

## 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.



- Selectable transmit power levels of 250 mW or 1 Watt for 900 MHz models and 65 mW for 2.4 GHz models
- *FlexPower®* power options allow for 10 V DC to 30 V DC, solar, and battery power sources for low power applications.
- Serial communication style (RS-232 or RS-485) is user selectable
- Multiple hops allow for an extended range
- Message routing improves link performance
- Self-healing, auto-routing RF network with multiple hops extends the network's range
- DIP switches select operational modes: master, repeater, or slave
- Built-in site survey mode enables rapid assessment of a location's RF transmission properties
- Frequency Hopping Spread Spectrum (FHSS) technology ensures reliable data delivery within the unlicensed Industrial, Scientific, and Medical (ISM) band
- Certified for use in Class I, Division 2, Group A, B, C, D Hazardous Locations when properly installed in accordance with the National Electrical Code, the Canadian Electrical Code, or applicable local codes/regulations (see Specifications)



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



**Important:** Por favor descargue desde [www.bannerengineering.com](http://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.



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



### 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.



### 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

| Models     | Frequency        | Transmit Power                           |
|------------|------------------|--|
| DX80DR9M-H | 900 MHz ISM Band | 250 mW or 1 Watt (DIP switch selectable) |
| DX80DR2M-H | 2.4 GHz ISM Band | 65 mW (100 mW EIRP)                      |

## 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:

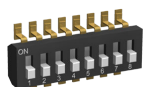
- MultiHop Data Radio Quick Start Guide: [152653](#)
- MultiHop Data Radio Instruction Manual: [151317](#)
- MultiHop Register Guide: [155289](#)

### Configure the DIP Switches

Before changing DIP switch positions, disconnect the power. 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)

| Switches   |                  |                  |   |   |   |   |   |   |
|--|------------------|------------------|---|---|---|---|---|---|
| Device Settings  | 1                | 2                | 3 | 4 | 5 | 6 | 7 | 8 |
| Serial line baud rate 19200 OR User defined receiver slots | OFF <sup>1</sup> | OFF <sup>1</sup> |   |   |   |   |   |   |

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

<sup>1</sup> Default configuration

<sup>2</sup> Default configuration for the E housing models only

### Application Mode

The MultiHop radio operates in either Modbus mode or transparent mode. Use the internal DIP switches to select the mode of operation. All MultiHop radios within a wireless network must be in the same 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.

In **transparent** application mode, all incoming packets are stored, then broadcast to all connected data radios. The data communication is packet based and not specific to any protocol. The application layer is responsible for data integrity. For one to one data radios it is possible to enable broadcast acknowledgement of the data packets to provide better throughput. In transparent mode, there is no access to the radio's I/O.

### 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.



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

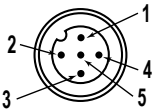
## Wire Your Sure Cross® Device

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

Refer to the Class I Division 2/Zone 2 control drawings (p/n 143086) for wiring specifications and limitations. Install the device in a suitable enclosure with provision for connection of Division 2 / Zone 2 wiring methods in accordance with local codes, as acceptable to the local inspection authority having jurisdiction.

## Apply Power to the Radio

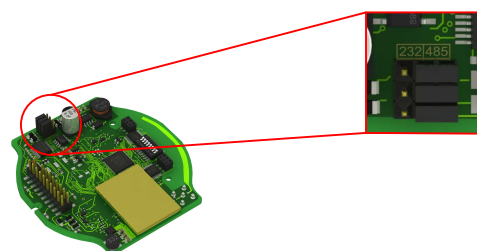
Connecting power to the communication pins will cause permanent damage. For *FlexPower* devices, do not apply more than 5.5 V to the gray wire. The FlexPower radios will operate equally well when powered from the brown or gray wire. It is not necessary to supply both. The power for the sensors can be supplied by the radio's SPx terminals or from the 10 V DC to 30 V DC used to power the radio.

|   | Pin | Wire Color | Models powered by 10 to 30 V dc with RS-485 | FlexPower models with RS-485 | FlexPower models with RS-232 |
|---|-----|------------|---|------------------------------|------------------------------|
|  | 1   | brown      | 10 V DC to 30 V DC                          | 10 V DC to 30 V DC           | 10 V DC to 30 V DC           |
|   | 2   | white      | RS-485 / D1 / B / +                         | RS-485 / D1 / B / +          | RS-232 Tx                    |
|   | 3   | blue       | dc common (GND)                             | dc common (GND)              | dc common (GND)              |
|   | 4   | black      | RS-485 / D0 / A / -                         | RS-485 / D0 / A / -          | RS-232 Rx                    |
|   | 5   | gray       | -   | 3.6 V DC to 5.5 V DC         | 3.6 V DC to 5.5 V DC         |

## Serial Communication

### RS-232 and RS-485 Communication

Three jumpers control the communication mode. To change the communication mode, change all three jumper positions. The jumpers are shown configured for RS-485 communication (factory default position).



## 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.

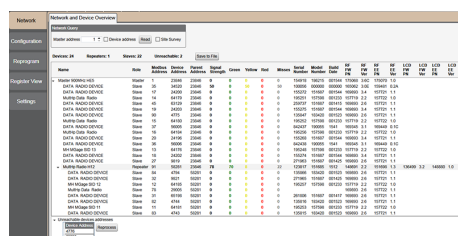
For MultiHop radios with rotary dials, use the rotary dials to set the device's MultiHop Radio ID. The left dial sets the left digit and the right dial sets the right digit.

- 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](#)

## Manufacturer Parameter Registers

The following are the device-specific and manufacturer parameters for the MultiHop radio devices. These registers are all within the 4xxxx range.

### 04100s Manufacturing Information

| Address (4xxxx) | Name                        | Format           |
|-----------------|-----------------------------|------------------|
| 4101–4104       | Serial number, digits 1–8   | ASCII, read only |
| 4111–4113       | Model number, digits 1–6    | ASCII, read only |
| 4121–4123       | Production date, digits 1–6 | ASCII, read only |

### 04200s Device Name

| Address (4xxxx) | Name                 | Format |
|-----------------|----------------------|--------|
| 4201–4209       | Name characters 1-18 | ASCII  |

### 04300s Software Information

| Address (4xxxx) | Name                                      | Format           |
|-----------------|---|------------------|
| 4301–4303       | RF firmware p/n                           | ASCII, read only |
| 4304–4305       | RF firmware version                       | ASCII, read only |
| 4306–4308       | RF EEPROM part number, digits 1–6         | ASCII, read only |
| 4309–4310       | RF EEPROM version number, characters 1–3  | ASCII, read only |
| 4311–4313       | LCD firmware p/n                          | ASCII, read only |
| 4314–4315       | LCD firmware version                      | ASCII, read only |
| 4316–4318       | LCD EEPROM part number, digits 1–6        | ASCII, read only |
| 4319–4320       | LCD EEPROM version number, characters 1–3 | ASCII, read only |

### 06400s Message Parameters

Strings stored in ASCII format are read as two characters per Modbus register. The lower numbered Modbus register contains the right-most characters in the string. Within a given Modbus register, the upper byte contains the ASCII character that goes to the right of the character in the lower byte.

| Address (4xxxx) | Name           | Format         |
|-----------------|----------------|----------------|
| 6401            | Device address | Hex            |
| 6402            | Parent address | Hex, read only |

### Storing a Model Number

For example, the model number 148691 is stored as shown below.

| Address (4xxxx) | Name                    | Modbus Register Value (in hex) | Character Representation |
|-----------------|-------------------------|--------------------------------|--------------------------|
| 4111            | Model number digits 6-5 | 0x3139                         | 1 9                      |
| 4112            | Model number digits 4-3 | 0x3638                         | 6 8                      |
| 4113            | Model number digits 2-1 | 0x3431                         | 4 1                      |

## Parameters Stored as Numbers

Parameters stored as number values (not ASCII) read out directly as 16-bit values. Examples of parameters of this type include the Parent Address or Device Address.

| Address (4xxxx) | Name           | Value (in hex) | Value (decimal) |
|-----------------|----------------|----------------|-----------------|
| 6401            | Device address | 0x002A         | 42              |
| 6402            | Parent address | 0x0023         | 35              |

## Specifications

### MultiHop Radio Specifications

#### Radio Range<sup>1</sup>

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)

#### 900 MHz Compliance (1 Watt)

FCC ID UE3RM1809: FCC Part 15, Subpart C, 15.247  
IC: 7044A-RM1809  
IFT: RCPBARM13-2283

#### 2.4 GHz Compliance (MultiHop)

FCC ID UE300DX80-2400: FCC Part 15, Subpart C, 15.247  
Radio Equipment Directive (RED) 2014/53/EU  
IC: 7044A-DX8024

#### Antenna Connection

Ext. Reverse Polarity SMA, 50 Ohms  
Max Tightening Torque: 0.45 N-m (4 lbf-in)

#### Radio Packet Size (MultiHop)

900 MHz: 175 bytes (85 Modbus registers)  
2.4 GHz: 75 bytes (37 Modbus registers)

### 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

### MultiHop M-H Specifications

#### Supply Voltage

10 V DC to 30 V DC (Outside the USA: 12 V DC to 24 V DC,  $\pm 10\%$ ) on the brown wire, or 3.6 V DC to 5.5 V DC low power option on the gray wire <sup>2</sup>

#### Wiring Access

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)  
Mounting: #10 or M5 (SS M5 hardware included)  
Max. Tightening Torque: 0.56 N-m (5 lbf-in)

#### Consumption

Master radio consumption (900 MHz): Maximum current draw is < 100 mA and typical current draw is < 30 mA at 24 V DC. (2.4 GHz consumption is less.)  
Repeater/slave radio consumption (900 MHz): Maximum current draw is < 40 mA and typical current draw is < 20 mA at 24 V DC. (2.4 GHz consumption is less.)

#### Interface

Two bi-color LED indicators; Two buttons; Six character LCD

#### Certifications



CSA: Class I, Division 2, Groups A, B, C, D (Ex/A Ex nA II T4) — Certificate 1921239



ATEX: Zone 2 (II 3G / Ex nA IIC) — Certificate LCIE 10 ATEX 1012 X

Refer to the Class I Division 2/Zone 2 control drawings (p/n [143086](#)) for wiring specifications and limitations. Install the device in a suitable enclosure with provision for connection of Division 2 / Zone 2 wiring methods in accordance with local codes, as acceptable to the local inspection authority having jurisdiction. All battery-powered devices must only use the lithium battery manufactured by Xeno, model XL-205F (Banner model number **BWA-BATT-001**).



(CE approval only applies to 2.4 GHz models)



(NOM approval only applies to 900 MHz models)

<sup>1</sup> 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.

<sup>2</sup> For European applications, power this device from a Limited Power Source as defined in EN 60950-1.

## 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)  
 –40 °C to +80 °C (–40 °F to +176 °F) ambient temperature for Class I  
 Division 2 / Zone 2  
 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: 30G 11 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.

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

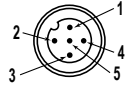
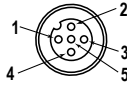
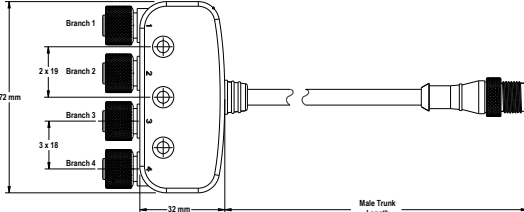
## Included with Device (Low-Profile Housings)


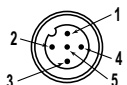
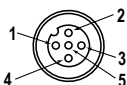
The following items ship with the low-profile housings.

- 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)
- MQDC1-506: 5-Euro (single ended) straight cable, 2m (Not included with FlexPower devices)

## Accessories

### Splitter Cordsets

| 5-Pin Threaded M12/Euro-Style Splitter Cordset with Flat Junction—Double Ended      |              |                   |  |   |
|---|--------------|-------------------|--|---|
| Model   | Trunk (Male) | Branches (Female) | Pinout (Male)  | Pinout (Female)   |
| CSB4-M1251M1250   | 0.3 m (1 ft) | Four (no cable)   |  |  |
|  |              |                   | 1 = Brown<br>2 = White<br>3 = Blue   | 4 = Black<br>5 = Gray   |

| 5-Pin Threaded M12/Euro-Style Splitter Tee |  |   |   |  |
|--|--|---|---|--|
| Model                                      | Description                                  |   | Pinout (Male)   | Pinout (Female)  |
| CSB-M1250M1250-T                           | Female trunk, 1 female branch, 1 male branch |  | <br>1 = Brown<br>2 = White<br>3 = Blue | <br>4 = Black<br>5 = Green/Yellow |



## 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 dBi. Antennas not included in this list or having a gain greater than 9 dBi 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.

**THIS LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER EXPRESS OR IMPLIED (INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), AND WHETHER ARISING UNDER COURSE OF PERFORMANCE, COURSE OF DEALING OR TRADE USAGE.**

This Warranty is exclusive and limited to repair or, at the discretion of Banner Engineering Corp., replacement. **IN NO EVENT SHALL BANNER ENGINEERING CORP. BE LIABLE TO BUYER OR ANY OTHER PERSON OR ENTITY FOR ANY EXTRA COSTS, EXPENSES, LOSSES, LOSS OF PROFITS, OR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES RESULTING FROM ANY PRODUCT DEFECT OR FROM THE USE OR INABILITY TO USE THE PRODUCT, WHETHER ARISING IN CONTRACT OR WARRANTY, STATUTE, TORT, STRICT LIABILITY, NEGLIGENCE, OR OTHERWISE.**

Banner Engineering Corp. reserves the right to change, modify or improve the design of the product without assuming any obligations or liabilities relating to any product previously manufactured by Banner Engineering Corp. Any misuse, abuse, or improper application or installation of this product or use of the product for personal protection applications when the product is identified as not intended for such purposes will void the product warranty. Any modifications to this product without prior express approval by Banner Engineering Corp will void the product warranties. All specifications published in this document are subject to change; Banner reserves the right to modify product specifications or update documentation at any time. Specifications and product information in English supersede that which is provided in any other language. For the most recent version of any documentation, refer to: [www.bannerengineering.com](http://www.bannerengineering.com).

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

## 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."

| Antenas SMA  | Modelo           | Antenas Tipo-N   | Modelo            |
|--|------------------|--|-------------------|
| Antena, Omni 902-928 MHz, 2 dBd, junta de caucho, RP-SMA Macho | <b>BWA-902-C</b> | Antena, Omni 902-928 MHz, 6 dBd, fibra de vidrio, 1800mm, N Hembra | <b>BWA-906-A</b>  |
| Antena, Omni 902-928 MHz, 5 dBd, junta de caucho, RP-SMA Macho | <b>BWA-905-C</b> | Antena, Yagi, 900 MHz, 10 dBd, N Hembra                            | <b>BWA-9Y10-A</b> |

## Mexican Importer

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