Sure Cross® Wireless Q45F Glass Fiber Optic 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.

Fiber optics have many advantages in photoelectric sensing:

- **Tight sensing locations**: The small size and flexibility of fiber optic assemblies allow positioning and mounting in tight spaces.
- **Vibration and Shock**: Optical fibers are low in mass, enabling fiber optic assemblies to withstand high levels of vibration and mechanical shock.
- **Extreme environments**: Fibers can be constructed to survive in areas of corrosive material or extreme moisture.

Available Models

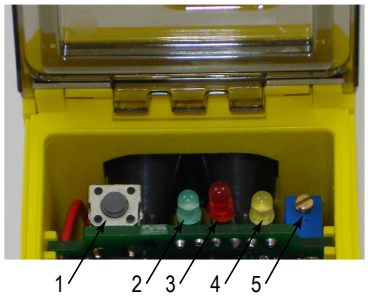
- **DX80N2Q45F**. Range: 1.3 m (4 ft) using IP23S fibers in opposed mode; or 100 mm (4 in) using BT23S fibers in diffuse mode

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



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.

Modbus Registers

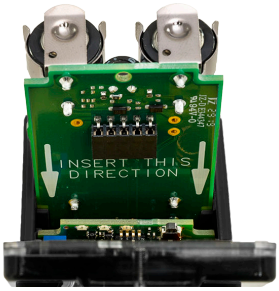
I/O #	Modbus Holding Register		I/O Type	I/O Range		Holding Register Representation	
	Gateway	Any Node		Min. Value	Max. Value	Min. (Dec.)	Max. (Dec.)
1	1	1 + (Node# × 16)	Sensor IN 1	0	1	0	1
2	2	2 + (Node# × 16)	Counter High Word	0	65535	0	65535
3	3	3 + (Node# × 16)	Counter Low Word	0	65535	0	65535
7	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				

Apply Power to the Q45

Follow these instructions to install or replace the lithium "AA" cell batteries.

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.

Figure 1. Q45 battery board



1. Loosen the clamp plate with a small Phillips screwdriver and lift the cover.
2. Slide the battery board out of the Q45 housing.
3. If applicable, remove the discharged batteries.
4. Install the new batteries. Use Banner's **BWA-BATT-006** replacement batteries or an equivalent 3.6 V AA lithium batteries, such as Xeno's XL-60F.
5. 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.
6. Slide the board containing the new batteries back into the Q45 housing.
7. Close the cover and gently tighten the clamp plate with the small Phillips screwdriver.

Optical Alignment Mode (Fiber-Optic)

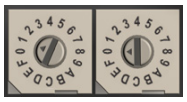
The Wireless Q45 Sensor enters and remains in optical alignment mode for 15 minutes after the button is pushed, after the Wireless Q45 Sensor exits binding mode, or after the Q45 is powered up (battery replaced).

During optical alignment mode, the sensor's amber 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 sensor state LED is inactive. To exit alignment mode earlier, click the button five times.

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. 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.
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. On the Q45: 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 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. On the Gateway: After binding all Q45s, 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 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

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

Radio
Range: 2.4 GHz, 65 mW: Up to 1000 m (3280 ft) with line of sight (internal antenna) [1]
Transmit Power: 2.4 GHz: 65 mW EIRP

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

2.4 GHz Compliance
FCC ID UE300DX80-2400: FCC Part 15, Subpart C, 15.247
Radio Equipment Directive (RED) 2014/53/EU
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/

Spread Spectrum Technology
FHSS (Frequency Hopping Spread Spectrum)

Indicators
Red and green LEDs (radio function); amber LED (only for alignment mode)

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

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

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

Environmental Rating
NEMA 6P, IP67

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

Figure 2. Excess gain diffuse mode glass fiber

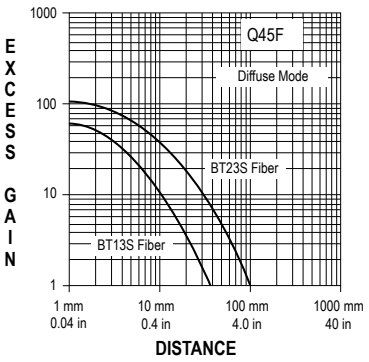


Figure 3. Beam pattern diffuse mode glass fiber

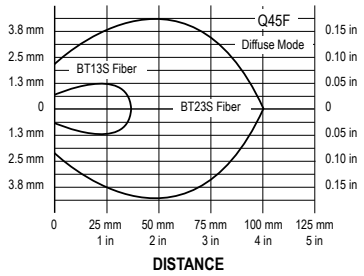


Figure 4. Excess gain opposed mode glass fiber

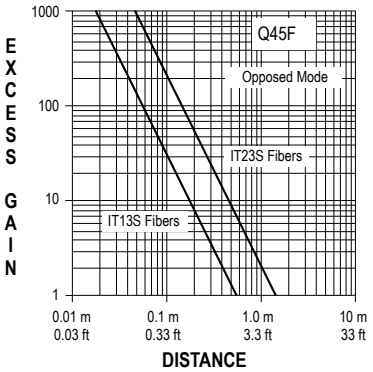
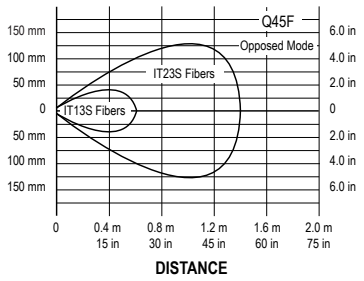


Figure 5. Beam pattern opposed mode glass fiber



[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.