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 industrial I/O device with up to two selectable discrete inputs, one NMOS discrete output, and four thermocouple inputs (defaults to J-type)
• One thermistor input used for integrated cold junction compensation (CJC)
• 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.
• DIP switches for user configuration
• Frequency Hopping Spread Spectrum (FHSS) technology ensures 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
• Lost RF links are detected and relevant outputs set to user-defined conditions

For additional information, updated documentation, and a list of accessories, refer to Banner Engineering’s website, www.bannerengineering.com.

Important: Please download the complete Performance Gateway or Node technical documentation, available in multiple languages, from 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 toda la documentación técnica de los Performance Gateway o Node, 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 Performance Gateway ou Node sur notre site 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

<table>
<thead>
<tr>
<th>Models</th>
<th>Frequency</th>
<th>Power</th>
<th>Housing</th>
<th>I/O</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX80N9X2S-P3</td>
<td>900 MHz ISM Band</td>
<td>10 to 30 V dc or battery supply module</td>
<td>IP67, NEMA 6</td>
<td>Inputs: Two selectable discrete, four thermocouple, one thermistor for CJC</td>
</tr>
<tr>
<td>DX80N9X1S-P3E</td>
<td>8 Band</td>
<td>10 to 30 V dc or integrated battery</td>
<td>IP66, NEMA 4X</td>
<td>Outputs: One NMOS discrete</td>
</tr>
<tr>
<td>DX80N2X2S-P3</td>
<td>2.4 GHz ISM Band</td>
<td>10 to 30 V dc or battery supply module</td>
<td>IP67, NEMA 6</td>
<td></td>
</tr>
<tr>
<td>DX80N2X1S-P3E</td>
<td>10 to 30 V dc</td>
<td>10 to 30 V dc or integrated battery</td>
<td>IP65, NEMA 4X</td>
<td></td>
</tr>
</tbody>
</table>

DX80...C (IP20; NEMA 1) models are also available. To order this model with an IP20 housing, add a C to the end of the model number: DX80N9X2S-P3C.

To order an integrated battery model without the battery, add a -NB to the model number. If you purchase a model without the battery, Banner Engineering recommends battery mode BWA-BATT-001. For Class I Division 1/Zone 0 and Class I Division 2/Zone 2 environments, only battery BWA-BATT-001 is certified.

Configuration Instructions

Setting Up Your Wireless Network

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

1. Disconnect the power from your Sure Cross 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 (p/n 128185)
- Sure Cross® Wireless I/O Network Instruction Manual (p/n 132607)

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.

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

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

<table>
<thead>
<tr>
<th>Device Settings</th>
<th>Switches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmit power level: 1 Watt (30 dBm)</td>
<td>OFF*</td>
</tr>
<tr>
<td>Transmit power level: 250 mW (24 dBm), DX80 compatibility mode</td>
<td>ON</td>
</tr>
<tr>
<td>Temp °Fahrenheit</td>
<td>OFF*</td>
</tr>
<tr>
<td>Temp °Celsius</td>
<td>ON</td>
</tr>
<tr>
<td>High resolution (0.1 degree)</td>
<td>OFF*</td>
</tr>
<tr>
<td>Low resolution (1 degree)</td>
<td>ON</td>
</tr>
<tr>
<td>Discrete sinking inputs</td>
<td>OFF*</td>
</tr>
<tr>
<td>Discrete sourcing inputs</td>
<td>ON</td>
</tr>
<tr>
<td>Thermocouple, J-Type</td>
<td></td>
</tr>
<tr>
<td>Thermocouple, B-Type</td>
<td></td>
</tr>
<tr>
<td>Thermocouple, C-Type</td>
<td></td>
</tr>
<tr>
<td>Thermocouple, D-Type</td>
<td></td>
</tr>
<tr>
<td>Thermocouple, E-Type</td>
<td></td>
</tr>
<tr>
<td>Thermocouple, G-Type</td>
<td></td>
</tr>
<tr>
<td>Thermocouple, K-Type</td>
<td></td>
</tr>
<tr>
<td>Thermocouple, L-Type</td>
<td></td>
</tr>
<tr>
<td>Thermocouple, M-Type</td>
<td></td>
</tr>
<tr>
<td>Thermocouple, N-Type</td>
<td></td>
</tr>
<tr>
<td>Thermocouple, P-Type</td>
<td></td>
</tr>
<tr>
<td>Thermocouple, R-Type</td>
<td></td>
</tr>
<tr>
<td>Thermocouple, S-Type</td>
<td></td>
</tr>
<tr>
<td>Thermocouple, T-Type</td>
<td></td>
</tr>
<tr>
<td>Thermocouple, U-Type</td>
<td></td>
</tr>
<tr>
<td>Modbus or UCT configured (overrides DIP switches)</td>
<td></td>
</tr>
</tbody>
</table>

* Default configuration

Discrete Input Type
Select the type of discrete input sensors to use with this device: sourcing (PNP) sensors or sinking (NPN) sensors.

Modbus/Software or DIP Switch Configured
In Modbus/Software Configured mode, use the User Configuration Software 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.

In high resolution mode, the temperature = (Modbus register value) ÷ 20. In low resolution mode, the temperature = (Modbus register value) ÷ 2.
Temperature Resolution
When set to high resolution, temperature values are stored to the nearest tenth (0.1) of a degree (default position). To measure temperatures above 1600 degrees Fahrenheit or 1600 degrees Celsius, switch the DIP switch to the ON position and use low resolution mode. In high resolution, the device cannot store values larger than 1600.

Temperature Units
Use the DIP switch to specify if the temperature is stored in degrees Fahrenheit or Celsius. The default position is OFF, setting the temperature to Fahrenheit. For Celsius measurements, set this switch to the ON position.

Thermocouple Type
Use DIP switches 5, 6, 7, and 8 to select the thermocouple type. The default position is the OFF position for all switches, setting the thermocouple to a J-type thermocouple.

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.

Mixing Performance and Non-Performance (150 mW) Radios in the Same Network
To comply with federal regulations, the 150 mW radios and 1 Watt radios communicate differently. All Performance models offer the ability to select between 250 mW and 1 Watt operation using the DIP switches. To mix Performance radios with non-Performance radios, refer to the product datasheet and:
- Operate Performance radios in 250 mW mode, not 1 Watt mode
- Set non-Performance (150 mW) radios to use Extended Address Mode

The 150 mW, 250 mW, and 1 Watt networks operate when collocated, but verify the antenna separation distance between a Gateway and Node or between two Gateways is at least 10 feet apart. For more detailed instructions about setting up your wireless network, refer to the following documents:
- DX80 Performance Quick Start Guide (p/n 128185)
- DX80 Performance Wireless I/O Network Instruction Manual (p/n 132607)

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

Apply Power to the Node
Integral 5-pin M12/Euro-style male quick disconnect wiring depends on the model and power requirements of the device. Not all models can be powered by 10 to 30 V DC and not all models can be powered by 3.6 to 5.5 V DC. Refer to to verify the power requirements of your device. For FlexPower devices, do not apply more than 5.5 V to the gray wire.

### 5-pin M12/Euro-style (male)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Wire Color</th>
<th>Nodes Powered by 10 to 30 V DC</th>
<th>Nodes Powered by Battery or Battery Pack</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brown</td>
<td>10 to 30 V DC</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>White</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>DC common (GND)</td>
<td>DC common (GND)</td>
</tr>
<tr>
<td>4</td>
<td>Black</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Gray</td>
<td>3.6 to 5.5 V DC</td>
<td></td>
</tr>
</tbody>
</table>

**DX80...C Wiring**
Wiring power to the DX80...C models varies depending the power requirements of the model. Connecting DC power to the communication pins (Tx/Rx) causes permanent damage. For FlexPower devices, do not apply more than 5.5 V to the B+ terminal.

<table>
<thead>
<tr>
<th>Terminal Label</th>
<th>Gateway and DX85</th>
<th>10 to 30 V DC Powered Nodes</th>
<th>Battery Powered Nodes</th>
</tr>
</thead>
<tbody>
<tr>
<td>V+</td>
<td>10 V DC to 30 V DC</td>
<td>10 V DC to 30 V DC</td>
<td></td>
</tr>
<tr>
<td>Tx/+</td>
<td>RS485 / D1 / B / +</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V−</td>
<td>DC common (GND)</td>
<td>DC common (GND)</td>
<td>DC common (GND)</td>
</tr>
<tr>
<td>Rx/−</td>
<td>RS485 / D0 / A / -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B+</td>
<td></td>
<td></td>
<td>3.6 to 5.5 V DC</td>
</tr>
</tbody>
</table>
Terminal Block (IP67 and C Housing)

For the DX8x...C models, PWR in the wiring diagram refers to V+ on the wiring board and GND in the wiring diagram refers to V- on the wiring board. Refer to the Class I Division 2/Zone 2 control drawings (p/n 143086) for wiring specifications and limitations.

<table>
<thead>
<tr>
<th>IP67 Housing</th>
<th>C Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>A4+ and A4-</td>
<td>A3+ and A3-</td>
</tr>
<tr>
<td>A1+ and A1-</td>
<td>A2+ and A2-</td>
</tr>
<tr>
<td>A2+ and A2-</td>
<td>A4+ and A4-</td>
</tr>
<tr>
<td>A3+ and A3-</td>
<td>GND and GND</td>
</tr>
<tr>
<td>PWR and PWR</td>
<td>DO1 and DO2</td>
</tr>
<tr>
<td>DI1 and DI2</td>
<td>DI1 and DI2</td>
</tr>
</tbody>
</table>

Wiring for DX80...E Radios

Connecting power to the communication pins will cause permanent damage. The integrated battery DX80...E radios may also be powered by 10 V DC to 30 V DC. 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. The BAT connection is a low voltage connection to the internal battery. Remove the internal battery if a low voltage source is connected to the BAT terminal. When powering the device from the integrated battery, the BAT connection must remain open.

<table>
<thead>
<tr>
<th>Integrated battery (RS-485) for P1E, M-H1E, M-H12E, and P16E Models</th>
<th>Integrated battery (RS-232) for P3E, P4E, M-H3E, and M-H4E Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 10 V DC to 30 V DC (optional)</td>
<td>10 V DC to 30 V DC (optional)</td>
</tr>
<tr>
<td>2 RS-485 / D1 / B / +</td>
<td>RS-232 Tx</td>
</tr>
<tr>
<td>3 dc common (GND)</td>
<td>dc common (GND)</td>
</tr>
<tr>
<td>4 RS-485 / D0 / A / -</td>
<td>RS-232 Rx</td>
</tr>
</tbody>
</table>

Terminal Block (E Housing)

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

| A4+ and A4- | A3+ and A3- |
| A1+ and A1- | A2+ and A2- |
| A2+ and A2- | A4+ and A4- |
| A3+ and A3- | GND and GND |
| PWR and PWR | DO1 and DO2 |
| DI1 and DI2 | DI1 and DI2 |

Wiring Diagrams for Discrete Inputs

Connecting power to the communication pins will cause permanent damage. For the DX8x...C models, PWR in the wiring diagram refers to V+ on the wiring board and GND in the wiring diagram refers to V- on the wiring board. To power the sensor using the switch power output (SPx), replace the PWR with SPx in these wiring diagrams.
Discrete Input Wiring for PNP Sensors

[Diagram of Discrete Input Wiring for PNP Sensors]

Discrete Input Wiring for NPN Sensors

[Diagram of Discrete Input Wiring for NPN Sensors]

Wiring Diagrams for Discrete Outputs
Connecting power to the communication pins will cause permanent damage. For the DX8xxC models, PWR in the wiring diagram refers to V+ on the wiring board and GND in the wiring diagram refers to V- on the wiring board. To power the sensor using the switch power output (SPx), replace the PWR with SPx in these wiring diagrams.

Discrete Output Wiring (NPN or NMOS)

[Diagram of Discrete Output Wiring (NPN or NMOS)]

Wiring Diagram for Thermocouple Inputs

Thermocouple: When wiring the thermocouple, x is the same number. For example, a thermocouple is wired to A1+ and A1-.

[Diagram of Thermocouple Input Wiring]

Supported Thermocouple Types
The thermocouple Node is configured, by default, to use J-type thermocouples. The following thermocouples are available by configuring the Node.

<table>
<thead>
<tr>
<th>Thermocouple</th>
<th>Range °F</th>
<th>Range °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type B</td>
<td>212 to 3,272</td>
<td>100 to 1,800</td>
</tr>
<tr>
<td>Type C</td>
<td>32 to 4,208</td>
<td>0 to 2,320</td>
</tr>
<tr>
<td>Type E</td>
<td>-58 to 1,832</td>
<td>-50 to 1,000</td>
</tr>
<tr>
<td>Type J</td>
<td>-292 to 1,382</td>
<td>-180 to 750</td>
</tr>
<tr>
<td>Type K</td>
<td>-292 to 2,282</td>
<td>-180 to 1,250</td>
</tr>
<tr>
<td>Type L</td>
<td>-328 to 1,652</td>
<td>-200 to 900</td>
</tr>
<tr>
<td>Type N</td>
<td>32 to 2,192</td>
<td>0 to 1,200</td>
</tr>
<tr>
<td>Type R</td>
<td>32 to 2,912</td>
<td>0 to 1,600</td>
</tr>
<tr>
<td>Type S</td>
<td>32 to 2,642</td>
<td>0 to 1,450</td>
</tr>
<tr>
<td>Type T</td>
<td>-238 to 752</td>
<td>-150 to 400</td>
</tr>
<tr>
<td>Type U</td>
<td>-148 to 1,112</td>
<td>-100 to 600</td>
</tr>
</tbody>
</table>

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:
- 900 MHz 150 mW and 250 mW radios: 6 feet
- 900 MHz 1 Watt radios: 15 feet
- 2.4 GHz 65 mW radios: 1 foot
Sure Cross® User Configuration Software

The User Configuration Software 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 configuration software from Banner Engineering’s website: 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.

- Performance Wireless I/O Network Instruction Manual: 132607

Holding Registers (High Resolution Mode)

<table>
<thead>
<tr>
<th>Gateway</th>
<th>Node</th>
<th>I/O Type</th>
<th>Min. Temp</th>
<th>Max. Temp</th>
<th>Holding Register Value</th>
<th>Terminal Block Labels</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 + (Node# × 16)</td>
<td>Thermocouple IN 1 (°F/°C)</td>
<td>-1638.3</td>
<td>+1638.4</td>
<td>32767</td>
<td>A1+/A1-</td>
</tr>
<tr>
<td>2</td>
<td>2 + (Node# × 16)</td>
<td>Thermocouple IN 2 (°F/°C)</td>
<td>-1638.3</td>
<td>+1638.4</td>
<td>32767</td>
<td>A2+/A2-</td>
</tr>
<tr>
<td>3</td>
<td>3 + (Node# × 16)</td>
<td>Thermocouple IN 3 (°F/°C)</td>
<td>-1638.3</td>
<td>+1638.4</td>
<td>32767</td>
<td>A3+/A3-</td>
</tr>
<tr>
<td>4</td>
<td>4 + (Node# × 16)</td>
<td>Thermocouple IN 4 (°F/°C)</td>
<td>-1638.3</td>
<td>+1638.4</td>
<td>32767</td>
<td>A4+/A4-</td>
</tr>
<tr>
<td>5</td>
<td>5 + (Node# × 16)</td>
<td>Thermistor IN (°F/°C)</td>
<td>-1638.3</td>
<td>+1638.4</td>
<td>32767</td>
<td>(on board)</td>
</tr>
<tr>
<td>6</td>
<td>6 + (Node# × 16)</td>
<td>Discrete IN 1, 2 *</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>D11, D12</td>
</tr>
<tr>
<td>7</td>
<td>7 + (Node# × 16)</td>
<td>Reserved</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>8 + (Node# × 16)</td>
<td>Device Message</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>9 + (Node# × 16)</td>
<td>Discrete OUT 1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>15</td>
<td>15 + (Node# × 16)</td>
<td>Control Message</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>16 + (Node# × 16)</td>
<td>Reserved</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In high resolution mode, the temperature = (Modbus register value) ÷ 20. In low resolution mode, the temperature is (Modbus register value) ÷ 2. Temperature values are stored as signed values in the Modbus register. A 0 in the register is interpreted as 0°; and -32767 (65535 unsigned) in the register (0xFFFF) is interpreted as −1 ÷ 20 = −0.05° in high resolution mode and −1 ÷ 2 = −0.5° in low resolution mode.

* The discrete inputs 1 and 2 are bit-packed into register 6, with discrete IN 1 using bit 0 and discrete IN 2 using bit 1. Because the two discrete INs are bit packed, only discrete IN 1 may be mapped using the User Configuration Tool. To use both discrete inputs you must use a host system.

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.

Install or Replace the Battery on a DX80E Model

To replace the lithium "D" cell battery or batteries in any DX80E model with the 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. Do not remove the radio cover from the face plate.
2. Remove the discharged battery or batteries.
3. Install the new battery or batteries.
4. Verify the positive and negative terminals align to the positive and negative terminals of the battery holder mounted within the case.
5. 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.

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

For outside or high humidity environments, dielectric grease may be applied to the battery terminals to prevent moisture and corrosion buildup.

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.

Specifications

Performance Radio Specifications

<table>
<thead>
<tr>
<th>Radio Range</th>
<th>900 MHz, 1 Watt: Up to 9.6 km (6 miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.4 GHz, 65 mW: Up to 3.2 km (2 miles)</td>
</tr>
<tr>
<td>Antenna Minimum Separation Distance</td>
<td>900 MHz, 1 Watt: 4.57 m (15 ft)</td>
</tr>
<tr>
<td></td>
<td>2.4 GHz, 65 mW: 0.3 m (1 ft)</td>
</tr>
<tr>
<td>Radio Transmit Power</td>
<td>900 MHz, 1 Watt: 30 dBm (1 W) conducted (up to 36 dBm EIRP)</td>
</tr>
<tr>
<td></td>
<td>2.4 GHz, 65 mW: 18 dBm (65 mW) conducted, less than or equal to 20 dBm (100 mW) EIRP</td>
</tr>
<tr>
<td>Spread Spectrum Technology</td>
<td>FHSS (Frequency Hopping Spread Spectrum)</td>
</tr>
<tr>
<td>900 MHz Compliance (1 Watt)</td>
<td>FCC ID UE3RM1809: FCC Part 15, Subpart C, 15.247</td>
</tr>
<tr>
<td></td>
<td>IC: 7044A-RM1809</td>
</tr>
<tr>
<td></td>
<td>IFT: CPBARM13-2283</td>
</tr>
<tr>
<td>2.4 GHz Compliance</td>
<td>FCC ID UE300DX80-2400: FCC Part 15, Subpart C, 15.247</td>
</tr>
<tr>
<td></td>
<td>Radio Equipment Directive (RED) 2014/53/EU</td>
</tr>
<tr>
<td></td>
<td>IC: 7044A-DX8024</td>
</tr>
<tr>
<td>Antenna Connection</td>
<td>Ext. Reverse Polarity SMA, 50 Ohms</td>
</tr>
<tr>
<td></td>
<td>Max Tightening Torque: 0.45 N·m (4 lbf·in)</td>
</tr>
<tr>
<td>Link Timeout</td>
<td>Gateway: Configurable via User Configuration Software</td>
</tr>
<tr>
<td></td>
<td>Node: Defined by Gateway</td>
</tr>
</tbody>
</table>

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

For outside or high humidity environments, dielectric grease may be applied to the battery terminals to prevent moisture and corrosion buildup.

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.

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.
Performance P3 Specifications

Supply Voltage
DX80 and “C” Housing Model: 10 V DC to 30 V DC or 3.6 V DC to 5.5 V DC low power option.
“E” Housing Model: 3.6 V DC low power option from an internal battery or 10 V DC to 30 V DC
900 MHz Consumption: Maximum current draw is < 40 mA and typical current draw is < 30 mA at 24 V DC. (2.4 GHz consumption is less.)

Discrete Input
Rating: 3 mA max current at 30 V DC
Sample Rate: 1 second
Report Rate: On change of state

Discrete Input ON Condition
PNP: Greater than 8 V
NPN: Less than 0.7 V

Discrete Input OFF Condition
PNP: Less than 5 V
NPN: Greater than 2 V or open

Thermocouple Inputs
Sample Rate: 8 seconds
Report Rate: 32 seconds
Accuracy: 0.1% of full scale reading + 0.8 °C
Resolution: 0.1 °C, 24-bit A/D converter

Thermocouple Notes
Each thermocouple input must be isolated from ground and shielded for proper operation.

Housing
Polycarbonate housing and rotary dial cover; polyester labels; EDPM rubber cover gasket; nitrite rubber, non-sulphur cured button covers
Weight: 0.26 kg (0.57 lbs)

Radiated Immunity: 10 V/m (EN 61000-4-3)

Shock and Vibration
All models meet IEC 60668-2-6 and IEC 60668-2-27 testing criteria
Shock: 30G 11 ms duration, half sine wave per IEC 60668-2-27
Vibration: 10 Hz to 55 Hz, 0.5 mm peak-to-peak amplitude per IEC 60668-2-6

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 60668-2-6 and IEC 60668-2-27 testing criteria
Shock: 30G 11 ms duration, half sine wave per IEC 60668-2-27
Vibration: 10 Hz to 55 Hz, 0.5 mm peak-to-peak amplitude per IEC 60668-2-6

Environmental Specifications for the C Housings

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 60668-2-6 and IEC 60668-2-27 testing criteria
Shock: 30G 11 ms duration, half sine wave per IEC 60668-2-27
Vibration: 10 Hz to 55 Hz, 0.5 mm peak-to-peak amplitude per IEC 60668-2-6

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.

Environmental Ratings for the C Housings

*C* Housing Models/External wiring terminals: IEC IP20; NEMA 1
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.

For European applications, power this device from a Limited Power Source as defined in EN 60950-1.
Environmental Specifications for the E Housing

**Operating Conditions**
-40 °C to +85 °C (–40 °F to +185 °F) (Electronics); –20 °C to +80 °C (–4 °F to +178 °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: 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 IP65
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.

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**Accessories**

### Mounting Brackets

**BWA-BK-020**
- Includes two 80-lb pull rare-earth magnet mounts and two #10-32 x 1 inch screw mounts
- Used on multiple mounting brackets
- 31.75 mm (1.25 inch) diameter

### Thermistor Probes

**BWA-THERMISTOR-PROBE-001**
- Temperature sensor with thermistor PS103G2
- Beta Value(K) 0–50°C: 3575
- Base thermistor accuracy of 0.2%
- Operating Temperature Range: –20 °C to +105 °C
- Maximum Power Rating: 30 mW at 25 °C; derated to 1 mW at 125 °C
- Dissipation Constant: 1 mW/°C
- Plated nickel finish; PVC insulation

### Included with the DX80 and DX80...C Models
- BWA-HW-002: DX80 Access Hardware Kit, containing four PG-7 plastic threaded plugs, four PG-7 nylon gland fittings, four PG-7 hex nuts, one 1/2-inch NPT plug, and one 1/2-inch nylon gland fitting. (Not included with IP20 DX80...C models)
- 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-HW-003: PTFE tape
- 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)
- MQDC1-506: 5-Euro (single ended) straight cable, 2m (Not included with FlexPower devices)
- BWA-HW-011: IP20 Screw Terminal Headers (2 pack) (Included only with the IP20 DX80...C models)
- Product datasheet and product family Quick Start Guide (128185 for DX80 Gateways or 152653 for MultiHop models)

### Included with the DX80...E Models
- Mounting hardware kit
- BWA-HW-003: PTFE tape
- 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)
- BWA-BATT-001: Replacement battery, 3.6 Volt, "D" Lithium Cell
- BWA-HW-032: Access Hardware for "E" Housing (One each of 1/2-inch plug, 1/2-inch gland)
- Product datasheet and product family Quick Start Guide (128185 for DX80 Gateways or 152653 for MultiHop models)
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.

Notas Adicionales

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<table>
<thead>
<tr>
<th>Antenas SMA</th>
<th>Modelo</th>
<th>Antenas Tipo-N</th>
<th>Modelo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antena, Omni 902-928 MHz, 2 dBd, junta de caucho, RP-SMA Macho</td>
<td>BWA-902-C</td>
<td>Antena, Omni 902-928 MHz, 6 dBd, fibra de vidrio, 1800mm, N Hembra</td>
<td>BWA-906-A</td>
</tr>
<tr>
<td>Antena, Omni 902-928 MHz, 5 dBd, junta de caucho, RP-SMA Macho</td>
<td>BWA-905-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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