Q45DPSD Wireless Differential Pressure Sensor Node

Features

The Sure Cross® Q45DPSD Differential Pressure Sensor Node combines a differential pressure sensor with the reliable, field-proven, Sure Cross industrial wireless architecture into one package, eliminating the need for ordering multiple components. The industrial-grade, battery-powered device can be used to wirelessly transmit differential pressure levels to a wireless DXM Controller/Gateway for remote monitoring of critical systems.

***Q45DPSD** Node and **QM42-DPS1-1Q** sensor*



Benefits

- Provides the ability to deliver factory automation and IIoT solutions for many applications including:
  - Filter Monitoring
  - Vacuum Line Monitoring
  - HVAC System/Duct Pressure
  - Dust Collectors
  - Clean Rooms
  - Fume Hoods
  - Air Flow
- Measurement range: ±1, ±5, or ±20 inches of water column (wc) with the **QM42-DPS1-1Q**, **QM42-DPS5-1Q** or **QM42-DPS20-1Q** sensor
- **Eliminate control wires**—The Sure Cross wireless system is a radio frequency network with integrated I/O that removes the need for power and control wires
- **Reduce complexity**—Machine or process reconfiguration made easier; great for retrofit applications
- **Deploy easily**—Simplify installation on existing equipment to enable deployment in remote and hard-to-access locations where implementing a wired solution would be difficult, impractical, or not cost-effective
- **Battery Life**— D-cell battery provides up to five years of battery life with one-minute sampling/reporting
- Frequency Hopping Spread Spectrum (FHSS) technology ensures reliable data delivery
- Transceivers provide bidirectional communication between the Gateway and Node, including fully acknowledged data transmission
- Connect with Banner's DXM Series Wireless Controller/Performance Gateway/edge device to process, analyze, and send data to a PLC, HMI, or Cloud platform.

Models

Model	Measurement Range	Frequency	Inputs
DX80N9Q45DPSD	Transmitter Only	900 MHz ISM Band	1-wire serial communications with QM42-DPS pressure sensors
DX80N9Q45DPSD NB	Transmitter Only (ships without a battery)		
DX80N2Q45DPSD NB	Transmitter Only (ships without a battery)	2.4 GHz ISM Band	

To install the **QM42-DPSx-1Q** Differential Pressure Sensors, refer to the QM42-DPSx datasheet (p/n 220219).

The following models are no longer available for order, but are still covered by the information in this document.

Model	Measurement Range	Frequency	Inputs
DX80N2Q45DPSD	Transmitter Only	2.4 GHz ISM Band	1-wire serial communications with QM42-DPS pressure sensors
DX80N9Q45DPSD-DP1	±1 inch of water column (wc) with the included **QM42-DPS1-1Q** pressure sensor and supplied tubing	900 MHz ISM Band	
DX80N2Q45DPSD-DP1		2.4 GHz ISM Band	
DX80N9Q45DPSD-DP5	±5 inch of water column (wc) with the included pressure sensor and tubing	900 MHz ISM Band	
DX80N2Q45DPSD-DP5		2.4 GHz ISM Band	
DX80N9Q45DPSD-DP20	± 20 inches of water column (wc) with the **QM42-DPS20-1Q** pressure sensor and supplied tubing	900 MHz ISM Band	
DX80N2Q45DPSD-DP20		2.4 GHz ISM Band	

Original Instructions
04-Feb-25

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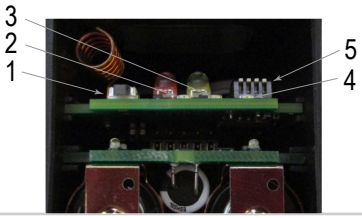
p/n: 222385 Rev. F

ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

Button and LEDs

1. Binding 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



Configuration Instructions

DIP Switches

The default settings for sample and report rates are 1 minute, switched power is 12 V, and warm-up time is 125 ms. Only DIP switches 1, 6, 7, or 8 should ever be modified from these settings. Factory default settings are noted by *.

Descriptions	DIP Switches							
	1	2	3	4	5	6	7	8
Transmit power level: 500 mW (27 dBm)	OFF*							
Transmit power level: 250 mW (24 dBm), DX80 compatibility mode	ON							
Reserved		OFF*	OFF*	OFF*				
Sample/report rate: user-configured					OFF*	OFF*		
Sample/report rate: 16 seconds					OFF	ON		
Sample/report rate: 64 seconds					ON	OFF		
Sample/report rate: sample on demand					ON	ON		
Serial inputs 4-6 disabled							OFF*	
Serial inputs 4-6 enabled							ON	
Reserved								OFF"
Reserved								ON

Transmit Power Levels

The 900 MHz radios transmit at 500 mW (27 dBm) or 250 mW (24 dBm). The 250 mW mode reduces the radio's range but improves the battery life in short-range applications. For 2.4 GHz models, this DIP switch is disabled. The transmit power for 2.4 GHz is fixed at about 65 mW EIRP (18 dBm).

Sample and Report Rates

The sample interval, or rate, defines how often the Sure Cross device provides switched power and samples the sensor. For battery-powered applications, setting a slower rate extends the battery life. In the case of this device, if the sample rate is set to 1 minute, the device will provide switched power and sample every 1 minute and immediately report the data if the value is different than the previous sample.

The report rate defines how often the Node communicates the I/O status to the Gateway at a minimum. In the case of this device, if the report rate is set to 2 minutes and the sampled data has not changed by the time it reaches the report rate, the Node automatically reports the latest value.

Apply Power to the Q45 D-Cell Models

Follow these instructions to install or replace the lithium D-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.

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1. Loosen the clamp plate with a small Phillips screwdriver and lift the cover.
2. Use the black pull wire to pull the battery board out of the Q45 housing.
3. If applicable, remove the discharged battery.
4. Install the new battery. Use Banner's **BWA-BATT-011** replacement battery or an equivalent 3.6 V D-cell lithium battery, such as Xeno's XL-205F.
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 battery back into the Q45 housing.
7. Close the cover and gently tighten the clamp plate with the small Phillips screwdriver.

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 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.

Bind to a DXM and Assign the Node Address

Before beginning the binding procedure, apply power to all the devices. Separate the radios by two meters when running the binding procedure. Put only one DXM into binding mode at a time to prevent the Q45 from binding to the wrong Gateway.

1. On the DXM: Use the arrow keys to select the **ISM Radio** menu on the LCD and click **ENTER**.
2. Highlight the **Binding** menu and click **ENTER**.
3. Use the arrow keys to select the Node address to bind the Q45 to.
4. On the Q45: Loosen the top clamp plate and lift the cover.
5. Enter binding mode by triple-clicking the binding button.
   The red and green LEDs flash alternately and the sensor searches for a Gateway in binding mode. After the Node binds, the LEDs stay solid momentarily, then they flash together four times. The Node exits binding mode.
6. Label the sensor with the Node address number for future reference.
7. On the DXM: Click **BACK** to exit binding for that specific Node address.
8. Repeat steps 3 through 7 and change the Node address for as many Q45s as are needed for your network.
9. On the DXM: After you have finished forming your network, click **BACK** until you reach the main menu.

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LED Behavior for the Gateways and Nodes

Verify all devices are communicating properly. Nodes do not sample inputs until they are communicating with the Gateway. The radios and antennas must be a minimum distance apart to function properly. Recommended minimum distances are:

900 MHz radios transmitting at ≤ 250 mW: 6 feet
900 MHz radios transmitting at ≥ 500 mW: 15 feet
2.4 GHz radios (transmitting at 65 mW): 1 foot

LED behavior

Devices with Two LEDs		Devices with One LED	Gateway Status	Node Status
LED 1	LED 2			
Green		Green	Power is on	N/A
Flashing green			N/A	Radio link is okay
Flashing red	Flashing red	Flashing red	Device error	Device error
	Flashing amber	Green and red flash (amber) together	Modbus communication active	N/A
	Flashing red	Flashing red	Modbus communication error	No radio link (flashes once every 3 s)
Flashing red (alternately)	Flashing red (alternately)	Green and red flash alternately	Device is in binding mode	Device is in binding mode
		Red	Gateway is trying to conduct a Site Survey with a Node that doesn't exist	
		Green and red solid (amber) together	No radio communication detected	
Red (for 4 seconds)	Red (for 4 seconds)	Green/red solid (amber) for 4 seconds, then flash 4 times		Binding mode is complete

For Gateway systems, the Modbus communication LEDs refer to the communication between the Gateway and its host system (if applicable).

Holding Registers

*Modbus holding registers for the **QM42-DPS1-1Q** model*

Modbus Registers		Type	Notes	I/O Type	I/O Range		Holding Register Representation (Dec)	
Gateway	Node				Min	Max	Min	Max
1	1 + (Node# × 16)	Int 16 Read Only	Pressure = Register Value ÷ 1000	Pressure (milli-in of water)	-1000	1000	-1000	1000
2	2 + (Node# × 16)		Pressure = Register Value ÷ 1000	Pressure (milli-PSI)	-0.036	0.036	-36	36
3	3 + (Node# × 16)		Temperature = Register Value ÷ 100	Temperature (°F)	-40	221	-4000	22 100
4	4 + (Node# × 16)		Temperature = Register Value ÷ 100	Temperature (°C)	-40	105	-4000	10 500
5	5 + (Node# × 16)		Pressure = Register Value	Pressure (Pascal)	-248	248	-248	248
6	6 + (Node# × 16)							
7	7 + (Node# × 16)			Reserved				
8	8 + (Node# × 16)			Device Message				
9	9 + (Node# × 16)							
	...							
15	15 + (Node# × 16)			Control Message				
16	16 + (Node# × 16)			Reserved				

*Modbus holding registers for the **QM42-DPS20-1Q** model*

Modbus Registers		Type	Notes	I/O Type	I/O Range		Holding Register Representation (Dec)	
Gateway	Node				Min	Max	Min	Max
1	1 + (Node# × 16)	Int 16 Read Only	Pressure = Register Value ÷ 1000	Pressure (milli-in of water)	-20000	20000	-20000	20000
2	2 + (Node# × 16)		Pressure = Register Value ÷ 1000	Pressure (milli-PSI)	-0.722	0.722	-722	722
3	3 + (Node# × 16)		Temperature = Register Value ÷ 100	Temperature (°F)	-40	221	-4000	22 100
4	4 + (Node# × 16)		Temperature = Register Value ÷ 100	Temperature (°C)	-40	105	-4000	10 500
5	5 + (Node# × 16)		Pressure = Register Value	Pressure (Pascal)	-4977	4977	-4977	4977

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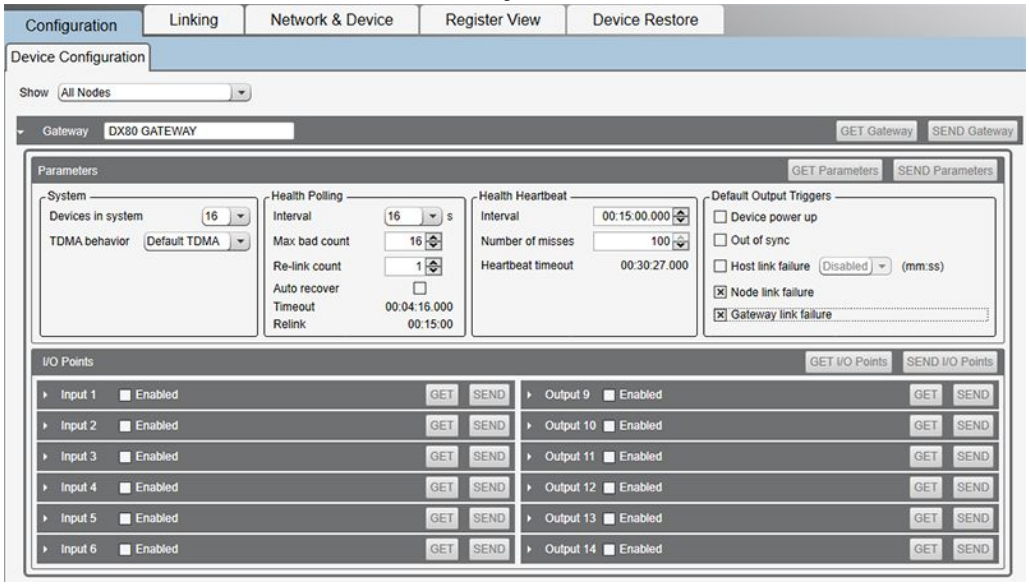
Modbus Registers		Type	Notes	I/O Type	I/O Range		Holding Register Representation (Dec)	
Gateway	Node				Min	Max	Min	Max
6	6 + (Node# × 16)							
7	7 + (Node# × 16)			Reserved				
8	8 + (Node# × 16)			Device Message				
9	9 + (Node# × 16)							
	...							
15	15 + (Node# × 16)			Control Message				
16	16 + (Node# × 16)			Reserved				

DX80 Performance Configuration Software

The configuration software offers an easy way to link I/O points in your wireless network, view I/O register values, and set system communication parameters when a host system is not part of the wireless network. The software runs on any computer with the Windows Vista, Windows 7, Windows 8, or Windows 10 operating system.

Device Configuration screen



Use a USB to RS-485 adapter cable to connect a standalone DX80 Gateway to the computer. For DXM Controllers with an internal DX80 radio, connect a computer to the DXM Controller using the supplied USB or Ethernet connection. Download the most recent revisions of the configuration software from Banner Engineering's website: https://www.bannerengineering.com/us/en/products/wireless-sensor-networks/reference-library/software.html.

The USB to RS-485 adapter cable is not required for the DXM Controller. For standalone DX80 Gateway devices use:

- USB to RS-485 adapter cable model **BWA-UCT-900** for 1 Watt radios
- USB to RS-485 adapter cable model **BWA-HW-006** for all other radios

Installing the Pressure Sensor

The pressure sensor can be mounted to any surface using fasteners sized for the 1/8-inch (3.2 mm) diameter through-holes on the base of the unit. The optional **BWA-BK-001** bracket may be used for mounting to a magnetic surface.

The supplied tubing has an 1/8 inch inner diameter and is intended to fit the barbed fittings on the high (+) and low (-) pressure ports. Cut the tubing to the length required, but for the best results, keep the tubing as short as possible. Install the high (+) side to the upstream or high-line pressure and install the low (-) side to downstream or low-line pressure.

Storage and Sleep Modes

Storage Mode (applies to battery-powered models only)—While in **storage mode**, the radio does not operate. To put any integrated battery Sure Cross® radio into storage mode, press and hold button 1 for five seconds. To wake the device, press and hold button 1 for five

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seconds. The radio is in storage mode when the LEDs stop blinking, but in some models, the LCD remains on for an additional minute after the radio enters storage mode. After a device has entered storage mode, you must wait one minute before waking it.

Sleep Mode (applies to both battery and 10–30 V DC powered models)—During normal operation, the Sure Cross radio devices enter **sleep mode** after 15 minutes of operation. The radio continues to function, but the LCD goes blank. To wake the device, press any button.

Specifications

Radio Specifications for Performance Internal Antenna

Radio Transmit Power (900 MHz, 500 mW radios)

Conducted: 27 dBm (500 mW)

EIRP with the supplied antenna: < 36 dBm

Radio Transmit Power (2.4 GHz radios)

Conducted: < 18 dBm (65 mW)

EIRP with the supplied antenna: < 20 dBm (100 mW)

Antenna Minimum Separation Distance

900 MHz radios transmitting at ≥ 500 mW: 4.57 m (15 ft) with the supplied antenna

2.4 GHz radios transmitting at 65 mW: 0.3 m (1 ft) with the supplied antenna

Radio Range

A 2 dB antenna ships with this device.

Transmit power and range are subject to many factors, including antenna gain, installation methods, characteristics of the application, and environmental conditions.

Please refer to the following documents for installation instructions and high-gain antenna options.

Installing Your Sure Cross® Radios (151514)
Conducting a Site Survey (133602)
Sure Cross® Antenna Basics (132113)

Link Timeout (Performance)

Gateway: Configurable via User Configuration Software

Node: Defined by Gateway

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

Contains IC: 7044A-SX7023EXT

2.4 GHz Compliance (SX243 Radio Module)

Radio module is indicated by the product label marking

Contains FCC ID: UE3SX243

Radio Equipment Directive (RED) 2014/53/EU

Contains IC: 7044A-SX243

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.

(Part 15.21) Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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.

Q45DPSD Specifications

Supply Voltage

3.6 V DC (internal battery)

Current Draw at 3.6 V DC

900 MHz, 1 Watt: Approximately 1 mA

900 MHz, 250 mW: Approximately 0.5 mA

Interface

Two bi-color LED indicators; Two buttons

Housing

Molded reinforced thermoplastic polyester housing, o-ring sealed transparent Lexan® cover, molded acrylic lenses, stainless steel hardware.

Designed to withstand 1200 psi washdown.

Certifications

CE/UKCA approval only applies to 2.4 GHz models

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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

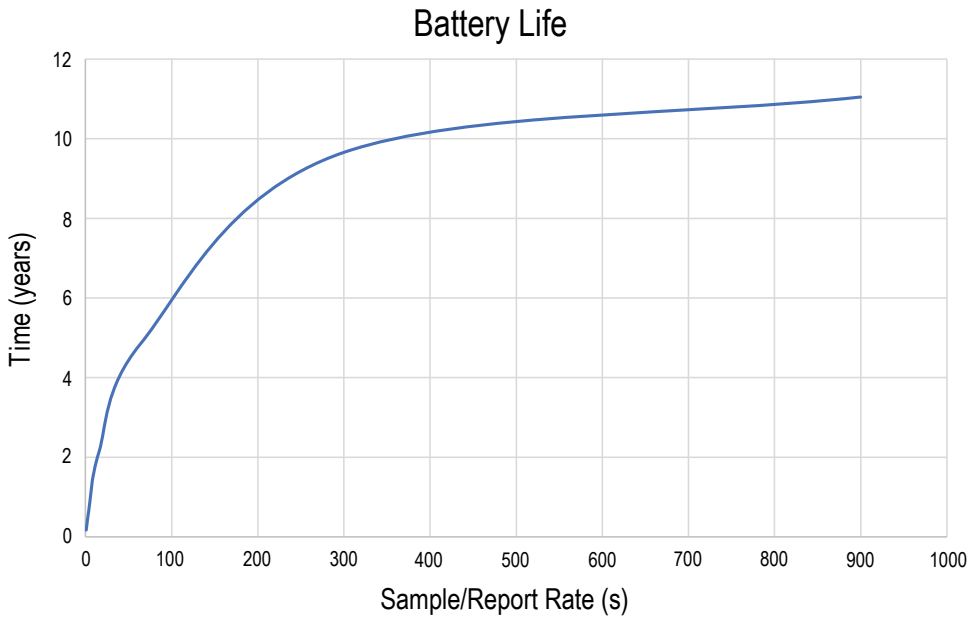
NEMA 6P

IP67

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

Battery Performance for the Q45DPSD

Battery life by sample/report rate (s)



Sample/Report Rate (s)	Battery Life (years)	Sample/Repeat Rate (s)	Battery Life (years)
1	0.17	64	4.84
2	0.33	300	9.65
4	0.64	900	11.04
16	2.13		

Accessories

Replacement Batteries

BWA-BATT-011

- 3.6 V Lithium D cell for non-hazardous locations only
- 19000 mAH
- One battery



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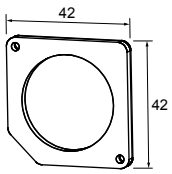
Brackets for the Q45DPSD

BWA-BK-001

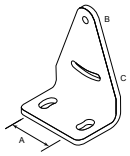
- Includes magnetic mounting bracket **SMB42FLM12** and 2 mounting screws



SMB42T

- Stainless steel 2-axis side-mounting bracket
- Nut strap included for replacing two M3 mounting nuts

Hole center spacing: A = 20.3, B to C = 24.1
Hole size: A = ø 4.3 × 20°, B = ø 3.0, C = ø 3.0 × 30°



Warnings

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: Please download the complete Q45DPSD Differential Pressure 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 Q45DPSD Differential Pressure 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 Q45DPSD Differential Pressure 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.

Install and properly ground a qualified surge suppressor when installing a remote antenna system. Remote antenna configurations installed without surge suppressors invalidate the manufacturer's warranty. Keep the ground wire as short as possible and make all ground connections to a single-point ground system to ensure no ground loops are created. No surge suppressor can absorb all lightning strikes; do not touch the Sure Cross® device or any equipment connected to the Sure Cross® device during a thunderstorm.

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:

- **Never operate a radio without connecting an antenna**
- Operating radios without an antenna connected will damage the radio circuitry.
- To avoid damaging the radio circuitry, never apply power to a Sure Cross® Performance or Sure Cross® MultiHop radio without an antenna connected.

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

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For patent information, see www.bannerengineering.com/patents.

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

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