

Sure Cross® Wireless Q120 Node (6 Buttons and Light)



Datasheet

Sure Cross® Wireless Q120 Nodes use the reliable, field-proven, Sure Cross wireless architecture. Containing a radio, internal battery supply, and optional 10 to 30 V dc power terminals, this product line is truly plug and play.

The Wireless Q120 Node with Button and Light is a wireless Node with six independently controlled push button inputs and six sets of LED indicator lights. The push buttons can be configured with DIP switches for either toggle or momentary operation; the red and green LED indicator light outputs can be configured for solid or flashing operation.

Benefits

- Powerful device to deliver factory automation and IIoT solutions for many applications including but not limited to:
 - Call for parts, service, or pallet pickup
 - Door/gate control
 - AGV control
 - Motor jog control
 - Forklift door control
- **Deploy easily**—Battery powered for "Peel and Stick" installation on existing equipment, with large lithium "D" cell for up to 3.5 years of battery life.
- **Eliminate control wires**—The Sure Cross wireless system is a radio frequency network with integrated I/O that removes the need for power and control wires; enables deployment in remote and hard-to-access locations.
- **Reduce complexity**—Machine or process reconfiguration made easier; great for retrofit applications



- Easy-to-use rugged device that can be handheld or mounted to equipment
- Six normally open (NO) push buttons for control of remote devices or system acknowledgment
- Local red and green LED indication can be linked to button presses or to other wireless inputs within the network
- Transceivers provide bidirectional communication between the Gateway and Node, including fully acknowledged data transmission
- DIP switches available for easy user configuration



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.

Models

Model	Frequency	Inputs and Outputs
DX80N9Q120BL-RG	900 MHz ISM Radio	Inputs: Six push buttons
DX80N2Q120BL-RG	2.4 GHz ISM Radio	Outputs: Six LED indicator lights

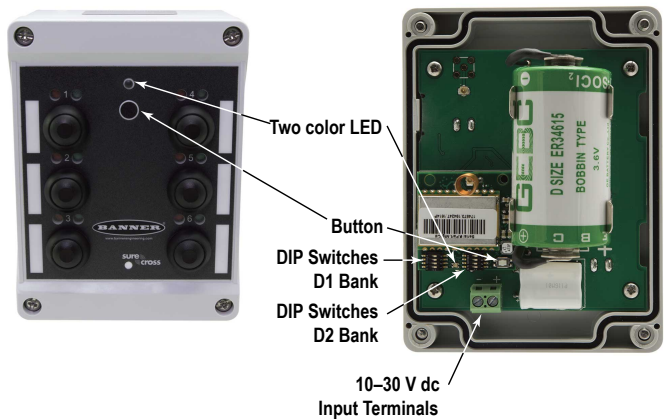
Storage Mode for the Wireless Q120 Node

While in **storage mode**, the Wireless Q120 Node's radio does not operate. The Wireless Q120 Node ships from the factory in storage mode to conserve the battery. To wake the device, press and hold the button for five seconds. To put any Wireless Q120 Node into storage mode, press and hold the button for five seconds. The Wireless Q120 Node is in storage mode when the LEDs stop blinking.



Configuration Instructions

Button and LEDs



Red LED (flashing) indicates a radio link error with the Gateway. Green LED (flashing) indicates a good radio link with the Gateway.

DIP Switches

Description	D1 Bank			
	1	2	3	4
Transmit power: 1 Watt	OFF*			
Transmit power: 250 mW (compatible with 150 mW radios)	ON			
Reserved		OFF*	OFF*	OFF*
Ignore DIP switch settings		ON	OFF	OFF

Description	D2 Bank			
	1	2	3	4
Low Speed Mode (Battery-powered)	OFF*			
High Speed Mode (10-30 V dc powered)	ON			
Button mode: toggle		OFF*		
Button mode: momentary		ON		
Reserved (keep in OFF position)			OFF*	OFF*

* Default position

After making any changes to any DIP switch position, reboot the Wireless Q120 Node by triple-clicking the button, waiting a second, then double-clicking the button.

Bind the Wireless Q120 Node to the Gateway and Assign the Node Address

Before beginning the binding procedure, apply power to all the devices. Separate the devices by two meters when running binding procedure. Put only one Gateway into binding at a time to prevent binding to the wrong Gateway.

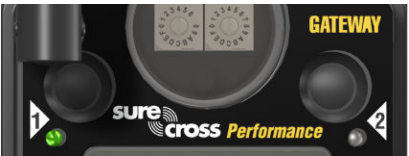


Figure 1. Buttons on a housed Gateway

1. Enter binding mode on the Gateway.
 - For housed DX80 Gateways, triple-click button 2 on the Gateway. Both LEDs flash red.
 - For board-level DX80 Gateways, triple-click the binding button on the Gateway. The green and red LED flashes.
2. Assign the Wireless Q120 Node a Node address using the Gateway's rotary dials. Use the left rotary dial for the left digit and the right rotary dial for the right digit. For example, to assign your Wireless Q120 Node to Node 10, set the Gateway's left dial to 1 and the right dial to 0. Valid Node addresses are 01 through 47.



3. Loosen the clamp plate on the top of the Wireless Q120 Node and lift the cover.
4. Enter binding mode on the Wireless Q120 Node by triple-clicking the Wireless Q120 Node's binding button. The red and green LEDs flash alternately and the sensor searches for a Gateway in binding mode. After the Wireless Q120 Node is bound, the LEDs stay solid momentarily, then they flash together four times. The Wireless Q120 Node exits binding mode.
5. Label the sensor with the Wireless Q120 Node's Node address number for future reference.
6. Repeat steps 2 through 5 for as many Wireless Q120 Node as are needed for your network.
7. After binding all Wireless Q120 Node, exit binding mode on the Gateway.
 - For housed DX80 Gateways, double-click button 2 on the Gateway.
 - For board-level DX80 Gateways, double-click the binding button on the Gateway.

For Gateways with single-line LCDs, after binding your Wireless Q120 Node to the Gateway, make note of the binding code displayed under the Gateway's *DVCFG menu, XADR submenu on the LCD. Knowing the binding code prevents having to re-bind all Wireless Q120 Nodes if your Gateway is ever replaced.

Modbus Registers

I/O #	Modbus Holding Register		I/O Type	I/O Range		Holding Register Representation	
	Gateway	Any Node		Min. Value	Max. Value	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
3	3	3 + (Node# × 16)	Discrete IN 3	0	1	0	1
4	4	4 + (Node# × 16)	Discrete IN 4	0	1	0	1
5	5	5 + (Node# × 16)	Discrete IN 5	0	1	0	1
6	6	6 + (Node# × 16)	Discrete IN 6	0	1	0	1
7	7	7 + (Node# × 16)	Reserved				
8	8	8 + (Node# × 16)	Device Message				
9	9	9 + (Node# × 16)	Discrete OUT 1	0	65535	0	65535
10	10	10 + (Node# × 16)	Discrete OUT 2	0	65535	0	65535
11	11	11 + (Node# × 16)	Discrete OUT 3	0	65535	0	65535
12	12	12 + (Node# × 16)	Discrete OUT 4	0	65535	0	65535
13	13	13 + (Node# × 16)	Discrete OUT 5	0	65535	0	65535
14	14	14 + (Node# × 16)	Discrete OUT 6	0	65535	0	65535
15	15	15 + (Node# × 16)	Control Message				
16	16	16 + (Node# × 16)	Reserved				

Set the appropriate discrete output to the following values to control the LED. Values not listed are reserved for future support.

Discrete OUT Holding Register Value	LED Operation	Discrete OUT Holding Register Value	LED Operation
0	LED Off	5	Red LED Flash
1	Green LED Flash	6	Red LED On
2	Green LED On		

Latch/Toggle Table for Host Systems or Scripting

For most models, use the DIP switches to set latch and toggle modes. Not all models have a DIP switch setting for Latch mode. If your model does not have those DIP switch settings, use the User Configuration Tool to enable latch or toggle inputs.

1. Set the DIP switch to allow the User Configuration Tool to configure the device and ignore the DIP switch settings.
2. Connect the Gateway to the computer with the User Configuration Tool installed.
3. Launch the User Configuration Tool and go to **Configuration > Device Configuration**.
4. For the Node you are configuring, click **GET Node** to load all of that Node's parameter settings.
5. Click on the arrow next to the Node to expand the list of that Node's inputs and outputs.

6. For the specific input, click on the arrow next to the input number to expand those parameters.
7. Under the **Serial options** section, select **Latch** or **Toggle** or **None** (momentary) in the **Sync Counter's** drop-down list.
8. Click **SEND Node** to send the changes to that Node's parameters to the network.

Latch

After an input is activated (set to 1) with a button press or using the messages, the input remains at 1 until cleared or alternated by writing to I/O 15. Latching prevents a successive button press from setting the input to 0.

Toggle

The input toggles between 0 and 1 with successive button pushes or touches. Write to I/O 15 to clear the toggle or to alternate the current state of the toggle.

To change the latch/toggle register value using a host system, write the following to the Node's I/O point 15:

For I/O point	Write this decimal value	
	To clear the register value	To alternate the state of the latch/toggle register value
1	5377	5505
2	5378	5506
3	5380	5508
4	5384	5512
5	5392	5520
6	5408	5536
All Points	5439	5567



Important: DO NOT write these values to I/O 15 if the device is used in momentary mode.

Installation Instructions

Watertight Glands and NPT Ports

To make glands and plugs watertight, use PTFE tape and follow these steps.

1. Wrap four to eight passes of polytetrafluoroethylene (PTFE) tape around the threads as close as possible to the hexagonal body of the gland.
2. Manually thread the gland into the housing hole. Never apply more than 5 in-lbf of torque to the gland or its cable clamp nut. ¹



Seal any unused access holes with one of the supplied plastic plugs. To install a watertight plug:

1. Wrap four to eight passes of PTFE tape around the plug's threads, as close as possible to the flanged surface.
2. Carefully thread the plastic plug into the vacant hole in the housing and tighten using a slotting screwdriver. Never apply more than 10 in-lbf torque to the plastic plug.

If your device has an unused NPT port, install a watertight NPT plug:

1. Wrap 12 to 16 passes of PTFE tape evenly across the length of the threads.
2. Manually thread the plug into the housing port until reaching some resistance.
3. Using a crescent wrench, turn the plug until all the plug's threads are engaged by the housing port or until the resistance doubles. Do not over-tighten as this will damage the device. These threads are tapered and will create a waterproof seal without over-tightening.

Wiring for DC Power

The Wireless Q120 Node has terminal connections to operate from 10 to 30 V dc power. Connect the power wires through the housing to the terminals shown in [Button and LEDs](#) on page 2. The battery can be removed to operate only from 10 to 30 V dc power or the battery can provide battery backup power.

The Wireless Q120 Node can be put into high speed mode when using 10 to 30 V dc. This will allow for LED indicators to run up to 16 times faster than a battery-powered Node. Operating in high speed mode with battery power significantly reduces the battery life.

¹ This is equivalent to the torque generated without using tools. If a wrench is used, apply only very light pressure. Torquing these fittings excessively damages the device.

Replace the Battery



To replace the lithium "D" cell battery, follow these steps. 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. Properly dispose of used batteries 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.

1. Unscrew the four corner screws and open the box.
2. Remove the discharged battery and replace with a new battery. Use a 3.6 V D cell lithium battery, such as Xeno's XL-205 or equivalent.
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. Reassemble the box and tighten the four corner screws.

Specifications

Performance Radio with Internal Antenna Specifications

Radio Range²

900 MHz, 1 Watt (Internal antenna): Up to 3.2 km (2 miles) with line of sight
2.4 GHz, 65 mW (Internal antenna): Up to 1000 m (3280 ft) with line of sight

Antenna Minimum Separation Distance

900 MHz, 150 mW and 250 mW: 2 m (6 ft)
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

Spread Spectrum Technology

FHSS (Frequency Hopping Spread Spectrum)

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 300 328: V1.8.1 (2012-06)
IC: 7044A-DX8024

Link Timeout

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

Radiated Immunity HF

10 V/m (EN 61000-4-3)

Q120 Six Button and Light Box Specifications

Button Input

Sample Rate: 62.5 milliseconds
Report Rate: On Change of State
ON Condition: Button pressed
OFF Condition: Button not pressed

Construction

Polycarbonate housing; polyester labels; EDPM rubber cover gasket; nylon buttons
Weight: 0.39 kg (0.85 lbs)
Maximum Tightening Torque: 0.56 N-m (5 lbf-in)

Environmental Rating

IEC IP67; NEMA 6

Operating Conditions

-40 °C to +70 °C (-40 °F to +158 °F)
90% at +50 °C maximum relative humidity (non-condensing)

Typical Battery Life

Up to 3.5 years, typical
A typical battery life assumes an average of 60 seconds between sensor changes of state and the default 62.5 millisecond sample rate.

Battery life with LEDs on or flashing:

One green LED flashing: 3.25 years
One green LED on: 1.75 years
All green LEDs flashing: 3 years
All green LEDs on: 1.25 years
One red LED flashing: 3.25 years
One red LED on: 1.25 year
All red LEDs flashing: 2.25 years
All red LEDs on: 0.5 years

Indicators

Read and green LEDs (radio function)

² Range depends on the environment and decreases significantly without line of sight. Always verify your wireless network's range by performing a Site Survey.

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. 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. Specifications and product information in English supersede that which is provided in any other language. For the most recent version of any documentation, refer to:

www.bannerengineering.com.

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.