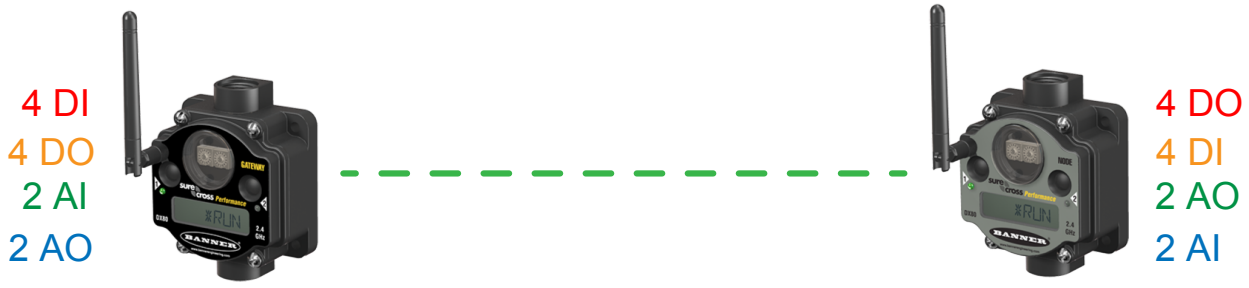
# Performance PM2 IO Mapping Kits

## Features



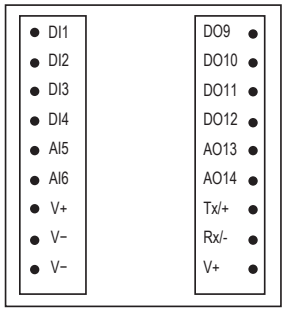

Gateway Node

The Sure Cross® Performance Mapping kits create a radio frequency network with integrated I/O that can operate in most environments and eliminate the need for wiring runs. The Performance Mapping kits include one Gateway, which acts as the wireless network master device, and one Nodes.

| Kit | Gateway and Node in Kit | Frequency | Inputs and Outputs |
|---|---|---|---|
| **DX80K9M6-PM2** | Gateway: DX80G9M6S-PM2<br>Node: DX80N9X6S-PM2 | 900 MHz, ISM Band | Inputs: Four selectable discrete, two 0–20 mA<br>Outputs: Four PNP discrete, two 0–20 mA analog |
| **DX80K2M6-PM2** | Gateway: DX80G2M6S-PM2<br>Node: DX80N2X6S-PM2 | 2.4 GHz, ISM Band | I/O is automatically mapped to the PM2 Gateway using the Gateway's menu system |

To view or download the latest technical information about this product, including specifications, dimensions, accessories, and wiring, go to www.bannerengineering.com.

## Models

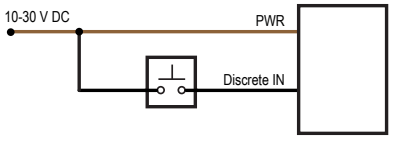
| Gateway and Node Terminals | Terminal Labels |
|---|---|
|  | AI*x* or A*x*. Analog IN *x*<br>AO*x*. Analog OUT *x*<br>DI*x*. Discrete IN *x*<br>DO*x*. Discrete OUT *x*<br>RX/-. Serial communication line for the Gateway. No connection for Nodes<br>TX/+. Serial communication line for the Gateway; no connection for Nodes<br>V+. 10 V DC to 30 V DC power connection<br>V–. Ground/DC common connection |



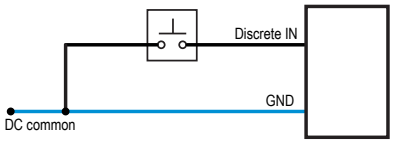
## Wiring Diagrams for Discrete Inputs

Connecting power to the communication pins will cause permanent damage. For the DX8*x*...C models, PWR in the wiring diagram refers to V+ on the wiring board and GND in the wiring diagram refers to V- on the wiring board. To power the sensor using the switch power output (SPx), replace the PWR with SPx in these wiring diagrams.

*Discrete Input Wiring for PNP Sensors*




*Discrete Input Wiring for NPN Sensors*




Original Instructions
01-Oct-24

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182639
p/n: 182639 Rev. E

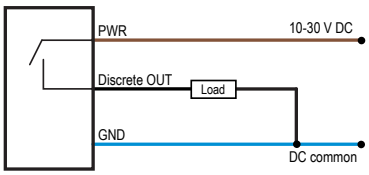
ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

# Wiring Diagrams for Discrete Outputs

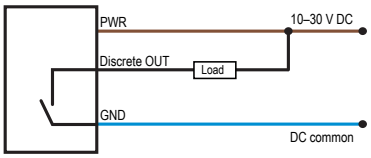
Connecting power to the communication pins will cause permanent damage. For the DX8*x*...C models, PWR in the wiring diagram refers to V+ on the wiring board and GND in the wiring diagram refers to V- on the wiring board. To power the sensor using the switch power output (SPx), replace the PWR with SPx in these wiring diagrams.

Refer to the specifications or the models table to determine if your device has PNP or NPN/NMOS discrete outputs.

*Discrete Output Wiring (PNP)*



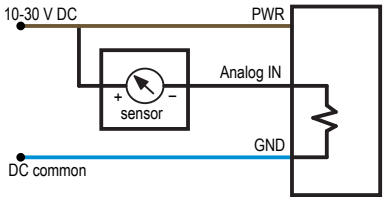

*Discrete Output Wiring (NPN or NMOS)*



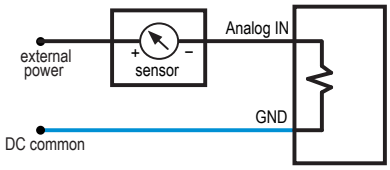

# Wiring Diagrams for Analog Inputs

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.

*Analog Input Wiring (10–30 V DC Power)*



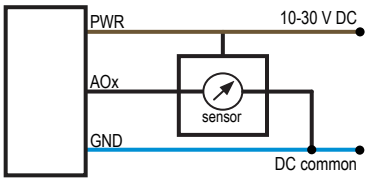

*Analog Input Wiring (4–20 mA, 2-Wire, Externally-Powered Sensors)*




# Wiring Diagrams for Analog Outputs

Connecting power to the communication pins will cause permanent damage.

*Analog Output Wiring*




# LED Behavior for the PMx Kits

Verify all devices are communicating properly. The radios and antennas must be a minimum distance apart to function properly. Recommended minimum distances are:

900 MHz 500 mW radios: 15 feet
2.4 GHz 65 mW radios: 1 foot

## Gateway LEDs

*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 |

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| Devices with Two LEDs | | Devices with One LED | Gateway Status | Node Status |
|---|---|---|---|---|
| LED 1 | LED 2 | | | |
| 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 |

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

### Node LEDs

*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 |

## IO Mapping for the PM2 Kits

By default, the PM2 kits are set to map between the Gateway and one Node. The rotary dials for the Node must be set to 01 for this mapping to work.

| Gateway | Maps to | Node |
|---|---|---|
| Discrete IN 1 | → | Discrete OUT 9 |
| Discrete IN 2 | → | Discrete OUT 10 |
| Discrete IN 3 | → | Discrete OUT 11 |
| Discrete IN 4 | → | Discrete OUT 12 |
| Analog IN 5 | → | Analog OUT 13 |
| Analog IN 6 | → | Analog OUT 14 |
| Discrete OUT 9 | ← | Discrete IN 1 |
| Discrete OUT 10 | ← | Discrete IN 2 |
| Discrete OUT 11 | ← | Discrete IN 3 |
| Discrete OUT 12 | ← | Discrete IN 4 |
| Analog OUT 13 | ← | Analog IN 5 |
| Analog OUT 14 | ← | Analog IN 6 |

To add additional Nodes to your original kit, download the Performance PM2 Gateway datasheet (p/n 173566) for the I/O mapping options and their respective Node rotary dial settings.

## PM2 Modbus Registers

| I/O | Modbus Holding Register | | I/O Type | I/O Range | | Holding Register Representation | |
|---|---|---|---|---|---|---|---|
| | Gateway | Any Node | | Min. Value | Max. Value | 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 |

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Continued from page 3

| I/O | Modbus Holding Register | | I/O Type | I/O Range | | Holding Register Representation | |
|---|---|---|---|---|---|---|---|
| | Gateway | Any Node | | Min. Value | Max. Value | Min. (Dec.) | Max. (Dec.) |
| 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) | Analog IN 5 (mA) | 0.0 | 20.0 | 0 | 65535 |
| 6 | 6 | 6 + (Node# × 16) | Analog IN 6 (mA) | 0.0 | 20.0 | 0 | 65535 |
| 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) | Analog OUT 13 (mA) | 0.0 | 20.0 | 0 | 65535 |
| 14 | 14 | 14 + (Node# × 16) | Analog OUT 14 (mA) | 0.0 | 20.0 | 0 | 65535 |
| 15 | 15 | 15 + (Node# × 16) | Control Message | | | | |
| 16 | 16 | 16 + (Node# × 16) | Reserved | | | | |

# 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 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.


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

# RS-485 Communication Specifications

**Communication Hardware (RS-485)**

Interface: 2-wire half-duplex RS-485

Baud rates: 9.6k, 19.2k (default), or 38.4k

Data format: 8 data bits, no parity, 1 stop bit

# PM2 Specifications

**Supply Voltage**

10 V DC to 30 V DC (Outside the USA: 12 V DC to 24 V DC, ± 10%)[1]

**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

**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

**Discrete Inputs**

Four, DIP switch selectable between PNP and NPN

Rating: 3 mA max current at 30 V DC

Sample Rate: 62.5 milliseconds

Report Rate: On change of state

**Discrete Input ON Condition**

PNP: Greater than 8 V

NPN: Less than 0.7 V

**Discrete Input OFF Condition**

PNP: Less than 5 V

NPN: Greater than 2 V or open

**Discrete Outputs**

Four PNP

Update Rate: 125 milliseconds

ON Condition: Supply minus 2 V

OFF Condition: Less than 2 V

Output State Following Timeout: OFF

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

**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

**Analog Outputs**

Two, 0 to 20 mA

Update Rate: 125 milliseconds

Accuracy: 0.1% of full scale +0.01% per °C

Resolution: 12-bit

**Analog Inputs**

Two, 0 to 20 mA

Input Rating: 24 mA

Impedance: Approximately 220 Ohms

Sample Rate: 62.5 milliseconds

Report Rate: 1 second or On Change of State (1% change in value)

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

Resolution: 12-bit

**Certifications**

CE/UKCA approval only applies to 2.4 GHz models

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Blenheim Court
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03737-22-04042

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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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# 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


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**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.

# 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-9O2-C** (900 MHz) or **BWA-2O2-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

**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 PM2 IO Mapping Kits 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 PM2 IO Mapping Kits, 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 PM2 IO Mapping Kits 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.

**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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