Quick Start Guide

Read these instructions before using your Sure Cross® radios. Do not discard these instructions. For more detailed information about installing and using your Sure Cross products, download and read the instruction manual: Sure Cross Wireless I/O Network Manual (p/n 132607) or Sure Cross MultiHop Radio Instruction Manual (p/n 151317).

Setting Up Your Wireless Network

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

For complete instructions, including binding, configuration, installation, weatherproofing, device menu maps, troubleshooting, and a list of accessories, refer to Sure Cross® Wireless I/O Network Instruction Manual (p/n 132607)

1. Disconnect the power from your Sure Cross® devices.
2. Configure the DIP switches of all devices. DIP switch configurations are always listed in the product's datasheet.
3. If your device has I/O, connect the sensors to the Sure Cross devices. Available I/O is always listed in the product's datasheet. If your device does not have I/O, skip this step.
4. 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.
5. Form the wireless network by binding the Nodes to the Gateway.
6. 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.
7. Configure any I/O points to use the sensors connected to the Sure Cross devices.
8. Conduct a site survey between the Gateway and Nodes.
9. Install your wireless sensor network components.

Mixing Performance and Non-Performance (150 mW) Radios in the Same Network

To comply with federal regulations, the 150 mW radios and 500 mW radios communicate differently. All Performance models offer the ability to select between 250 mW and 500 mW 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 500 mW mode
- Set non-Performance (150 mW) radios to use Extended Address Mode

The 150 mW, 250 mW, 500 mW, and 1 W 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)
- DXM Quick Start Guide (p/n 191247)
- DXM Instruction Manuals (DXM100-Bx: 190037 and DXM150-Bx: 190038)

Apply Power to the Gateway or Node

Integral 5-pin M12 male quick-disconnect connector wiring depends on the model and power requirements of the device. Not all models can be powered by 10 V DC to 30 V DC and not all models can be powered by 3.6 V DC to 5.5 V DC. Refer to your specific device's specifications to verify the power requirements of your device.

Original Instructions
17-Oct-24

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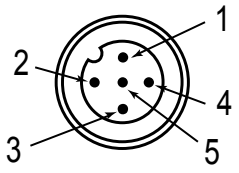
128185_WEB
p/n: 128185_WEB Rev. M

ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

5-pin M12 wiring for the Gateway and Nodes

5-pin M12 Connector	Pin	Wire Color	Gateway (10 V DC to 30 V DC)	Node (10 V DC to 30 V DC)	Node (FlexPower)
	1	brown	10 V DC to 30 V DC input	10 V DC to 30 V DC	
	2	white	RS485 / D1 / B / +		
	3	blue	DC common (GND)	DC common (GND)	DC common (GND)
	4	black	RS485 / D0 / A / -		
	5	gray	Comms ground		3.6 V DC to 5.5 V DC [1]

1. Apply power to the Gateway by connecting the 10 V DC to 30 V DC cable as shown.
   The Gateway begins in RUN mode, displays the current network ID (NID), then identifies itself as a Gateway.
2. Apply power to the Node by connecting the 10 V DC to 30 V DC cable or the DX81 Battery Supply Module as shown. To apply power to a FlexPower Node with an integrated battery, install the battery into the housing.
   The Node starts in RUN mode, displays the current network ID, then identifies itself as a Node and lists its device ID.

Bind Radios to Form Networks

Binding Nodes to a Gateway ensures the Nodes only exchange data with the Gateway they are bound to. For a more detailed definition of binding mode, refer to the *Advanced Setup* section of the *Sure Cross Wireless I/O Networks* instruction manual (p/n 132607).

Apply power to the Gateway and Nodes.

1. Enter binding mode on the Gateway.
   - If you have a two-button Gateway, triple-click button 2
   - If you have a one-button Gateway, triple-click the button
   - If you have a Gateway with no buttons, remove the rotary dial access cover and set both the right and left rotary dials to 0, then set both the right and left rotary dials to F.
   - If you have a DXM, under the **ISM Radio** menu, use the down arrow button to highlight the **Binding** menu. Click **ENTER**.

Two-button Gateway



One-button Gateway



   The LEDs flash alternately when the Gateway is in binding mode. Any Node entering binding mode will bind to this Gateway.
2. 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 Node.
   - If you have a two-button Node, triple-click button 2.
   - If you have a one-button Node, triple-click the button.
   - If you have a Node with no buttons, remove the top cover and set both the left and right rotary dials to F to enter binding mode. [2]

   The Node enters binding mode and locates the Gateway in binding mode.

   For two LED models, the red LEDs flash alternately. After binding is complete, both LEDs are both solid red for a few seconds.

   For one-LED models, the red and green LED flashes alternately while the Node searches for the Gateway. After binding is complete, the LED is red and green for four seconds (looks amber), then the red and green flash simultaneously (looks amber) four times.

   The Node automatically exits binding mode, cycles its power, and then enters RUN mode.
4. For DXM models, click **BACK** to exit binding for that specific Node address.
5. Repeat steps 2 through 4 for all Nodes that will communicate to this Gateway.
6. Exit binding mode on the Gateway.
   - If you have a two-button Gateway, single-click either button.

---

[1] For FlexPower devices, do not apply more than 5.5 V DC to the gray wire.
[2] Some older M-GAGE Nodes (models DX80N*X1W0P0ZR) may require F-F binding despite having a single button. Refer to the Node's datasheet for specific information.

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- If you have a one-button Gateway, single-click the button.
- If you have a Gateway with no buttons, change the Gateway's rotary dials to a valid Network ID.
- If you have a DXM, click **BACK** until you return to the main menu.

When installing special kits with pre-mapped I/O, indicated by device model numbers beginning in DX80K, return the rotary dials to their original positions after binding. If the rotary dials are not returned to their original positions, the I/O mapping will not work.

After the binding process is complete, data begins transmitting to the Gateway.

LED Behavior for the Gateways and Nodes

Verify all devices are communicating properly. 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 radios transmitting at ≤ 250 mW: 6 feet
900 MHz radios transmitting at ≥ 500 mW: 15 feet
2.4 GHz radios (transmitting at 65 mW): 1 foot

LED behavior

Devices with Two LEDs		Devices with One LED	Gateway Status	Node Status
LED 1	LED 2			
Green		Green	Power is on	N/A
Flashing green			N/A	Radio link is okay
Flashing red	Flashing red	Flashing red	Device error	Device error
	Flashing amber	Green and red flash (amber) together	Modbus communication active	N/A
	Flashing red	Flashing red	Modbus communication error	No radio link (flashes once every 3 s)
Flashing red (alternately)	Flashing red (alternately)	Green and red flash alternately	Device is in binding mode	Device is in binding mode
		Red	Gateway is trying to conduct a Site Survey with a Node that doesn't exist	
		Green and red solid (amber) together	No radio communication detected	
Red (for 4 seconds)	Red (for 4 seconds)	Green/red solid (amber) for 4 seconds, then flash 4 times		Binding mode is complete

For Gateway systems, the Modbus communication LEDs refer to the communication between the Gateway and its host system (if applicable).

Conducting a Site Survey (Gateway and Nodes)

A Site Survey, also known as a Radio Signal Strength Indication (RSSI), analyzes the radio communications link between the Gateway and any Node within the network by analyzing the radio signal strength of received data packets and reporting the number of missed packets that required a retry.

Perform a Site Survey before permanently installing the radio network to ensure reliable communication. Activate Site Survey mode from either the Gateway buttons or the Gateway Modbus holding register 15. Only the Gateway can initiate a Site Survey, and the Site Survey analyzes the radio communications link with one Node at a time.

Conduct a Site Survey Using the Menu System

Initiate a Site Survey using the Gateway's buttons and menu system.

1. Remove the Gateway's rotary dial access cover.
2. Set the Gateway's rotary dials to the desired Node number.

   For example, to check the status of Node 1, set the Gateway's left rotary dial to 0 and the right rotary dial to 1. To check the status of Node 32, set the Gateway's left rotary dial to 3 and the right rotary dial to 2.

   The Gateway is now enabled to read the status of the selected Node. The display scrolls through the Node's I/O status.
3. Single-click button 1 to scroll across the menu levels until reaching the Site Survey (SITE) menu.
4. Single-click button 2 to enter the Site Survey menu.
5. Single-click button 2 to begin conducting a Site Survey with the Node selected in step 2.
   The Gateway analyzes the quality of the signal from the selected Node by counting the number of data packets it receives from the Node.
6. Examine reception readings (M, R, Y, G) of the Gateway at various locations.

   Site survey results display as a percentage. M represents the percent of missed packets while R, Y, and G represent the percent of received packets at a given signal strength.

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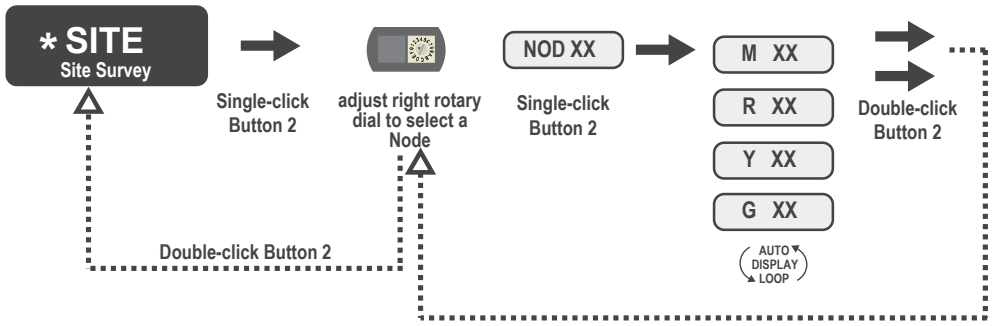
M = Percent of missed packets; R = RED marginal signal; Y = YELLOW good signal; G = GREEN excellent signal. Record the results if you need troubleshooting assistance from the factory.

7. Change the Gateway's rotary dials to conduct a Site Survey with another Node and repeat steps 2 through 6.
8. To end the Site Survey, double-click the Gateway's button 2.
9. Change the Gateway's rotary dials back to 0.
   The LCD displays the device readings for the Gateway.
10. Double-click button 2 to move back to the top level menu.
11. Single-click button 1 to return to RUN mode.
12. Install the rotary dial access cover, referring to the Installation section of the manual to create an IP67 seal.

SITE (Site Survey) Menu

The **SITE** menu displays the results of a Site Survey conducted with this Gateway.

SITE menu



The **SITE** menu displays the device number of the Node the Site Survey was conducted with as well as the missed, green, yellow, and red received packet count. The **SITE** menu is only available on the Gateways. To access the **SITE** menu, single-click button 1 to scroll across the menu levels until reaching the Site Survey (**SITE**) menu.

See "Conduct a Site Survey Using the Menu System" on page 3.

See "Interpreting the Site Survey Results" on page 6.

Conduct a Site Survey from a Gateway Board Model

Conducting a Site Survey, also known as an RSSI (Radio Signal Strength Indication), analyzes the radio communications link between the Gateway and any Node within the network by analyzing the radio signal strength of received data packets and reporting the number of missed packets that required a retry.

Perform a Site Survey before permanently installing the radio network to ensure reliable communication. Only the Gateway can initiate a Site Survey, and the Site Survey analyzes the radio communications link with one Node at a time. Follow these steps to conduct a Site Survey from the board module Gateway.

1. Set the Gateway's rotary dials to the Node address you'd like to conduct a Site Survey with.
   For example, to analyze the signal strength between this Gateway and Node 02, rotate the left rotary dial to 0 and the right rotary dial to 2.
   The Site Survey automatically begins running. If there is no device at address 02, the LED is solid red. If there is a device at address 02, the LED flashes amber.
2. Evaluate the signal strength. The amber LED flashes at specific rates to indicate the Site Survey results. Each signal strength represents the majority of the data packets being received at that signal strength. For example, a strong signal strength indicates the majority of the data packets were received at a strong signal, but a few may have been received at a good or weak signal strength.
   - Eight flashes per second: Very strong signal strength
   - Four flashes per second: Strong signal strength
   - Two flashes per second: Good signal strength
   - One flash per second: Weak signal strength
   - Solid amber LED: No radio communication detected
3. To exit the Site Survey, set the Gateway's rotary dials to 00. Otherwise, after 15 minutes the Gateway automatically exits Site Survey mode.
   The LED flashes green to indicate the Gateway is in standard operating mode.

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Conduct a Site Survey Using Modbus Commands

Use Modbus commands sent from the host system to start a Site Survey.

To start a Site Survey using a Modbus write holding register command, send a control code of 32 (0x20) and the Node number 1 through 47 (0x01 to 0x2F) to the Gateway Modbus holding register for I/O 15.

Modbus commands for I/O 15

	Modbus Register	
	[15:8]	[7:0]
I/O 15	Control Code	Data Field

I/O 15 control messages

I/O 15 Control Messages			
Control Code	**Data Field**	**Restrictions**	**Description**
32	Node # 1–15	Gateway only	Enable Site Survey between Gateway and Node defined by the data field. All error messages from the Gateway are ignored when running Site Survey. Only one Node can participate in Site Survey at a time. To disable the Site Survey, use control code 0x20 with Node 0. A Node must be enabled to run the Site Survey, then disabled before selecting the next Node.

Example Command

Example Modbus command for I/O 15

	Modbus Register	
I/O 15	32	02

When Site Survey runs, the accumulated results are stored in the Gateway's I/O 7 and I/O 8 holding registers. The LEDs on the both the Gateway and the Node's front panel display the signal strength for the wireless RF link. The quality of the communications link is indicated by:

Green LED = excellent signal strength
Amber LED = good signal strength
Red LED = poor signal strength

The signal strength is the transmitted signal strength relative to the ambient RF signal present in a specific location, or noise floor.

The Gateway also displays the Site Survey results on the LCD (for models with an LCD). For one transmit and receive interval, the Gateway saves the lowest signal strength. The LCD and Modbus registers contain the results of the last 100 samples. The totals are a running tally of the last 100 samples and are continuously updated. Four categories are displayed:

G (green) = excellent signal strength
Y (yellow) = good signal strength
R (red) = poor signal strength
M = Missed packet

To disable Site Survey, send control code 32 (0x20) and Node number 0 (0x0), which is represented as 8192 (0x2000).

Site Survey Data Holding

With Site Survey active, registers I/O 7 and 8 are Site Survey data holding registers that store the accumulated Site Survey results. Error collections in holding register 8 are saved when Site Survey runs and restored after Site Survey is disabled.

Site survey registers and example results

	Register		Example Results	
	[15:8]	**[7:0]**	**[15:8]**	**[7:0]**
I/O 7	Red Total	Missed Total	10	0
I/O 8	Green Total	Yellow Total	80	10

> **NOTE:** This is the current register arrangement when using Modbus/TCP or Modbus RTU. In some older models, the Modbus/TCP registers are reversed (missed and yellow totals are in [8:15], red and green totals are in [0:7]).

Conduct a Site Survey from the DXM

Conduct a Site Survey to verify the wireless communication between the radios within your wireless network.

Conduct the site survey when the Nodes and DXM Controller are at the proposed installation sites to determine each radio's signal strength with the DXM.

For a DX80 network, the Gateway controls the site survey and the results display on the LCD. Running a site survey on a DX80 network does not affect the throughput of the DX80 network. The DX80 Gateway-Node system can run a site survey analysis while the network is

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operational. For a MulitHop network, the client device passes the site survey request to the intended Modbus server device. The Site Survey runs and the results display on the LCD. Running a site survey on a MultiHop network stops all network traffic to that device.

1. On the DXM: Use the arrow buttons to select the **ISM Radio** menu and press **ENTER**.
2. Select the **Site Survey** menu and press **ENTER**.
3. Use the Up or Down arrows to select the device ID number and press **ENTER** to run the site survey with that radio.
   The site survey results display as green, yellow, red, and missed packets. Green indicates the highest signal strength, then yellow, and red. Missed packets were not received.
4. When you are finished running the Site Survey, press **Back** twice to return to the main menu and exit site survey mode.

If the Site Survey fails (100 missed packets), verify the radios are at least 10 feet from the DXM and/or rerun the binding procedure. If you find poor signal quality, common solutions include moving the DXM to a more central location relative to the Nodes or using higher-gain antennas on the DXM. Contact your local Banner Engineering representative for assistance.

Interpreting the Site Survey Results

Site Survey results are listed as a percentage of data packets received and indicate the signal strength of the received signal.

Site survey results

	Result	Description
	Green	Packets received at a strong signal strength. A strong signal strength is greater than −90 dBm at the receiver.
	Yellow	Packets received at a good signal strength. A good signal is between −90 and −100 dBm at the receiver.
	Red	Packets received at a weak signal strength. A weak signal is less than −100 dBm at the receiver.
	Missed	Packets not received on the first transmission and requiring a retry.

Judging if the reliability of a network's signal meets the needs of the application is not just a matter of green, yellow, and red packets received. In normal operating mode, when data packets are not received, the transmitter re-sends the packet until all data is received.

For slow monitoring applications such as a tank farm, where data is required in terms of seconds or minutes, receiving most of the data in the 'red' range, indicating a weak but reliable signal, transmits enough data for accurate monitoring. Nodes positioned near the outside range of the radio signal may have 90% of the data packets received in the red zone, again indicating a weak, but reliable signal.

Improving Your Site Survey Results

Refer to the Sure Cross Installation Guide (p/n 151514) for installation details and tips and tricks for improving your radio network's performance.

If your Site Survey results have more yellow than green, consider replacing the Node's antenna with one the following:

- Use a 2 dBi Omni dome antenna (model BWA-9O2-D) or a 5 dBi Omni antenna (model BWA-9O5-C)
- Use a 6 dBi Yagi (directional) antenna (model BWA-9Y6-A)

If the distance between devices is greater than 5,000 meters (3 miles) line-of-sight or objects, such as trees or man-made obstructions, interfere with the path, and the MISSED packet count exceeds 25 per 100 packets, consider the following steps:

- Install the antenna(s) remotely at a higher position (requires an antenna extension cable);
- Use a higher gain antenna;
- Decrease the distance between devices; or
- Use data radios to extend the position of the Gateway relative to the host system.

Performance Levels

Referenced omni-directional and directional antennas are listed at the end of this section.

Very strong signal strength is 100 green signals (displayed on the LCD) or eight flashes per second (models without LCDs). If the included 2 dBi OMNI antenna does not achieve this signal strength, use a different omni antenna, such as the 2 dBi dome antenna (same gain, different form factor) or 5 dBi antenna (higher gain). You may also use a low-gain directional antenna, such as the 6.5 dBd Yagi antenna.

Strong signal strength is represented by some green signals and some yellow signals (very few red signals and very few missed signals) or four flashes per second. To improve your radio performance, consider using a different omni antenna, such as the 2 dBi dome antenna, 5 dBi antenna, 6 dBi antenna, or 8 dBi antenna. You may also use a low-gain directional antenna, such as the 6.5 dBd Yagi antenna. We also recommend installing the antenna(s) remotely at a higher position. Additional antenna cables are available from Banner Engineering if needed.

Good or weak signal strength equals some yellow signals and a majority of red signals (very few green signals, a small number of yellow signals, and a small to medium number of missed signals) or one to two flashes per second. To improve your radio performance, consider

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using one of the 6 dBi or 8 dBi omni-directional antennas or the 10 dBd directional antenna. We also recommend installing the antenna(s) remotely at a higher position. Additional antenna cables are available from Banner Engineering if needed.

No radio communication is when more than 50% of the radio signals are missed or a solid amber LED. To improve radio performance, use a 8 dBi omni-direction antenna or a 10 dBd directional antenna and elevate the antenna above any obstructions. The lack of signals may also be due to the distance between the Gateway (parent/client radio) and Nodes (remote radio). If this is the case, please contact Banner Engineering for further assistance. We also recommend installing the antenna(s) remotely at a higher position. Additional antenna cables are available from Banner Engineering if needed.

Omni-Directional (Omni) Antennas

BWA-9O2-D (2 dBi OMNI antenna, dome style)—For applications where a durable antenna is needed external to the radio enclosure.

BWA-9O5-C (5 dBi OMNI antenna with RP-SMA connector)—Antenna for medium antenna performance increase or to elevate the antenna above obstacles such as buildings or tall crops. We recommend using one of the following LMR200 extension cables (RP-SMA to RP-SMA):

- BWC-2MRSFRS3 (3 meters long)
- BWC-2MRSFRS6 (6 meters long)
- BWC-2MRSFRS9 (9 meters long)
- BWC-2MRSFRS12 (12 meters long)

BWA-9O6-AS (6 dBi OMNI antenna with Type N cable connector)— Antenna for strong antenna performance increase. Requires a RP-SMA to Type N converter cable (BWC-1MRSMN05). May require one of the following antenna extension cables:

- BWC-4MNFN3 (3 meters long)
- BWC-4MNFN6 (6 meters long)
- BWC-4MNFN15 (15 meters long)
- BWC-4MNFN30 (30 meters long)

Requires a surge suppression device (model BWC-PRC827-DC) if the antenna is external to a building, connected to other electronics, or elevated.

BWA-9O8-AS (8 dBi OMNI antenna with Type N cable connector)—Antenna for very strong antenna performance increase. Requires a RP-SMA to Type N converter cable (model BWC-1MRSMN05). May require one of the following antenna extension cables:

- BWC-4MNFN3 (3 meters long)
- BWC-4MNFN6 (6 meters long)
- BWC-4MNFN15 (15 meters long)
- BWC-4MNFN30 (30 meters long)

Requires a surge suppression device (model BWC-PRC827-DC) if the antenna is external to a building, connected to other electronics, or elevated.

Directional (Yagi) Antennas

BWA-9Y6-A (6.5 dBd YAGI antenna with Type N cable connector)—Antenna for strong, directional antenna performance. Requires a RP-SMA to Type N converter cable (model BWC-1MRSMN05). May require one of the following antenna extension cables:

- BWC-4MNFN3 (3 meters long)
- BWC-4MNFN6 (6 meters long)
- BWC-4MNFN15 (15 meters long)
- BWC-4MNFN30 (30 meters long)

Requires a surge suppression device (model BWC-PRC827-DC) if the antenna is external to a building, connected to other electronics, or elevated.

BWA-9Y10-A (10 dBd YAGI antenna with Type N cable connector)—Antenna for very strong, directional antenna performance increase. Requires a RP-SMA to Type N converter cable (model BWC-1MRSMN05). May requires one of the following antenna extension cables:

- BWC-4MNFN3 (3 meters long)
- BWC-4MNFN6 (6 meters long)
- BWC-4MNFN15 (15 meters long)
- BWC-4MNFN30 (30 meters long)

Requires a surge suppression device (model BWC-PRC827-DC) if the antenna is external to a building, connected to other electronics, or elevated.

Installing Your Sure Cross® Radios

Please refer to one of these instruction manuals to install your wireless network components.

- DX80 Performance Wireless I/O Network Instruction Manual: 132607
- MultiHop Data Radio Instruction Manual: 151317

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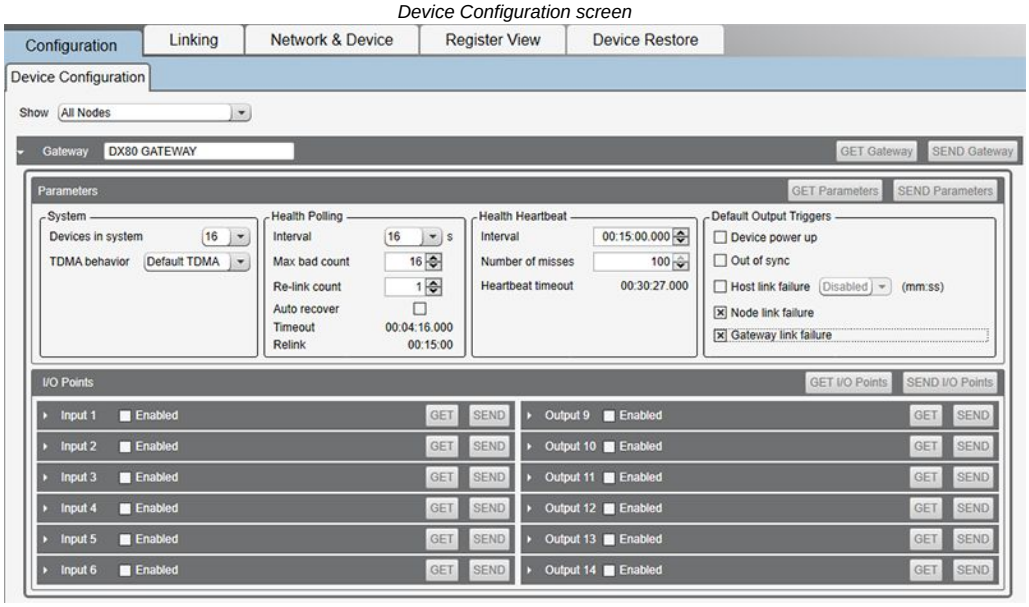
DX80 Performance Configuration Software

The 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.

Device Configuration screen



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 the supplied USB or Ethernet connection. Download the most recent revisions of the configuration software from Banner Engineering's website: https://www.bannerengineering.com/us/en/products/wireless-sensor-networks/reference-library/software.html.

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

Warnings

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: Please download the complete DX80 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 DX80 Performance Gateway or 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 DX80 Performance Gateway or 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.

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.

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IMPORTANT:

- **Never operate a radio without connecting an antenna**
- Operating 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 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.

Banner Engineering Corp Limited Warranty

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