SureCross Performance FlexPower Node

Configurable FlexPower Node with discrete, analog, and thermistor I/O

The SureCross® wireless system is a radio frequency network with integrated I/O that can operate in most environments and eliminate the need for wiring runs. Wireless networks are formed around a Gateway, which acts as the wireless network master device, and one or more Nodes.

- 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 1 Watt and license-free operation up to 4 watt EIRP, with a high-gain antenna, in the U.S. and Canada for 900 MHz
- *Flex*Power® power options allows for +10 to 30V dc, solar, and battery power sources for low power applications.
- DIP switches for user configuration
- Frequency Hopping Spread Spectrum (FHSS) technology and Time Division Multiple Access (TDMA) control architecture ensure reliable data delivery within the unlicensed Industrial, Scientific, and Medical (ISM) band
- 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

Model	Freq.	Power	Housing	Inputs and Outputs	
DX80N9X2S-P1	900 MHz ISM Band	10 to 30V dc or battery supply module	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 0–10V), and two thermistor **Outputs**: Two NMOS/sinking discrete **Switch Power**: One *
DX80N9X1S-P1E		10 to 30V dc or integrated battery	IP54, NEMA 4		
DX80N2X2S-P1	2.4 GHz ISM Band	10 to 30V dc or battery supply module	IP67, NEMA 6		
DX80N2X1S-P1E		10 to 30V dc or integrated battery	IP54, NEMA 4		

* 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*," part number b_3099584.

DX80...C (IP20; NEMA 1) models are also available. To order this model with an IP20 housing, add a C to the end of the model number: DX80N9X2S-P1C.
The integrated battery models are also available without batteries. If you purchase a model without the battery, Banner Engineering recommends using the XENO XL-205F battery or equivalent. For DX99 models, only a XENO XL-205F battery is certified.

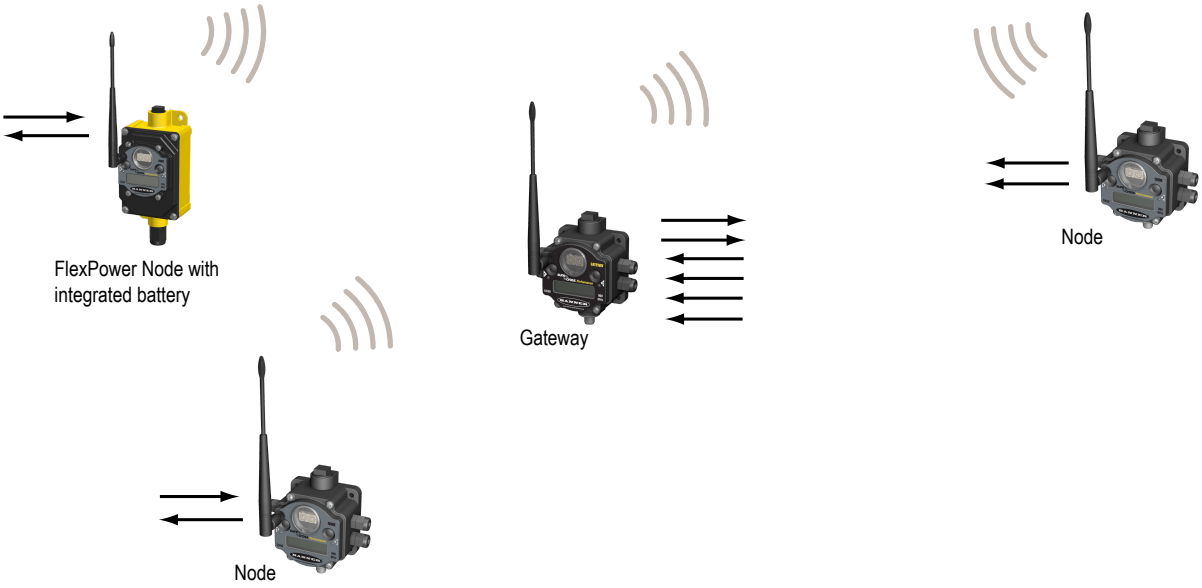
WARNING: Not To Be Used for Personnel Protection
Never use this product as a sensing device for personnel protection. Doing so could lead to serious injury or death. This product does NOT include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition.

Important: Never Operate 1 Watt Radios Without Antennas.
To avoid damaging the radio circuitry, never power up SureCross Performance or SureCross MultiHop (1 Watt) radios without an antenna.

The SureCross® Performance Wireless Network

The SureCross® Performance wireless I/O network provides reliable monitoring without the burden of wiring or conduit installation. The SureCross wireless network can operate independently or in conjunction with a host system, PLC, and/or PC software.

Each wireless network system consists of one Gateway and one or more Nodes. Devices ship with factory defined inputs and outputs that may be all discrete, all analog, or a mix of discrete and analog I/O.



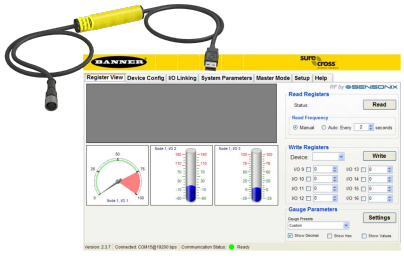
The SureCross® Performance network is a deterministic system—the network identifies when the radio signal is lost and drives relevant outputs to user-defined conditions. Once the radio signal is reacquired, the network returns to normal operation.

SureCross® Performance Gateways and Nodes

A **Gateway** is the master device within each radio network. Every wireless network must have one Gateway that schedules communication traffic and controls the I/O configuration for the network. A radio network contains only one Gateway, but can contain many Nodes. Similar to how a gateway device on a wired network acts as a "portal" between networks, the SureCross Gateway acts as the portal between the wireless network and the host controller. When the Gateway, using its Modbus RTU RS-485 connection, is a Modbus slave to a Modbus RTU host controller, the wireless network may contain up to 47 Nodes in a single wireless network and the Gateway holds the Modbus registers of all wireless devices within the network.

A **Node** is a wireless network end-point device used to provide sensing capability in a remote area or factory. The Node collects data from sensors and communicates the data back to the Gateway. Nodes are available in a wide variety of power or input/output options. Each Node device can be connected to sensors or output devices and reports I/O status to the Gateway.

SureCross User Configuration Tool



The User Configuration Tool (UCT) offers an easy way to link I/O points in your wireless network, view I/O register values graphically, and set system communication parameters when a host system is not part of the wireless network.

The UCT requires a special USB to RS-485 (model number BWA-HW-006) converter cable to pass information between your computer and the Gateway. Download the most recent revisions of the UCT software from Banner Engineering's website: *http://www.bannerengineering.com/wireless*.

Setting Up Your Wireless Network

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

1. Configure the DIP switches of all devices.
2. Connect the sensors to the SureCross devices.

3. Apply power to all devices.
4. Form the wireless network. For binding instructions, refer to the product manual.
5. Observe the LED behavior to verify the devices are communicating with each other.
6. Conduct a site survey between the Gateway and Nodes. For site survey instructions, refer to the product manual.
7. Install your wireless sensor network components. For installation instructions, refer to the product manual.

For additional information, including installation and setup, weatherproofing, device menu maps, troubleshooting, and a list of accessories, refer to one of the following product manuals.

- SureCross Quick Start Guide: Banner part number *128185*
- SureCross Wireless I/O Network Manual: *132607*
- Web Configurator Manual (used with "Pro" and DX83 models): *134421*
- Host Configuration Manual *132114*

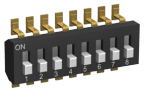
Configuring the DIP Switches

Before making any changes to the DIP switch positions, disconnect the power. For devices with batteries integrated into the housing, remove the battery for at least one minute. DIP switch changes will not be recognized if power isn't cycled to the device.

Accessing the Internal DIP Switches

To access the internal DIP switches, follow these steps:

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. For integrated battery models (no ribbon cable) and Class I, Division 2 certified devices (ribbon cable is glued down), skip this step.
4. Remove the black cover plate from the bottom of the device's cover.
   The DIP switches are located behind the rotary dials.



After making the necessary changes to the DIP switches, place the black cover plate back into position and gently push into place. Plug the ribbon cable in after verifying that the blocked hole lines up with the missing pin. 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 can be operated at 1 watt (30 dBm) or 250 mW (24 dBm). While the radios operate in 1 Watt mode, they cannot communicate with 150 mW DX80 radio devices. To communicate with the 150 mW radio models, operate this radio in 250 mW mode. For 2.4 GHz radios, this DIP switch is disabled. The transmit power for 2.4 GHz is fixed at about 100 mW EIRP (18 dBm), making the 2.4 GHz Performance models automatically compatible with the DX80 2.4 GHz models.

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 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
Host configured (override 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

Discrete Configuration, Switch 2 ON	DIP Switches					
Descriptions	**3**	**4**	**5**	**6**	**7**	**8**
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
Host configured (override 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).

Boost Voltage

The boost voltage is the power supplied to the sensor powered by this *Flex*Power Node.

Discrete Input Type

Select the type of discrete input sensors to use with this device: sourcing (PNP) sensors or sinking (NPN) sensors.

Host Configured

Selecting “Host Configured (override switches)” uses the factory’s default configuration for this device or allows a host system to set parameters. If the host configured option is not selected, use the DIP switches to configure the device parameters.

Sample and Report Rates

The sample interval, or rate, defines how often the SureCross device samples the input. For battery-powered applications, setting a slower rate extends the battery life.

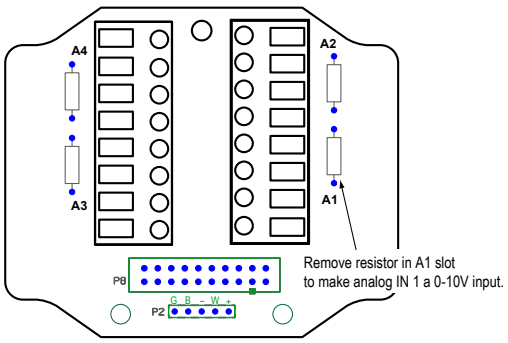
The report rate defines how often the Node communicates the I/O status to the Gateway. Change of state reporting sets the system to report only when the value crosses the threshold setting. For FlexPower™ applications, setting the report rate to a slower rate extends the battery life.

Warm-Up Time

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

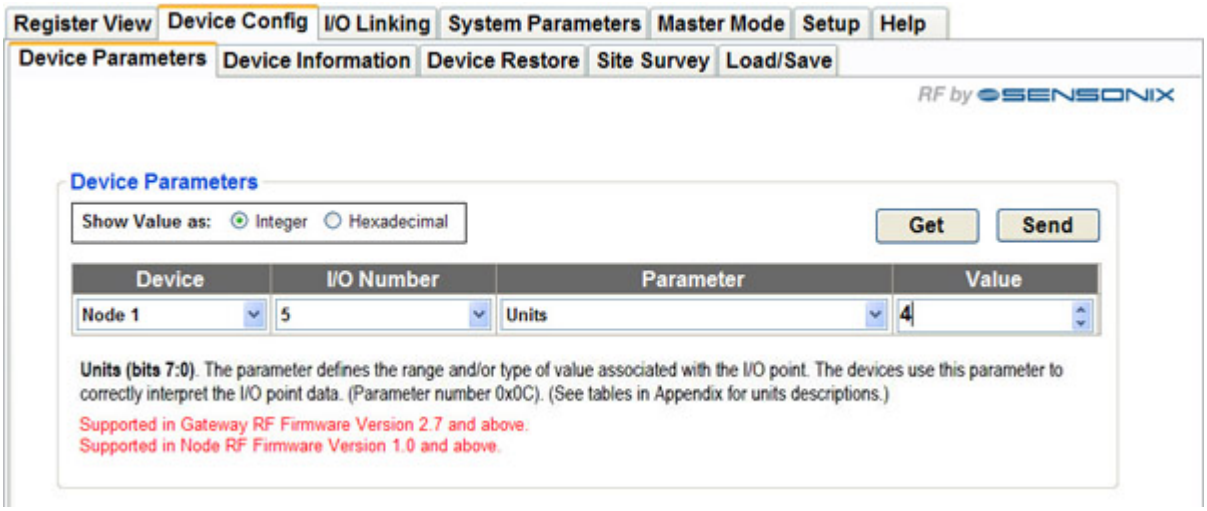
Configuring Universal Analog Inputs for mA or V

To configure inputs to use 0 to10V instead of 0 to 20mA, remove the installed resistors from the marked locations on the wiring board. For example, to make analog input 1 a 0 to 10V input, follow these instructions.



Step 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.)
Step 2. Launch the User Configuration Tool software.

Step 3. Change the units parameter for this particular input on this device (Gateway or Node) to use voltage instead of milliamps. Refer to the Modbus Register table for the I/O number for each analog input. Writing a four (4) to the Units parameter defines the units as 0 to 10V. Writing a two (2) to the Units parameter defines the units as 0 to 20 mA.



Note that a 220 ohm 0.1% resistor must be installed for a 0 to 20mA input. The resistor must be removed for an input defined as a 0 to 10V input.

Storage Mode and Sleep Mode

While in **storage mode**, the radio does not operate. All SureCross® radios powered from an integrated battery ship from the factory in storage mode to conserve the battery. To wake the device, press and hold button 1 for five seconds. To put any FlexPower® or integrated battery SureCross radio into storage mode, 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.

During normal operation, the SureCross 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.

Mixing Performance and Non-Performance Radios in the Same Network

To comply with federal regulations, the 150 mW radios and 1 Watt radios communicate differently. To mix Performance radios with non-Performance radios:

- Performance radios must operate in 250 mW mode, **not** 1 Watt mode (DIP switch 1 ON)
- Non-Performance radios must be set to use Extended Address Mode (DIP switch 1 ON)

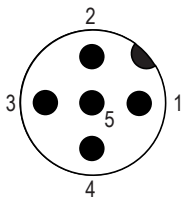
For more detailed instructions about setting up your wireless network, refer to the Quick Start Guide, Banner document number 128185. For more information about using Performance and non-Performance radios within the same network, refer the technical note titled *Mixing Performance Radios and 150 mW Radios in the Same Network*listed on the FAQ/Knowledgebase section of Banner's Wireless Sensor Networks website.

Wiring Your SureCross® Device

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

5-pin Euro-Style Wiring (Nodes)

Wiring the 5-pin Euro-style connector depends on the model and power requirements of the device.

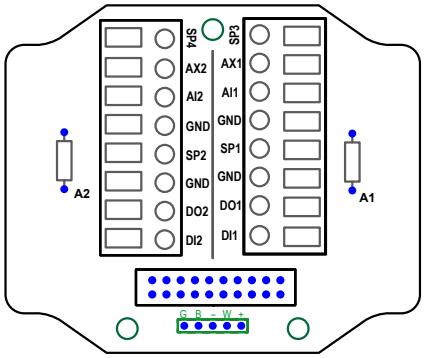


Wire No.	Wire Color	10 to 30V dc Powered Nodes	Battery Powered Nodes
1	Brown	10 to 30V dc	
2	White		
3	Blue	dc common (GND)	dc common (GND)
4	Black		
5	Gray		3.6 to 5.5V dc

Connecting dc power to the communication pins will cause permanent damage. For FlexPower devices, do not apply more than 5.5V to the gray wire.

Terminal Blocks (IP67 Base)

This is the wiring board for the DX80**M6S-P1 (IP67) models.



AI*x* or A*x*. Analog IN *x*.

AX1. Thermistor

AX2. Thermistor

AO*x*. Analog OUT *x*.

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.

DX80...C Wiring

Wiring power to the DX80...C models varies depending the power requirements of the model.

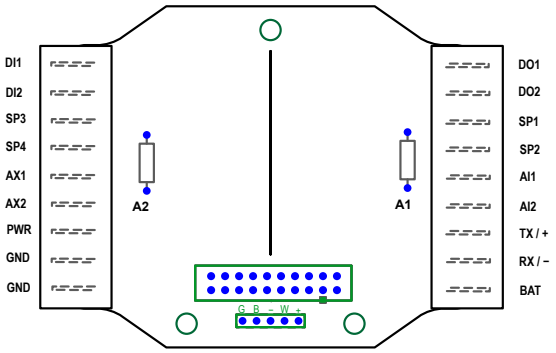
Terminal Label	Gateway, DX85 *	10 to 30V dc Powered Nodes	Battery Powered Nodes **
V+	10 to 30V dc	10 to 30V dc	
Tx/+	RS485 / D1 / B / +		
V-	dc common (GND)	dc common (GND)	dc common (GND)
Rx/-	RS485 / D0 / A / -		
B+			3.6 to 5.5V dc

* Connecting dc power to the communication pins will cause permanent damage.

** For FlexPower devices, do not apply more than 5.5V to the gray wire.

Terminal Blocks (IP20 Base)

This is the wiring board for the DX80**X2S-P1C IP20 models.



AI*x* or A*x*. Analog IN *x*.

AO*x*. Analog OUT *x*.

AX1. Thermistor

AX2. Thermistor

B+. 3.6 to 5.5V dc (for battery powered models only).

DI*x*. Discrete IN *x*.

DO*x*. Discrete OUT *x*.

GND. Ground/dc common connection.

PWR. Power, 10 to 30V dc power connection.

SP*x*. Switch Power. Provides variable power sources for external devices.

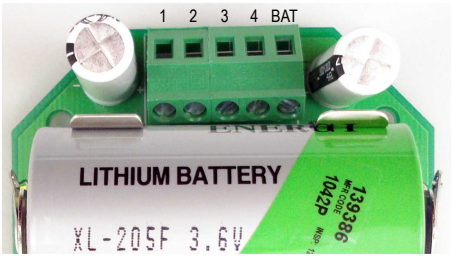
RX/-. Serial comms line

TX/+. Serial comms line

Wiring for DX80...E Radios

Connecting dc power to the communication pins will cause permanent damage.

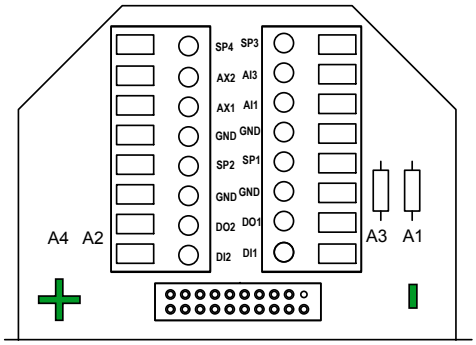
The integrated battery DX80...E radios may also be powered by 10 to 30V dc. The power for the sensors can be supplied by the radio's SPx terminals or from the 10 to 30V dc used to power the radio.

		Integrated battery (RS-485) (P1E, M-H1E Models)	Integrated battery (RS-232) (P3E, P4E, M-H3E, M-H4E Models)
	1	10 to 30V dc (optional)	10 to 30V 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

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.

Terminal Blocks (IP54 Base)

This is the wiring board for the DX80**M6S-P1E model.



AI*x* or A*x*. Analog IN *x*.

AX1. Thermistor

AX2. Thermistor

AO*x*. Analog OUT *x*.

DI*x*. Discrete IN *x*.

DO*x*. Discrete OUT *x*.

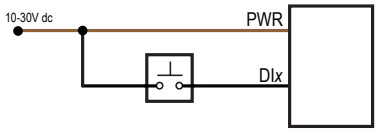
GND. Ground/dc common connection.

SP*x*. Switch Power. Provides variable power sources for external devices.

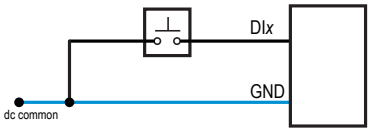
Wiring Diagrams

Connecting dc 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.

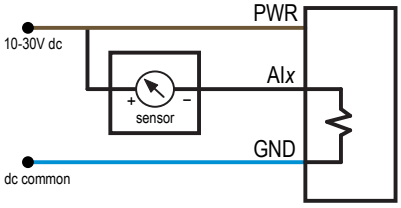
Discrete Input Wiring for PNP Sensors



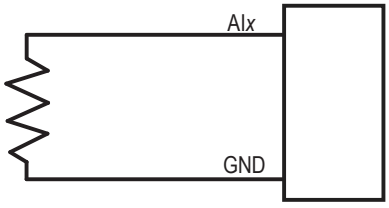
Discrete Input Wiring for NPN Sensors



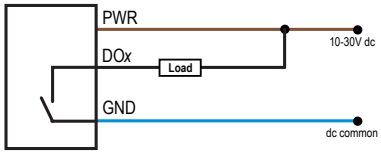
Analog Input Wiring (10 to 30V dc Power)



Thermistor Input Wiring



Discrete Output Wiring (NPN or NMOS)



Use AX1 or AX2 for the thermistor input wiring.

LED Behavior for the Gateways

After powering up and binding the Gateway and its Nodes, verify all devices are communicating properly. When testing communication between the Gateway and Node, verify all radios and antennas are at least two meters apart or the communications may fail. This table lists the LED behavior for the Gateway models with two LEDs.

LED 1	LED 2	Gateway Status
(green on)		Power ON
(red flashing)	(red flashing)	Device Error
	(yellow flashing)	Modbus Communication Active
	(red flashing)	Modbus Communication Error

For Gateway and Ethernet Bridge systems, active Modbus communication refers to the communication between the Gateway and the Ethernet Bridge. For GatewayPro systems, the Modbus communication LEDs refer to the communication internal to the Gateway Pro. For Gateway only systems, the Modbus communication LEDs refer to the communication between the Gateway and its host system (if applicable).

Modbus Register Table

I/O	Modbus Holding Register		I/O Type	Units	I/O Range		Holding Register Representation		Terminal Block Labels
	Gateway	Any Node			Min. Value	Max. Value	Min. (Dec.)	Max. (Dec.)	
1	1	1 + (Node# × 16)	Discrete IN 1	-	0	1	0	1	DI1
2	2	2 + (Node# × 16)	Discrete IN 2	-	0	1	0	1	DI2
3	3	3 + (Node# × 16)	Analog IN 1	mA / V	0.0	20.0 / 10.0	0	65535	AI1
4	4	4 + (Node# × 16)	Analog IN 2						AI2
5	5	5 + (Node# × 16)	Thermistor IN 1	°F/°C	-1638.3	+1638.4	-32768	32767	AX1
6	6	6 + (Node# × 16)	Thermistor IN 2						AX2
7	7	7 + (Node# × 16)	Reserved						
8	8	8 + (Node# × 16)	Device Message						
9	9	9 + (Node# × 16)	Discrete OUT 1	-	0	1	0	1	DO1
10	10	10 + (Node# × 16)	Discrete OUT 2	-	0	1	0	1	DO2
		...							
15	15	15 + (Node# × 16)	Control Message						
16	16	16 + (Node# × 16)	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.

Specifications

Radio

Radio Range

900 MHz (1 Watt): Up to 9.6 kilometers (6 miles) *

2.4 GHz: Up to 3.2 kilometers (2 miles) *

Radio Transmit Power

900 MHz (1 Watt): 30 dBm conducted (up to 36 dBm EIRP)

2.4 GHz: 18 dBm conducted, less than or equal to 20 dBm EIRP

900 MHz Compliance (1 Watt Radios)

FCC ID UE3RM1809: This device complies with FCC Part 15, Subpart C, 15.247

IC: 7044A-RM1809

2.4 GHz Compliance

FCC ID UE300DX80-2400 - This device complies with FCC Part 15, Subpart C, 15.247

ETSI/EN: In accordance with EN 300 328: V1.7.1 (2006-05)

IC: 7044A-DX8024

Spread Spectrum Technology

FHSS (Frequency Hopping Spread Spectrum)

Link Timeout

Gateway: Configurable

Node: Defined by Gateway

* 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. To determine the range of your wireless network, perform a Site Survey.

General

Power*

DX80 and DX80..C Model Requirements: +10 to 30V dc or 3.6 to 5.5V dc low power option (For European applications: +10 to 24V dc, ± 10% or 3.6 to 5.5V dc low power option)

DX80...E Model Requirements: 3.6V dc low power option from an internal battery or 10 to 30V dc

900 MHz Consumption: Maximum current draw is <40 mA and typical current draw is <30 mA at 24V dc. (2.4 GHz consumption is less.)

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 DX80...C Mounting: #10 or M5 (SS M5 hardware included)

DX80...E Mounting: 1/4-inch or M7 (SS M7 hardware included)

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

Antenna Connection

Ext. Reverse Polarity SMA, 50 Ohms

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

Interface

Indicators: Two bi-color LEDs

Buttons: Two

Display: Six character LCD

Wiring Access

DX80 Models: Four PG-7, One 1/2-inch NPT, One 5-pin Euro-style male connector

DX80...C Models: External terminals

DX80...E Models: Two 1/2-inch NPT

* For European applications, power the DX80 from a Limited Power Source as defined in EN 60950-1.

Inputs

Discrete Input

Rating: 3 mA max current at 30V dc

Sample / Report Rates: DIP switch configurable

Discrete Input ON Condition

PNP: Greater than 8V

NPN: Less than 0.7V

Discrete Input OFF Condition

PNP: Less than 5V

NPN: Greater than 2V or open

Analog Inputs

Rating in 0–20 mA mode: 24 mA

Rating in 0–10V mode: 10V

Outputs

Discrete Output Rating (Performance NMOS)

Less than 1 A max current at 30V dc

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

Discrete Output

Update Rate: 1 second

ON Condition: Less than 0.7V

OFF Condition: Open

Output State Following Timeout

De-energized (OFF)

Switch Power Outputs

Analog configuration: one

Discrete configuration: two

Inputs	Outputs
Impedance: 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 **Thermistor** Model: Omega's 44006 or 44031 families of 10 kOhm Sample Rate: 1 second Report Rate: 16 seconds Accuracy: 0.4° C (10 to 50° C); Up to 0.8° C (−40 to +85° C)	Host configuration: up to four

Environmental	
Ratings DX80:IEC IP67; NEMA 6; (See UL section below for any applicable UL specifications) DX80...C: IEC IP20; NEMA 1 DX80...E: IEC IP54; NEMA 4 **Conditions** Operating Temperature (P1 and P1C models): −40 to +85° C (Electronics); −20 to +80° C (LCD) Operating Temperature (P1E model): −40 to +65° C Operating Humidity: 95% max. relative (non-condensing) Radiated Immunity: 10 V/m, 80-2700 MHz (EN61000-6-2)	**Shock and Vibration** IEC 68-2-6 and IEC 68-2-7 Shock: 30g, 11 millisecond half sine wave, 18 shocks Vibration: 0.5 mm p-p, 10 to 60 Hz

Refer to the SureCross® DX80 Wireless I/O Network product manual, Banner 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 DX80 radios.

- 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 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. (Not included with Internal antenna models)
- Quick Start Guide (128185 for DX80 Gateways or 152653 for MultiHop models)
- MQDC1-506: 5-Euro (single ended) straight cable, 2m (Not included with FlexPower devices)
- BWA-HW-011: IP20 Screw Terminal Headers (2 pack) (Included only with the IP20 DX80...C models)

Included with Device (DX80...E Models)

The following items ship with the DX80...E (NEMA 4) 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)
- Quick Start Guide (128185 for DX80 Gateways or 152653 for MultiHop models)

Warnings

The manufacturer does not take responsibility for the violation of any warning listed in this document.

Make no modifications to this product. Any modifications to this product not expressly approved by Banner Engineering could void the user's authority to operate the product. Contact the Factory for more information.

All specifications published in this document are subject to change. Banner reserves the right to modify the specifications of products without notice. Banner Engineering reserves the right to update or change documentation at any time. For the most recent version of any documentation, refer to our website: *www.bannerengineering.com*.

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.