

Sure Cross® Wireless Q45RDNL Node (Remote Discrete Non-Contact Switch)



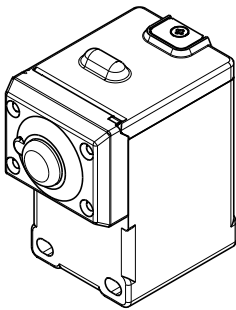
Datasheet

Sure Cross® Wireless Q45 Sensors combine the best of Banner's flexible Q45 sensor family with its reliable, field-proven, Sure Cross wireless architecture to solve new classes of applications limited only by the user's imagination. Containing a variety of sensor models, a radio, and internal battery supply, this product line is truly plug and play.

The Q45RDNL is a compact, industrial, battery-powered device that uses a locally installed magnet to sense the position of mechanical mechanisms. The Q45 wirelessly transmits the position to a wireless controller/gateway using a discrete input state. Configure the Q45 using internal DIP switches or the User Configuration Software.

Benefits

- Powerful device to deliver factory automation and IIoT solutions for many applications including but not limited to:
 - Door position sensing
 - Security - verify gate or door closure
 - Safety shower operation monitoring
 - Damper/valve/actuator position
 - Articulating equipment position (outriggers, booms, chocks, cylinders etc.)
- Easy-to-use rugged device that can be easily mounted to equipment
- Senses the position of doors, levers, or other moving mechanicals object by proximity to the Q45
- Use with a DXM Wireless Controller to track position, count cycles, or times in different positions
- Local LED indication can be linked to proximity sensing or to other wireless inputs within the network
- Battery powered for "peel and stick" functionality with 2-year battery life capability
- **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
- **Reduce complexity**—Machine or process reconfiguration made easier; great for retrofit applications
- **Deploy easily**—Simplify installation on existing equipment enables deployment in remote and hard-to-access locations where implementing a wired solution would be difficult, impractical, or not cost-effective



- Selectable transmit power levels of 250 mW or 1 Watt for 900 MHz models and 65 mW for 2.4 GHz models
- DIP switches for user configuration
- Frequency Hopping Spread Spectrum (FHSS) technology ensures 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
- Diagnostics allow user-defined output settings in the unlikely event of lost RF signal



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: Please download the complete Wireless Q45 Sensor Node technical documentation, available in multiple languages, from 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 toda la documentación técnica de los Wireless Q45 Sensor Node, 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 Q45 Sensor Node sur notre site www.bannerengineering.com pour les détails sur leur utilisation correcte, les applications, les notes de sécurité et les instructions de montage.



Models

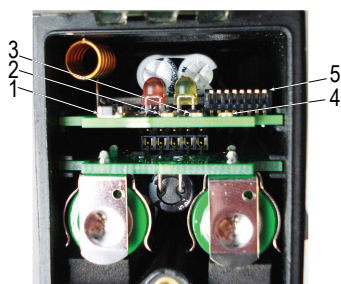
Model	Frequency	Inputs and Outputs
DX80N9Q45RDNL-NH	900 MHz ISM Band	Inputs: One remote discrete non-contact switch
DX80N2Q45RDNL-NH	2.4 GHz ISM Band	Outputs: One four-color LED indicator light

Storage Mode

While in **storage mode**, the Q45's radio does not operate. The Q45 ships from the factory in storage mode to conserve the battery. To wake the device, press and hold the binding button (inside the housing on the radio board) for five seconds. To put any Q45 into storage mode, press and hold the binding button for five seconds. The Q45 is in storage mode when the LEDs stop blinking.

Configuration Instructions

Binding Button and LED Indicators



- 1 Binding button
- 2 Red LED (flashing) indicates a radio link error with the Gateway.
- 3 Green LED (flashing) indicates a good radio link with the Gateway.
- 4 Amber LED indicates when input 1 is active. The LED is active at power up and disabled after 15 minutes to conserve power. To enable the LED for another 15 minutes, press the binding button once. To disable the LED, press the binding button 5 times.
- 5 DIP Switches

DIP Switch Settings

After making any changes to any DIP switch position, reboot the Wireless Q45 Sensor by triple-clicking the button, waiting a second, then double-clicking the button. By default, the DIP switches are in the OFF position. To turn a DIP switch on, push the switch toward the battery pack. DIP switches are numbered from left to right.

Device Settings	1	2	3	4	5	6	7	8
900 MHz transmit power level: 1 Watt (30 dBm)	OFF*							
900 MHz transmit power level: 250 mW (24 dBm), DX80 compatibility mode	ON							
Modbus or UCT configured (overrides DIP Switches 3-8)		OFF*						
DIP switch configured		ON						
Standard input			OFF*					
Inverted input			ON					
Light mode: flashing				OFF*				
Light mode: solid				ON				
Red light mapped to input					OFF*	OFF*	OFF*	
Yellow light mapped to input					OFF	OFF	ON	
Green light mapped to input					OFF	ON	OFF	
Blue light mapped to input					OFF	ON	ON	
No lights mapped to input					ON	OFF	OFF	
Reserved					ON	OFF	ON	
Reserved					ON	ON	OFF	
Reserved					ON	ON	ON	
Reserved								OFF*

* default configuration

Transmit Power Levels

The 900 MHz radios transmit at 1 Watt (30 dBm) or 250 mW (24 dBm). While the Performance radios operate in 1 Watt mode, they cannot communicate with the older 150 mW radios. To communicate with 150 mW radios, operate this radio in 250 mW mode. For 2.4 GHz models, this DIP switch is disabled. The transmit power for 2.4 GHz is fixed at about 65 mW EIRP (18 dBm), making the 2.4 GHz Performance models automatically compatible with older 2.4 GHz models.

Modbus/Software or DIP Switch Configured

In Modbus/Software Configured mode, use the User Configuration Software or a Modbus command to change the device parameters. DIP switch positions 3 through 8 are ignored. In DIP Switch Configured mode, use the DIP switches to configure the parameters listed in the table.

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)	Non-Contact Switch State	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 (red light)	0	1	0	1
10	10	10 + (Node# × 16)	Discrete OUT 2 (yellow light)	0	1	0	1
11	11	11 + (Node# × 16)	Discrete OUT 3 (green light)	0	1	0	1
12	12	12 + (Node# × 16)	Discrete OUT 4 (blue light)	0	1	0	1
		...					
15	15	15 + (Node# × 16)	Control Message				
16	16	16 + (Node# × 16)	Reserved				

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.

- Enter binding mode on the Gateway.
 - For housed DX80 Gateways, triple-click button 2 on the Gateway. Both LEDs flash red.
 - For Gateway board modules, triple-click the binding button. The green and red LED flashes.
- Assign the Q45 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 Q45 to Node 10, set the Gateway's left dial to 1 and the right dial to 0. Valid Node addresses are 01 through 47.



- Loosen the clamp plate on the top of the Q45 and lift the cover.
- Enter binding mode on the Q45 by triple-clicking the Q45's binding button. The red and green LEDs flash alternately and the sensor searches for a Gateway in binding mode. After the Q45 is bound, the LEDs stay solid momentarily, then they flash together four times. The Q45 exits binding mode.
- Label the sensor with the Q45's Node address number for future reference.
- Repeat steps 2 through 5 for as many Q45s as are needed for your network.
- After binding all Q45s, 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 Q45 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 Q45s if your Gateway is ever replaced.

Bind to a DXM Gateway and Assign the Node Address

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

- On the DXM radio using the arrow keys select the **ISM Radio** menu on the LCD and click **ENTER**.
- Highlight the **Binding** menu and click **ENTER**.

3. Use the arrow keys to select the Node address to bind the Q45 to.
4. Loosen the clamp plate on the top of the Q45 and lift the cover.
5. Enter binding mode on the Q45 by triple-clicking the power/binding button.
The red and green LEDs flash alternately and the sensor searches for a Gateway in binding mode. After the Q45 binds, the LEDs stay solid momentarily, then they flash together four times. The Q45 exits binding mode.
6. Label the sensor with the Q45's Node address number for future reference.
7. Click **BACK** on DXM to exit binding for that specific Node address.
8. Repeat steps 3 through 7 changing the Node address for as many Q45s as are needed for your network.
9. Click **BACK** on DXM until back to the main menu when finished binding.

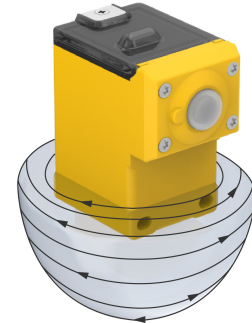
Magnetic Non-Contact Switch Sensing Area

The Q45RDNL has a normally open reed switch embedded into its base. Discrete switch closure is the result of a magnetic force in proximity to the lower portion of the Q45 housing surface.

The sensing area extends up to 1 inch from the face, rear, and bottom of device and up to 1 inch to the sides from the center of the base with the supplied Neodymium (axially magnetized) rare earth magnet. The supplied magnet, p/n 204457, is a 0.5 inch × 0.25 inch Neodymium rare earth magnet with a pull force of 10.9 lbs.

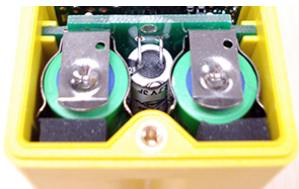
Mounting the Q45RDNL depends on the specific application, but either the magnet or Q45RNL can be mounted to the movable or fixed surface.

Any customer-supplied magnet configuration can be used. The sensing distance will vary based on the supplied magnet's size, type, and pull force.



Replace or Install the Batteries

To replace the lithium "AA" 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. Lift the plastic cover.
2. Slide the board containing the batteries out of the Q45 housing.
3. Remove the discharged batteries and replace with new batteries. Use two 3.6 V AA lithium batteries, such as Xeno's XL-60F or equivalent.
4. 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.
5. Slide the board containing the new batteries back into the Q45 housing.

The replacement battery model number is BWA-BATT-006. For pricing and availability, contact Banner Engineering.

Specifications

Performance Radio with Internal Antenna Specifications

Radio Range¹

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: FCC Part 15, Subpart C, 15.247
IC: 7044A-RM1809

2.4 GHz Compliance

FCC ID UE300DX80-2400: FCC Part 15, Subpart C, 15.247
RED Directive 2014/53/EU
IC: 7044A-DX8024

Link Timeout

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

¹ Range depends on the environment and decreases significantly without line of sight. Always verify your wireless network's range by performing a Site Survey.

Q45RDNL Specifications

Typical Battery Life

Up to 2 years

A typical battery life assumes an average of 20 seconds between sensor changes of state and the default 62.5 millisecond sample rate. Battery life is reduced to 1 year with an average of 2 seconds between changes of state.

Battery life with light continuously flashing: 2 months

Battery life with light continuously solid: 1.5 weeks

Construction

Molded reinforced thermoplastic polyester housing, oring-sealed transparent Lexan® cover, molded acrylic lenses, and stainless steel hardware. Designed to withstand 1200 psi washdown.

Indicators

Red and green LEDs (radio function); amber LED indicates when input 1 is active

Default Sensing Interval

62.5 milliseconds

Report Rate

On Change of State

Button Input

Sample Rate: 62.5 milliseconds

Report Rate: On Change of State

ON Condition: Button pressed

OFF Condition: Button not pressed

Certifications



(NOM approval only applies to 900 MHz models)

Environmental Specifications

Operating Conditions

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

Radiated Immunity: 10 V/m (EN 61000-4-3)

Environmental Rating

NEMA 6P, IEC IP67

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

Applications for the Q45RDNL Sensor Node

Mount the Wireless Q45RDNL Sensor Node using the two (2) provided screws, the recommended bracket, or industrial-grade, double-sided tape on the back or the sides of the device.

Mount the supplied magnet with epoxy or double-sided tape. Customer-supplied specialized magnets can also be used. When the magnet is in range of the reed switch, the magnetic field closes the switching circuit.

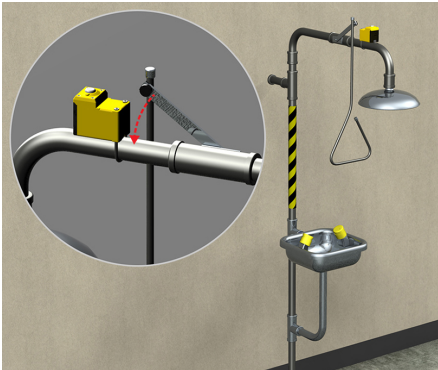


Figure 1. Sensing the actuation of a safety shower

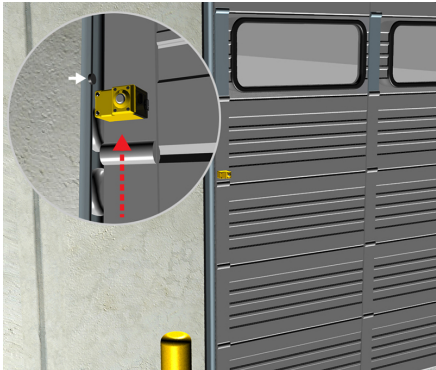


Figure 2. Sensing the door position

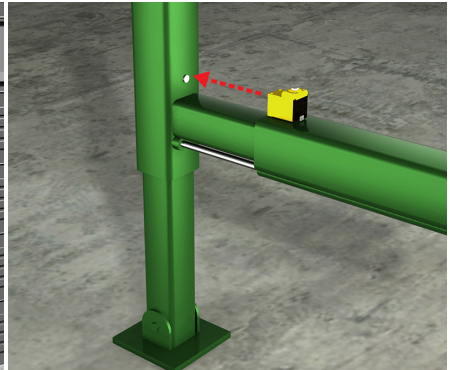


Figure 3. Sensing the extension or retraction of an articulating arm or stow position

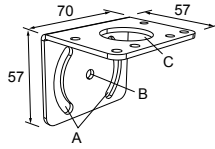
Mounting Brackets

- Q45 Wireless sensors can be mounted with double-sided tape or with bracket options below
- -NH models are supplied with two (2) mounting screws and nuts

Use with the -NH models:

SMB30MM

- 12-ga. stainless steel bracket with curved mounting slots for versatile orientation
- Clearance for M6 (1/4 in) hardware
- Mounting hole for 30 mm sensor



Hole center spacing: A = 51, A to B = 25.4

Hole size: A = 42.6 x 7, B = ϕ 6.4, C = ϕ 30.1

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.

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.

Banner es una marca registrada de Banner Engineering Corp. y podrán ser utilizadas de manera indistinta para referirse al fabricante. "Este equipo ha sido diseñado para operar con las antenas tipo Omnidireccional para una ganancia máxima de antena de 6 dBd y Yagi para una ganancia máxima de antena 10 dBd que en seguida se enlistan. También se incluyen aquellas con aprobación ATEX tipo Omnidireccional siempre que no excedan una ganancia máxima de antena de 6dBd. El uso con este equipo de antenas no incluidas en esta lista o que tengan una ganancia mayor que 6 dBd en tipo omnidireccional y 10 dBd en tipo Yagi, quedan prohibidas. La impedancia requerida de la antena es de 50 ohms."

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

Mexican Importer

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



more sensors, more solutions