

# SureCross DX80 Ultrasonic Node



Node with a battery and ultrasonic sensor integrated into the housing



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 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

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

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.

## 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.

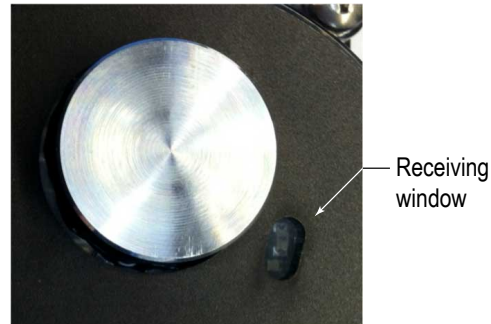
A few seconds after exiting binding mode, the Node's LED blinks green, indicating it is synchronized to the Gateway. The Gateway enters standard operating mode with the LCD autoscrolling through the menu options.

## Optical Commissioning Device

The optical commissioning device is an LED flashlight and is used to trigger binding between the FlexPower Node and a Gateway.



Model Number: BWA-MGFOB-001



**Click and Hold.** Click and hold the LED light within one centimeter of the receiving window to wake the FlexPower Node from "deep sleep." If your Node is not in "deep sleep," clicking and holding the LED light will put it into "deep sleep." While in "deep sleep" mode, the Node does not attempt to transmit to the Gateway and remains in deep sleep until an LED light at the receiving window wakes it up.

**Triple click.** Triple clicking at the receiving window puts the Node into binding mode. The Node is assigned the Node address the Gateway's rotary dials are set to. Before putting the Node into binding mode, verify the Gateway's rotary dials are set to ensure the Node will be binding to the correct Node address.

**Double click.** If the Node is in binding mode, double clicking the LED exits binding mode without binding the Node to 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  $-1 \div 20 = -0.05^\circ$ .

## Using the Ultrasonic Sensor

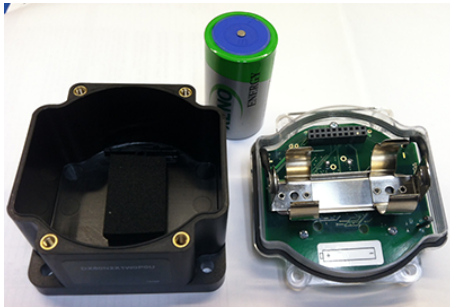
The ultrasonic TEACH function stores the current distance measured minus 900 millimeters into the threshold of the input.

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.

## Battery Replacement

To replace the lithium "D" cell battery, follow these steps.



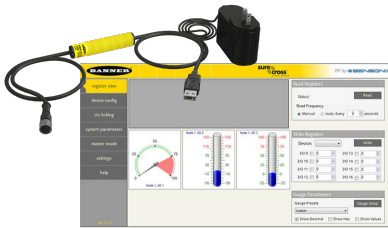
1. Remove the four screws mounting the face plate to the housing and remove the face plate.
2. Remove the discharged battery and replace with a new battery. Only use a 3.6V lithium battery from Xeno, model number XL-205F or similar.
3. Verify the battery's positive and negative terminals align to the 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.

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

## Specifications

### Radio Range

- 900 MHz: 300 meters (1000 feet)
- 2.4 GHz: 150 meters (500 feet)

### Radio Transmit Power

- 900 MHz: 21 dBm (150 mW) conducted
- 2.4 GHz: 18 dBm (65 mW) conducted, less than or equal to 20 dBm (100 mW) EIRP

### Power

- Requirements: 3.6V 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 (150 mW Radios)**

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

Radio range depends on the environment and line of sight.

Refer to the [SureCross Installation Guide](#) (p/n 151514) for installation and waterproofing instructions. Operating the devices at the maximum operating conditions for extended periods can shorten the life of the device.

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

**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

**Environmental**

Rating: IEC IP67; NEMA 6; (See UL section below for any applicable UL specifications)  
Operating Temperature: –40 to +85 °C  
Operating Humidity: 95% max. relative (non-condensing)

**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

## Warnings

**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 subject to change;** Banner reserves the right to modify product specifications or to update documentation at any time. For the most recent version of any documentation, refer to: [www.bannerengineering.com](http://www.bannerengineering.com). © 2006-2013 Banner Engineering Corp. All rights reserved.

## Exporting SureCross Radios

**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.

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