Features

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 two selectable discrete inputs, two NMOS discrete outputs, and two thermistor inputs when configured for discrete mode; two selectable discrete inputs, two NMOS discrete outputs, two analog inputs, and two thermistor inputs when configured for analog mode; switch power outputs in each mode
- Selectable transmit power levels of 250 mW or 500 mW for 900 MHz models and 65 mW for 2.4 GHz models
- *Flex*Power® 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
- 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

Models

Model	Freq.	Power	Housing	Inputs and Outputs	
DX80N9X1S-P1E **DX80N9X1S-P1E NB** (ships without a battery)	900 MHz ISM Band	10 V DC to 30 V DC or integrated battery	IP65, NEMA 4X	**Discrete Mode** **Inputs**: Two selectable discrete and two thermistor **Outputs**: Two NMOS/sinking discrete **Switch Power**: Two	**Analog Mode** **Inputs**: Two selectable discrete, two analog (0–20 mA or 0–10 V), and two thermistor **Outputs**: Two NMOS/sinking discrete **Switch Power**: One
DX80N2X1S-P1E **DX80N2X1S-P1E NB** (ships without a battery)	2.4 GHz ISM Band	10 V DC to 30 V DC or integrated battery	IP65, NEMA 4X		

The switch power model can be configured to supply continuous power. For more information and detailed instructions, refer to the technical note "Configuring for Continuous Switch Power or Host Controlled Switch Power," part number b_3099584.

If you purchase a model without the battery, Banner Engineering recommends lithium D cell battery **BWA-BATT-001**.

The following models are no longer available for order, but are still covered by the information in this document.

Model	Freq.	Power	Housing	Inputs and Outputs	
DX80N9X2S-P1	900 MHz ISM Band	10 V DC to 30 V DC or battery supply module	IEC IP67; NEMA 6	**Discrete Mode** **Inputs**: Two selectable discrete and two thermistor **Outputs**: Two NMOS/sinking discrete **Switch Power**: Two	**Analog Mode** **Inputs**: Two selectable discrete, two analog (0–20 mA or 0–10 V), and two thermistor **Outputs**: Two NMOS/sinking discrete **Switch Power**: One
DX80N2X2S-P1	2.4 GHz ISM Band	10 V DC to 30 V DC or battery supply module	IEC IP67; NEMA 6		

Storage and Sleep Modes

Storage Mode (applies to battery-powered models only)—While in **storage mode**, the radio does not operate. To put any integrated battery Sure Cross® radio into storage mode, press and hold button 1 for five seconds. To wake the device, press and hold button 1 for five 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 one 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.

Configuration Instructions

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)

Original Instructions
14-Feb-25

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155748
p/n: 155748 Rev. S

ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

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.

Configure the DIP Switches

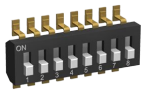
Before changing DIP switch positions, disconnect the power.[1]

Any changes made to the DIP switches are not recognized until after power is cycled to the device. For parameters not set using the DIP switches, use the configuration software to make configuration changes. For parameters set using the DIP switches, the DIP switch positions override any changes made using the 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. Skip this step if there is no ribbon cable (integrated battery models) or the ribbon cable is glued down (for C housing models).
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

	Switches	
Device Settings	**1**	**2**
Transmit power level: 500 mW (27 dBm) (default)	OFF*	
Transmit power level: 250 mW (24 dBm), DX80 compatibility mode	ON	
Analog configuration (default)		OFF*
Discrete configuration		ON

Analog or Discrete Configuration

Select between an analog configuration or a discrete configuration using the DIP switch specified in the table. The default switch settings for this device are all in the OFF position.

DIP Switch Settings for Analog Configuration (Switch 2 OFF)

Select between an analog configuration or a discrete configuration using DIP switch 2.

For analog configuration, DIP switch 2 is in the OFF position (factory default). Analog configuration has analog IN 1 linked to switch power 1 (SP1) and is programmable using switches four through eight. Sample and report rates for analog input 2 (not available in the integrated

[1] For devices powered by batteries integrated into the housing, triple-click button 2, then double-click button 2 to reset the device without removing the battery.

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battery model) are listed in the specifications. Discrete inputs 1 and 2 are also active in this configuration and the input types are defined using switch 3. Two sinking discrete outputs are active for this configuration.

Analog Configuration, Switch 2 OFF	DIP Switches					
Descriptions	3	4	5	6	7	8
Discrete Sinking (NPN)	OFF*					
Discrete Sourcing (PNP)	ON					
Boost Voltage: 10V (to Analog IN 1)		OFF*				
Boost Voltage: 15V (to Analog IN 1)		ON				
Warm-up Time 10 milliseconds			OFF*			
Warm-up Time 500 milliseconds			ON			
Sample/Report Rate 1 second				OFF	OFF	OFF
Sample/Report Rate 2 seconds				OFF	OFF	ON
Sample/Report Rate 4 seconds				OFF	ON	OFF
Sample/Report Rate 16 seconds				OFF	ON	ON
Sample/Report Rate 64 seconds				ON	OFF	OFF
Sample/Report Rate 5 minutes				ON	OFF	ON
Modbus or software configured (overrides DIP switches)				ON	ON	OFF
Sample/Report Rate 15 minutes				ON	ON	ON

Analog IN 2 (not available in integrated battery model), Discrete 1, and Discrete 2 are not powered from switched power terminals. In this configuration, SP2 is disabled. If you need SP2, contact the factory.

DIP Switch Settings for Discrete Configuration (DIP Switch 2 ON)

The discrete configuration matches the switch power outputs (SP1, SP2) with the discrete inputs. The discrete configuration is selected when switch 2 is in the ON position. Two sinking discrete outputs are active for this configuration.

Discrete Configuration, Switch 2 ON	DIP Switches					
Descriptions	3	4	5	6	7	8
Discrete Sinking (NPN)	OFF*					
Discrete Sourcing (PNP)	ON					
Boost Voltage: 5V		OFF*				
Boost Voltage: 10V		ON				
Warm-up Time 4 milliseconds			OFF*			
Warm-up Time 10 milliseconds			ON			
Sample/Report Rate 62.5 milliseconds				OFF	OFF	OFF
Sample/Report Rate 125 milliseconds				OFF	OFF	ON
Sample/Report Rate 250 milliseconds				OFF	ON	OFF
Sample/Report Rate 500 milliseconds				OFF	ON	ON
Sample/Report Rate 1 second				ON	OFF	OFF
Sample/Report Rate 2 seconds				ON	OFF	ON
Modbus or software configured (overrides DIP switches)				ON	ON	OFF
Sample/Report Rate 16 seconds				ON	ON	ON

Discrete IN 1 uses switched power 1 (SP1). Discrete IN 2 uses switched power 2 (SP2).

Transmit Power Levels

The 900 MHz radios have a high output option that will transmit at 500 mW (27 dBm). The low output option transmits at 250 mW (24 dBm). The 250 mW mode reduces the radio's range but improves the battery life in short-range applications. 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).

Sensor Switched Power Voltage

The sensor switched power voltage is the power supplied by the Node to the sensor.

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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 DX80 Performance 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.

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 battery-powered applications, setting the report rate to a slower rate extends the battery life.

Warm-Up Time
The warm-up time defines how long the device must power up the sensor before a stable sensor reading is taken.

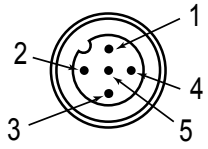
Mixing Performance and Non-Performance (150 mW) Radios in the Same Network
To comply with federal regulations, the 150 mW radios and 500 mW radios communicate differently. All Performance models offer the ability to select between 250 mW and 500 mW operation using the DIP switches.

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)

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 male quick-disconnect connector 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 *Flex*Power devices, do not apply more than 5.5 V to the gray wire.

5-pin M12 Male Quick Disconnect Connector	Pin	Wire Color	Nodes Powered by 10 to 30 V DC	Nodes Powered by Battery or Battery Pack
	1	Brown	10 to 30 V DC	
	2	White		
	3	Blue	DC common (GND)	DC common (GND)
	4	Black		
	5	Gray		3.6 to 5.5 V DC

P1 Wiring Boards
These are the wiring boards for the DX80**M6S-P1, -P1C, and -P1E models.

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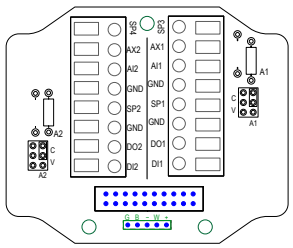
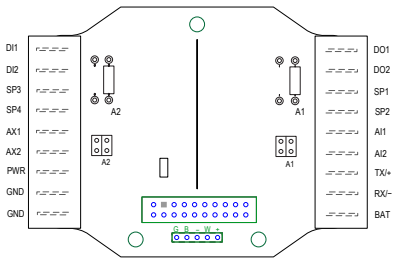
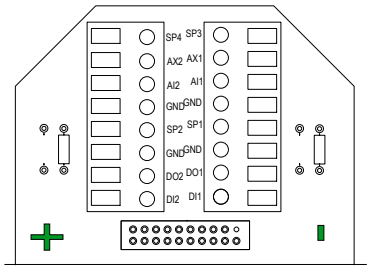
P1 Models	P1C Models	P1E Models
		
AI*x* or A*x*. Analog IN *x* AX1. Thermistor AX2. Thermistor AO*x*. Analog OUT *x* B+. 3.6 V DC to 5.5 V DC (use for battery-powered models only)	DI*x*. Discrete IN *x* DO*x*. Discrete OUT *x* GND. Ground/DC common connection SP*x*. Switch Power; provides variable power sources for external devices	PWR. 10 V DC to 30 V DC power connection RX/-. Serial communication line for the Gateway. No connection for Nodes TX/+. Serial communication line for the Gateway; no connection for Nodes

Apply Power to the DX80C Nodes

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 *Flex*Power devices, do not apply more than 5.5 V to the B+ terminal.

Wiring for the C housing models

Terminal Label	Gateway and DX85	10 V DC to 30 V DC Powered Nodes	Battery-Powered Nodes
V+	10 V DC to 30 V DC	10 V DC to 30 V DC	
Tx/+	RS485 / D1 / B / +		
V–	DC common (GND)	DC common (GND)	DC common (GND)
Rx/–	RS485 / D0 / A / -		
B+			3.6 V DC to 5.5 V DC

Apply Power to the DX80...E Radios

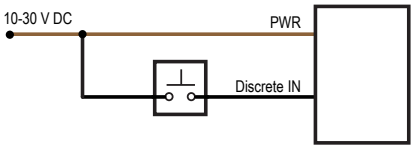
Connecting power to the communication pins will cause permanent damage. The integrated battery DX80...E radios may also be powered by 10 V DC to 30 V DC. The power for the sensors can be supplied by the radio's SPx terminals or from the 10 V DC to 30 V DC used to power the radio. The BAT connection is 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.

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

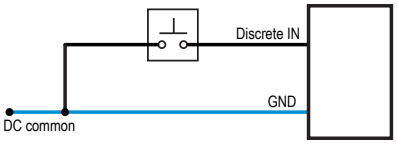
P1 Wiring Diagrams

Connecting power to the communication pins will cause permanent damage. Do not exceed analog input ratings for analog inputs. Only connect sensor outputs to analog inputs.

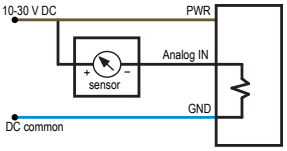
Discrete Input Wiring for PNP Sensors



Discrete Input Wiring for NPN Sensors



Analog Input Wiring (10–30 V DC Power)



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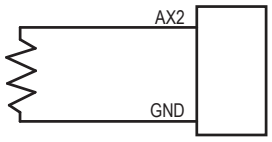
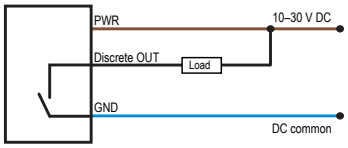
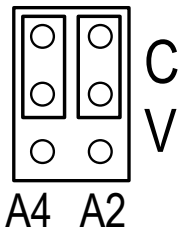
Thermistor Input Wiring  	*Discrete Output Wiring (NPN or NMOS)*  	To power the sensor using the switch power output (SPx), replace the PWR with SPx in these wiring diagrams.
Use AX1 or AX2 for the thermistor input wiring.		

Configure the Universal Analog IO by Setting Jumpers

For models with universal analog configuration jumpers, by default, the analog input jumpers are set to use current (0–20 mA). To use the voltage (0–10 V) analog input, follow these steps.

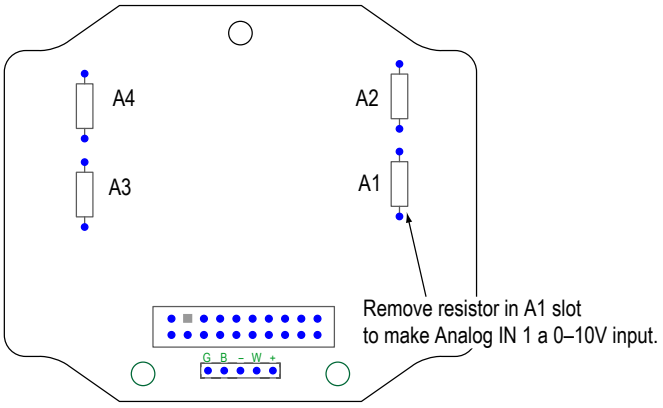


1. Disconnect the power from the device.
2. Open the housing and access the wiring board.
3. Move the jumper for the desired analog input (shown are analog 2 and analog 4) from the C position (shown) to the V position. For the board models with two pins instead of three, remove the jumper to select 0–10 V configuration.
4. Close the housing and reconnect the power.
5. With the Gateway connected to your computer, launch the DX80 Performance Configuration Software.
6. From the **Device › Configuration Settings** menu, select **Comm Port** and click **Connect**.
7. Go to the **Configuration › Device Configuration** screen.
8. Click the arrow next to the Node number to view its parameters.
9. Click **GET Node**.
10. From the **Units** drop-down list, select 0–10V.
11. Click **SEND** to send the changes to this Node's configuration back to the Gateway.

Configure the Universal Analog IO by Cutting Resistors

For models without analog configuration jumpers, you must remove the installed resistors to configure inputs to use 0 to10 V instead of 0 to 20 mA. For example, to make analog input 1 a 0 to 10 V input, follow these instructions.

Note that a 220 ohm 0.1% resistor must be installed for a 0 to 20 mA input. Remove the resistor to configure the input as a 0 to 10 V input.



1. Cut out the resistor installed in the A1 (analog 1) slot.
   Your wiring board may differ slightly from the board shown. Use the board's labels to confirm you have selected the correct resistor to cut.
2. Launch the DX80 Performance Configuration Software.
3. After connecting to your network, go to the **Configuration › Device Configuration** screen.
4. Click on the arrow next to your device. For this example, we're using Node 1.
   The inputs and outputs for Node 1 display.
5. Click **GET Node** to download the existing configuration for your Node.
   The existing configuration for your Node is downloaded and loaded into the software.
6. For the input or output you are configuring, click on the arrow next to the I/O point. For this example, we're configuring Input 1.

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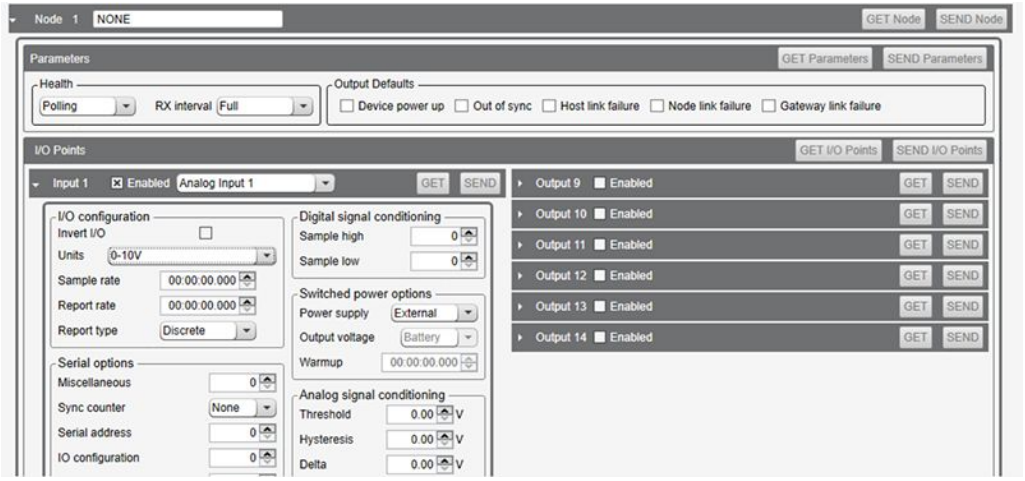

The I/O point's parameters display.

7. Verify the I/O point is enabled, then from the Units drop-down list, select 0-10V.
8. Click **SEND Node** for the Node you configured.
   The configuration changes are uploaded back to your network.

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).

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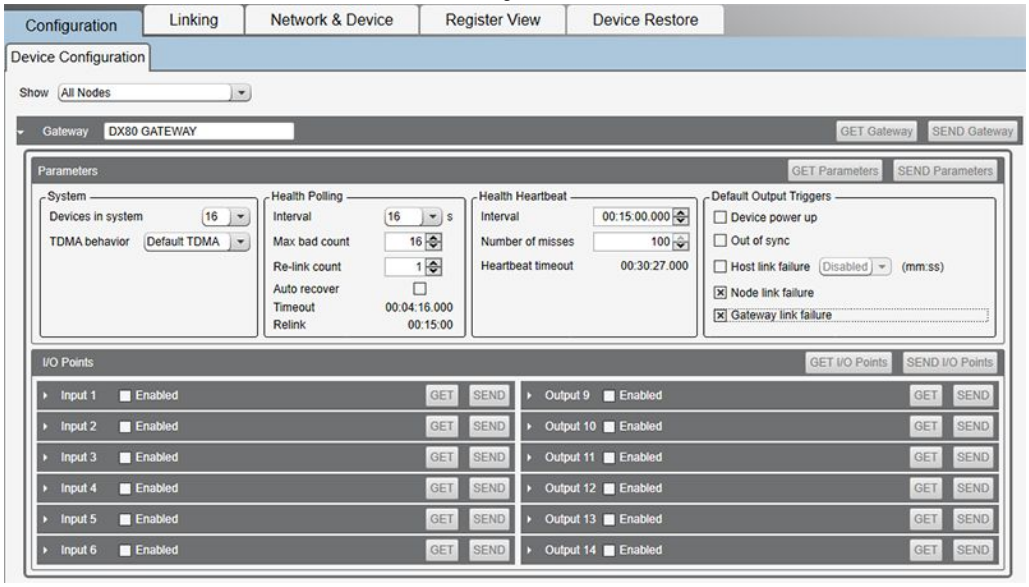
DX80 Performance Configuration Software

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

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

P1 Holding Registers

The temperature = (Modbus register value) ÷ 20. 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.

Modbus Registers		EIP Registers		I/O Type	I/O Range		Holding Register Representation (Dec.)		Terminal Labels
Gateway	Node	Node			Min.	Max.	Min.	Max.	
1	1 + (Node# × 16)	0 + (Node# × 8)	Instance 100 / N7	Discrete IN 1	0	1	0	1	DI1
2	2 + (Node# × 16)	1 + (Node# × 8)		Discrete IN 2	0	1	0	1	DI2
3	3 + (Node# × 16)	2 + (Node# × 8)		Analog IN 1 (mA or V)	0.0	20.0 / 10.0	0	65535	AI1
4	4 + (Node# × 16)	3 + (Node# × 8)		Analog IN 2 (mA or V)					
5	5 + (Node# × 16)	4 + (Node# × 8)		Thermistor IN 1 (°F/°C)	-1638.3	+1638.4	-32768	32767	AX1
6	6 + (Node# × 16)	5 + (Node# × 8)		Thermistor IN 2 (°F/°C)					
7	7 + (Node# × 16)	6 + (Node# × 8)		Reserved					
8	8 + (Node# × 16)	7 + (Node# × 8)		Device Message					
9	9 + (Node# × 16)	0 + (Node# × 8)	Instance 112 / N14	Discrete OUT 1	0	1	0	1	DO1
10	10 + (Node# × 16)	1 + (Node# × 8)		Discrete OUT 2	0	1	0	1	DO2

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Modbus Registers		EIP Registers		I/O Type	I/O Range		Holding Register Representation (Dec.)		Terminal Labels
Gateway	Node	Node			Min.	Max.	Min.	Max.	
	...								
15	15 + (Node# × 16)	6 + (Node# × 8)		Control Message					
16	16 + (Node# × 16)	7 + (Node# × 8)		Reserved					

Install or Replace the Battery on a DX80E Model

Follow these steps to replace the lithium "D" cell battery or batteries in any DX80E model.

1. Remove the four screws mounting the face plate to the housing and remove the face plate. If there is a radio cover on the faceplate, do not remove the radio cover from the faceplate.
2. If applicable, 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

Radio Specifications for Performance Models

Radio Transmit Power (900 MHz, 500 mW radios)

Conducted: 27 dBm (500 mW)

EIRP with the supplied antenna: < 36 dBm

Radio Transmit Power (2.4 GHz radios)

Conducted: < 18 dBm (65 mW)

EIRP with the supplied antenna: < 20 dBm (100 mW)

Radio Range

A 2 dB antenna ships with this device.

Transmit power and range are subject to many factors, including antenna gain, installation methods, characteristics of the application, and environmental conditions.

Please refer to the following documents for installation instructions and high-gain antenna options.

Installing Your Sure Cross® Radios (151514)
Conducting a Site Survey (133602)
Sure Cross® Antenna Basics (132113)

Antenna Minimum Separation Distance

900 MHz radios transmitting at ≥ 500 mW: 4.57 m (15 ft) with the supplied antenna

2.4 GHz radios transmitting at 65 mW: 0.3 m (1 ft) with the supplied antenna

Link Timeout (Performance)

Gateway: Configurable via User Configuration Software

Node: Defined by Gateway

Spread Spectrum Technology

FHSS (Frequency Hopping Spread Spectrum)

Antenna Connection

Ext. Reverse Polarity SMA, 50 Ohms

Max Tightening Torque: 0.45 N·m (4 lbf·in)

900 MHz Compliance (SX7023EXT Radio Module)

Radio module is indicated by the product label marking

Contains FCC ID: UE3SX7023EXT

Contains IC: 7044A-SX7023EXT

2.4 GHz Compliance (SX243 Radio Module)

Radio module is indicated by the product label marking

Contains FCC ID: UE3SX243

Radio Equipment Directive (RED) 2014/53/EU

Contains IC: 7044A-SX243

FCC Part 15 Class A for Intentional Radiators

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not

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installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

(Part 15.21) Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Industry Canada Statement for Intentional Radiators

This device contains licence-exempt transmitters(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil contient des émetteurs/récepteurs exemptés de licence conformes à la norme Innovation, Sciences, et Développement économique Canada. L'exploitation est autorisée aux deux conditions suivantes:

1. L'appareil ne doit pas produire de brouillage.
2. L'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

P1 Node Specifications

Supply Voltage

DX80 and "C" Housing Models: 10 V DC to 30 V DC or 3.6 V DC to 5.5 V DC low power option Outside the USA: 12 V DC to 24 V DC, ±10% or 3.6 V DC to 5.5 V DC low power option[2]

"E" Housing Models: 3.6 V DC (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.)

Current Draw at 24 V DC

Approximately 4 mA

Current Draw at 3.6 V DC

900 MHz, 1 Watt: Approximately 1 mA

900 MHz, 250 mW: Approximately 0.5 mA

2.4 GHz, 65 mW: Approximately 0.3 mA

Housing

Polycarbonate housing and rotary dial cover; polyester labels; EDPM rubber cover gasket; nitrile rubber, non-sulphur cured button covers

Weight: 0.26 kg (0.57 lbs)

DX80 and "C" Housing Models: Mounting: #10 or M5 (SS M5 hardware included)

"E" Housing Models: Mounting: 1/4-inch or M7 (SS M7 hardware included)

Max. Tightening Torque: 0.56 N·m (5 lbf·in)

Interface

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

Wiring Access

DX80 Models: Four PG-7, one 1/2-inch NPT, one 5-pin M12 male quick-disconnect connector

"C" Housing Models: External terminals

"E" Housing Models: Two 1/2-inch NPT

Discrete Input

Rating: 3 mA max current at 30 V DC

Sample / Report Rates: DIP switch configurable

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

[2] For European applications, power this device from a Limited Power Source as defined in EN 60950-1.

Analog Inputs

Rating in 0–20 mA mode: 24 mA

Rating in 0–10 V mode: 10 V

Impedance: Approximately 220 Ohms

Analog Input 1 Sample/Report Rates: DIP switch configurable

Analog Input 2 Sample/Report Rates: 1 second / 16 seconds

Accuracy: 0.2% of full scale +0.01% per °C

Resolution: 12-bit

Discrete Output Rating (Performance NMOS)

Less than 1 A max current at 30 V DC

ON-State Saturation: Less than 0.7 V at 20 mA

Discrete Output

Update Rate: 1 second

ON Condition: Less than 0.7 V

OFF Condition: Open

Output State Following Timeout: De-energized (OFF)

Switch Power Outputs

Analog configuration: one (SP1)

Discrete configuration: two (SP1 and SP2)

Host configuration: up to four

Thermistor Input

Model: Omega's 44006 or 44031 family of 10 kOhm thermistors

Sample Rate: 1 second

Report Rate: 16 seconds

Accuracy: 0.4 °C (10 °C to 50 °C); Up to 0.8 °C (−40 °C to 85 °C)

Certifications

CE/UKCA approval only applies to 2.4 GHz models

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Environmental Specifications (IP67 Housing Models)

Operating Conditions

–40 °C to +85 °C (–40 °F to +185 °F) (Electronics); –20 °C to +80 °C (–4 °F to +176 °F) (LCD)

95% maximum relative humidity (non-condensing)

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

Shock and Vibration

All models meet IEC 60068-2-6 and IEC 60068-2-27 testing criteria

Shock: 30G 11 ms duration, half sine wave per IEC 60068-2-27

Vibration: 10 Hz to 55 Hz, 0.5 mm peak-to-peak amplitude per IEC 60068-2-6

Environmental Ratings

IEC IP67; NEMA 6

For installation and waterproofing instructions, go to www.bannerengineering.com and search for the complete instruction manual (p/n 132607)

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

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 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

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

Refer to the Sure Cross® DX80 Performance (p/n 132607) or the Sure Cross® MultiHop (p/n 151317) instruction manual for installation and waterproofing instructions.

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

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 +176 °F) (LCD)

95% maximum relative humidity (non-condensing)

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

Shock and Vibration

All models meet IEC 60068-2-6 and IEC 60068-2-27 testing criteria

Shock: 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

IP65

Refer to the Sure Cross® DX80 Performance (p/n 132607) or the Sure Cross® MultiHop (p/n 151317) instruction manual for installation and waterproofing instructions.

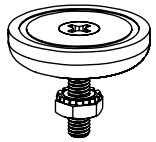
Operating the devices at the maximum operating conditions for extended periods can shorten the life of the device.

Accessories

Mounting Brackets

BWA-BK-020

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



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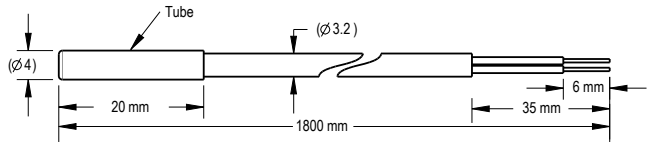
Thermistor Probes

BWA-THERMISTOR-PROBE-003

- 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 (–4 °F to +221 °F)
- Maximum Power Rating: 30 mW at 25 °C; derated to 1 mW at 125 °C
- Dissipation Constant: 1 mW/°C
- 316 stainless steel 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 × 25mm SS screws, four M5-0.8 × 16 mm SS screws, four M5-0.8 mm SS hex nuts, and four #8-32 × 3/4" SS bolts
- **BWA-HW-003**: PTFE tape
- **BWA-9O2-C** (900 MHz) or **BWA-2O2-C** (2.4 GHz): Antenna, 2 dBd Omni, Rubber Swivel RP-SMA Male (not included with internal antenna models)
- **MQDC1-506**: 5-pin M12 (single ended) straight cordset, 2 m (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 Performance models or 152653 for MultiHop models)

Included with the DX80..E Models

- Mounting hardware kit
- BWA-HW-003: PTFE tape
- BWA-9O2-C (900 MHz) or BWA-2O2-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

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 Performance P1 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 P1 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 P1 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

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 (con Antena)

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

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

Approved Antennas

BWA-9O2-C--Antena, Omni 902-928 MHz, 2 dBd, junta de caucho, RP-SMA Macho
BWA-9O5-C--Antena, Omni 902-928 MHz, 5 dBd, junta de caucho, RP-SMA Macho
BWA-9O6-A--Antena, Omni 902-928 MHz, 6 dBd, fibra de vidrio, 1800mm, N Hembra
BWA-9Y10-A--Antena, Yagi, 900 MHz, 10 dBd, N Hembra

Mexican Importer

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