Ultrasonic Node with Internal Battery

Features

For additional information, updated documentation, and a list of accessories, refer to Banner Engineering's website, www.bannerengineering.com.

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 is driven by one primary lithium 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 architectures 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

The following models are no longer available for order, but are still covered by the information in this document.

Models	Frequency	Environmental Rating	I/O
DX80N2X1W0P0U	2.4 GHz ISM Band	IP67, NEMA 6	**Inputs**: One Ultrasonic, one temperature
DX80N2X1W0P0U NB (ships without the battery)			

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.

Using the Ultrasonic Sensor

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

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.

164800
p/n: 164800 Rev. C

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

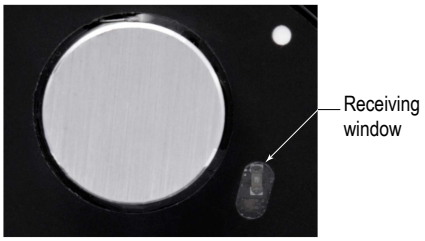
Step 1. Single click either button 1 or button 2 on the Gateway to exit binding mode and reboot.

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 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.

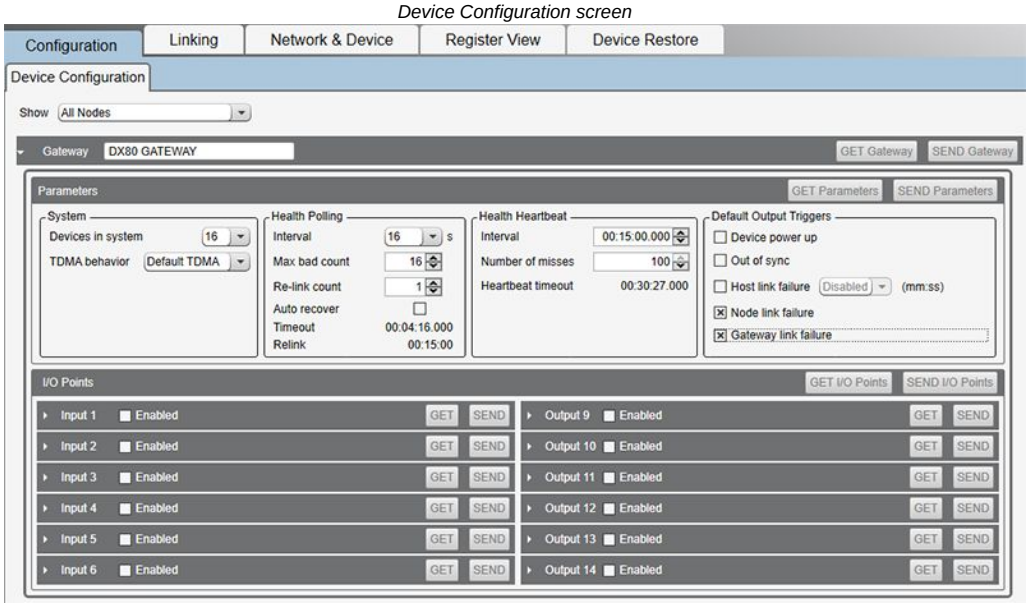
Binding Mode (Triple click). Triple-clicking at the receiving window puts the radio into binding mode. The ultrasonic radio is assigned the Slave ID address by the Gateway or Master radio.

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.

DX80 Performance Configuration Software

The configuration software offers an easy way to link I/O points in your wireless network, view I/O register values, and set system communication parameters when a host system is not part of the wireless network. The software runs on any computer with the Windows Vista, Windows 7, Windows 8, or Windows 10 operating system.

Device Configuration screen



Use a USB to RS-485 adapter cable to connect a standalone DX80 Gateway to the computer. For DXM Controllers with an internal DX80 radio, connect a computer to the DXM Controller using the supplied USB or Ethernet connection. Download the most recent revisions of the configuration software from Banner Engineering's website: https://www.bannerengineering.com/us/en/products/wireless-sensor-networks/reference-library/software.html.

The USB to RS-485 adapter cable is not required for the DXM Controller. For standalone DX80 Gateway devices use:

- USB to RS-485 adapter cable model **BWA-UCT-900** for 1 Watt radios
- USB to RS-485 adapter cable model **BWA-HW-006** for all other radios

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 for Ultrasonic Node with Battery

Radio Range

900 MHz: 300 m (1000 ft)

2.4 GHz: 150 m (500 ft)

Radio range depends on the environment and line of sight.

Radio Transmit Power

900 MHz Conducted: 21 dBm (150 mW)

2.4 GHz Conducted: < 18 dBm (65 mW); EIRP with the supplied antenna: < 20 dBm (100 mW)

Spread Spectrum Technology

FHSS (Frequency Hopping Spread Spectrum)

900 MHz Compliance (DX8009 Radio Module; 150 mW)

Contains FCC ID: TGUDX80

Contains IC: 7044A-DX8009

2.4 GHz Compliance (DX80-2400 Radio Module)

Radio module is indicated by the product label marking

Contains FCC ID: UE300DX80-2400

Radio Equipment Directive (RED) 2014/53/EU

Contains IC: 7044A-DX8024

ANATEL: 15966-21-04042 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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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)

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

Environmental Conditions

Rating: IEC IP67; NEMA 6

–40 °C to +85 °C (–40 °F to +185 °F)(1)

95% maximum relative humidity (non-condensing)

Refer to the Sure Cross® Installation Guide (p/n 151317) for installation and waterproofing instructions.

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

(1) Operating the devices at the maximum operating conditions for extended periods can shorten the life of the device.

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

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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For patent information, see www.bannerengineering.com/patents.

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.** 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.