Sure Cross® Wireless Q45 Sensor - Remote Device

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.

Figure 1. Model DX80N9Q45RD-QPF-0.5

Figure 2. Model DX80N9Q45RD

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.

Available Models

- DX80N9Q45RD-QPF-0.5 with an 18 inch female pigtail
- DX80N9Q45RD with a female connector embedded in the front

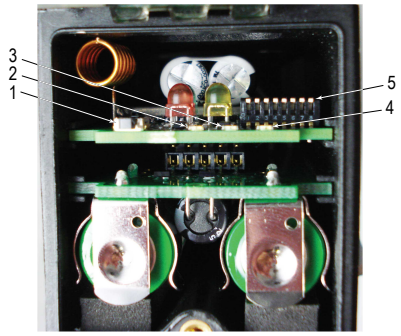
WARNING: Not To Be Used for Personnel Protection

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.

Storage Mode for the Wireless Q45 Sensors

While in storage mode, the Wireless Q45 Sensor's radio does not operate. All Wireless Q45 Sensors ship 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 Q45 Sensor into storage mode, press and hold the button for five seconds. The Wireless Q45 Sensor is in storage mode when the LEDs stop blinking.

Button, LEDs, and DIP Switches



1 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 button once. To disable the LED, press the button 5 times.

5 DIP Switches

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		

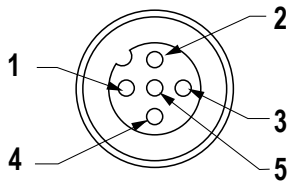
Description	DIP Switches			
	5	6	7	8
2 millisecond warmup time, 62.5 ms sample rate			OFF *	OFF *
2 millisecond warmup time, 250 ms sample rate			OFF	ON
5 millisecond warmup time, 125 ms sample rate			ON	OFF
5 millisecond warmup time, 500 ms sample rate			ON	ON

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.

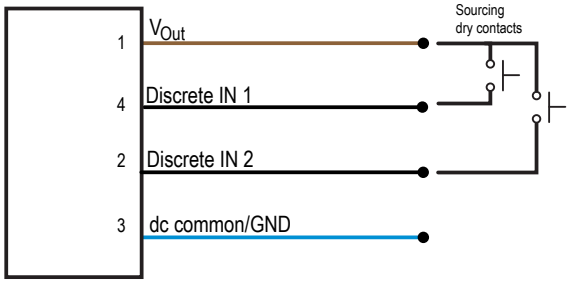
To use with Turck's Bi10-M30-Y1X-H1141 Namur proximity sensor, set DIP switch 5 and 7 to ON and DIP switches 6 and 8 to OFF.

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

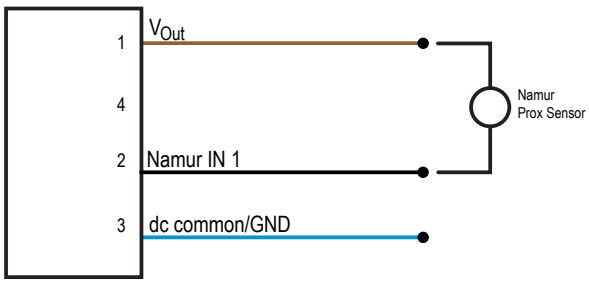
Wiring

5-pin M12/Euro-style Female Connection	Pin No.	Wire Color	Wireless Q45 Sensor
	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	-

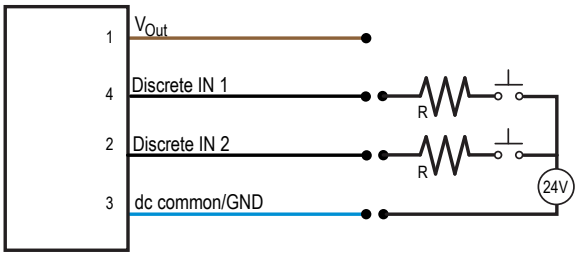
Wiring for Dry Contact Mode



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

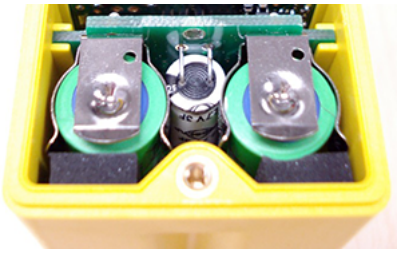
Modbus Register Table

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				
16	16	16 + (Node# × 16)	Reserved				

Replacing 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.

Replacement battery model number: BWA-BATT-006. For pricing and availability, contact Banner Engineering.

Bind the Q45s to the Gateway and Assign the Node Address

Before beginning the binding procedure, apply power to all the devices.

1. Enter binding mode on the Gateway.
   - For single-button models, triple-click the button.
   - For two-button models, triple-click button 2.

   On the board modules, the green and red LED flashes. On the housed Gateway models, both LEDs flash red.
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 01, set the left dial to 0 and the right dial to 1.

   Valid Node addresses are 01 through 47.
3. Loosen the clamp plate on the top of the Wireless Q45 Sensor and lift the cover.
4. Enter binding mode on the Wireless Q45 Sensor by triple-clicking the button. For the opposed mode sensor, the button is on the receiver.
   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 and place the sticker on the Wireless Q45 Sensor.
6. Repeat steps 2 through 5 for as many Wireless Q45 Sensors as are needed for your network.

7. After binding all Wireless Q45 Sensors, exit binding mode on the Gateway.
   - For single-button models, double-click the button.
   - For two-button models, double-click button 2.

For Gateways with LCDs, after binding your Wireless Q45 Sensors 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.

Specifications

The following specifications refer to both the radio and the wireless sensor.

Radio Range
900 MHz, 1 Watt (Internal antenna): Up to 3.2 km (2 miles)[1]

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

900 MHz Compliance (1 Watt)
FCC ID UE3RM1809: This device complies with FCC Part 15, Subpart C, 15.247
IC: 7044A-RM1809

Spread Spectrum Technology
FHSS (Frequency Hopping Spread Spectrum)

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. Q45s are designed to withstand 1200 psi washdown.

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

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.

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

Report Rate
On Change of State

Operating Conditions
–40 °C to 70 °C (–40 °F to 158 °F); 90% relative humidity at 50 °C (non-condensing)

Environmental Rating
NEMA 6P, IEC IP67

Warnings

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Exporting Sure Cross® Radios

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[1] Radio range significantly decreases without line of sight. Always verify your wireless network's range by running a site survey.