

# Sure Cross® Wireless Q45CV Convergent Sensor Node



## 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 convergent sensor is ideal for reflective sensing of very small parts or profiles, and can accurately sense the position of parts approaching from the side. The sensor will ignore all but the most highly reflective objects that are outside the sensing range.

### Available Models

- **DX80N2Q45CV-KR:** 1½ inch focal point



### 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.

## 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.

## Optical Alignment Mode (Convergent)

Convergent-mode sensors use a lens system to focus emitter and the receiver elements to an exact point in front of the sensor. The sensor detects an object when that object completes or "makes" the light beam. Convergent-mode sensors produce a small, intense, and well-defined sensing area, at a fixed distance from the sensor lens.

The Wireless Q45 Sensor enters and remains in optical alignment mode for 15 minutes after the button is pushed, after the Wireless Q45 Sensor exits binding mode, or after the Q45 is powered up (battery replaced).

During optical alignment mode, the sensor's beam is bright enough to see when aligned with a target, making alignment and mounting easier to accomplish. During this alignment mode, the sensor's yellow LED lights up whenever the sensor detects the reflected beam.

After 15 minutes, the Wireless Q45 Sensor automatically exits optical alignment mode and begins normal operation. After the sensor begins normal operation, the amber/yellow sensor state LED is inactive. To exit alignment mode earlier, click the button five times.

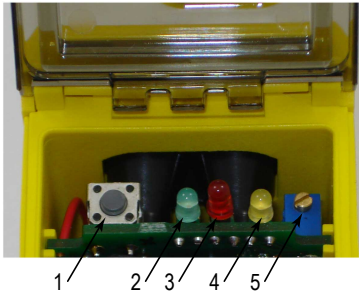


## Modbus Registers

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)	Sensor IN 1	0	1	0	1
2	2	2 + (Node# × 16)	Counter High Word	0	65535	0	65535
3	3	3 + (Node# × 16)	Counter Low Word	0	65535	0	65535
7	7	7 + (Node# × 16)	Reserved				
8	8	8 + (Node# × 16)	Device Message				
14	14	14 + (Node# × 16)	Clear Counter	0	1	0	1
15	15	15 + (Node# × 16)	Control Message				
16	16	16 + (Node# × 16)	Reserved				



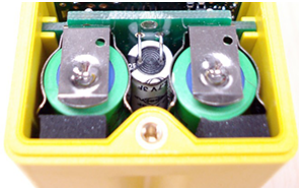
## Button and LEDs



- 1 Button
- 2 Green LED (flashing) indicates a good radio link with the Gateway.
- 3 Red LED (flashing) indicates a radio link error with the Gateway.
- 4 Alignment or Test Mode: the amber LED indicates sensor function (optical sensor models) or when input 1 is active (dry contact models). The amber LED is not used during normal operation.
- 5 Excess gain potentiometer. Turn clockwise to increase the gain.

## 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.

## 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.

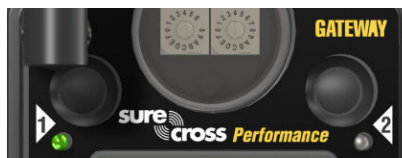


Figure 1. Buttons on a housed Gateway

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 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 Q45 as are needed for your network.
7. After binding all Q45, 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.

## Specifications

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### Performance: Radio with Internal Antenna Specifications

**Radio Range<sup>1</sup>**

2.4 GHz, 65 mW (Internal antenna): Up to 1000 m (3280 ft) with line of sight

**Antenna Minimum Separation Distance**

2.4 GHz, 65 mW: 0.3 m (1 ft)

**Radio Transmit Power**

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)

**2.4 GHz Compliance for Korean Radio Models**

KCC-CRM-BE2-DX

**Link Timeout**

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

**Radiated Immunity HF**

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

### Q45CV Sensor Node Specifications

**Typical Battery Life**

Up to 2 years

A typical battery life assumes an average of 10 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 1 second between changes of state.

**Default Sensing Interval**

62.5 milliseconds

**Report Rate**

On Change of State

**Sensing Range**

1½ inch focal point

**Adjustments**

Multi-turn sensitivity control (allows precise sensitivity setting - turn clockwise to increase gain).

**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 (only for alignment mode)

### 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**

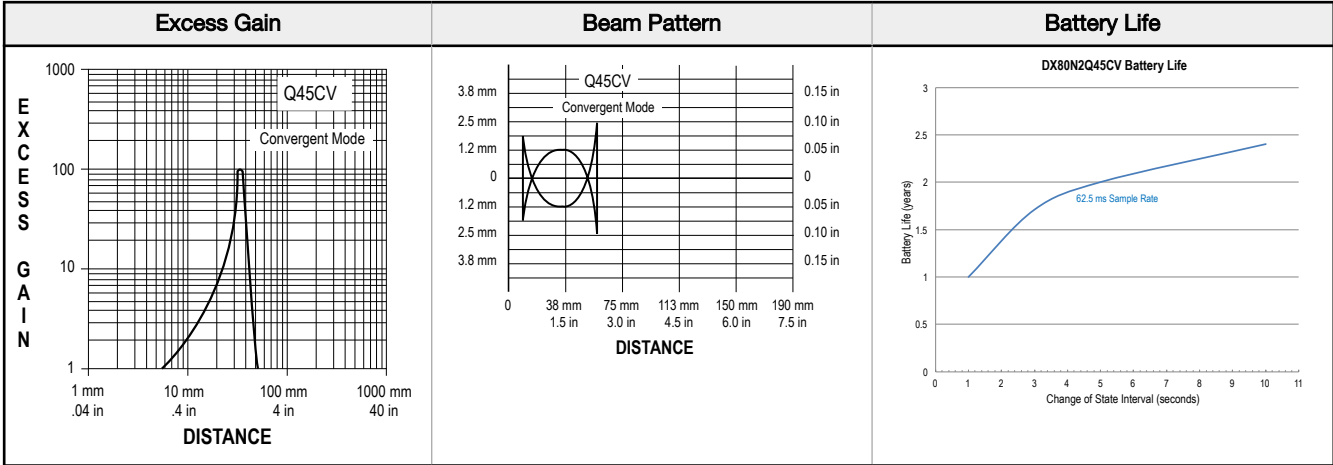
NEMA 6P, IEC IP67

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

<sup>1</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.

### Performance Curves

Performance curves are based on a 90% reflectance white test card.



### Banner Engineering Corp. Limited Warranty

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For patent information, see [www.bannerengineering.com/patents](http://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.** 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.