

## Datasheet



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

The Sure Cross® 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 an Ultrasonic sensor integrated into the housing
- *FlexPower*® technology driven by one lithium primary battery integrated into the housing
- Power-efficient occupancy sensor for parking applications
- 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

Models	Frequency	Environmental Rating	I/O
DX80N9X1W0P0U	900 MHz ISM Band	IP67, NEMA 6	Inputs: One Ultrasonic, one temperature
DX80N2X1W0P0U	2.4 GHz ISM Band		



### 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.

## Using the Ultrasonic Sensor

The ultrasonic TEACH function stores the current distance measured minus 900 millimeters into the threshold of the input.

For example, an ultrasonic sensor is mounted on the ceiling of a parking garage, 3000 millimeters above the floor. The TEACH function stores the distance from the ceiling to the floor minus 900 millimeters, resulting in a detection threshold of 2100 millimeters. If the ultrasonic sensor detects something closer than 2100 millimeters, a vehicle is detected in that parking space.

- Host controlled systems can trigger the ultrasonic TEACH function by writing 22112 (0x5660) to the ultrasonic Node's I/O point 15 (Control Message).
- Host controlled systems or non-host connected systems can trigger the ultrasonic TEACH function by writing a 1 to the Node's I/O point 14. An example of a non-host controlled system would be to use a button on another radio device and map that input to this output.

## Binding Radios to Form Networks (Embedded Ultrasonic or Light Models)

The process of binding creates a secure wireless network between a Gateway and one or more Nodes. For the battery-powered Ultrasonic and Light Nodes, the Gateway should be set to 250 mW mode. Follow the instructions below to set the power level on the Gateway and bind the wireless network.

### On the Gateway

Step 1. Set the Extended Address Mode DIP switch (DIP switch 1) for DX80 Gateways or 250 mW mode DIP switch (DIP switch 1) for DX80 Performance Gateways to the ON position.

1. Disconnect the Gateway from its power source.
2. Remove the Gateway's top cover.



3. Move DIP switch 1 to the ON position. (Refer to the datasheet for instructions on accessing the DIP switches.)
4. Apply power to the Gateway.

Step 2. Triple click button 2 to enter binding mode.

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

Step 3. Assign the Node a Node Address. 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.)

On the Node

Step 1. Place the optical commissioning device pointed directly at the LED receiving window.

Step 2. Triple-click the button on the optical commissioning device to place the Node into binding mode. (If the Node is in its "slow scan" mode, this will wake up the Node as well as begin binding mode.)

After entering binding mode, the Node's LED blinks slowly, alternating between red and green. After the Node receives a valid binding code from the Gateway, the red and green LEDs are both illuminated continuously, resulting in a slightly orange light.

Step 3. The device automatically resets.

Step 4. To identify the device, write the Node address on the Node's label.

Step 5. Repeat this sequence (Node step 3 and Node step 4) for as many Nodes as you need to bind. When using this addressing system, up to 47 Nodes may be addressed by a single Gateway.

If two Nodes are accidentally assigned the same address, rerun the binding procedure on one of the Nodes to reassign the Node address. The binding sequence may be run on a Node as many times as necessary. If a Node is put into binding mode but does not receive a binding code from a valid Gateway with 60 seconds, the Node automatically exits binding mode.

On the Gateway

Step 1. Single click either button 1 or button 2 on the Gateway to exit binding mode and reboot.

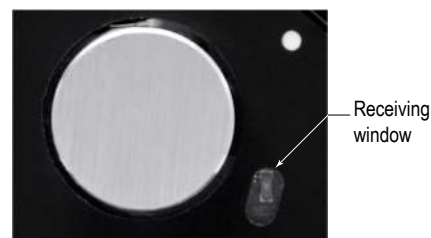
A few seconds after exiting binding mode, the Node's LED blinks green, indicating it is synchronized to the Gateway. The Gateway enters standard operating mode with the LCD autoscrolling through the menu options.

## Optical Commissioning Device

The optical commissioning device is a LED flashlight used to change the radio's modes. A radio can be put into sleep mode, taken out of sleep mode, or put into binding mode.



Model Number: BWA-MGFOB-001



**Sleep Mode (Click and Hold).** Click and hold the LED light within one centimeter of the radio's receiving window to wake the device from "deep sleep." If your radio is not in deep sleep mode, clicking and holding the LED light puts it into deep sleep. While in deep sleep mode, the radio does not attempt to transmit and remains in deep sleep until an LED light at the receiving window wakes it up.

**Binding Mode (Triple click).** Triple clicking at the receiving window puts the radio into binding mode. The ultrasonic radio is assigned the Slave ID address by the Gateway or Master radio.

**Exit (Double click).** If the ultrasonic radio is in binding mode, double click the optical commissioning device at the LED to exit binding mode without binding.

## Sure Cross® User Configuration Tool

The User Configuration Tool (UCT) software runs on any Windows machine and uses a USB to RS-485 adapter 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.

## 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)	Ultrasonic (mm)	0	4000	0	65535
2	2	2 + (Node# × 16)	Temperature (°C/°F)	-1638.3	+1638.4	0	65535
7	7	7 + (Node# × 16)	Reserved				
8	8	8 + (Node# × 16)	Device Message				
14	14	14 + (Node# × 16)	Ultrasonic TEACH	0	1	0	1
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 65535 in the register (0xFFFF) is interpreted as -1 ÷ 20 = -0.05°.

## Specifications

### Radio Range<sup>1</sup>

900 MHz: 300 m (1000 ft)  
2.4 GHz: 150 m (500 ft)

### Radio Transmit Power

900 MHz, 150 mW: 21 dBm (150 mW) conducted  
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)

### Supply Voltage

3.6 V dc low power option from an internal battery

### Housing

Polycarbonate housing and rotary dial cover; polyester labels; EDPM rubber cover gasket  
Weight: 0.30 kg (0.65 lbs)  
Mounting: # 10 or M5 (SS M5 hardware included)  
Max. Tightening Torque: 0.56 N·m (5 lbf·in)

### 900 MHz Compliance

FCC ID TGUDX80 - This device complies with FCC Part 15, Subpart C, 15.247  
IC: 7044A-DX8009

### 2.4 GHz Compliance

FCC ID UE300DX80-2400 - This device complies with FCC Part 15, Subpart C, 15.247  
ETSI EN 300 328 V1.8.1 (2012-06)  
IC: 7044A-DX8024

### Ultrasonic Input

Range: 600–4000 mm  
Sample Rate: 10 seconds  
Report Rate: 64 seconds or on Change of State

### Temperature Input

Range: -45 to 85 °C  
Sample Rate: 10 seconds  
Report Rate: 64 seconds

### Link Timeout

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

<sup>1</sup> Radio range depends on the environment and line of sight.

**Environmental Conditions<sup>2</sup>**

Rating: IEC IP67; NEMA 6

-40 °C to +85 °C (-40 °F to +185 °F)<sup>3</sup>

95% maximum relative humidity (non-condensing)

**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

## Battery Replacement

To replace the lithium "D" cell battery, 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 and replace with a new battery. Only use a 3.6V lithium battery from Xeno, model number XL-205F or similar.
3. Verify the battery's positive and negative terminals align to the positive and negative terminals of the battery holder mounted within the case. The negative end is toward the spring. 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.

When removing the battery, press the battery towards the negative terminal to compress the spring. Pry up on the battery's positive end to remove from the battery holder. 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.

## 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.

## Exporting Sure Cross® Radios

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.

## Copyright Notice

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. For the most recent version of any documentation, refer to: [www.bannerengineering.com](http://www.bannerengineering.com). © Banner Engineering Corp. All rights reserved.

<sup>2</sup> Refer to the *Sure Cross® Installation Guide* (p/n 151514) for installation and waterproofing instructions.

<sup>3</sup> Operating the devices at the maximum operating conditions for extended periods can shorten the life of the device.