

Datasheet

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 and one DC Latch output
- Selectable transmit power levels of 250 mW or 1 Watt for 900 MHz models and 65 mW for 2.4 GHz models
- FlexPower® technology driven by one lithium primary battery integrated into the housing or by 10 to 30 V dc
- 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

For additional information, updated documentation, and accessories, refer to Banner Engineering's website, www.bannerengineering.com/surecross.

Models	Frequency	I/O
DX80N9X2S-DCLATCHE	900 MHz ISM Band	Inputs: Two selectable discrete
DX80N2X2S-DCLATCHE	2.4 GHz ISM Band	Outputs for DC Latch: DC Latch



WARNING: Not To Be Used for Personnel Protection

Never use this device as a sensing device for personnel protection. Doing so could lead to serious injury or death. This device 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.



CAUTION: 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.



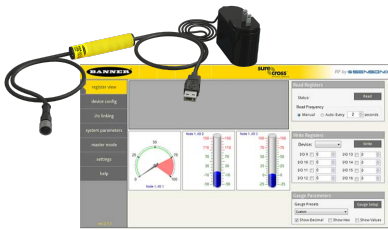
CAUTION: Electrostatic Discharge (ESD)

ESD Sensitive Device. This product uses semiconductors that can be damaged by electrostatic discharge (ESD). When performing maintenance, care must be taken so the device is not damaged. Disconnect power from the device when accessing the internal DIP switches. Proper handling procedures include wearing anti-static wrist straps. Damage from inappropriate handling is not covered by warranty.



SureCross User Configuration Tool

The User Configuration Tool (UCT) software runs on any Windows machine and uses a converter cable to connect your Gateway to the computer.



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. Download the most recent revisions of the UCT software from Banner Engineering's website: <http://www.bannerengineering.com/wireless>.

The UCT requires a special USB to RS-485 (model number BWA-UCT-900 for 1 Watt radios, BWA-HW-006 can be used for all other radios) converter cable to pass information between your computer and the Gateway.

Setting Up Your Wireless Network

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

Disconnect the power from your SureCross devices.

1. Configure the DIP switches of all devices.
2. Connect the sensors to the SureCross devices.
3. Apply power to all devices.
 - For two LED 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 one LED 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.
4. Form the wireless network by binding the Nodes to the Gateway. If the binding instructions are not included in the datasheet, refer to the product manual for binding instructions.
5. Observe the LED behavior to verify the devices are communicating with each other.
 - For two LED 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 one LED models, the Gateway's LED is solid green and the Node's LED flashes green to indicate it is communicating with the Gateway.
6. Conduct a site survey between the Gateway and Nodes. If the site survey instructions are not included in this datasheet, refer to the product manual for detailed site survey instructions.
7. Install your wireless sensor network components. If installation instructions are not included in this datasheet, refer to the product manual for detailed installation instructions.

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: [128185](#)
- SureCross Wireless I/O Network Instruction Manual: [132607](#)
- Web Configurator Instruction Manual (used with "Pro" and DX83 models): [134421](#)
- Host Controller Systems Instruction Manual: [132114](#)

Configure the DIP Switches

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

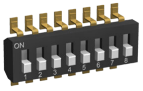
For parameters not set via DIP switches, use the User Configuration Tool (UCT) to make configuration changes. For parameters set using the DIP switches, the DIP switch positions override any changes made using the User Configuration Tool.

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	3	4	5	6	7	8
Transmit power level: 1 Watt (30 dBm)	OFF*							
Transmit power level: 250 mW (24 dBm), DX80 compatibility mode	ON							
Modbus or UCT configured (overrides DIP switches 3-8)		OFF*						
DIP switch configured		ON						
Inputs sinking (NPN)			OFF*					
Inputs sourcing (PNP)			ON					

* Default configuration

Discrete Input Type

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

Modbus/User Configuration Tool (UCT) or DIP Switch Configured

In Modbus/UCT Configured mode, the device parameters are changed using the User Configuration Tool (UCT) or a Modbus command. All DIP switch positions are ignored. In DIP Switch Configured mode, use the DIP switches to configure the parameters listed in the table.

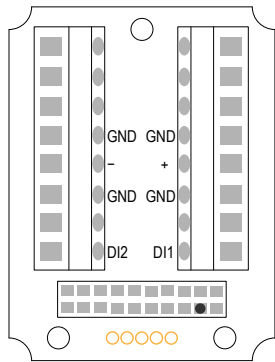
Transmit Power Levels

The 900 MHz radios can be operated at 1 watt (30 dBm) or 250 mW (24 dBm). While the Performance radios operate in 1 Watt mode, they cannot communicate with the older 150 mW radios. To communicate with the older 150 mW radios, operate this radio in 250 mW mode. 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), making the 2.4 GHz Performance models automatically compatible with older 2.4 GHz models.

Wiring Your SureCross® Device

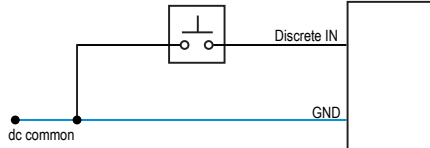
Use the following wiring diagrams to first wire the sensors and then apply power to the SureCross devices.

Terminal Blocks and Wiring

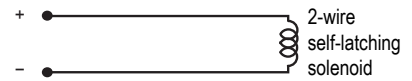


+ and -. DC Latching relay outputs
 DI1 and DI2. Discrete inputs, sinking
 GND. Ground/dc common connection

Discrete Input Wiring for NPN Sensors



DC Latching



Replacing the Integrated Battery (DX80...E Models)

To replace the lithium "D" cell battery in any integrated housing model, follow these steps.

1. Remove the four screws mounting the face plate to the housing and remove the face plate. Do not remove the radio cover from the face plate.
2. Remove the discharged battery and replace with a new battery.
 Only use a 3.6V lithium battery from Xeno, model number XL-205F.
3. Verify the battery's positive and negative terminals align to the positive and negative terminals of the battery holder mounted within the case.

Caution: There is a risk of explosion if the battery is replaced incorrectly.

4. After replacing the battery, allow up to 60 seconds for the device to power up.

For outside or high humidity environments, conductive grease may be applied to the battery terminals to prevent moisture and corrosion buildup.

Properly dispose of your used battery 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. 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.

Replacement battery model number: BWA-BATT-001. For pricing and availability, contact Banner Engineering.

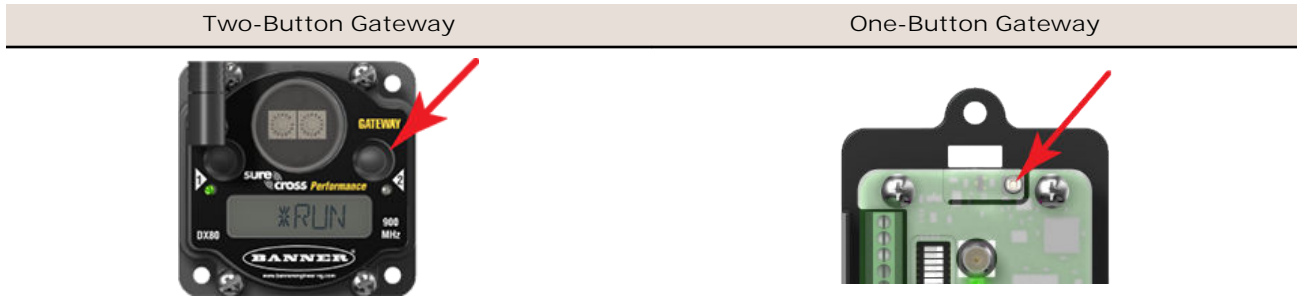


Bind Radios to Form Networks

Binding Nodes to a Gateway ensures the Nodes only exchange data with the Gateway they are bound to. For a more detailed definition of binding mode, refer to the *Advanced Setup* section of the *SureCross Wireless I/O Networks* instruction manual.

Apply power to the Gateway and Nodes.

1. Enter binding mode on the Gateway.
 - If you have a two-button Gateway, triple-click button 2
 - If you have a one-button Gateway, triple-click the button



The LEDs flash alternately when the Gateway is in binding mode. Any Node entering binding mode will bind to this Gateway.

2. Using the Gateway's rotary dials, select the Node address to assign to the Node. Use the left rotary dial for the left digit and the right rotary dial for the right digit. For example, to assign your Node to address 10, set the left dial to 1 and the right dial to 0. (Address 00 is reserved for the Gateway. Nodes assigned to 00 will not bind to a Gateway.)
3. Enter binding mode on the Node.
 - If you have a two-button Node, triple-click button 2.
 - If you have a one-button Node, triple-click the button.

The Node enters binding mode and locates the Gateway in binding mode.

For two LED models, the red LEDs flash alternately. After binding is complete, both LEDs are both solid red for a few seconds.

For one-LED models, the red and green LED flashes alternately while the Node searches for the Gateway. After binding is complete, the LED is red and green for four seconds (looks amber), then the red and green flash simultaneously (looks amber) four times.

The Node automatically exits binding mode, cycles its power, then enters RUN mode.

4. Repeat steps 2 and 3 for all Nodes that will communicate to this Gateway.
5. Exit binding mode on the Gateway.
 - If you have a two-button Gateway, single-click either button.
 - If you have a one-button Gateway, single-click the button.

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:

- 2.4 GHz 65 mW radios: 1 foot
- 900 MHz 150 mW radios: 6 feet
- 900 MHz 1 Watt radios: 15 feet

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

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
		...					
7	7	7 + (Node# × 16)	Reserved				
8	8	8 + (Node# × 16)	Device Message				
9	9	9 + (Node# × 16)	DC LATCH OUT	0	1	0	1
		...					
15	15	15 + (Node# × 16)	Control Message				
16	16	16 + (Node# × 16)	Reserved				

DC Latching Operation

To operate the outputs, write I/O register 9 to 1 to activate the DC Latching output. Write I/O register 9 to 0 to deactivate the outputs.

The I/O register 9 operations are not functional when the Node and Gateway lose radio communication. After the Node loses radio contact with the Gateway or if the Node cycles power, the solenoid reverts back to its configured default state. The initial configured default state of the DC Latching output is deactivated. After the Node re-establishes a radio link to the Gateway, the DC Latching output returns to its last state held in the Gateway from the last output write before the loss of radio communication or power cycle.

Because of the solenoid charging power requirements, the DC Latching output cannot be written more than once every 10 seconds. If the output is re-written less than 10 seconds after the previous write, the DC Latching output is written to its new state 10 seconds after the previous write.

Specifications

Radio Range

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

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

900 MHz Compliance (1 Watt)

- 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)

Discrete I inputs

- Rating: 3 mA max current at 30 V dc
- Sample Rate: 62.5 milliseconds
- Report Rate: On change of state

Discrete I input ON Condition

- PNP: Greater than 8 V
- NPN: Less than 0.7 V

Discrete I input OFF Condition

- PNP: Less than 5 V
- NPN: Greater than 2 V or open

Notes

Notice: This equipment must be professionally installed. The output power must be limited, through the use of firmware or a hardware attenuator, when using high-gain antennas such that the +36 dBm EIRP limit is not exceeded.

Supply Power

- 3.6 V dc low power option from an internal battery or from 10 to 40 V dc

Housing

- Polycarbonate housing and rotary dial cover; polyester labels; EDPM rubber cover gasket; nitrile rubber, non-sulphur cured button covers
- Mounting: 1/4-inch or M7 (SS M7 hardware included)
- Max. Tightening Torque: 0.56 N·m (5 lbf·in)

Antenna Connection

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

Interface

- Indicators: Two bi-color LEDs
- Buttons: Two

Wiring Access

- Two 1/2-inch NPT

Link Timeout

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

Environmental Ratings

- "E" Housing Models: IEC IP65; NEMA 4X ²

Operating Conditions

- 40 °C to +65 °C (-40 °F to +149 °F) (Electronics); -20 °C to +80 °C (-4 °F to +176 °F) (LCD)
- 95% maximum relative humidity (non-condensing)
- Radiated Immunity: 10 V/m, 80-2700 MHz (EN61000-6-2)

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

Certifications



Included with Device

The following items ship with this model.

- BWA-902-C (900 MHz) or BWA-202-C (2.4 GHz): Antenna, 2 dBd Omni, Rubber Swivel RP-SMA Male. (Not included with Internal antenna models)
- BWA-BATT-001: Replacement battery, 3.6 Volt, "D" Lithium Cell
- BWA-HW-032: Access Hardware for "E" Housing (One each of 1/2-inch plug, 1/2-inch gland)

Warnings

Antenna Installations. 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 SureCross® device or any equipment connected to the SureCross device during a thunderstorm.

Exporting SureCross 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 SureCross 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.

Violating 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. All specifications published in this document are

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

² Refer to the [SureCross Wireless I/O Networks Instruction Manual](#) (p/n 132607) for installation and waterproofing instructions.

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