Sure Cross® DX99..D5 FlexPower Node

Datasheet

The Sure Cross® wireless system is a radio frequency network with integrated I/O that can operate in most environments and eliminate the need for wiring runs. DX99 wireless networks are formed around a Gateway, which acts as the wireless network master device, and one or more Intrinsically Safe Nodes.

This configurable FlexPower Node has one analog input using an extended warm-up time to accommodate radar, ultrasonic, and other sensors that require an extended warm-up time. Other configurations allow for RTD, discrete, and two analog inputs.

- Default configuration defines one analog input with an extended 29 second warm-up time for compatibility with most 4 to 20 mA sensors, including radar, ultrasonic, and other sensors requiring an extended warm-up time
- Additional configuration allow for one 3-wire 100-Ohm Platinum RTD, one sinking discrete input, two analog inputs, and 19V boost voltage
- *Flex*Power® technology driven by one lithium primary battery integrated into the housing
- DIP switches for user configuration
- Frequency Hopping Spread Spectrum (FHSS) technology and Time Division Multiple Access (TDMA) control architecture ensure reliable data delivery within the unlicensed Industrial, Scientific, and Medical (ISM) band
- Transceivers provide bidirectional communication between the Gateway and Node, including fully acknowledged data transmission
- Lost RF links are detected and relevant outputs set to user-defined conditions
- DX99 Metal housings are certified for use in Class I, Division 1, Groups A, B, C, D; Class II, Division 1, Groups E, F, G; Class III, Division 1; and Zone 0 (Category 1G) and Zone 20 (Category 1D) when properly installed in accordance with the National Electrical Code, the Canadian Electrical Code, or applicable local codes/regulations

For additional information, updated documentation, and accessories, refer to Banner Engineering's website, *www.bannerengineering.com/surecross*.

Models	Frequency	Boost Voltage	I/O
DX99N9X1S1N0M3X0D5	900 MHz ISM Band	19 V	Inputs: One analog input with a 29 second warm-up time; one sinking discrete
DX99N2X1S1N0M3X0D5	2.4 GHz ISM Band		Additional Input Configurations: One 3-wire 100-Ohm Platinum RTD, one sinking discrete, and two analog (0-20 mA)

These models ship with the battery disconnected. To install the battery, refer to the battery replacement instructions in this datasheet.

⚠️ WARNING: Not To Be Used for Personnel Protection

Never use this device as a sensing device for personnel protection. Doing so could lead to serious injury or death. This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition.

Sure Cross® User Configuration Tool

The User Configuration Tool (UCT) offers an easy way to link I/O points in your wireless network, view I/O register values graphically, and set system communication parameters when a host system is not part of the wireless network.
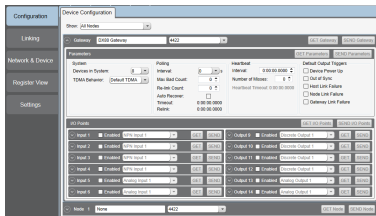
The User Configuration Tool (UCT) software runs on any computer with the Windows 7, Windows 8, or Windows 10 operating system. Use a USB to RS-485 adapter cable to connect a standalone DX80 Gateway to the computer. For DXM Controllers with an internal DX80 radio, connect a computer to the DXM Controller using a USB or Ethernet connection. Download the most recent revisions of the UCT software from Banner Engineering's website: *http://www.bannerengineering.com/wireless*.

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

Setting Up Your Wireless Network

To set up and install your wireless network, follow these steps.

Disconnect the power from your Sure Cross devices.

1. Configure the DIP switches of all devices.
2. If your device has I/O, connect the sensors to the Sure Cross devices. If your device does not have I/O, skip this step.
3. Refer to the wiring diagrams to apply power to all devices.
   - For two LED models, the Gateway's LED 1 is solid green and the Node's LED 2 flashes red to indicate there is no radio link to the Gateway.
   - For one LED models, the Gateway's LED is solid green and the Node's LED flashes red to indicate there is no radio link to the Gateway.
4. Form the wireless network by binding the Nodes to the Gateway. If the binding instructions are not included in the datasheet, refer to the product manual for binding instructions.
5. Observe the LED behavior to verify the devices are communicating with each other.
   - For two LED models, the Gateway's LED 1 is solid green and the Node's LED 1 flashes green to indicate it is communicating with the Gateway.
   - For one LED models, the Gateway's LED is solid green and the Node's LED flashes green to indicate it is communicating with the Gateway.
6. Conduct a site survey between the Gateway and Nodes. If the site survey instructions are not included in this datasheet, refer to the product manual for detailed site survey instructions.
7. Install your wireless sensor network components. If installation instructions are not included in this datasheet, refer to the product manual for detailed installation instructions.

For additional information, including installation and setup, weatherproofing, device menu maps, troubleshooting, and a list of accessories, refer to one of the following product manuals.
- Sure Cross® Wireless I/O Network Instruction Manual: *132607*
- Web Configurator Instruction Manual (used with "Pro" and DX83 models): *134421*
- Host Controller Systems Instruction Manual: *132114*

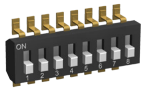## Configure the DIP Switches

Before making any changes to the DIP switch positions, disconnect the power. DIP switch changes will not be recognized if power isn't cycled to the device. For devices with batteries integrated into the housing, remove the battery for at least one minute.

Accessing the DIP Switches of a Single-Chamber Metal Housing

The DIP switches are located behind the rotary dials.

To access the DIP switches, follow these steps:

1. Unscrew and remove the top of the DX99 metal housing. The top section is the section with the glass window.
2. Pull the radio cover section off the bracket assembly. Two pins hold the radio cover to the bracket assembly.
3. Gently unplug the ribbon cable from the back of the radio cover.
4. Remove the black cover plate from the bottom of the device's cover.
   The DIP switches are located behind the rotary dials.

After making the necessary changes to the DIP switches, place the black cover plate back into position and gently push into place. Plug the ribbon cable in after verifying that the blocked hole lines up with the missing pin. Mount the cover back onto the bracket assembly.

DIP Switch Settings (RTD Cin)

Device Settings	Switches							
	1	2	3	4	5	6	7	8
Rotary dial address mode	OFF *							
Extended address mode	ON							
Modbus or UCT configured (override DIP switches)		OFF *						
DIP switch configured		ON						
Disable RTD (I/O 6)			OFF *					
Enable RTD (I/O 6)			ON					
Temp °Celsius for RTD Input				OFF *				
Temp °Fahrenheit for RTD Input				ON				
One current input (I/O 3)					OFF *			
Two current inputs (I/O 3 and I/O 4)					ON			
10 ms warm-up; 250 ms sample/report rate						OFF *	OFF *	OFF *
10 ms warm-up; 1 second sample/report rate						OFF	OFF	ON
10 ms warm-up; 4 seconds sample/report rate						OFF	ON	OFF
250 ms warm-up; 4 seconds sample/report rate						OFF	ON	ON
10 ms warm-up; 16 seconds sample/report rate						ON	OFF	OFF

* Default configuration

The measured temperature = (Modbus register value) ÷ 20.

To use a radar sensor, DIP switch 2 must be OFF. DIP switches 3 through 8 are disabled. The warm-up time defaults to 29 seconds and the sample rate defaults to 20 minutes. This is a good choice providing a reasonable balance between battery life of six to 12 months (depends on particular sensor) and a response time of 20 minutes. The loop powered 4 to 20 mA sensor will be powered by SP1 (sensor +) and the loop return will be connected to AI1 (sensor -). Every 20 minutes SP1 powers up to 19 volts for 29 seconds (warm-up time), then samples the AI input. In rare cases, a particular sensor may require the warm-up time to be increased. The warm-up time can be extended using the User Configuration Tool (UCT). On this model, the warm-up time parameter is set in half second increments. For example, to extend the warm-up time to 60 seconds, set the warm-up parameter to 60 × 2 = 120. Extending the warm-up time increases the current consumption, so you may want to consider slowing the sample rate, which is also configurable using the UCT. The sample rate parameter is set in 1/16 second increments. To set the sample rate to 40 minutes (2400 seconds) set the sample rate parameter to 2400 × 16, or 38400. The maximum setting is 65,535 or about 68 minutes.

To use a pressure sensor, DIP switch 2 must be ON. Use DIP switches 6 through 8 to set the warm-up time and sample/report rate for the analog inputs and their corresponding switch power outputs.

Address Mode

The SureCross wireless devices may use one of two types of addressing modes: rotary dial addressing or extended addressing. In rotary dial address mode, the left rotary dial establishes the network ID and the right rotary dial sets the device ID. The wireless network is restricted to a maximum of 16 devices.

Extended address mode uses a security code to "bind" Nodes to a specific Gateway. Bound Nodes can only send and receive information from the Gateway to which they are bound. In extended address mode, wireless networks may contain up to 48 radio devices. For more information on extended address mode, refer to the SureCross™ Wireless I/O Network product manual.

The device ships in rotary dial address mode by default, with the DIP switch in the OFF position. To use extended address mode, change the DIP switch to the ON position.

Modbus/User Configuration Tool (UCT) or DIP Switch Configured

In Modbus/UCT Configured mode, the device parameters are changed using the User Configuration Tool (UCT) or a Modbus command. All DIP switch positions are ignored. In DIP Switch Configured mode, use the DIP switches to configure the parameters listed in the table.

Temperature Units

Use the DIP switch to specify if the temperature is stored in degrees Fahrenheit or Celsius. The default position is OFF, setting the temperature to Fahrenheit. For Celsius measurements, set this switch to the ON position.

Warm-Up Time

The warm-up time defines how long the device must power up the sensor before a stable sensor reading is taken.

Terminal Blocks and Wiring

The complete control drawing is document *141513* at *www.bannerengineering.com*. In the control drawings, this device is referred to as the RTD Cin/Vin.
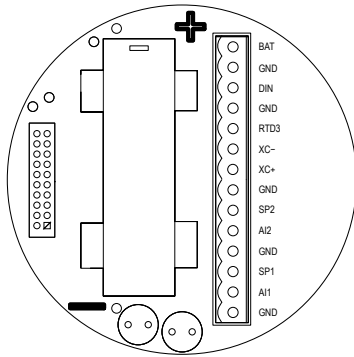
AI*x* or A*x*. Analog IN *x*
BAT. Internal battery connection
DI*x*. Discrete IN *x*
GND. Ground/dc common connection
RTD3. RTD connection. See Control Drawings.
SP*x*. Switch Power; provides variable power sources for external devices
XC- and XC+. RTD connection. See Control Drawings.

The GND connection can be considered the same as the housing ground when using a stainless steel antenna feedthrough (model BWA-HW-016 or BWA-HW-017). When the stainless steel antenna feedthroughs are not used, the GND connection is isolated from the metal housing.

Control Drawings

RTD Cin/Vin - Single Chamber Metal Housing (DX99..D)

RTD Cin/Vin - Any Boost Voltage

RTD Cin/Vin - Any Boost Voltage (Powered Externally from the FlexPower Node)

* denotes an optional 3-wire GND connection
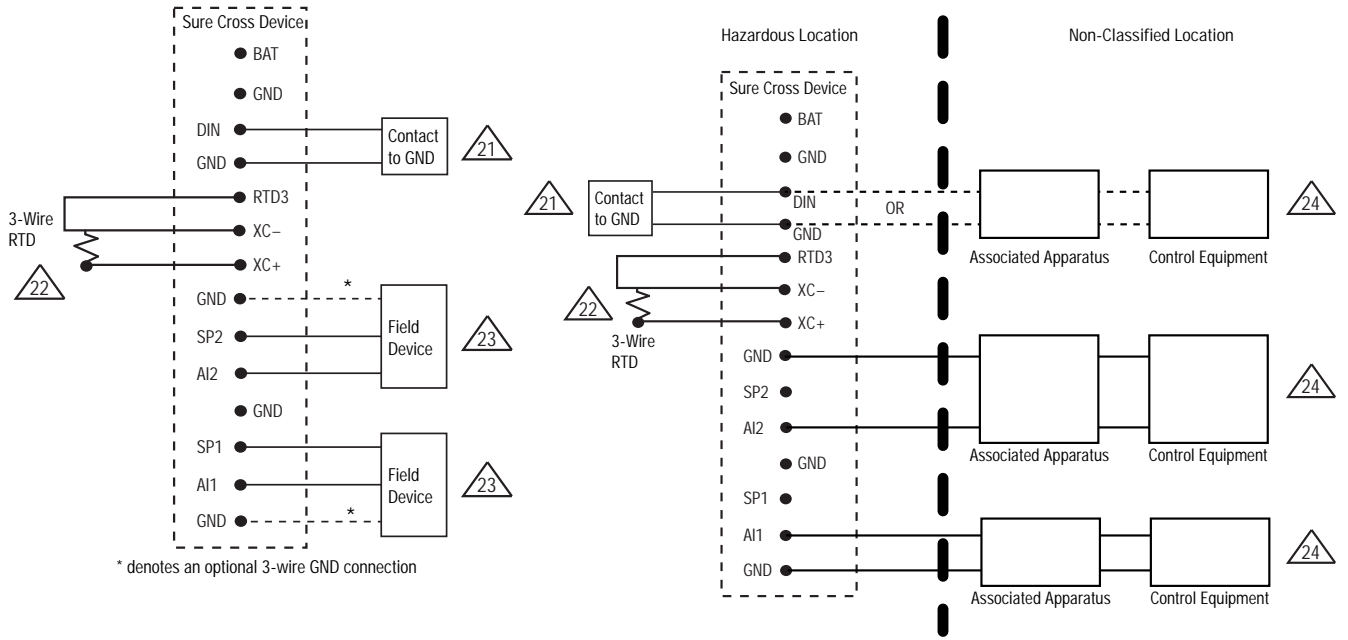
Entity Parameters - 21	
Uo/Voc	5.88 V
Io/Isc	1.80 mA
Po	2.65 mW
Co/Ca	43 µF
Lo/La	12.3 H

Entity Parameters - 22	
Uo/Voc	5.88 V
Io/Isc	77.2 mA
Po	113.5 mW
Co/Ca	43 µF
Lo/La	6.7 mH

Entity Parameters - 24	
Ui/Vmax	30 V
Ii/Imax	120 mA
Pi	840 mW
Ci	0
Li	0

Notes:
1. The total capacitance of all field devices/ cables that may be connected to terminals of Group 23 must not exceed the Co/Ca value shown in the table.
2. The total inductance of all field devices/cables that may be connected to terminals of Group 23 must not exceed the Lo/La values shown in the table.

Entity Parameters - 23				
	10 V	13 V	18 V	19 V
Uo/Voc	12.6 V	15.75 V	21 V	23.1 V
Io/Isc	34.89 mA	78.22 mA	94.75 mA	114.56 mA
Po	110 mW	308 mW	498 mW	662 mW
Co/Ca	1104 nF	432 nF	142 nF	94 nF
Lo/La	32.8 mH	6.5 mH	4.4 mH	3.0 mH

Metal Enclosure	
CSA C/US	Class I, Division 1, Groups A, B, C, D Class II, Division 1, Groups E, F, G Class III, Division 1 Class I, Zone 0, Group IIC
LCIE/ATEX	Group IIC, Zone 0 Dust, Zone 20

Models	
DX99N9X1S1N0M3X0D5	DX99N2X1S1N0M3X0D5

LED Behavior for the Nodes

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:

  2.4 GHz 65 mW radios: 1 foot
  900 MHz 150 mW and 250 mW radios: 6 feet
  900 MHz 1 Watt radios: 15 feet

LED 1	LED 2	Node Status
Flashing green		Radio Link Ok
Flashing red	Flashing red	Device Error
	Flashing red, 1 per 3 sec	No Radio Link

Modbus Register Table (DX99 RTD Cin)

I/O	Modbus Holding Register		I/O Type	Units	I/O Range		Holding Register Representation		Terminal Block Labels
	Gateway	Any Node			Min.	Max.	Min. (Dec.)	Max. (Dec.)	
1	1	1 + (Node# × 16)	Discrete IN 1	-	0	1	0	1	DIN
2	2	2 + (Node# × 16)							
3	3	3 + (Node# × 16)	Analog IN 1	mA	0	20.0	0	65535	AI1
4	4	4 + (Node# × 16)	Analog IN 2	mA	0	20.0	0	65535	AI2
5	5	5 + (Node# × 16)							
6	6	6 + (Node# × 16)	RTD IN	°F/°C	-1638.3	1638.4	-32768	32767	RTD*x*
7	7	7 + (Node# × 16)	Reserved						
8	8	8 + (Node# × 16)	Device Message						
		…							
15	15	15 + (Node# × 16)	Control Message						
16	16	16 + (Node# × 16)	Reserved						

The temperature = (Modbus register value) ÷ 20.

Temperature values are stored as signed values in the Modbus register. A 0 in the register is interpreted as 0°; and 65535 in the register (0xFFFF) is interpreted as $-1 \div 20 = -0.05°$ in high resolution mode and $-1 \div 2 = -0.5°$ in low resolution mode.

Storage and Sleep Modes

Storage Mode (applies to battery-powered models only)—While in storage mode, the radio does not operate. All Sure Cross® radios powered from an integrated battery ship from the factory in storage mode to conserve the battery. To wake the device, press and hold button 1 for 5 seconds. To put any *Flex*Power® or integrated battery Sure Cross radio into storage mode, press and hold button 1 for 5 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 1 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.

Assembly

Follow these steps to assemble your DX99…D Metal Housing with Dome Antenna model. The DX99 unit ships as a complete unit, including the radio core, housing, and integrated battery. One terminal header is also included in the shipment. To unpack and wire the unit:
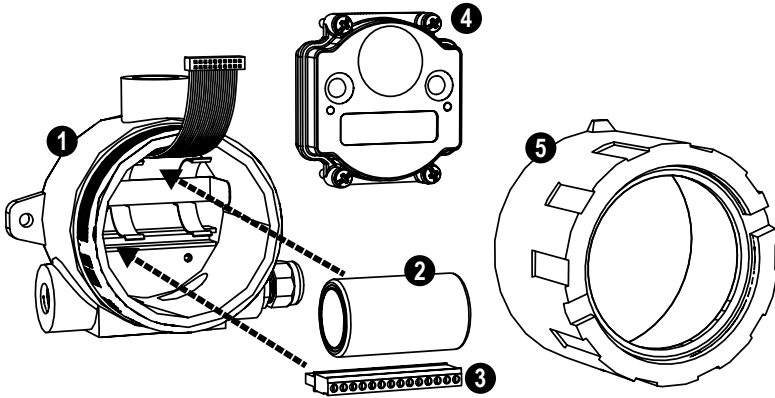
Figure 1. Installing the Battery and Terminal Header

Step 1. Open the end with the glass window (5) and gently lift the radio core unit (4) and the space frame it sits on up. The core unit connects to the space frame using two pins and the radio core is connected to the wiring board with a ribbon cable.

Step 2. Disconnect the ribbon cable from the radio.

Step 3. Insert the battery (2) into the battery holder, verifying the position and negative poles of the battery are positioned according to the markings on the board.

Step 4. Install the terminal header (3) onto the terminal pins.

Step 5. Insert your sensor wires through a cable gland and one of the two 1/2-inch NPT ports. Wire the sensor wires into the terminal header (3) according to the control drawings, p/n 141513. Use a cable gland certified for your region and environment. For a waterproof seal, refer to the waterproofing instructions in Banner document 132607.
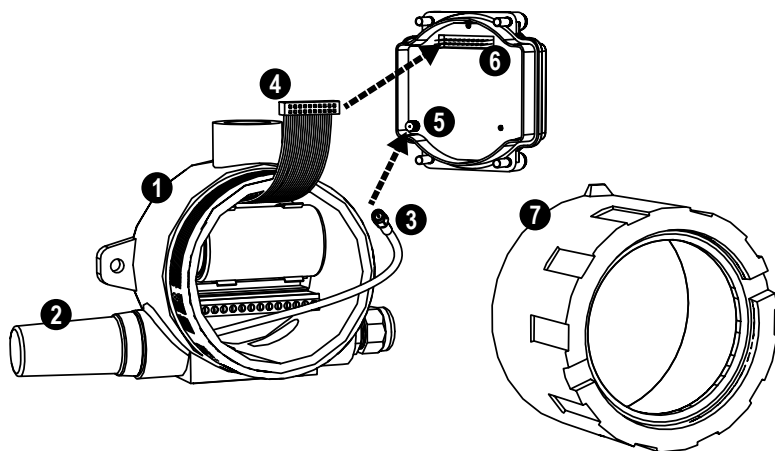

Figure 2. Installing and Connecting the Antenna

Step 6. To install the dome antenna (2), thread the antenna cable through the 1/2-inch NPT port and screw the dome antenna to the 1/2-inch NPT port.

Step 7. Connect the antenna cable (3) to the radio unit's antenna connector (5). (You may need to separate the space frame from the radio to do this.)

Step 8. Gently install the ribbon cable (4) into the ribbon cable pins (6), verifying the ribbon cable is seated on both rows of pins.

Step 9. Reconnect the space frame (not shown) to the radio core unit.

Step 10. Place the radio unit into the housing and gently push down until the spacer frame pin holes rest on the edge of the metal housing.
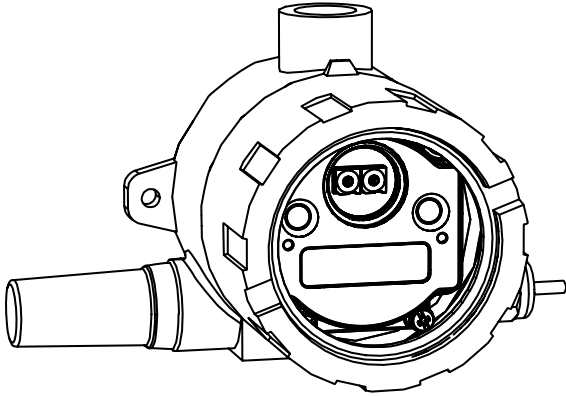

Figure 3. Final Assembly

Step 11. Close the metal cover firmly and lock closed using the set screw.

Replacing the Battery (DX99...D Models)

To replace the lithium "D" cell battery in the metal housings, follow these steps.

1. Unscrew the lid of the metal enclosure.
2. Lift the radio out of the metal enclosure and pull the spacer frame off the back side of the radio.
3. Disconnect the radio by unplugging the ribbon cable from the radio board and set aside the radio and spacer frame.
4. Remove the discharged battery.
5. Replace with a new battery. Only use a 3.6 V lithium battery from Xeno, model number XL-205F.
6. 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.
7. Wait two minutes.
8. Insert the ribbon cable through the center of the spacer frame, then plug the ribbon cable back into the radio board.
9. Insert the radio back onto the spacer frame pins. Push the radio and spacer frame assembly back into the enclosure until it is seated.
10. Screw on the lid and tighten.
11. After replacing the battery, allow up to 60 seconds for the device to power up.
12. Properly dispose of your used battery 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.

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.

The battery may be replaced in explosive gas atmospheres. Replacement battery model number: BWA-BATT-001. For pricing and availability, contact Banner Engineering.

⚠️ **WARNING:**
- Do not replace battery when an explosive dust atmosphere may be present.
- The replacement battery MUST be a Banner approved battery, model number BWA-BATT-001. Use of a different battery will VOID the intrinsic safety rating of this device and may result in an explosion!
- When replacing the battery, the negative end of the battery holder is the side by the large capacitors. This side is marked with a minus (−) sign.
- Do not attempt to recharge the battery. These batteries are not rechargeable. Recharging may cause serious injury to personnel or damage the equipment. Replace only with factory recommended batteries.

Specifications

Radio Range[1]
900 MHz, 150 mW: Up to 4.8 km (3 miles)
2.4 GHz, 65 mW: Up to 3.2 km (2 miles)

Minimum Separation Distance
900 MHz, 150 mW: 2 m (6 ft)
2.4 GHz, 65 mW: 0.3 m (1 ft)

Radio Transmit Power
900 MHz, 150 mW: 21 dBm (150 mW) conducted
2.4 GHz, 65 mW: 18 dBm (65 mW) conducted, less than or equal to 20 dBm (100 mW) EIRP

900 MHz Compliance
FCC ID TGUDX80 - This device complies with FCC Part 15, Subpart C, 15.247
IC: 7044A-DX8009

2.4 GHz Compliance
FCC ID UE300DX80-2400 - This device complies with FCC Part 15, Subpart C, 15.247
ETSI EN 300 328 V1.8.1 (2012-06)
IC: 7044A-DX8024

Analog Input 1
Rating: 24 mA
Sample Rate: 20 minutes (DIP switch configurable)
Report Rate: 20 minutes (DIP switch configurable)
Accuracy: 0.1% of full scale +0.01% per °C
Resolution: 15-bit
Switch Power 1 (SP1) Warm-up: 29 seconds

Analog Input 2
Rating: 24 mA
Sample Rate: 16 seconds (DIP switch configurable)
Report Rate: 16 seconds (DIP switch configurable)
Accuracy: 0.1% of full scale +0.01% per °C
Resolution: 15-bit
Switch Power 2 (SP2)

Notes
The RTD input is enabled or disabled using DIP switch 3.
The analog input 1 and 2 sample and report rates can be changed using DIP switches 6, 7, and 8.

Supply Voltage
3.6 V dc low power option from an internal battery

Power Consumption
Consumption: Application dependant

Housing
Glass and cast aluminium w/ chromating and chemically resistant paint (outside only)

Antenna Connection
Ext. Reverse Polarity SMA, 50 Ohms
Max Tightening Torque: 0.45 N·m (4 lbf·in)

Interface
Indicators: Two bi-color LEDs
Buttons: Two
Display: Six character LCD

Wiring Access
Two 1/2-inch NPT ports, one 3/4-inch NPT port (internal threads)

Spread Spectrum Technology
FHSS (Frequency Hopping Spread Spectrum)

RTD Input
Type: Platinum, 100 ohm (European, DIN 43760)
Sample Rate: 16 seconds
Report Rate: 16 seconds
Accuracy: 0.1% of full scale
Resolution: 0.1 °C, 15-bit

Discrete Input
Input Rating: See control drawing
Sample Rate: 62.5 milliseconds
Report Rate: On change of state
ON Condition (NPN): Less than 0.7 V
OFF Condition (DX99 NPN): Greater than 2.2 V or open

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[1] Radio range is with the 2 dB antenna that ships with the product. High-gain antennas are available, but the range depends on the environment and line of sight. Always verify your wireless network's range by performing a Site Survey.

Environmental Rating
  IEC IP68 [2]

Operating Conditions[3]
  −40 °C to +65 °C (−40 °F to +149 °F) (Electronics); −20 °C to +80 °C
  (−4 °F to +176 °F) (LCD)
  95% maximum relative humidity (non-condensing)
  Radiated Immunity: 10 V/m (EN 61000-4-3)

Shock and Vibration
  IEC 68-2-6 and IEC 68-2-27
  Shock: 30g, 11 millisecond half sine wave, 18 shocks
  Vibration: 0.5 mm p-p, 10 to 60 Hz

Certifications

CSA: Class I, Division 1, Groups A, B, C, D; Class II, Division 1,
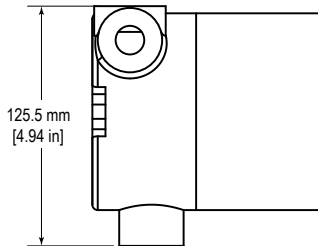Groups E, F, G; Class III, Division 1 (Ex ia IIC T4 / AEx ia IIC T4)
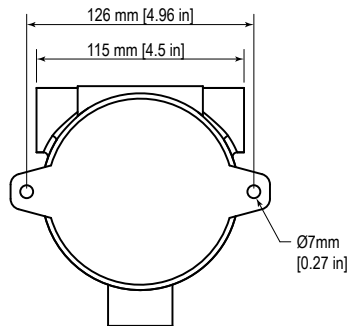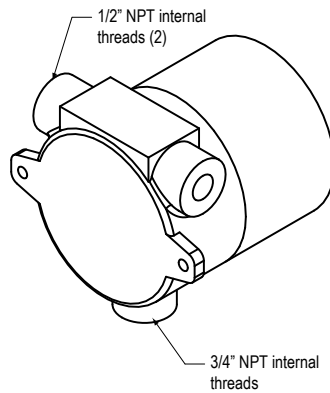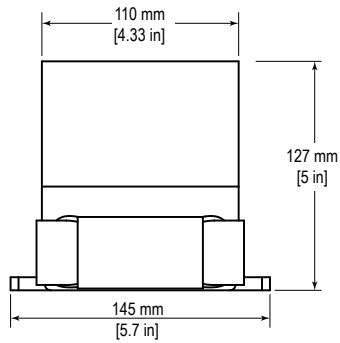Certificate: 2008243

LCIE/ATEX: Zone 0 (Category 1G) and 20 (Category 1D),
Temperature Class T4 (II 1 GD / Ex ia IIC T4 Ga / Ex ia IIIC T82°C
Da IP68) Certificate: LCIE 08 ATEX 6098 X

Special Conditions for Safe Use imposed by Intrinsic Safety Certificate
LCIE 08 ATEX 6098 X: Ambient temperature range is −40 to 70 °C.
Sure Cross® DX99 FlexPower devices can only be connected to
Intrinsically Safe certified equipment or simple apparatus as defined by
EN 60079-11. All connected equipment must comply with the Entity
Parameters (Safety Parameters) listed in the Control Drawings (p/n
141513). The device must only use a lithium battery manufactured by
XENO, type XL-205F.

CE
1725

Sensor Battery Life	Sample Rates	
	20 minutes	60 minutes
Endress and Hauser Micropilot M (FMR-245 A2V1GNJAC1A)	0.8 years	1.9 years
VEGAPULS 62 (PS62.UXCAE3DANXX)	1.0 years	2.4 years
SIEMENS LR250	1.3 years	2.8 years

Metal Housing Dimensions

110 mm [4.33 in]
127 mm [5 in]
145 mm [5.7 in]

1/2" NPT internal threads (2)
3/4" NPT internal threads

126 mm [4.96 in]
115 mm [4.5 in]
Ø7mm [0.27 in]

125.5 mm [4.94 in]

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[2] Refer to the Sure Cross® Wireless I/O Networks Instruction Manual (p/n 132607) for installation and waterproofing instructions.
[3] Operating the devices at the maximum operating conditions for extended periods can shorten the life of the device.

Included with Device (Metal Housing with Dome Antenna)

	Model	Qty	Item
Dome Antenna	BWA-9O2-001, or BWA-2O2-001	1	Dome Antenna, 902-928 MHz, 2 dBd Omni, 1/2-inch NPT, 18" cable, or Dome Antenna, 2.4 GHz, 2 dBd Omni, 1/2-inch NPT, 18" cable
	BWA-HW-024	1	Terminal strip header, 14 position

Warnings

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. A list of approved countries appears in the *Radio Certifications* section of the product manual. 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. Consult with Banner Engineering Corp. if the destination country is not on this list.

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