

Sure Cross® Wireless Q45TH Sensor Node (Temperature/Humidity)



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.



(Shown with the temperature/humidity sensor connected)

The Sure Cross Temperature and Humidity Sensor works in a variety of environments to provide temperature and humidity measurements.

The Wireless Q45 Temperature and Relative Humidity Sensor Node:

- Works with one of two sensor options: temperature and relative humidity or temperature only
- Provides high accuracy temperature and humidity measurements
- Achieves humidity accuracy of $\pm 2\%$ relative humidity and temperature accuracy of $0.3\text{ }^{\circ}\text{C}$
- Houses the sensor element in a robust stainless steel case
- Includes a red/green/yellow/blue LED that can be used to provide local visual indication of change in environmental conditions

Banner Humidity Sensor Calibration Statement. This calibration statement (also available online) lists the chain with which the calibration of Banner humidity sensors is traceable to NIST standards.



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	Radio Frequency	Description
DX80N9Q45TH	900 MHz ISM Band	Must be paired with M12FTH4Q Temperature and Humidity Sensor or M12FT4Q Temperature Sensor (sold separately)

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.

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.



Modbus Register Table

The temperature = (Holding register value) ÷ 20.

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)	Humidity (%RH)	0	100.00%	0	10,000
2	2	2 + (Node# × 16)	Temperature (°C)	-1638.3	1638.4	-32768	32767
3	3	3 + (Node# × 16)	Temperature (°F)	-1638.3	1638.4	-32768	32767
		...					
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 (Green Light)	0	1	0	1
11	11	11 + (Node# × 16)	Discrete OUT 3 (Yellow 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				

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 is not used.
- 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. As shown in the image, 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.

Description	DIP Switches							
	1	2	3	4	5	6	7	8
Transmit power: 1 Watt (default)	OFF *							
Transmit power: 250 mW (compatible with 150 mW radios)	ON							
Reserved (default)		OFF *	OFF *	OFF *				
Sample/Report Rate: User configured (64 seconds by default) (default)					OFF *	OFF *		
Sample/Report Rate: 16 seconds					OFF	ON		
Sample/Report Rate: 64 seconds					ON	OFF		
Sample/Report Rate: Sample on Demand					ON	ON		
Reserved (keep in OFF position) (default)							OFF *	
Light mode: flash (recommended to conserve the battery) (default) ¹								OFF *
Light mode: solid								ON

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.

¹ The light consumes most of the sensor's power. If the light remains off most of the time, the batteries will last much longer. In flashing mode, the light can be on for up to one year on a pair of batteries.

- 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.

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

Wireless Q45TH Sensor Node Specifications

Typical Battery Life

Up to 1.5 years, typical

Battery life is reduced to 9 months when the sample/report rate is increased to 16 seconds

Construction

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

Connection

One 5-pin threaded M12/Euro-style female quick disconnect

Indicators

Red and green LEDs (radio function)

Temperature Sensor

Measuring Range: -40 °C to +85 °C (-40 °F to +185 °F)

Resolution: 0.1 °C

Accuracy: ±0.3 °C

Default Sensing Interval

64 seconds

Humidity Sensor

Measuring Range: 0% to 100% relative humidity

Resolution: 0.1% relative humidity

Accuracy: ±2% relative humidity at 23 °C

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.

Accessories

FTH-FIL-001

- Aluminum grill filter cap (factory default, ships with M12FTQ sensors)



FTH-FIL-002

- Stainless steel, sintered to 10 micrometer porosity (for high dust environments.)



5-Pin Threaded M12/Euro-Style Cordsets Less Than 3 m Long—Double Ended				
Model	Length	Style	Dimensions	Pinout
DEE2R-51D	0.31 m (1 ft)	Female Straight/ Male Straight		Male
DEE2R-53D	0.91 m (3 ft)			
DEE2R-58D	2.44 m (8 ft)			Female

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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

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