Sure Cross® Wireless Q45U Sensor Node
(Universal 1-Wire Serial)

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 Sure Cross Universal 1-Wire Serial Sensor is designed to read the primary inputs of devices in the 1-Wire Serial Sensor family. The Wireless Q45 Universal 1-Wire Serial Sensor Node:

- Reads the 1-Wire Serial Interface sensor
- Determines an efficient power setting
- Includes a red/green/yellow/blue LED to provide local visual indication

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

<table>
<thead>
<tr>
<th>Models</th>
<th>Radio Frequency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX80N9Q45U</td>
<td>900 MHz ISM Band</td>
<td>Must be paired with a 1-Wire Serial interface sensor (sold separately)</td>
</tr>
<tr>
<td>DX80N2Q45U</td>
<td>2.4 GHz ISM Band</td>
<td>Supported 1-Wire Serial Interface sensors include but are not limited to: M12FT4Q, M12FT4Q, QM42VT1, K50UX1RA</td>
</tr>
</tbody>
</table>

General Operation
For the first 15 minutes after power up, the Node samples the sensor every two seconds (fast sample mode). After 15 minutes, the Node defaults to 5 minute sample intervals. Activate fast sample mode by single clicking the button (the amber LED is solid).

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.

Button and LEDs

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 Switches
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.

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.

<table>
<thead>
<tr>
<th>Description</th>
<th>DIP Switches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmit power: 1 Watt</td>
<td>OFF *</td>
</tr>
<tr>
<td>Transmit power: 250 mW (compatible with 150 mW radios)</td>
<td>ON</td>
</tr>
<tr>
<td>Reserved</td>
<td>OFF * OFF * OFF *</td>
</tr>
<tr>
<td>Sample/Report Rate: User configured (5 minutes by default)</td>
<td>OFF * OFF *</td>
</tr>
<tr>
<td>Sample/Report Rate: 16 seconds</td>
<td>OFF ON</td>
</tr>
<tr>
<td>Sample/Report Rate: 64 seconds</td>
<td>ON OFF</td>
</tr>
<tr>
<td>Sample/Report Rate: Sample on Demand</td>
<td>ON ON</td>
</tr>
<tr>
<td>Reserved (keep in OFF position)</td>
<td>OFF *</td>
</tr>
<tr>
<td>Light mode: flash (recommended to conserve the battery)</td>
<td>OFF *</td>
</tr>
<tr>
<td>Light mode: solid</td>
<td>ON</td>
</tr>
</tbody>
</table>

* Default position

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.

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 Q45s as are needed for your network.

7. 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.

Modbus Register Table

<table>
<thead>
<tr>
<th>I/O #</th>
<th>Modbus Holding Register</th>
<th>I/O Type *</th>
<th>I/O Range</th>
<th>Holding Register Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gateway</td>
<td>Any Node</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1 + (Node# x 16)</td>
<td>1-Wire Serial Sensor Primary Input 1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>2 + (Node# x 16)</td>
<td>1-Wire Serial Sensor Primary Input 2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>3 + (Node# x 16)</td>
<td>1-Wire Serial Sensor Primary Input 3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>4 + (Node# x 16)</td>
<td>1-Wire Serial Sensor Primary Input 4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5 + (Node# x 16)</td>
<td>1-Wire Serial Sensor Primary Input 5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>6 + (Node# x 16)</td>
<td>1-Wire Serial Sensor Primary Input 6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>7 + (Node# x 16)</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>8 + (Node# x 16)</td>
<td>Device Message</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>9 + (Node# x 16)</td>
<td>Discrete OUT 1: Red Light</td>
<td>0 1 0 1</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>10 + (Node# x 16)</td>
<td>Discrete OUT 2: Yellow Light</td>
<td>0 1 0 1</td>
</tr>
<tr>
<td>11</td>
<td>11</td>
<td>11 + (Node# x 16)</td>
<td>Discrete OUT 3: Green Light</td>
<td>0 1 0 1</td>
</tr>
<tr>
<td>12</td>
<td>12</td>
<td>12 + (Node# x 16)</td>
<td>Discrete OUT 4: Blue Light</td>
<td>0 1 0 1</td>
</tr>
</tbody>
</table>

* 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.
Sure Cross® Wireless Q45U Sensor Node (Universal 1-Wire Serial)

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<tr>
<th>I/O #</th>
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<tr>
<td></td>
<td>Gateway</td>
<td>Any Node</td>
<td>Min.</td>
<td>Max.</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>15</td>
<td>15 + (Node# × 16)</td>
<td>Control Message</td>
</tr>
<tr>
<td>16</td>
<td>16</td>
<td>16 + (Node# × 16)</td>
<td>Reserved</td>
<td></td>
</tr>
</tbody>
</table>

* These are the default data types that output from the 1-Wire Serial Interface sensor, corresponding to inputs 1 through 6 of the Q45 Node. Refer to the datasheet of the 1-Wire Serial Interface sensor for information about the register function.

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.

Specifications

Performance Radio with Internal Antenna Specifications

- **Radio Range**:
  - 900 MHz, 1 Watt (Internal antenna): Up to 3.2 km (2 miles) with line of sight
  - 2.4 GHz, 65 mW (Internal antenna): Up to 200 m (660 ft) with line of sight
- **Antenna Minimum Separation Distance**:
  - 900 MHz, 150 mW and 250 mW: 2 m (6 ft)
  - 900 MHz, 1 Watt: 4.27 m (14 ft)
  - 2.4 GHz, 65 mW: 0.3 m (1 ft)
- **Radio Transmit Power**:
  - 900 MHz, 1 Watt: 30 dBm (1 W) conducted (up to 36 dBm EIRP)
  - 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)**
- **900 MHz Compliance**: FCC Part 15, Subpart C, 15.247
  - IC: 7044A-RM1809
- **2.4 GHz Compliance**:
  - FCC ID UE300DX80-2400: FCC Part 15, Subpart C, 15.247
  - RED Directive 2014/53/EU
  - IC: 7044A-DX8024

- **Link Timeout**
  - Gateway: Configurable via User Configuration Software
  - Node: Defined by Gateway

Wireless Q45U Universal 1-Wire Specifications

- **Typical Battery Life**: See chart
- **Default Sensing Interval**: 5 minutes
- **Connection**: One 5-pin threaded M12/Euro-style female quick disconnect
- **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)

Certifications

- **NOM**
- **NYCE**
  - (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.

Battery Life for a Q45VA or Q45VT/Q45U Node with 1-Wire Serial Sensor

This is the battery life curve for the following models:

- Q45VT or Q45U 1-Wire Serial Interface Node connected to a 1-wire serial sensor (such as a VT1 Vibration/Temperature sensor)
- Q45VT I/O Node

Range depends on the environment and decreases significantly without line of sight. Always verify your wireless network’s range by performing a Site Survey.
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.

This Warranty is exclusive and limited to repair or, at the discretion of Banner Engineering Corp., replacement. IN NO EVENT SHALL BANNER ENGINEERING CORP. BE LIABLE TO BUYER OR ANY OTHER PERSON OR ENTITY FOR ANY EXTRA COSTS, EXPENSES, LOSSES, LOSS OF PROFITS, OR ANY INCIDENTAL, CONSEQUENTIAL, OR SPECIAL DAMAGES RESULTING FROM ANY PRODUCT DEFECT OR FROM THE USE OR INABILITY TO USE THE PRODUCT, WHETHER ARISING IN CONTRACT OR WARRANTY, STATUTE, TORT, STRICT LIABILITY, NEGLIGENCE, OR OTHERWISE.

Banner Engineering Corp. reserves the right to change, modify or improve the design of the product without assuming any obligations or liabilities relating to any product previously manufactured by Banner Engineering Corp. Any misuse, abuse, or improper application or installation of this product or use of the product for personal protection applications which the product is identified as not intended for such purposes will void the product warranty. Any modifications to this product without prior express approval by Banner Engineering Corp will void the product warranties. All specifications published in this document are subject to change; Banner reserves the right to modify product specifications or update documentation at any time. Specifications and product information in English supersedes that which is provided in any other language. For the most recent version of any documentation, refer to: www.bannerengineering.com.

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 device 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 omnidirectional and 10 dBd in type Yagi, quedan prohibidas. La impedancia requerida de la antena es de 50 ohms.

Omnidirectional for a gain of 6 dBd and Yagi for a maximum antenna of 10 dBd that are certified. 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 Omni y 10 dBd en tipo Yagi, quedan prohibidas. La impedancia requerida de la antena es de 50 ohms.”

Antenas SMA

<table>
<thead>
<tr>
<th>Modelo</th>
<th>Antena, Omni 902-928 MHz, 2 dBd, junta de caucho, RP-SMA Macho</th>
<th>Antena, Omri 902-928 MHz, 5 dBd, junta de caucho, RP-SMA Macho</th>
</tr>
</thead>
<tbody>
<tr>
<td>BWA-902-C</td>
<td>BWA-905-C</td>
<td></td>
</tr>
</tbody>
</table>

Antenas Tipo-N

<table>
<thead>
<tr>
<th>Modelo</th>
<th>Antena, Omni 902-928 MHz, 6 dBd, fibra de vidrio, 1800mm, N Hembra</th>
<th>Antena, Yagi, 900 MHz, 10 dBd, N Hembra</th>
</tr>
</thead>
<tbody>
<tr>
<td>BWA-906-A</td>
<td>BWA-910-A</td>
<td></td>
</tr>
</tbody>
</table>

Mexican Importer

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