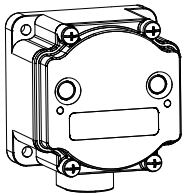


## Datasheet

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. The Performance Series P6L Node is low-cost, battery-powered device that can convert Banner 1-wire serial sensor device into a wireless input. All configuration is done through internal DIP switches or the DX80 User Configuration Tool.

### 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 for predictive maintenance motor health monitoring
  - Temperature and humidity for energy management, process monitoring, etc
- **Longer Battery Life**—Large D cell battery gives extended battery life vs. Q45 1-wire serial devices
- **Compact Design**—Internal antenna for smaller footprint
- **Eliminate control wires**—The Sure Cross wireless system is a radio frequency network with integrated I/O that removes the need for power and control wires.
- **Reduce complexity**—Machine or process reconfiguration made easier; great for retrofit applications
- **Deploy easily**—Simplified installation on existing equipment enables deployment in remote and hard-to-access locations where implementing a wired solution would be difficult, impractical, or not cost-effective



- Selectable transmit power levels of 250 mW or 1 Watt for 900 MHz models and 65 mW for 2.4 GHz models
- DIP switches for user configuration
- Frequency Hopping Spread Spectrum (FHSS) technology and Time Division Multiple Access (TDMA) control architecture ensure reliable data delivery within the unlicensed Industrial, Scientific, and Medical (ISM) band
- Transceivers provide bidirectional communication between the Gateway and Node, including fully acknowledged data transmission
- Diagnostics allow user-defined output settings in the unlikely event of lost RF signal

For additional information, updated documentation, and a list of accessories, refer to Banner Engineering's website, [www.bannerengineering.com/wireless](http://www.bannerengineering.com/wireless).



#### 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.



#### CAUTION: Never Operate 1 Watt Radios Without Antennas

To avoid damaging the radio circuitry, never power up Sure Cross® Performance or Sure Cross MultiHop (1 Watt) radios without an antenna.



#### CAUTION: Electrostatic Discharge (ESD)

**ESD Sensitive Device.** This product uses semiconductors that can be damaged by electrostatic discharge (ESD). When performing maintenance, care must be taken so the device is not damaged. Disconnect power from the device when accessing the internal DIP switches. Proper handling procedures include wearing anti-static wrist straps. Damage from inappropriate handling is not covered by warranty.

## Models

| Models        | Frequency        | Power              | I/O                                                                  |
|---------------|------------------|--------------------|----------------------------------------------------------------------|
| DX80N9X1W-P6L | 900 MHz ISM Band | Integrated battery | <b>Inputs:</b> 1-Wire serial interface for one serial sensing device |
| DX80N2X1W-P6L | 2.4 GHz ISM Band |                    |                                                                      |



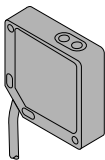
## General Operation

For the first five minutes after powering up, the Node operates in fast sample mode, sampling and sending data every two seconds. After five minutes, the Node defaults to five minute sample intervals and the LCD turns off to save power, which is ideal for the battery-powered models. Use the DIP switches or the User Configuration Tool (UCT) software to set the sample rate.

To activate fast sample mode, single-click button 1. LED 2 is on (amber) during the fast sample mode. To exit fast sample mode and turn off the LCD, click button 2 five times.

## Sensors with a Serial Interface

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

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>K50UX1RA</b></p> <ul style="list-style-type: none"> <li>U-GAGE Ultrasonic Sensor with 1-wire serial interface</li> <li>Datasheet: <a href="#">191599</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <p><b>M12FTH4Q</b></p> <ul style="list-style-type: none"> <li>Temperature and Humidity Sensor, <math>\pm 2\%</math> Accuracy, 1-wire serial interface</li> <li>(Requires a 5-pin threaded M12/Euro-style double-ended cordset less than 3 meters long, such as model DEE2R-5xD.)</li> <li>Datasheet: <a href="#">162669</a></li> </ul> <p><b>M12FT4Q</b></p> <ul style="list-style-type: none"> <li>Temperature Sensor with 1-wire serial interface</li> <li>(Requires a 5-pin threaded M12/Euro-style double-ended cordset less than 3 meters long, such as model DEE2R-5xD.)</li> <li>Datasheet: <a href="#">162669</a></li> </ul>  |
| <p><b>QM42VT1</b></p> <ul style="list-style-type: none"> <li>Vibration and temperature sensor with 1-wire serial interface</li> <li>Detects dual-axis vibration</li> <li>Zinc alloy housing</li> <li>3 m cable with a 5-pin M12/Euro-style male quick disconnect (QD)</li> <li>Datasheet: <a href="#">186209</a></li> </ul> <p><b>QM42VT1QP</b></p> <ul style="list-style-type: none"> <li>Vibration and temperature sensor with 1-wire serial interface</li> <li>Detects dual-axis vibration</li> <li>Zinc alloy housing</li> <li>150 mm (6 in) PVC cable with a 5-pin M12/Euro-style male quick disconnect (QD)</li> <li>Datasheet: <a href="#">186209</a></li> </ul>  | <p><b>QS30WEQ</b></p> <ul style="list-style-type: none"> <li>WORLD-BEAM Photoelectric Emitter, QS30 (Max Range: 100 feet, 10x excess gain at 50 feet), 1-wire serial interface</li> <li>Datasheet: <a href="#">140987</a></li> </ul> <p><b>QS30WRQ</b></p> <ul style="list-style-type: none"> <li>WORLD-BEAM Photoelectric Receiver, QS30 (Max Range: 100 feet, 10x excess gain at 50 feet), 1-wire serial interface</li> <li>Datasheet: <a href="#">140987</a></li> </ul>                                                                                                                                                          |

## Configuration Instructions

### Setting Up Your Wireless Network

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

Disconnect the power from your Sure Cross devices.

1. Configure the DIP switches of all devices.
2. If your device has I/O, connect the sensors to the Sure Cross devices. If your device does not have I/O, skip this step.

3. Refer to the wiring diagrams to apply power to all devices.
  - For housed models, the Gateway's LED 1 is solid green and the Node's LED 2 flashes red to indicate there is no radio link to the Gateway.
  - For board-level models, the Gateway's LED is solid green and the Node's LED flashes red to indicate there is no radio link to the Gateway.
4. Form the wireless network by binding the Nodes to the Gateway. If the binding instructions are not included in the datasheet, refer to the product manual for binding instructions.
5. Observe the LED behavior to verify the devices are communicating with each other.
  - For housed models, the Gateway's LED 1 is solid green and the Node's LED 1 flashes green to indicate it is communicating with the Gateway.
  - For board-level models, the Gateway's LED is solid green and the Node's LED flashes green to indicate it is communicating with the Gateway.
6. Configure any I/O points to use the sensors connected to the Sure Cross devices.
7. Conduct a site survey between the Gateway and Nodes. If the site survey instructions are not included in this datasheet, refer to the product manual for detailed site survey instructions.
8. Install your wireless sensor network components. If installation instructions are not included in this datasheet, refer to the product manual for detailed installation instructions.

For additional information, including installation and setup, weatherproofing, device menu maps, troubleshooting, and a list of accessories, refer to one of the following product manuals.

- Sure Cross® Quick Start Guide: [128185](#)
- Sure Cross® Wireless I/O Network Instruction Manual: [132607](#)
- Web Configurator Instruction Manual (used with "Pro" and DX83 models): [134421](#)
- Host Controller Systems Instruction Manual: [132114](#)

## Configure the DIP Switches

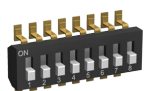
Before changing DIP switch positions, disconnect the power. For devices with batteries integrated into the housing, remove the battery(ies) for at least one minute. DIP switch changes are not recognized until after power is cycled to the device.

For parameters not set via DIP switches, use the User Configuration Tool (UCT) to make configuration changes. For parameters set using the DIP switches, the DIP switch positions override any changes made using the User Configuration Tool.

## Accessing the Internal DIP Switches

To access the internal DIP switches, follow these steps:

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) 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.



After making the necessary changes to the DIP switches, place the black cover plate back into position and gently push into place. Plug the ribbon cable in after verifying that the blocked hole lines up with the missing pin. Mount the cover back onto the housing.

## DIP Switch Settings

These DIP switch settings are available with radio firmware versions 5.3 and higher.

| Device Settings                                                 | Switches |     |     |     |     |   |   |   |
|-----------------------------------------------------------------|----------|-----|-----|-----|-----|---|---|---|
|                                                                 | 1        | 2   | 3   | 4   | 5   | 6 | 7 | 8 |
| Transmit power level: 1 Watt (30 dBm) (default)                 | OFF      |     |     |     |     |   |   |   |
| Transmit power level: 250 mW (24 dBm), DX80 compatibility mode  | ON       |     |     |     |     |   |   |   |
| Modbus or UCT configured (overrides DIP switches 3-8) (default) |          | OFF |     |     |     |   |   |   |
| DIP switch configured                                           |          | ON  |     |     |     |   |   |   |
| Sensor 1: 6 registers (default)                                 |          |     | OFF | OFF | OFF |   |   |   |

| Device Settings                             | Switches |   |     |     |    |     |     |     |
|---------------------------------------------|----------|---|-----|-----|----|-----|-----|-----|
|                                             | 1        | 2 | 3   | 4   | 5  | 6   | 7   | 8   |
| Sensor 1: 3 registers                       |          |   | OFF | OFF | ON |     |     |     |
| Sample/Report Rates: 5 minutes (default)    |          |   |     |     |    | OFF | OFF | OFF |
| Sample/Report Rates: 2 minutes              |          |   |     |     |    | OFF | OFF | ON  |
| Sample/Report Rates: 1 minute               |          |   |     |     |    | OFF | ON  | OFF |
| Sample/Report Rates: 30 seconds             |          |   |     |     |    | OFF | ON  | ON  |
| Sample/Report Rates: 10 seconds             |          |   |     |     |    | ON  | OFF | OFF |
| Sample/Report Rates: 5 seconds <sup>1</sup> |          |   |     |     |    | ON  | OFF | ON  |
| Sample/Report Rates: sample on demand       |          |   |     |     |    | ON  | ON  | OFF |

Select **Sensor 1: 3 registers** when the sensor is only using inputs 1 through 3 to conserve battery life.

#### Modbus/User Configuration Tool (UCT) or DIP Switch Configured

In Modbus/UCT Configured mode, use the User Configuration Tool (UCT) or a Modbus command to change the device parameters. DIP switch positions 3 through 8 are ignored. In DIP Switch Configured mode, use the DIP switches to configure the parameters listed in the table.

#### Sample and Report Rates

The sample interval, or rate, defines how often the Sure Cross device samples the input. For battery-powered applications, setting a slower rate extends the battery life.

The report rate defines how often the Node communicates the I/O status to the Gateway. For *FlexPower*® applications, setting the report rate to a slower rate extends the battery life.

#### Transmit Power Levels

The 900 MHz radios transmit at 1 Watt (30 dBm) or 250 mW (24 dBm). While the Performance radios operate in 1 Watt mode, they cannot communicate with the older 150 mW radios. To communicate with 150 mW radios, operate this radio in 250 mW mode. For 2.4 GHz models, this DIP switch is disabled. The transmit power for 2.4 GHz is fixed at about 65 mW EIRP (18 dBm), making the 2.4 GHz Performance models automatically compatible with older 2.4 GHz models.

#### Wiring Your Sure Cross® Device

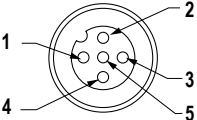
Use the following wiring diagrams to first wire the sensors and then apply power to the Sure Cross devices.

#### Control Drawings

Refer to the Class I Division 2/Zone 2 control drawings (p/n [143086](#)) for wiring specifications or 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.

| 5-pin M12/Euro-style Female Quick Disconnect                                        | Pin | Wire Color | Description             |
|-------------------------------------------------------------------------------------|-----|------------|-------------------------|
|  | 1   | Brown      | Power out + (to sensor) |
|                                                                                     | 2   | White      | Device select           |
|                                                                                     | 3   | Blue       | dc common (GND)         |
|                                                                                     | 4   | Black      | Device output           |
|                                                                                     | 5   | Gray       | Serial comms            |

#### Bind the DX80 Nodes to the DX80 Gateway and Assign the Node Address

Before beginning the binding procedure, apply power to all the devices. Separate radios by 2 meters when running binding procedure. Put only one Gateway into binding at a time to prevent binding to the wrong Gateway.

<sup>1</sup> Recommended setting for 10–30 V dc powered devices.

1. Enter binding mode on the Gateway.
  - For housed DX80 Gateways, triple-click the right-hand button. LEDs alternatively flash red.
  - For board level DX80 Gateways, triple-click the binding button. LED flashes green and red.
2. Use both of the Node's rotary dials to assign the Node Address defined in the Gateway's datasheet.  
The left rotary dial represents the tens digit (0 through 4) and the right dial represents the ones digit (0 through 9) of the Node Address.
3. To enter binding mode on the Node, triple-click button 2.  
The Node enters binding mode and locates the Gateway in binding mode. The red LEDs flash alternately. The Node automatically exits binding mode. After the Node is bound, the LEDs are both solid red for a few seconds. The Node cycles its power, then enters Run mode.
4. Label the Node with the assigned address for future references.
5. Repeat steps 2 through 4 for all Nodes that need to communicate to this Gateway.
6. Exit binding mode on the Gateway by single-clicking either button 1 or button 2.

For Gateways with single line LCDs, after binding your Nodes to the Gateway, make note of the binding code displayed under the Gateway's \*DVCFG menu, XADR submenu on the LCD. Knowing the binding code prevents having to re-bind all Nodes if your Gateway is ever replaced.

## Bind a DX80 Node to a DXM Gateway and Assign the Node Address

Before beginning the binding procedure, apply power to all the devices. Separate radios by 2 meters when running binding procedure. Put only one DXM Gateway into binding at a time to prevent binding to the wrong Gateway.

1. Enter binding mode on the DXM radio:
  - a) Use the arrow keys to select the **ISM Radio** menu on the LCD and click **ENTER**.
  - b) Highlight the **Binding** menu and click **ENTER**.
2. Assign the Node address to the Node.
  - For Nodes without rotary dials: Use the DXM arrow keys to select the Node address to assign to the DX80 Node about to enter binding mode. The DXM assigns this Node address to the next Node that enters binding mode. Only bind one Node at a time.
  - For Nodes with rotary dials: Use the Node's rotary dials to assign a valid decimal Node Address (between 01 and 47). The left rotary dial represents the tens digit (0 through 4) and the right dial represents the ones digit (0 through 9) of the Node Address.
3. Enter binding mode on the DX80 Node by triple-clicking the right-hand button.  
The left and right red LEDs flash alternately and the Node searches for a Gateway in binding mode. After the Node binds, the LEDs stay solid momentarily, then they flash together four times. The Node exits binding mode.
4. Label the Node with the assigned address number for future reference.
5. Click **BACK** on the DXM to exit binding for that specific Node address.
6. Repeat steps 2 through 5, for as many DX80 Nodes as are needed for your network.
7. When you are finished binding, click **BACK** on the DXM until you return to the main menu.

## LED Behavior for the Nodes

Nodes do not sample inputs until they are communicating with the Gateway. The radios and antennas must be a minimum distance apart to function properly. Recommended minimum distances are:

2.4 GHz 65 mW radios: 1 foot

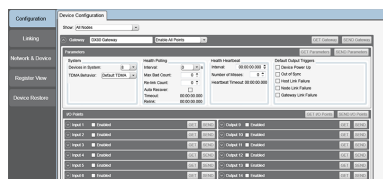
900 MHz 150 mW and 250 mW radios: 6 feet

900 MHz 1 Watt radios: 15 feet

| LED 1          | LED 2                     | Node Status   |
|----------------|---------------------------|---------------|
| Flashing green |                           | Radio Link Ok |
| Flashing red   | Flashing red              | Device Error  |
|                | Flashing red, 1 per 3 sec | No Radio Link |

## Sure Cross® User Configuration Tool

The User Configuration Tool (UCT) offers an easy way to link I/O points in your wireless network, view I/O register values, and set system communication parameters when a host system is not part of the wireless network. The software runs on any computer with the Windows Vista, Windows 7, Windows 8, or Windows 10 operating system.



Use a USB to RS-485 adapter cable to connect a standalone DX80 Gateway to the computer. For DXM Controllers with an internal DX80 radio, connect a computer to the DXM Controller using a USB or Ethernet connection. Download the most recent revisions of the UCT software from Banner Engineering's website: [www.bannerengineering.com/wireless](http://www.bannerengineering.com/wireless).

The USB to RS-485 adapter cable is not required for the DXM Controller. For standalone DX80 Gateway devices use:

- USB to RS-485 adapter cable model BWA-UCT-900 for 1 Watt radios
- USB to RS-485 adapter cable model BWA-HW-006 for all other radios

## Installing Your Sure Cross® Radios

Please refer to one of the following instruction manuals for details about successfully installing your wireless network components.

- DX80 and Performance Wireless I/O Network Instruction Manual: [132607](#)

## Holding Registers

| I/O Point | Modbus Registers |                                  | EIP Registers                  |                    | I/O Type            |
|-----------|------------------|----------------------------------|--------------------------------|--------------------|---------------------|
|           | Gateway          | Any Node                         |                                |                    |                     |
| 1         | 1                | $1 + (\text{Node\#} \times 16)$  | $0 + (\text{Node\#} \times 8)$ | Instance 100 / N7  | Sensor Data Input 1 |
| 2         | 2                | $2 + (\text{Node\#} \times 16)$  | $1 + (\text{Node\#} \times 8)$ |                    | Sensor Data Input 2 |
| 3         | 3                | $3 + (\text{Node\#} \times 16)$  | $2 + (\text{Node\#} \times 8)$ |                    | Sensor Data Input 3 |
| 4         | 4                | $4 + (\text{Node\#} \times 16)$  | $3 + (\text{Node\#} \times 8)$ |                    | Sensor Data Input 4 |
| 5         | 5                | $5 + (\text{Node\#} \times 16)$  | $4 + (\text{Node\#} \times 8)$ |                    | Sensor Data Input 5 |
| 6         | 6                | $6 + (\text{Node\#} \times 16)$  | $5 + (\text{Node\#} \times 8)$ |                    | Sensor Data Input 6 |
| 7         | 7                | $7 + (\text{Node\#} \times 16)$  | $6 + (\text{Node\#} \times 8)$ |                    | Reserved            |
| 8         | 8                | $8 + (\text{Node\#} \times 16)$  | $7 + (\text{Node\#} \times 8)$ |                    | Device Message      |
|           |                  | ...                              |                                | Instance 112 / N14 |                     |
| 15        | 15               | $15 + (\text{Node\#} \times 16)$ | $6 + (\text{Node\#} \times 8)$ |                    | Control Message     |
| 16        | 16               | $16 + (\text{Node\#} \times 16)$ | $7 + (\text{Node\#} \times 8)$ |                    | Reserved            |

## Installing or Replacing the Battery (DX80 Models)

To install or replace a lithium "D" cell battery in any integrated housing model, 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 (if applicable) by pressing the battery toward the negative terminal to compress the spring. Pry up on the battery's positive end to remove from the battery holder.
  3. Install the new battery. Only use a 3.6 V lithium battery from Xeno, model number XL-205F.
  4. Verify the battery's positive and negative terminals align to the positive and negative terminals of the battery holder mounted within the case. The negative end is toward the spring.
- Caution: There is a risk of explosion if the battery is replaced incorrectly.
5. After installing the battery, allow up to 60 seconds for the device to power up.
  6. 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.



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.

Replacement battery model number: BWA-BATT-001. For pricing and availability, contact Banner Engineering.

## Storage and Sleep Modes

**Storage Mode** (applies to battery-powered models only)—While in **storage mode**, the radio does not operate. All Sure Cross® radios powered from an integrated battery ship from the factory in storage mode to conserve the battery. To wake the device, press and hold button 1 for 5 seconds. To put any *FlexPower*® or integrated battery Sure Cross radio into storage mode, press and hold button 1 for 5 seconds. The radio is in storage mode when the LEDs stop blinking, but in some models, the LCD remains on for an additional minute after the radio enters storage mode. After a device has entered storage mode, you must wait 1 minute before waking it.

**Sleep Mode** (applies to both battery and 10–30 V dc powered models)—During normal operation, the Sure Cross radio devices enter **sleep mode** after 15 minutes of operation. The radio continues to function, but the LCD goes blank. To wake the device, press any button.

## Specifications

### Performance Radio Specifications

#### Radio Range<sup>2</sup>

900 MHz, 1 Watt (Internal antenna): Up to 3.2 km (2 miles) with line of sight  
2.4 GHz, 65 mW (Internal antenna): Up to 1000 m (3280 ft) with line of sight

#### 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: This device complies with FCC Part 15, Subpart C, 15.247  
IC: 7044A-RM1809

#### 2.4 GHz Compliance

FCC ID UE300DX80-2400 - This device complies with FCC Part 15, Subpart C, 15.247  
ETSI EN 300 328: V1.8.1 (2012-06)  
IC: 7044A-DX8024

#### Link Timeout

Gateway: Configurable via User Configuration Tool (UCT) software  
Node: Defined by Gateway

### P6L Model Specifications

#### Supply Voltage

3.6 V dc low power option from an internal battery

#### Sample/Report Rates

5 minutes

#### Interface

Two bi-color LED indicators  
Two buttons

#### Wiring Access

One 5-pin threaded M12/Euro-style female quick disconnect

#### Housing

Polycarbonate housing, polyester labels, EDPM rubber cover gasket, nitrile rubber, non-sulphur cured button covers  
Weight: 0.30 kg (0.65 lbs)  
Mounting: #10 or M5 (SS M5 hardware included)  
Max. Tightening Torque: 0.56 N·m (5 lbf·in)

#### Certifications



<sup>2</sup> Range depends on the environment and decreases significantly without line of sight. Always verify your wireless network's range by performing a Site Survey.

## 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

IEC 68-2-6 and IEC 68-2-27  
 Shock: 30g, 11 millisecond half sine wave, 18 shocks  
 Vibration: 0.5 mm p-p, 10 to 60 Hz

### Environmental Ratings

IEC IP67; NEMA 6  
 Refer to the Sure Cross® Wireless I/O Networks Instruction Manual (p/n [132607](#)) for installation and waterproofing instructions.

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

## 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.** A list of approved countries appears in the *Radio Certifications* section of the product manual. 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. 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).