Sure Cross® Wireless Q45RD Sensor (Remote Device)

Datasheet

Figure 1. Model DX80N9Q45RD-QPF-0.5

Figure 2. Model DX80N9Q45RD

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 Remote Device model is designed to interface with isolated dry contacts (pushbuttons), sourcing outputs, or Namur inductive proximity sensors.

Although these models support two dry contact inputs, the default Gateway I/O mapping configuration of the Banner Q45 wireless system supports one dry contact input. To map the second dry contact input on the Q45, use the Gateway's DIP switches to map the I/O. See the Gateway's datasheet for details.

Important: Because these sensors run on very low battery power, the contact wetting voltage is 3.3 volts. High voltage contacts are not designed to reliably switch these low voltages. Use a contact rated for operation at 3.3 volts.

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.

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.

Models

Model	Frequency	Connector
DX80N9Q45RD-QPF-0.5	900 MHz ISM Band	18 inch cable with a 5-pin M12/Euro-style female quick disconnect connector
DX80N9Q45RD		5-pin M12/Euro-style female quick disconnect connector embedded in the front

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

DIP Switches for Dry Contact Input Mode (DIP Switch 5 OFF)

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.

As shown in the image above, the DIP switches are in the OFF position. To turn a DIP switch on, push the switch toward the battery pack. DIP switches one through four are numbered from left to right as shown above.

Description	DIP Switches							
	1	2	3	4	5	6	7	8
Transmit power: 1 Watt	OFF *							
Transmit power: 250 mW (compatible with 150 mW radios)	ON							
Reserved		OFF *	OFF *	OFF *				
Dry contact input mode					OFF *			
3.3 V contact wetting voltage						OFF *		
5.5 V contact wetting voltage						ON		
Two dry contact inputs							OFF *	
One dry contact input							ON	
62.5 millisecond sample rate								OFF *
250 millisecond sample rate								ON

* Default position (as shown above)

DIP Switches for Namur Input Mode (DIP Switch 5 ON)

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.

As shown in the image above, the DIP switches are in the OFF position. To turn a DIP switch on, push the switch toward the battery pack. DIP switches one through four are numbered from left to right as shown above.

Description	DIP Switches			
	5	6	7	8
Namur input mode	ON			
5.5 V sensor voltage		OFF *		
8.2 V sensor voltage		ON		

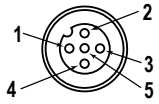
Description	DIP Switches			
	5	6	7	8
2 millisecond warmup time, 62.5 ms sample rate			OFF *	OFF *
2 millisecond warmup time, 250 ms sample rate			OFF	ON
5 millisecond warmup time, 125 ms sample rate			ON	OFF
5 millisecond warmup time, 500 ms sample rate			ON	ON

To use with Turck's Bi2-M12-Y1X-H1141, Bi5-M18-Y1X-H1141 Namur proximity sensor, set DIP switch 5 to ON and DIP switches 6 through 8 to OFF.

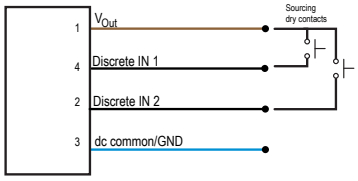
To use with Turck's Bi10-M30-Y1X-H1141 Namur proximity sensor, set DIP switch 5 and 7 to ON and DIP switches 6 and 8 to OFF.

Use cable MQDEC-406SS (male to female cable) to connect the Namur sensors to the Wireless Q45 Sensor - Remote Device model's interface.

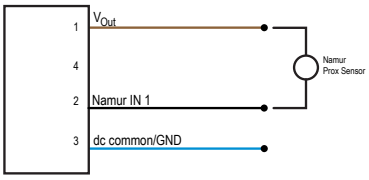
Wiring

5-pin M12/Euro-style Female Connection	Pin	Wire Color	Description
	1	Brown	V_{Out}
	2	White	Discrete IN 2 or Namur IN 1
	3	Blue	dc common (GND)
	4	Black	Discrete IN 1
	5	Gray	-

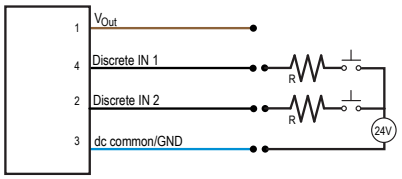
Wiring for Dry Contact Mode



Wiring for Namur Mode



Wiring for Externally Powered Sourcing Sensors



Voltage at the discrete IN:

- 0 V to 1 V = OFF
- 2 V to 5 V = ON
- More than 6 V will damage the Q45 sensor's input

Internal resistance is 800 Ohms. To connect the Wireless Q45 Sensor to a 24 V sourcing output, add a 3.0 KOhm to 5.6 KOhm external resistor in series to reduce the voltage applied to the Q45 Sensor's discrete input to less than 6 V.

R = 3.0 to 5.6 KOhm at 24 V

Modbus Register Table

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 OR Namur IN 1	0	1	0	1
2	2	2 + (Node# × 16)	Discrete IN 2	0	1	0	1
		...					
7	7	7 + (Node# × 16)	Reserved				
8	8	8 + (Node# × 16)	Device Message				
		...					
15	15	15 + (Node# × 16)	Control Message				

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.)
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.

1. 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.
2. 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.

3. Loosen the clamp plate on the top of the Q45 and lift the cover.
4. 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.
5. Label the sensor with the Q45's Node address number for future reference.
6. Repeat steps 2 through 5 for as many Q45s as are needed for your network.
7. 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.

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 900 MHz Radio Specifications for Internal Antennas

Radio Range
900 MHz, 1 Watt (Internal antenna): Up to 3.2 km (2 miles) with line of sight

Antenna Minimum Separation Distance
900 MHz, 1 Watt: 4.57 m (15 ft)

Radio Transmit Power
900 MHz, 1 Watt (Internal antenna): 25 dBm Conducted

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

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

Q45RD Specifications

Externally Powered Sourcing Sensors
ON Condition: 2 V to 5 V
OFF Condition: Less than 1 V

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 Sample Rate
62.5 milliseconds (dry contact) or 125 milliseconds (Namur)

Report Rate
On Change of State

Typical Battery Life for One Dry Contact Input
Up to 3 years at a 62.5 ms sample rate or 250 ms sample rate.
Assumes an average of 20 seconds between changes of state and a Gateway heartbeat setting of 30 seconds.

Typical Battery Life for Bi2 and Bi5 Namur Inputs
Up to 2 years at a 2 ms warmup time and 62.5 ms sample rate; 4 years at a 2 ms warmup time and 250 ms sample rate.
Assumes an average of 20 seconds between changes of state and a Gateway heartbeat setting of 30 seconds.

Typical Battery Life for Bi10 Namur Inputs
Up to 2 years at a 5 ms warmup time and 125 ms sample rate; 4 years at a 5 ms warmup time and 500 ms sample rate.
Assumes an average of 20 seconds between changes of state and a Gateway heartbeat setting of 30 seconds.

Certifications

NOM NYCE

(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.

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 that 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
Antena, Omni 902-928 MHz, 2 dBd, junta de caucho, RP-SMA Macho	**BWA-9O2-C**
Antena, Omni 902-928 MHz, 5 dBd, junta de caucho, RP-SMA Macho	**BWA-9O5-C**

Antenas Tipo-N	Modelo
Antena, Omni 902-928 MHz, 6 dBd, fibra de vidrio, 1800mm, N Hembra	**BWA-9O6-A**
Antena, Yagi, 900 MHz, 10 dBd, N Hembra	**BWA-9Y10-A**

Mexican Importer

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