18 dBm) and DIP switch 5 is used to set the frame timing. The default position (OFF) sets the frame timing to 60 milliseconds. To increase throughput, set the frame timing to 40 milliseconds. Note that increasing the throughput decreases the battery life.

**Important:** Prior to date code 15341 and radio firmware version 3.6, the frame timing was 40 ms (OFF) or 20 ms (ON).

Wire Your Sure Cross® Device

Use the following wiring diagrams to first wire the sensors and then apply power to the Sure Cross devices.

Control Drawings

Refer to the Class I Division 2/Zone 2 control drawings (p/n 143086) for wiring specifications and limitations.

5-Pin M12/Euro-style Female Quick Disconnect

This female quick disconnect fitting interfaces with a 1-wire serial sensor. The following information defines the wires and the appropriate connection points in the Sure Cross radio.

<table>
<thead>
<tr>
<th>5-pin M12/Euro-style Female Quick Disconnect</th>
<th>Pin</th>
<th>Wire Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Diagram of 5-pin M12/Euro-style Female Quick Disconnect" /></td>
<td>1</td>
<td>Brown</td>
<td>Power out + (to sensor)</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>White</td>
<td>Device select</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Blue</td>
<td>DC common (GND)</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Black</td>
<td>Device output</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Gray</td>
<td>Serial comms</td>
</tr>
</tbody>
</table>
5-Pin M12/Euro-Style Male Quick Disconnect

Integral 5-pin M12/Euro-style male quick disconnects are wired for 10 V DC to 30 V DC power as shown.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Wire Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brown</td>
<td>10 V DC to 30 V DC</td>
</tr>
<tr>
<td>2</td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>DC common (GND)</td>
</tr>
<tr>
<td>4</td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Gray</td>
<td></td>
</tr>
</tbody>
</table>

Set the MultiHop Radio (Slave) ID

The slave ID is an identifying number used for devices within a Modbus system. When using more than one Modbus slave, assign each slave a unique ID number.

For MultiHop radios with rotary dials, use the rotary dials to set the device’s MultiHop Radio ID. The left dial sets the left digit and the right dial sets the right digit.

- Modbus Slave IDs 01 through 10—Reserved for slaves directly connected to the host (local I/O). Polling messages addressed to these devices are not relayed over the wireless link.
- Modbus Slave IDs 11 through 60—Use for MultiHop master, repeater, and slave radios. Up to 50 devices (local slaves and remote slaves) may be used in this system.

If your MultiHop radio does not have rotary dials, you must use the master radio to set the Slave ID during the binding process.

MultiHop Configuration Software

Use Banner’s MultiHop Configuration Software to view your MultiHop radio network and configure the radio and its I/O.

The software connects to a MultiHop master radio using one of four methods.
- Serial; using a USB to RS-485 (for RS-485 radios) or a USB to RS-232 (for RS-232 radios) converter cable.
- Modbus TCP; using an Ethernet connection to an Ethernet radio master.
- Serial DXM; using a USB cable to a DXM Controller to access a MultiHop master radio.
- TCP DXM: using an Ethernet connection to a DXM Controller to access a MultiHop master radio.

For MultiHop DX80DR* models, Banner recommends using BWA-UCT-900, an RS-485 to USB adapter cable with a wall plug that can power your 1 Watt MultiHop radio while you configure it. The adapter cable is not required when connecting to a DXM Controller.

Download the most recent software revision from the Wireless Reference Library on Banner Engineering’s website: [www.bannerengineering.com](http://www.bannerengineering.com).

Installing Your Sure Cross® Radios

Please refer to one of the following instruction manuals for details about successfully installing your wireless network components.
- MultiHop Data Radio Instruction Manual: 151317

Modbus Register Table

**Serial Inputs (General).** At every sample interval, a message is sent to the serial sensor to request sensor data. By default, registers are updated every five minutes. Use the MultiHop Configuration Tool to change the sensors sample times.

<table>
<thead>
<tr>
<th>Register (40000)</th>
<th>Input #</th>
<th>I/O Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>1</td>
<td>Primary IN 1</td>
</tr>
<tr>
<td>102</td>
<td>2</td>
<td>Primary IN 2</td>
</tr>
<tr>
<td>103</td>
<td>3</td>
<td>Primary IN 3</td>
</tr>
<tr>
<td>104</td>
<td>4</td>
<td>Primary IN 4</td>
</tr>
<tr>
<td>105</td>
<td>5</td>
<td>Primary IN 5</td>
</tr>
<tr>
<td>106</td>
<td>6</td>
<td>Primary IN 6</td>
</tr>
</tbody>
</table>

Modbus Addressing Convention

All Modbus addresses refer to Modbus holding registers. When writing your own Modbus scripts, use the appropriate commands for interfacing to holding registers. Parameter description headings refer to addresses in the range of 40000 as is customary with Modbus convention.

Install or Replace the Battery for a DX80 Integrated Battery Model

To install or replace the 3.6 V lithium “D” cell battery in any model with a battery integrated into the housing, follow these steps.

1. Remove the four screws mounting the face plate to the housing and remove the face plate.
2. Remove the discharged battery.
3. Install the new battery, verifying the battery’s positive and negative terminals align to the positive and negative terminals of the battery holder mounted within the case.
4. After installing the battery, allow up to 60 seconds for the device to power up.
5. Properly dispose of used batteries according to local regulations by taking it to a hazardous waste collection site, an e-waste disposal center, or other facility qualified to accept lithium batteries.

**CAUTION:** There is a risk of explosion if the battery is replaced incorrectly.

As with all batteries, these are a fire, explosion, and severe burn hazard. Do not burn or expose them to high temperatures. Do not recharge, crush, disassemble, or expose the contents to water.

For non-hazardous locations, the replacement battery is model BWA-BATT-011. For non-hazardous or hazardous locations, the replacement battery is Xeno model XL-205F, Banner model BWA-BATT-001. For pricing and availability, contact Banner Engineering.

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**Modbus Register Configuration**

Change the factory default settings for the inputs, outputs, and device operations using the device Modbus registers. To change parameters, set the data radio network to Modbus mode and assign the data radio a valid Modbus slave ID.

Generic input or output parameters are grouped together based on the device input or output number: input 1, input 2, output 1 etc. Operation type specific parameters (discrete, counter, analog 4 to 20 mA) are grouped together based on the I/O type number: analog 1, analog 2, counter 1, etc.

Not all inputs or outputs may be available for all models. To determine which specific I/O is available on your model, refer to the Modbus Input/Output Register Maps listed in the device’s datasheet. For more information about registers, refer to the MultiHop Product Manual (p/n 151317).

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**Specifications**

**MultiHop Radio Specifications**

- **Radio Range:**
  - 900 MHz, 1 Watt: Up to 9.6 km (6 miles)
  - 2.4 GHz, 65 mW: Up to 3.2 km (2 miles)
- **Antenna Minimum Separation Distance:**
  - 900 MHz, 150 mW and 250 mW: 2 m (6 ft)
  - 900 MHz, 1 Watt: 4.57 m (15 ft)
  - 2.4 GHz, 65 mW: 0.3 m (1 ft)
- **Radio Transmit Power:**
  - 900 MHz, 1 Watt: 30 dBm (1 W) conducted (up to 36 dBm EIRP)
  - 2.4 GHz, 65 mW: 18 dBm (65 mW) conducted, less than or equal to 20 dBm (100 mW) EIRP
- **Spread Spectrum Technology:**
  - FHSS (Frequency Hopping Spread Spectrum)

**M-H6x Specifications**

- **Supply Voltage:**
  - Integrated battery models: 3.6 V DC low power option from an internal battery
  - Non-battery models: 10 V DC to 30 V DC (Outside the USA: 12 V DC to 24 V DC, ±10%)
- **Interface:**
  - Two bi-color LED indicators
  - Two buttons
  - Six character LCD
- **Wiring Access:**
  - Integrated battery models: One 5-pin threaded M12/Euro-style female quick disconnect
  - Non-battery models: One 5-pin threaded M12/Euro-style female quick disconnect and One 5-pin threaded M12/Euro-style male quick disconnect
- **Housing:**
  - Polycarbonate housing and rotary dial cover; polyester labels; EDPM rubber cover gasket; nitrile rubber, non-sulphur cured button covers
  - Weight: 0.26 kg (0.57 lbs)
  - Max. Tightening Torque: 0.56 N·m (5 lbf·in)

**Certifications**

- **CE:** (CE approval only applies to 2.4 MHz models)
- **NOM:** (NOM approval only applies to 900 MHz models)
- **CSA and ATEX certification applies only to the H6 models. The H6D models are not CSA or ATEX certified.**

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1. Radio range is with the 2 dB antenna that ships with the product. High-gain antennas are available, but the range depends on the environment and line of sight. Always verify your wireless network’s range by performing a Site Survey.
2. For European applications, power this device from a Limited Power Source as defined in EN 60950-1.
RS-485 Communication Specifications

Communication Hardware (MultiHop RS-485)
- Interface: 2-wire half-duplex RS-485
- Baud rates: 9.6k, 19.2k (default), or 38.4k via DIP switches; 1200 and 2400 via the MultiHop Configuration Software
- Data format: 8 data bits, no parity, 1 stop bit

Environmental Specifications

Operating Conditions
- –40 °C to +85 °C (–40 °F to +185 °F) (Electronics); –20 °C to +80 °C (–4 °F to +176 °F) (LCD)
- 95% maximum relative humidity (non-condensing)
- Radiated Immunity: 10 V/m (EN 61000-4-3)

Shock and Vibration
- All models meet IEC 60068-2-6 and IEC 60068-2-27 testing criteria
- Shock: 3000 ms duration, half sine wave per IEC 60068-2-27
- Vibration: 10 Hz to 55 Hz, 0.5 mm peak-to-peak amplitude per IEC 60068-2-6

Environmental Ratings
- IEC IP67; NEMA 6
- Refer to the Sure Cross® MultiHop Product Instruction Manual (p/n 151317) for installation and waterproofing instructions.

Operate the devices at the maximum operating conditions for extended periods can shorten the life of the device.

Included with Device
- BWA-HW-001: Mounting Hardware Kit, containing four M5-0.8 x 25mm SS screws, four M5-0.8 x 16mm SS screws, four M5-0.8mm SS hex nuts, and four #8-32 x 3/4" SS bolts
- BWA-902-C (900 MHz) or BWA-202-C (2.4 GHz): Antenna, 2 dBd Omni, Rubber Swivel RP-SMA Male. (Not included with Internal antenna models)
- Quick Start Guide (128185 for DX80 Gateways or 152653 for MultiHop models)

Accessories

Sensors with a Serial Interface
The following sensors are designed to be used with any of the 1-Wire Serial Interface Nodes.

**K50UX1ARA U-GAGE Ultrasonic Sensor**
- 1-wire serial interface
- Range: 100 mm to 1 m (3.94 in to 39.4 in)
- Datasheet: 191599

**K50UX1CRA U-GAGE Ultrasonic Sensor**
- 1-wire serial interface
- Range: 300 mm to 3 m (11.8 in to 118 in)
- Datasheet: 191599

**M12FTH4Q Temperature and Humidity Sensor**
- ±2% Accuracy, 1-wire serial interface
- (Requires a 5-pin threaded M12/Euro-style double-ended cordset less than 3 meters long, such as model DEE2R-5dD.)
- Datasheet: 162669

**M12F4Q Temperature Sensor**
- 1-wire serial interface
- (Requires a 5-pin threaded M12/Euro-style double-ended cordset less than 3 meters long, such as model DEE2R-5dD.)
- Datasheet: 162669

**QM30VT1 Vibration and Temperature Sensor**
- Aluminum housing
- 2.09 m (6.85 ft) cable with a 5-pin M12/Euro-Style male quick disconnect (QD)
- Datasheet: 212568

**QM30VT1-QP Vibration and Temperature Sensor**
- Aluminum housing
- 150 mm (6 in) cable with a 5-pin M12/Euro-Style male quick disconnect (QD)
- Datasheet: 212568

**QM30VT1-SS Vibration and Temperature Sensor**
- Stainless steel housing
- 2.09 m (6.85 ft) cable with a 5-pin M12/Euro-Style male quick disconnect (QD)
- Datasheet: 212568

**QS30WEQ WORLD-BEAM Photoelectric Emitter, QS30**
- Max Range: 100 feet, 10x excess gain at 50 feet, 1-wire serial interface
- Datasheet: 140987

**QS30WRQ WORLD-BEAM Photoelectric Receiver, QS30**
- Max Range: 100 feet, 10x excess gain at 50 feet, 1-wire serial interface
- Datasheet: 140987

Warnings

Install and properly ground a qualified surge suppressor when installing a remote antenna system. Remote antenna configurations installed without surge suppressors invalidate the manufacturer’s warranty. Keep the ground wire as short as possible and make all ground connections to a single-point ground system to ensure no ground loops are created. No surge suppressor can absorb all lightning strikes; do not touch the Sure Cross® device or any equipment connected to the Sure Cross device during a thunderstorm.

Exporting Sure Cross Radios. It is our intent to fully comply with all national and regional regulations regarding radio frequency emissions. Customers who want to re-export this product to a country other than that to which it was sold must ensure the device is approved in the destination country. The Sure Cross wireless products were certified for use in these countries using the antenna that ships with the product. When using other antennas, verify you are not exceeding the transmit power levels allowed by local governing agencies. This device has been designed to operate with the antennas listed on Banner Engineering’s website and having a maximum gain of 9 dBm. Antennas not included in this list or having a gain greater than 9 dBm are strictly prohibited for use with this device. The required antenna impedance is 50 ohms. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen such that the equivalent isotropically radiated power (EIRP) is not more than that permitted for successful communication. Consult with Banner Engineering Corp. if the destination country is not on this list.
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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For patent information, see www.bannerengineering.com/patents.

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Notas Adicionales

Información México: La operación de este equipo está sujeta a las siguientes dos condiciones: 1) es posible que este equipo o dispositivo no cause interferencia perjudicial y 2) este equipo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada.

Banner es una marca registrada de Banner Engineering Corp. y podrán ser utilizadas de manera indistinta para referirse al fabricante. “Este equipo ha sido diseñado para operar con las antenas tipo Omnidireccional para una ganancia máxima de antena de 6 dBd y Yagi para una ganancia máxima de antena 10 dBd que en seguida se enlistan. También se incluyen aquellas con aprobación ATEX tipo Omnidireccional siempre que no excedan una ganancia máxima de antena de 6dBd. El uso con este equipo de antenas no incluidas en esta lista o que tengan una ganancia mayor que 6 dBd en tipo omnidireccional y 10 dBd en tipo Yagi, quedan prohibidas. La impedancia requerida de la antena es de 50 ohms.”

<table>
<thead>
<tr>
<th>Antenas SMA</th>
<th>Modelo</th>
<th>Antenas Tipo-N</th>
<th>Modelo</th>
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<tbody>
<tr>
<td>Antena, Omni 902-928 MHz, 2 dBd, junta de caucho, RP-SMA Macho</td>
<td>BWA-9O2-C</td>
<td>Antena, Omni 902-928 MHz, 6 dBd, fibra de vidrio, 1800mm, N Hembra</td>
<td>BWA-9O6-A</td>
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<tr>
<td>Antena, Omni 902-928 MHz, 5 dBd, junta de caucho, RP-SMA Macho</td>
<td>BWA-9O5-C</td>
<td>Antena, Yagi, 900 MHz, 10 dBd, N Hembra</td>
<td>BWA-9Y10-A</td>
</tr>
</tbody>
</table>

Mexican Importer

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