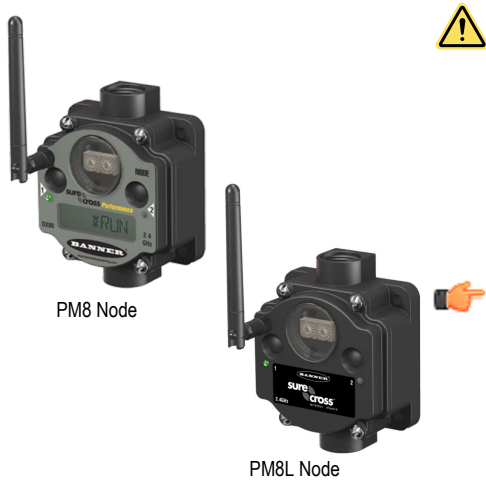


## Datasheet

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.



### 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:

- **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.

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

## Models

Models	Frequency	Environmental Rating	I/O
DX80N2X6S-PM8-KR	2.4 GHz ISM Band	IP67, NEMA 6	<b>Inputs:</b> Six sourcing discrete
DX80N2X6S-PM8L-KR			<b>Outputs:</b> Six sourcing discrete
DX80N2X6S-PM8C-KR		IP20, NEMA 1	I/O is automatically mapped to the PM8 Gateway using the Gateway's menu system

The PM8L models have no LCD and, therefore, no accessible menu system. To run a site survey with the PM8L Nodes, refer to the PM8 Gateway datasheet.

## Configuration Instructions

### Wire Your Sure Cross® Device

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

Refer to the Class I Division 2/Zone 2 control drawings (p/n [143086](#)) for wiring specifications and limitations. Install the device in a suitable enclosure with provision for connection of Division 2 / Zone 2 wiring methods in accordance with local codes, as acceptable to the local inspection authority having jurisdiction.

### Terminal Blocks and Wiring (PM8 and PM8C Models)

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



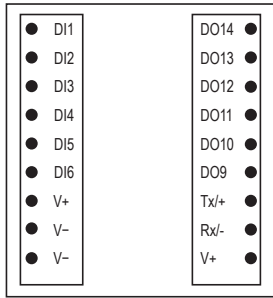


Figure 1. -PM8 Board

DIx. Discrete IN 1 through 6.  
 DOx. Discrete OUT 9 through 14.  
 GND. Ground/dc common connection  
 PWR. 10 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  
 V+. 10 to 30 V dc power connection  
 V-. Ground/dc common connection

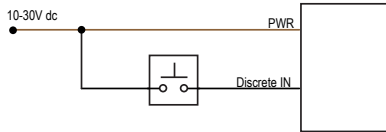


Figure 2. Discrete Input Wiring for PNP Sensors

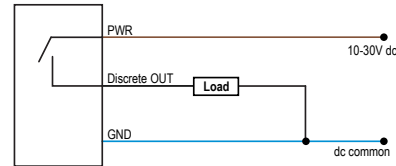


Figure 3. Discrete Output Wiring (PNP)

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

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

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

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

### 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

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

## Installing Your Sure Cross® Radios

Follow these recommendations to install your wireless network components.

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

- DX80 and Performance Wireless I/O Network Instruction Manual: [132607](#)
- MultiHop Data Radio Instruction Manual: [151317](#)

## Modbus Register Table

I/O	Modbus Holding Register		I/O Type	I/O Range		Holding Register Representation	
	Gateway	Any Node		Min.	Max.	Min. (Dec.)	Max. (Dec.)
1	1	1 + (Node# × 16)	Discrete IN 1	0	1	0	1
2	2	2 + (Node# × 16)	Discrete IN 2	0	1	0	1
3	3	3 + (Node# × 16)	Discrete IN 3	0	1	0	1
4	4	4 + (Node# × 16)	Discrete IN 4	0	1	0	1
5	5	5 + (Node# × 16)	Discrete IN 5	0	1	0	1
6	6	6 + (Node# × 16)	Discrete IN 6	0	1	0	1
7	7	7 + (Node# × 16)	Reserved				
8	8	8 + (Node# × 16)	Device Message				
9	9	9 + (Node# × 16)	Discrete OUT 9	0	1	0	1
10	10	10 + (Node# × 16)	Discrete OUT 10	0	1	0	1
11	11	11 + (Node# × 16)	Discrete OUT 11	0	1	0	1
12	12	12 + (Node# × 16)	Discrete OUT 12	0	1	0	1
13	13	13 + (Node# × 16)	Discrete OUT 13	0	1	0	1
14	14	14 + (Node# × 16)	Discrete OUT 14	0	1	0	1
15	15	15 + (Node# × 16)	Control Message				
16	16	16 + (Node# × 16)	Reserved				

## Specifications

### Performance 2.4 GHz Korean Radio Specifications

**Radio Range<sup>¶</sup>**

2.4 GHz, 65 mW: Up to 3.2 km (2 miles)

**Antenna Minimum Separation Distance**

2.4 GHz, 65 mW: 0.3 m (1 ft)

**Radio Transmit Power**

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)

**2.4 GHz Compliance for Korean Radio Models**

KCC-CRM-BE2-DX

**Antenna Connection**

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

**Link Timeout**

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

### PM8-KR Specifications

**Supply Voltage**

10 V dc to 30 V dc (Outside the USA: 12 V dc to 24 V dc, ± 10%)

**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)

**Power Consumption**

900 MHz Consumption: Maximum current draw is < 100 mA and typical current draw is < 50 mA at 24 V dc. (2.4 GHz consumption is less.)

**Wiring Access**

Two 1/2-inch NPT ports

**Interface**

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

<sup>¶</sup> 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 Inputs**

Six PNP  
 Rating: 3 mA max current at 30 V dc  
 Sample Rate: 62.5 milliseconds  
 Report Rate: On change of state  
 Discrete Input ON Condition: Greater than 4.5 V  
 Discrete Input OFF Condition: Less than 4 V

**Certifications****Discrete Outputs**

Six PNP  
 Update Rate: 125 milliseconds  
 ON Condition: Supply minus 2 V  
 OFF Condition: Less than 2 V  
 Output State Following Timeout: OFF

**Discrete Output Rating (PNP)**

100 mA max current at 30 V dc  
 ON-State Saturation: Less than 3 V at 100 mA  
 OFF-state Leakage: Less than 10 µA

## 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)  
 -40 °C to +80 °C (-40 °F to +176 °F) ambient temperature for Class I  
 Division 2 / Zone 2  
 95% maximum relative humidity (non-condensing)  
 Radiated Immunity: 10 V/m (EN 61000-4-3)

**Shock and Vibration**

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

**Environmental Ratings**

IEC IP67; NEMA 6  
 Refer to the Sure Cross® Wireless I/O Networks Instruction Manual (p/n [132607](#)) for installation and waterproofing instructions.  
 Refer to the Sure Cross® MultiHop Product Instruction Manual (p/n [151317](#)) 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 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**

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

**Environmental Ratings**

"C" Housing Models/External wiring terminals: IEC IP20; NEMA 1  
 Refer to the Sure Cross® Wireless I/O Networks Instruction Manual (p/n [132607](#)) for installation and waterproofing instructions.

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

## Included with Model

The following items ship with the PM2 and PM8 radios.

- One 1/2-inch NPT plug (not included with IP20 "C" models)
- Two 1/2-inch nylon gland fittings (not included with IP20 "C" models)
- **BWA-902-C** (900 MHz) or **BWA-202-C** (2.4 GHz) Antenna, 2 dBd Omni, Rubber Swivel RP-SMA Male
- **BWA-HW-011** IP20 Screw Terminal Headers (2 pack) (IP20 "C" models only)

## Warnings

**Install and properly ground a qualified surge suppressor when installing a remote antenna system.** Remote antenna configurations installed without surge suppressors invalidate the manufacturer's warranty. Keep the ground wire as short as possible and make all ground connections to a single-point ground system to ensure no ground loops are created. No surge suppressor can absorb all lightning strikes; do not touch the Sure Cross® device or any equipment connected to the Sure Cross device during a thunderstorm.

**Exporting Sure Cross® Radios.** It is our intent to fully comply with all national and regional regulations regarding radio frequency emissions. **Customers who want to re-export this product to a country other than that to which it was sold must ensure the device is approved in the destination country.** A list of approved countries appears in the *Radio Certifications* section of the product manual. The Sure Cross wireless products were certified for use in these countries using the antenna that ships with the product. When using other antennas, verify you are not exceeding the transmit power levels allowed by local governing agencies. Consult with Banner Engineering Corp. if the destination country is not on this list.

## Banner Engineering Corp. Limited Warranty

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

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For patent information, see [www.bannerengineering.com/patents](http://www.bannerengineering.com/patents).