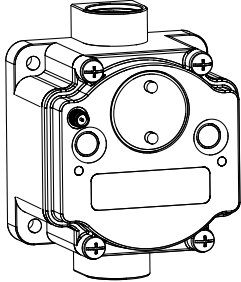# Sure Cross® Performance P14 Node

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 one configurable discrete input, one configurable analog input, one thermistor input, one asynchronous counter input, and one switch power output
- Selectable transmit power levels of 250 mW or 1 Watt for 900 MHz models and 65 mW for 2.4 GHz models
- DIP switches for user configuration
- Frequency Hopping Spread Spectrum (FHSS) technology 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
- Field-wireable terminals for wiring I/O

Models

Model	Frequency	Inputs and Outputs	
DX80N9X1S-P14	900 MHz ISM Band	**Discrete Mode** **Inputs**: One configurable discrete, one thermistor, one asynchronous counter **Switch Power Outputs**: One	**Analog Mode** **Inputs**: One configurable discrete, one configurable analog, one thermistor, one asynchronous counter **Switch Power Outputs**: One
DX80N2X1S-P14	2.4 GHz ISM Band		

This 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 (p/n b_3099584).

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 lithium D cell battery **BWA-BATT-001**.

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)

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. Any changes made to the DIP switches are not recognized until after power is cycled to the device.

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.

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 (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: 1 Watt (30 dBm)	OFF*	
Transmit power level: 250 mW (24 dBm), DX80 compatibility mode	ON	
Analog configuration		OFF*
Discrete configuration		ON

* Default configuration

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.

Transmit Power Levels

The 900 MHz radios transmit at 1 Watt (30 dBm) or 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).

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). The analog cofiguration pairs the switch power output with the analog input and is programmable using switches four through eight. The discrete input is active in this configuration and its input type is defined using switch 3.

Analog Configuration, Switch 2 OFF	DIP Switches					
Descriptions	**3**	**4**	**5**	**6**	**7**	**8**
Discrete Sinking (NPN)	OFF*					
Discrete Sourcing (PNP)	ON					
Sensor Switched Power Voltage: 10 V (to Analog IN 1)		OFF*				
Sensor Switched Power Voltage: 15 V (to Analog IN 1)		ON				
Warm-up Time 10 milliseconds			OFF*			
Warm-up Time 500 milliseconds			ON			

Analog Configuration, Switch 2 OFF	DIP Switches					
Descriptions	**3**	**4**	**5**	**6**	**7**	**8**
Modbus or UCT Configured (Overrides DIP Switches)				OFF	OFF	OFF
Sample/Report Rate 15 minutes				OFF	OFF	ON
Sample/Report Rate 5 minutes				OFF	ON	OFF
Sample/Report Rate 64 seconds				OFF	ON	ON
Sample/Report Rate 16 seconds				ON	OFF	OFF
Sample/Report Rate 4 seconds				ON	OFF	ON
Sample/Report Rate 2 seconds				ON	ON	OFF
Sample/Report Rate 1 second				ON	ON	ON

Discrete Configuration (DIP Switch 2 ON)

The discrete configuration pairs the switch power output with the discrete input. The discrete configuration is selected when switch 2 is in the ON position.

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

Sensor Switched Power Voltage

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

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.

Wire for Power and I/O

Follow these instructions to wire your device for power, ground, inputs, and outputs. The jumper settings determine which inputs and outputs are active.

| Input Configuration	Jumper Setting	Wiring Terminals	Wiring Diagram Label	Description
Discrete Input	J1 set to 5	1	Discrete IN	Discrete Input (default)
Reserved	J1 set to 8	1		Reserved for future use
		2	GND	Ground
		3	SPx	Switch Power 1 (3.6 to 24 V)
Analog Current Input	J2 set to C	4	Analog IN	Analog Input (0-20 mA) (default)
Analog Voltage Input	J2 set to V	4	Analog IN	Analog Input (0-10 V)
		5	GND	Ground
Counter Input	J3 set to 3	6	Counter IN	Counter Input
Thermistor Input	J3 set to 4	6	Thermistor IN	Thermistor Input (default)
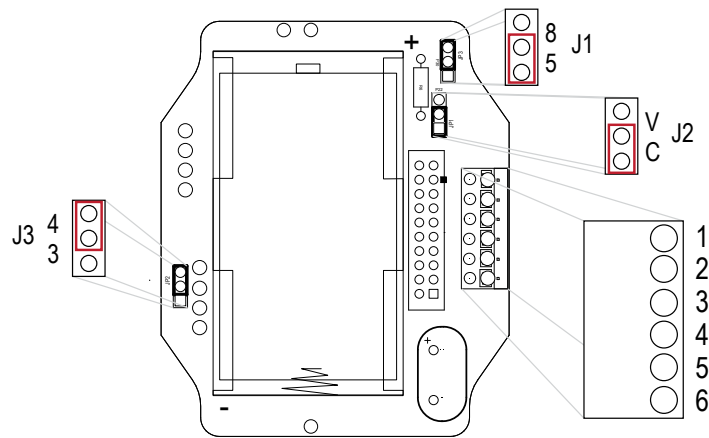
Wiring Diagrams

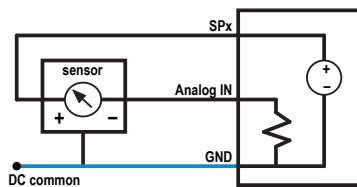Discrete Input Wiring for PNP Sensors
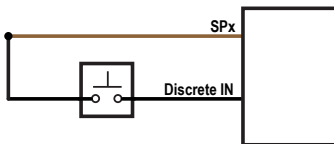
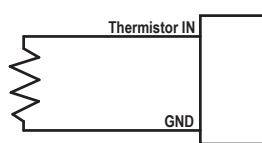Discrete Input Wiring for NPN Sensors
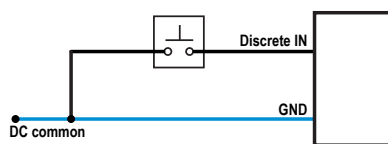
Counter Input Wiring
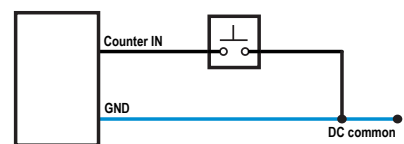
Analog Input Wiring

Thermistor Input Wiring

Do not exceed analog input ratings for analog inputs. Only connect sensor outputs to analog inputs.

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

Table 1: LED behavior for the Nodes

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

Configuring the Discrete Input

By default, the J1 jumper is set to 5 for a discrete input and DIP switch 3 is set to OFF to select NPN.

To use discrete PNP inputs, set DIP switch 3 to the ON position. See Configure the DIP Switches on page 2 for more instructions.

Configuring the Thermistor Input

By default, jumper J3 is set to use the thermistor input.

The thermistor input requires a 10 kOhm 44006, 44016, or 44031 type thermistor. By default, the Node is configured to use a 44006 or 44031 type. To use type 44016, use the User Configuration Tool and follow these instructions.

1. With the Gateway connected to your computer, launch the User Configuration Tool software.
2. From the **Device** > **Configuration Settings** menu, select **Comm Port** and click **Connect**.
3. Go to the **Configuration** > **Device Configuration** screen.
4. Click the arrow next to the Node number of your P14 Node to view its parameters.
5. Click **GET Node**.
6. Click on the arrow next to Input 5 to view that input's parameters.
7. Under **Serial Options**, change **I/O Config** from 3 to 5.
8. Click **SEND**.

Configuring the Counter Input

To use the counter input instead, change the J3 jumper to the '3' position. By default, the counter is a frequency (1 Hz to 10 kHz) counter. To change your counter input to an event (rising edge) counter, use the Use Configuration Tool and follow these instructions.

1. With the Gateway connected to your computer, launch the User Configuration Tool software.
2. From the **Device** > **Configuration Settings** menu, select **Comm Port** and click **Connect**.
3. Go to the **Configuration** > **Device Configuration** screen.
4. Click the arrow next to the Node number of your P14 Node to view its parameters.
5. Click **GET Node**.
6. Click on the arrow next to Input 3 to view that input's parameters.
7. On the input type drop-down list, change it from Asynchronous Counter 2 to Interrupt Input 2.
8. Change the **Units** from 16-bit Asynchronous Counter to 32-bit Asynchronous Counter.
9. Change the **Report Type** from Analog to Double.
10. Click **SEND**.

Configuring the Analog Input

By default, jumper J2 is set to use a current (0 to 20 mA) analog input. To use the voltage (0 to 10 V) analog input, change the J2 jumper position from A to V. Complete the configuration change using the User Configuration Tool and follow these instructions.

1. With the Gateway connected to your computer, launch the User Configuration Tool software.
2. From the **Device** > **Configuration Settings** menu, select **Comm Port** and click **Connect**.
3. Go to the **Configuration** > **Device Configuration** screen.
4. Click the arrow next to the Node number of your P14 Node to view its parameters.
5. Click **GET Node**.
6. Under **I/O Configuration**, change the **Units** from 0-20mA to 0-10V.
7. Click **SEND**.

Clearing the Event Counter

When using a host-controlled system, clear the counter by sending a control message on Node register 15. Control messages on Node register 15 are acknowledged with the same value echoed to Node register 7. Write 5122 (0x1402) to clear the counter

When you are not using a host-controlled system, use the User Configuration Tool (UCT) to configure Node register 14 as a clear counter output type. Then, a transition from a 0 to a 1 on the Node's output register clears the counter. Use this method on Gateway IO mapping to map inputs, such as a push button, to clear counter values. To configure Node register 14 as a clear counter output type, following these steps:

1. Launch the UCT and access your wireless network.

2. Go to **Configuration** > **Device Configuration**.
3. Click on the arrow next to the Node to expand that Node's I/O parameters.
4. Click on the arrow next to Output 14 to expand those parameters.
5. For Output 14, select the **Enabled** checkbox.
6. In the drop-down list that appears, select **Clear Asynchronous Counter**.
7. In the **I/O configuration** section, select **Hold last state**.
8. In the **Extended parameters** section, enter 2 into the **Miscellaneous** field.
9. Click **SEND** on the Output 14 line.
10. Write your Node's output register 14 from 0 to 1 to clear the counter.

Event Counter Presets from a Host-Controlled System

The event counter input can be preset from a host system using Advanced Control Messages. From the host system, each device has allocated Node registers 7, 15, and 16 that send preset data to the event counter. When power is applied to the Node, the counter value is reset to the last saved value. Setting the counter using the preset or clear functions saves the preset value or zeroes.

The event counter input is a 32-bit value that can be preset using the parameter control codes 143 (0x8F) and 144 (0x90). Parameter control code 143 writes the lower half [15:0] of the counter and code 144 writes the upper half [31:16] of the counter.

Defining the Counter Select Mask using the second bit position selects the counter. Set Modbus register 16 to the high or low data value. Read Modbus register 7 for the transfer acknowledgment.

Node Reg 15	143 or 144 (0x8F or 0x90)	Counter Select Mask
Node Reg 16	Low or High Value	
Node Reg 7	Acknowledge Code 143 or 144	Acknowledge Counter Select Mask

Preset the Counter to 20,567,001

To preset the counter to the value 20,567,001 (hex 0139 D3D9), follow these steps:

1. Write the upper word to the counter using control code 144 (0x90).

Node Reg 15	0x90	2
Node Reg 16	0139	
Node Reg 7	0x90	2

2. Write the lower word to the counter using control code 143 (0x8F).

Node Reg 15	0x8F	2
Node Reg 16	D3D9	
Node Reg 7	0x8F	2

The counter has been preset to 20,567,001 (0x0139 D3D9).

Sure Cross® 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.

Figure 1. Device Configuration screen
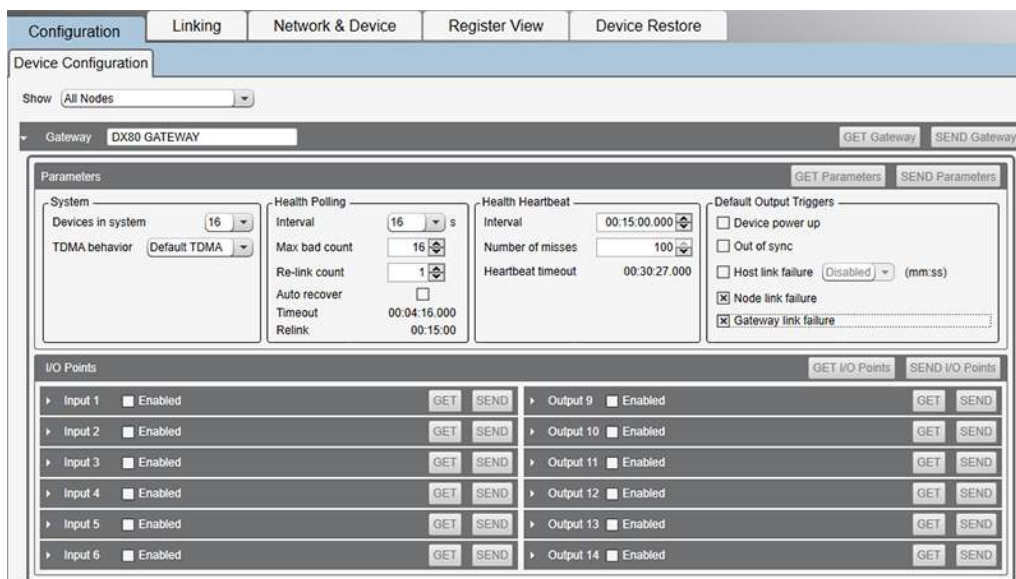
Use a USB to RS-485 adapter cable to connect a standalone DX80 Gateway to the computer. For DXM Controllers with an internal DX80 radio, connect a computer to the DXM Controller using the supplied USB or Ethernet connection. Download the most recent revisions of the configuration software from Banner 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.
- Performance Wireless I/O Network Instruction Manual: 132607
- MultiHop Data Radio Instruction Manual: 151317

Holding Registers

Modbus Registers		EIP Registers		I/O Type	I/O Range		Holding Register Representation (Dec)	
Gateway	Node	Node			Min.	Max.	Min.	Max.
1	1 + (Node# × 16)	0 + (Node# × 8)	Instance 100 / N7	Discrete IN 1	0	1	0	1
2	2 + (Node# × 16)	1 + (Node# × 8)		Analog IN 1 (mA / V)	0.0	20.0 / 10.0	0	65535
3	3 + (Node# × 16)	2 + (Node# × 8)		Counter High Word	0	65535	0	65535
4	4 + (Node# × 16)	3 + (Node# × 8)		Counter Low Word	0	65535	0	65535
5	5 + (Node# × 16)	4 + (Node# × 8)		Thermistor IN 4 (°F/°C)	-1638.3	+1638.4	-32768	32767
6	6 + (Node# × 16)	5 + (Node# × 8)						
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					
	...							
15	15 + (Node# × 16)	6 + (Node# × 8)		Control Message				
16	16 + (Node# × 16)	7 + (Node# × 8)		Reserved				

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.

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.

Install or Replace the Battery for a DX80 Integrated Battery Model

To install or replace the 3.6 V lithium "D" cell battery in any model with a 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.
2. Remove the discharged battery.
3. Install the new battery, verifying the battery's positive and negative terminals align to the positive and negative terminals of the battery holder mounted within the case.
4. After installing the battery, allow up to 60 seconds for the device to power up.
5. 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.
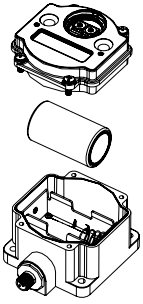
⚠️ **CAUTION:** There is a risk of explosion if the battery is replaced incorrectly.

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

Radio Range [1]
900 MHz, 1 Watt: Up to 9.6 km (6 miles)
2.4 GHz, 65 mW: Up to 3.2 km (2 miles)

Antenna Minimum Separation Distance
900 MHz, 1 Watt: 4.57 m (15 ft)
2.4 GHz, 65 mW: 0.3 m (1 ft)

Radio Transmit Power
900 MHz, 1 Watt: 30 dBm (1 W) conducted (up to 36 dBm EIRP)
2.4 GHz, 65 mW: 18 dBm (65 mW) conducted, less than or equal to 20 dBm (100 mW) EIRP

Spread Spectrum Technology
FHSS (Frequency Hopping Spread Spectrum)

Link Timeout (Performance)
Gateway: Configurable via User Configuration Software
Node: Defined by Gateway

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

900 MHz Compliance (1 Watt)
Contains FCC ID: UE3RM1809: FCC Part 15, Subpart C, 15.247
Contains IC: 7044A-RM1809
IFT: RCPBARM13-2283

NOM | **NYCE**

(NOM approval only applies to 900 MHz models)

2.4 GHz Compliance (DX80-2400 Radio Module)
Radio module is indicated by the product label marking
Contains FCC ID: UE300DX80-2400: FCC Part 15, Subpart C, 15.247
Radio Equipment Directive (RED) 2014/53/EU
Contains IC: 7044A-DX8024
ANATEL: 15966-21-04042 Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados. Para maiores informações, consulte o site da ANATEL www.gov.br/anatel/pt-br/

2.4 GHz Compliance (SX243 Radio Module)
Radio module is indicated by the product label marking
Contains FCC ID: UE3SX243: FCC Part 15, Subpart C, 15.247
Radio Equipment Directive (RED) 2014/53/EU
Contains IC: 7044A-SX243

P14 Node Specifications

Supply Voltage
3.6 V DC (internal battery)

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

Wiring Access
Two 1/2-inch NPT

Housing
Polycarbonate housing and rotary dial cover; polyester labels; EDPM rubber cover gasket; nitrile rubber, non-sulphur cured button covers
Weight: 0.26 kg (0.57 lbs)
Mounting: #10 or M5 (SS M5 hardware included)
Max. Tightening Torque: 0.56 N·m (5 lbf·in)

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

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[1] 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.

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

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
    Accuracy: 0.2% of full scale +0.01% per °C
    Resolution: 12-bit

Switch Power Outputs
    Analog configuration: one (SP1)
    Discrete configuration: one (SP1)

Thermistor Input
    Model: 44006, 44016, or 44031 family of 10 kOhm thermistors
    Sample Rate: 16 seconds
    Report Rate: 64 seconds
    Accuracy: 0.4 °C (10 °C to 50 °C); Up to 0.8 °C (−40 °C to 85 °C)

Counter Input
    Event counter: Input rating 1 Hz to 10 kHz (For battery powered devices, the recommended input rating is less than 1 kHz)
    Rate (frequency) counter: 1 Hz to 10 kHz
    Threshold: 1.7 V

Certifications

CE

UKCA

Banner Engineering Europe Park Lane, Culliganlaan 2F bus 3, 1831 Diegem, BELGIUM

(CE/UKCA approval only applies to 2.4 GHz models)

Turck Banner LTD
Blenheim House, Blenheim Court, Wickford, Essex SS11 8YT, Great Britain

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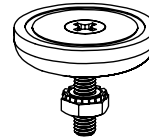
Operating the devices at the maximum operating conditions for extended periods can shorten the life of the device.

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

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
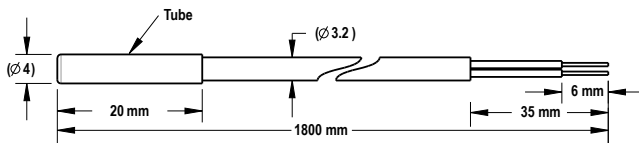
Included with Model

The following items ship with the M-H14 and P14 radios.
- BWA-HW-059: DX80 Access Hardware Kit, containing one 1/2-inch NPT strain relief fitting with o-ring, and one 1/2-inch NPT plastic vent plug.

- 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-9O2-C (900 MHz) or BWA-2O2-C (2.4 GHz): Antenna, 2 dBd Omni, Rubber Swivel RP-SMA Male.
- Quick Start Guide (128185 for DX80 Gateways or 152653 for MultiHop models)
- BWA-BATT-001: Replacement battery, 3.6 V lithium "D" cell

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 that 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.

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 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 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.

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.

Banner Engineering Corp. Limited Warranty

Banner Engineering Corp. warrants its products to be free from defects in material and workmanship for one year following the date of shipment. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture which, at the time it is returned to the factory, is found to have been defective during the warranty period. This warranty does not cover damage or liability for misuse, abuse, or the improper application or installation of the Banner product.

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

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

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

For patent information, see www.bannerengineering.com/patents.

FCC Part 15 Class A

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 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.

Industry Canada

IC: 7044A-RM1809 or 7044A-SX7023EXT—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.

Notas Adicionales

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

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

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

Mexican Importer

Banner Engineering de Mèxico, S. de R.L. de C.V.
David Alfaro Siqueiros 103 Piso 2 Valle oriente
San Pedro Garza Garcia Nuevo Leòn, C. P. 66269

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ANATEL

Modelo (Model): DX80-2400—Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados. Para maiores informações, consulte o site da ANATEL www.gov.br/anatel/pt-br/

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