

# Sure Cross® Wireless Q120BL 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 Q120BL 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

## Models

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

## Storage Mode

While in **storage mode**, the device's radio does not operate, to conserve the battery. To put any device into storage mode, press and hold the binding button for five seconds. The device is in storage mode when the LEDs stop blinking. To wake the device, press and hold the binding button (inside the housing on the radio board) for five seconds.

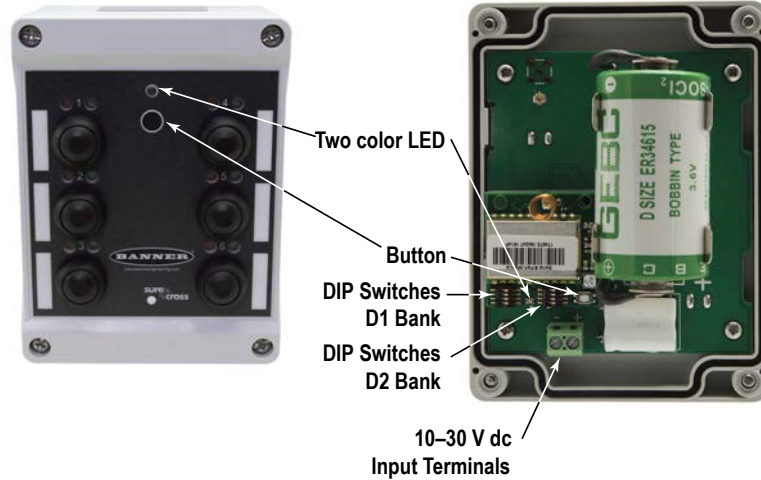


## Configuration Instructions

### Button and LEDs

A flashing green LED indicates a good radio link with the Gateway. A flashing red LED indicates a radio link error with the Gateway.

Figure 1. Buttons, LEDs, and DIP switch locations



### DIP Switches

Description	D1 Bank				Description	D2 Bank			
	1	2	3	4		1	2	3	4
Transmit power: 1 Watt	OFF*				Low Speed Mode (Battery-powered)	OFF*			
Transmit power: 250 mW (compatible with 150 mW radios)	ON				High Speed Mode (10-30 V dc powered)	ON			
Reserved		OFF*	OFF*	OFF*	Button mode: toggle		OFF*		
Ignore DIP switch settings		ON	OFF	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 Q120BL Node by triple-clicking the button, waiting a second, then double-clicking the button.

### Wiring for DC Power

The Q120BL 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 Q120BL 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.

### Bind 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.

- On the Gateway: Enter binding mode.
  - For housed DX80 Gateways, triple-click button 2 on the Gateway. Both LEDs flash red.
  - For Gateway board modules, triple-click the button. The green and red LED flashes.
- Assign the Q120BL 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 Q120BL 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. On the Q45: Loosen the clamp plate on the top of the Q120BL Node and lift the cover.
4. Enter binding mode on the Q120BL Node by triple-clicking the Q120BL Node's button. The red and green LEDs flash alternately and the sensor searches for a Gateway in binding mode. After the Q120BL Node is bound, the LEDs stay solid momentarily, then they flash together four times. The Q120BL Node exits binding mode.
5. Label the sensor with the Q120BL Node's Node address number for future reference.
6. Repeat steps 2 through 5 for as many Q120BL Nodes as are needed for your network.
7. On the Gateway: After binding all Q120BL Nodes, exit binding mode.
  - For housed DX80 Gateways, double-click button 2.
  - For board-level DX80 Gateways, double-click the button.

For Gateways with single-line LCDs: After binding your Q120BL 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 Q120BL 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 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 Software to configure the device and ignore the DIP switch settings.
2. Connect the Gateway to the computer with the software installed and launch the software.
  - a. Click **Device > Connection Settings**.
  - b. Select appropriate connection type (**Serial** or **TCP**).
  - c. Select the correct COMM port or enter the IP Address and click **Connect**.
3. 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:

Table 1: Latch/toggle register values

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

Figure 2. Watertight glands wrapped in PTFE tape



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.

<sup>1</sup> 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 Range<sup>2</sup>

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

#### 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

#### Link Timeout (Performance)

Gateway: Configurable via User Configuration Software  
Node: Defined by Gateway

#### Spread Spectrum Technology

FHSS (Frequency Hopping Spread Spectrum)

#### 900 MHz Compliance (1 Watt)

Contains FCC ID: UE3RM1809: FCC Part 15, Subpart C, 15.247  
Contains IC: 7044A-RM1809  
IFT: RCPBARM13-2283



(NOM approval only applies to 900 MHz models)

#### 2.4 GHz Compliance (DX80-2400 Radio Module)

Radio module is indicated by the product label marking  
Contains FCC ID: UE300DX80-2400: FCC Part 15, Subpart C, 15.247  
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/](http://www.gov.br/anatel/pt-br/)

#### 2.4 GHz Compliance (SX243 Radio Module)

Radio module is indicated by the product label marking  
Contains FCC ID: UE3SX243: FCC Part 15, Subpart C, 15.247  
Radio Equipment Directive (RED) 2014/53/EU  
Contains IC: 7044A-SX243

### 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

#### 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

#### Supply Voltage

3.6 V DC (internal battery) or 10 V DC to 30 V DC (Outside the USA: 12 V DC to 24 V DC, ± 10%)

#### Operating Conditions

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

#### Environmental Rating

IP67; NEMA 6

#### Indicators

Read and green LEDs (radio function)

#### 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)

## Warnings

**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

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

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.



**Important:** Please download the complete Wireless Q120BL Node with Button and Light technical documentation, available in multiple languages, from [www.bannerengineering.com](http://www.bannerengineering.com) for details on the proper use, applications, Warnings, and installation instructions of this device.



**Important:** Por favor descargue desde [www.bannerengineering.com](http://www.bannerengineering.com) toda la documentación técnica de los Wireless Q120BL Node with Button and Light, disponibles en múltiples idiomas, para detalles del uso adecuado, aplicaciones, advertencias, y las instrucciones de instalación de estos dispositivos.



**Important:** Veuillez télécharger la documentation technique complète des Wireless Q120BL Node with Button and Light sur notre site [www.bannerengineering.com](http://www.bannerengineering.com) pour les détails sur leur utilisation correcte, les applications, les notes de sécurité et les instructions de montage.



**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.



**Important:**

- **Electrostatic discharge (ESD) sensitive device**
- ESD can damage the device. Damage from inappropriate handling is not covered by warranty.
- Use proper handling procedures to prevent ESD damage. Proper handling procedures include leaving devices in their anti-static packaging until ready for use; wearing anti-static wrist straps; and assembling units on a grounded, static-dissipative surface.

## 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](http://www.bannerengineering.com/patents).

## Notas Adicionales

Información México: La operación de este equipo está sujeta a las siguientes dos condiciones: 1) es posible que este equipo o dispositivo no cause interferencia perjudicial y 2) este equipo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada.

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Antenas SMA	Modelo	Antenas Tipo-N	Modelo
Antena, Omni 902-928 MHz, 2 dBd, junta de caucho, RP-SMA Macho	<b>BWA-902-C</b>	Antena, Omni 902-928 MHz, 6 dBd, fibra de vidrio, 1800mm, N Hembra	<b>BWA-906-A</b>
Antena, Omni 902-928 MHz, 5 dBd, junta de caucho, RP-SMA Macho	<b>BWA-905-C</b>	Antena, Yagi, 900 MHz, 10 dBd, N Hembra	<b>BWA-9Y10-A</b>

## Mexican Importer

Banner Engineering de México, S. de R.L. de C.V.  
David Alfaro Siqueiros 103 Piso 2 Valle oriente  
San Pedro Garza Garcia Nuevo León, C. P. 66269  
81 8363.2714

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