Q45TH Wireless Temperature-Humidity Sensor Node (900 MHz)

BANNER ®

Q45TH Features

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 an internal battery supply, this product line is truly plug-and-play.

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 ±2% relative humidity and temperature accuracy of 0.3 °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.

(Shown with the temperature/ humidity sensor connected)

Q45TH 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)

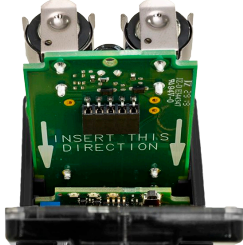## Apply Power to the Q45 AA-Cell Models

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

> **CAUTION:**
> - **As with all batteries, these are fire, explosion, and severe burn hazards. There is a risk of explosion if the battery is replaced incorrectly.**
> - Do not burn or expose them to high temperatures. Do not recharge, crush, disassemble, or expose the contents to water.
> - Verify the battery's positive and negative terminals align to the positive and negative terminals of the battery holder mounted within the case.
> - Properly dispose of used batteries according to local regulations by taking them to a hazardous waste collection site, an e-waste disposal center, or another facility qualified to accept lithium batteries.

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 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.
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.
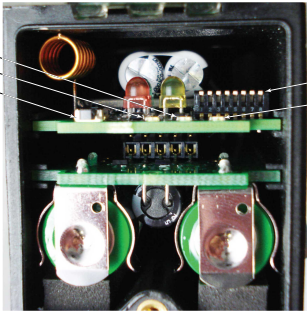
Storage Mode

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.

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							

November 16, 2023

Continued from page 2

Description	DIP Switches							
	1	2	3	4	5	6	7	8
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 the 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 Q45TH 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 Q45TH 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 Q45TH and lift the cover.
4. Enter binding mode on the Q45TH by triple-clicking the Q45TH's button.
   The red and green LEDs flash alternately and the sensor searches for a Gateway in binding mode. After the Q45TH is bound, the LEDs stay solid momentarily, then they flash together four times. The Q45TH exits binding mode.
5. Label the sensor with the Q45TH's Node address number for future reference.
6. Repeat steps 2 through 5 for as many Q45THs as are needed for your network.
7. On the Gateway: After binding all Q45THs, 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 Q45TH 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 Q45THs if your Gateway is ever replaced.

Specifications

Radio Specifications for 900 MHz Performance with Internal Antennas

Supplied Antenna
This device includes an internal 2 dB antenna. Range depends on the environment and decreases significantly without line-of-sight. Always verify your wireless network's range by performing a Site Survey.

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

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

Antenna Minimum Separation Distance
900 MHz (1 Watt): 4.57 m (15 ft) with the supplied 2 dB antenna

Spread Spectrum Technology
FHSS (Frequency Hopping Spread Spectrum)

900 MHz Compliance (SX7023EXT Radio Module)
Radio module is indicated by the product label marking
Contains FCC ID: UE3SX7023EXT: FCC Part 15, Subpart C, 15.247
Contains IC: 7044A-SX7023EXT

900 MHz Compliance (RM1809 Radio Module)
Radio module is indicated by the product label marking
Contains FCC ID: UE3RM1809: FCC Part 15, Subpart C, 15.247
Contains IC: 7044A-RM1809
IFT: RCPBARM13-2283

---

[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.

Link Timeout (Performance)

Gateway: Configurable via User Configuration Software

Node: Defined by Gateway

Q45TH (900 MHz) 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 M12 female quick-disconnect connector

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

Environmental Specifications for the Q45

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

IP67

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

FCC Part 15 Class A for Intentional Radiators

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Industry Canada Statement for Intentional Radiators

This device contains licence-exempt transmitters(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil contient des émetteurs/récepteurs exemptés de licence conformes à la norme Innovation, Sciences, et Développement économique Canada. L'exploitation est autorisée aux deux conditions suivantes:

1. L'appareil ne doit pas produire de brouillage.
2. L'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.
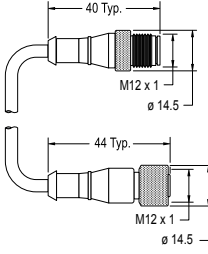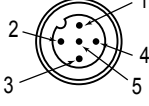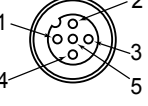
Q45TH Accessories

FTH-FIL-001		FTH-FIL-002	
• Aluminum grill filter cap • Factory default, ships with the M12FT*Q and Q45 All-in-One sensors		• Stainless steel • Sintered to 40-micrometer porosity (for high dust environments.)	

 November 16, 2023

5-Pin Threaded M12 Cordsets Less Than 3 m Long—Double Ended					
Model	Length	Style	Dimensions	Pinout (Male)	Pinout (Female)
DEE2R-51D	0.3 m (1 ft)	Female Straight/ Male Straight	40 Typ. M12 x 1 ø 14.5 / 44 Typ. M12 x 1 ø 14.5	1 = Brown 2 = White 3 = Blue	4 = Black 5 = Green/Yellow
DEE2R-53D	0.91 m (3 ft)				
DEE2R-58D	2.44 m (8 ft)				

Warnings

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.

> **IMPORTANT:** Please download the complete Q45TH Wireless Temperature-Humidity Sensor Node (900 MHz) 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 Q45TH Wireless Temperature-Humidity Sensor Node (900 MHz), 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 Q45TH Wireless Temperature-Humidity Sensor Node (900 MHz) 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.

> **IMPORTANT:**
> - **Electrostatic discharge (ESD) sensitive device**
> - ESD can damage the device. Damage from inappropriate handling is not covered by warranty.
> - Use proper handling procedures to prevent ESD damage. Proper handling procedures include leaving devices in their anti-static packaging until ready for use; wearing anti-static wrist straps; and assembling units on a grounded, static-dissipative surface.

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.

THIS LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER EXPRESS OR IMPLIED (INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), AND WHETHER ARISING UNDER COURSE OF PERFORMANCE, COURSE OF DEALING OR TRADE USAGE.

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."

Mexican Importer

Banner Engineering de Mèxico, S. de R.L. de C.V. | David Alfaro Siqueiros 103 Piso 2 Valle oriente | San Pedro Garza Garcia Nuevo Leòn, C. P. 66269

81 8363.2714

192694