

Features

The SureCross™ DX70 wireless series consists of a radio frequency network system built around two devices and configured I/O.

- Wireless industrial I/O system with discrete (sourcing or sinking) inputs and outputs, analog inputs and outputs, and link loss output*
- +10 to 30V dc power input
- Frequency Hopping Spread Spectrum (FHSS) technology and Time Division Multiple Access (TDMA) control architecture combine to ensure reliable data delivery within the unlicensed Industrial, Scientific, and Medical (ISM) bands
- Transceivers for two-way communication between the devices, including fully acknowledged data transmission
- Lost RF links are detected and relevant outputs go to user-defined default states
- External or internal antenna
- 900 MHz or 2.4 GHz frequencies
- Built-in signal strength indication

For additional information and a complete list of accessories, including FCC approved antennas, please refer to Banner Engineering's website, www.bannerengineering.com/surecross.

* Link loss output may be selected or deselected to be one of the four outputs



WARNING... Not to be used for personnel protection

Never use these products for personnel protection. Doing so could lead to serious injury or death.

These products do NOT include the self-checking redundant circuitry necessary to allow their use in personnel safety applications. A failure or malfunction can cause either an energized or de-energized product output condition. Consult your current Banner Safety Products catalog for safety products that meet OSHA, ANSI, and IEC standards for personnel protection.



SureCross™ DX70 Wireless System

Models

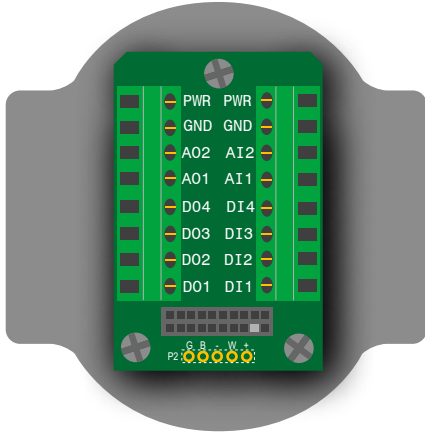
Device	Models	Frequency	Power	Antenna	I/O
Nodes	DX70N9X6S4P4M2M2	900 MHz ISM Band	+10 to 30V dc	Standard	Discrete Inputs: Four Sourcing (default) Discrete Outputs: Four Sourcing Analog Inputs: Two 0-20 mA Analog Outputs: Two 0-20 mA
	DX70N9X6W4P4M2M2			Internal	
	DX70N2X6S4P4M2M2	2.4 GHz ISM Band		Standard	
	DX70N2X6W4P4M2M2			Internal	
Gateways	DX70G9X6S4P4M2M2	900 MHz ISM Band		Standard	
	DX70G9X6W4P4M2M2			Internal	
	DX70G2X6S4P4M2M2	2.4 GHz ISM Band		Standard	
	DX70G2X6W4P4M2M2			Internal	

Node	DX70N9X6S8P4	900 MHz ISM Band	+10 to 30V dc	Standard	Discrete Inputs: Eight Sourcing (default) Discrete Outputs: Four Sourcing
	DX70N9X6W8P4			Internal	
	DX70N2X6S8P4	2.4 GHz ISM Band		Standard	
	DX70N2X6W8P4			Internal	
Gateway	DX70G9X6S4P8	900 MHz ISM Band		Standard	Discrete Inputs: Four Sourcing (default) Discrete Outputs: Eight Sourcing
	DX70G9X6W4P8			Internal	
	DX70G2X6S4P8	2.4 GHz ISM Band		Standard	
	DX70G2X6W4P8			Internal	

DX70 devices should only be paired in the similar I/O structure groupings listed. The P4M2M2 devices are paired together, as are the 8P4 and 4P8 devices. Do not mix and match between groups.

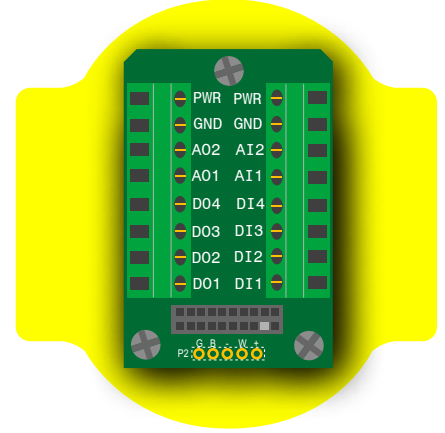
Hookup Diagrams

DX70 Gateway I/O Terminal Block



Configured Input/Output Mapping, 4P4M2M2 Models

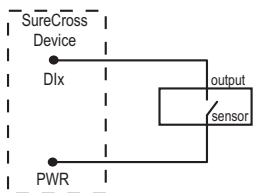
DX70 Node I/O Terminal Block



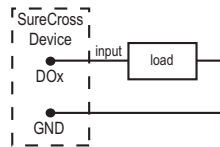
Terminal Block Label	DX70 Gateway	DX70 Node	Terminal Block Label
DI1	Discrete IN 1*	Discrete OUT 1 or Lost Link*	DO1
DI2	Discrete IN 2	Discrete OUT 2	DO2
DI3	Discrete IN 3	Discrete OUT 3	DO3
DI4	Discrete IN 4	Discrete OUT 4	DO4
AI1	Analog IN 1	Analog OUT 1	AO1
AI2	Analog IN 2	Analog OUT 2	AO2
DO1	Discrete OUT 1 or Lost Link*	Discrete IN 1*	DI1
DO2	Discrete OUT 2	Discrete IN 2	DI2
DO3	Discrete OUT 3	Discrete IN 3	DI3
DO4	Discrete OUT 4	Discrete IN 4	DI4
AO1	Analog OUT 1	Analog IN 1	AI1
AO2	Analog OUT 2	Analog IN 2	AI2

* If digital output 1 is used as a lost link output (default) then digital input 1 is non-functional. Please refer to the *Configuration* section to change this setting. Input 1 is not available when the lost link output is selected.

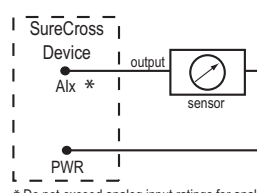
Sourcing Input Wiring



Sourcing Output Wiring

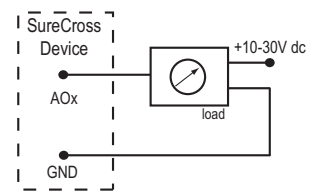


Analog (Sourcing) Input Wiring



* Do not exceed analog input ratings for analog inputs. Only connect sensor outputs to analog inputs.

Analog (Sourcing) Output Wiring

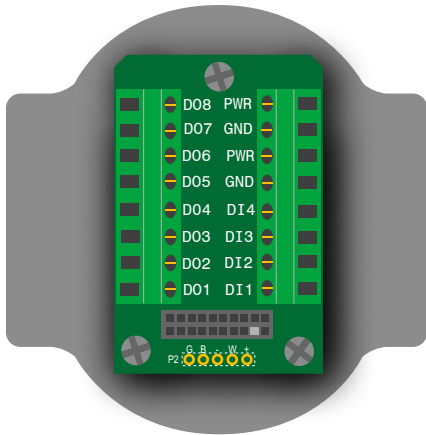


Refer to the sensing device data sheet for a device specific wiring diagram.

SureCross™ DX70 Wireless System

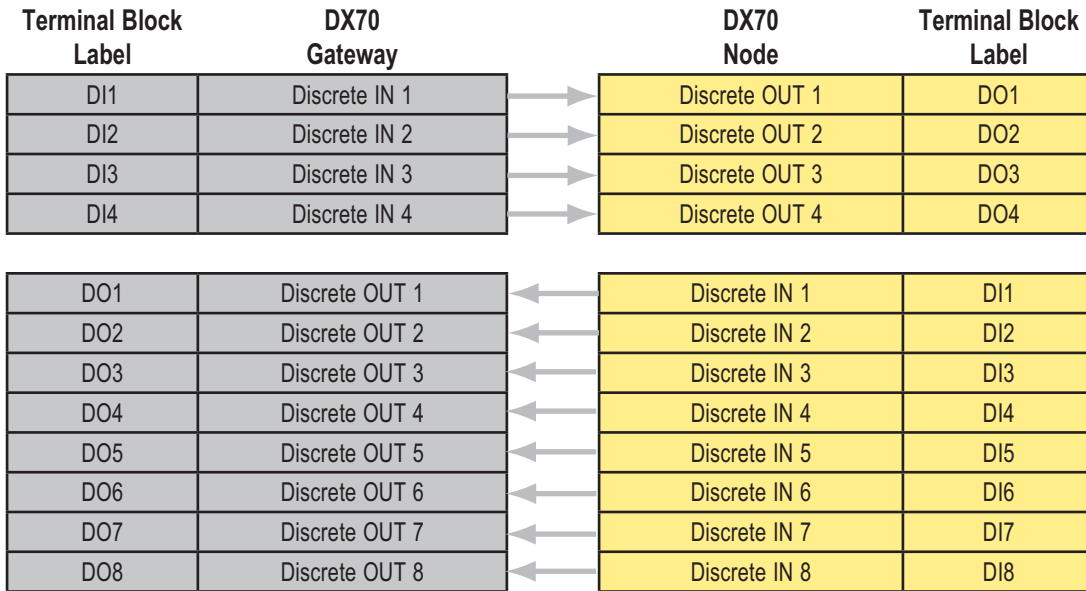
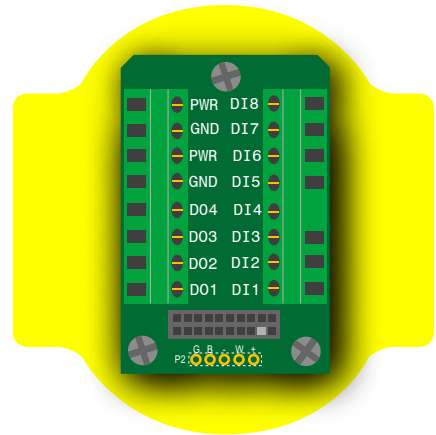
Hookup Diagrams, continued

DX70 Gateway
I/O Terminal Block



Configured Input/Output Mapping, 8P4 to 4P8 Models

DX70 Node
I/O Terminal Block



The lost link option is not available on this model.

Device Layouts



1 Rotary Switches

After the DX70 devices are bound, use the rotary switches on the Gateway to set the Network ID (NID) to a decimal value from 1 to 32.

2 LEDs

Power LED - Power indicator. A green LED indicates the power is on.

Signal LED - Provides real-time feedback regarding RF link status and communications activity.

3 Port, NPT Gland, or Plug

If unused, install the provided plug into the 1/2 NPT threaded port. Use PTFE tape if an IP67 seal is required.

4 Housing

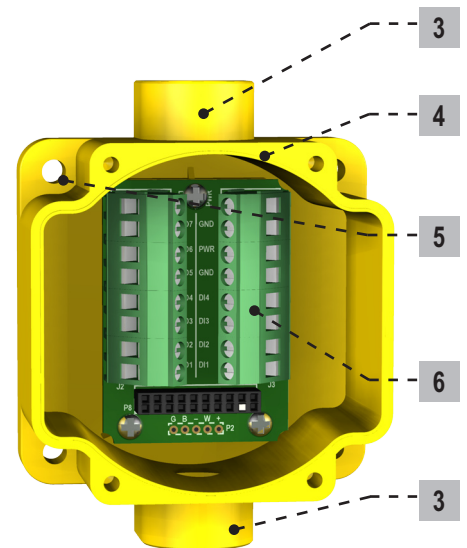
The rugged, industrial DX70 housing meets IEC IP67 standards.

5 Mounting Hole, #10/M5 Clearance

Mounting holes accept metric M5 or UNC/UNF #10 hardware -- DIN rail mount adapter bracket available

6 Wiring Terminal Strip

The 16 wiring terminals accept wire sizes: AWG 12-28 or 2.5 mm²

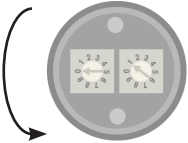
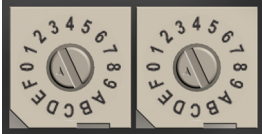
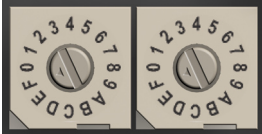
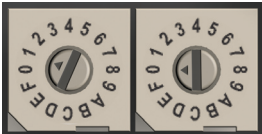


SureCross™ DX70 Wireless System

Device Binding

Binding two DX70 devices locks the Node to a specific Gateway by teaching the Node the Gateway's unique serial number. After the two devices are bound, the Node only accepts data from the Gateway it is bound to. New or replacement devices from the factory require binding before operation.

If the power is applied and the Power LED is solid green and the Signal LED is solid red for more than thirty seconds (indicating an RF link error), the devices need to be bound. To bind:

Step	User Action	
1	Install the supplied antennas to both the Gateway and Node devices.	
2	Apply power to both devices and position the Gateway and Node about two meters apart. The Power LED is a solid green and the Signal LED is a solid red, indicating an RF link error. *	Power LED: ● (green) Signal LED: ● (red)
3	Remove the rotary switch access covers. Rotate the cover counterclockwise to remove and clockwise to tighten.	
4	On the Gateway, set the rotary dials to 00, then set the rotary switches to FF (shown). After the rotary switches are set to FF, the Gateway enters binding mode. Note that the rotary dials for each device must be changed to FF after applying power, not before applying power.	 Power LED: ✖ (red) Signal LED: ✖ (red)
5	On the Node, set the rotary dials to 00, then set them to FF (shown). The Node enters binding mode and waits for the Gateway to respond. Both the Gateway's and Node's LEDs alternately flash red during pairing.	 Power LED: ✖ (red) Signal LED: ✖ (red)
6	After the devices are successfully bound, the Node's LEDs are solid red for a few seconds and the Node automatically exits binding mode. The Node Power LED is solid green and Signal LED is solid red, indicating the Node is bound. Binding should take less than twenty seconds.	Power LED: ● (green) Signal LED: ● (red)
7	Change the Gateway's rotary dials to a valid Network ID. Valid Network IDs are 01 through 32, in decimal, established using both rotary dials. The left dial may be set to 0, 1, 2, or 3. The right dial may be set from 0 to 9 when the left dial is at 0, 1, or 2; or set to 0 through 2 when the left dial is at 3. (Positions A through F are invalid network ID numbers.) In the sample shown to the right, the Gateway is set to Network ID 10.**	
8	The Node automatically synchronizes to the Gateway and establishes a radio link in less than a minute. When a radio link is established, the Power LED is green and the Signal LED flashes yellow on both devices to indicate the signal strength.	Power LED: ● (green) Signal LED: ✨ (yellow)
9	On the Node, set the rotary dials back to 00, or any position other than FF.	
10	Replace both the rotary switch access covers.	

Regardless of the position of the Node's rotary dials, the DX70 devices within this bound pair maintain a radio link. For successful binding, the Gateway and Node should be at least two meters apart and have the antennas installed.

* Unbound devices will have a solid green Power LED and solid red Signal LED thirty seconds after power up. Bound devices have a solid green Power LED and a flashing yellow Signal LED within thirty seconds of power up.

** When multiple networks operate in the same area, assign a unique Network ID (NID) to the Gateway device within each bound pair.

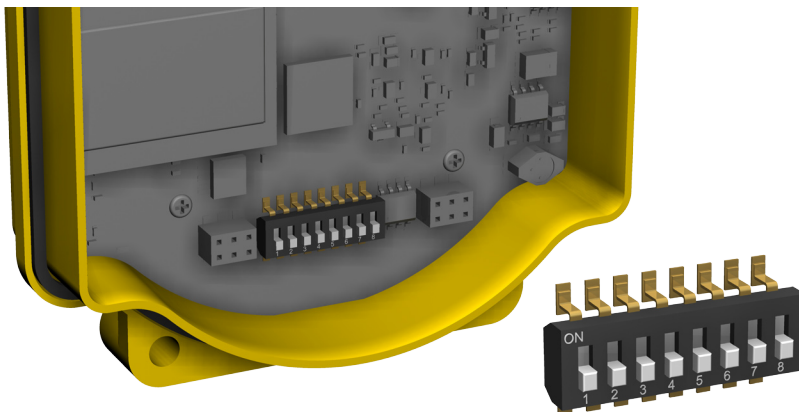
Configuration

Switches

Use the switches on the circuit board to set:

- link output error response
- input type
- output or link mapping
- link timeout

Changes made to the DIP switches affect all I/O for this device.



Switches		
1	2	Link Output Error
Off	Off	Deenergize outputs *
On	Off	Energize outputs
Off	On	Latch last state
On	On	Reserved
3	Input Type	
Off	PNP *	
On	NPN	
4	Output or Link Mapping**	
Off	Output 1 to Link Error *	
On	Output 1 to Input 1	
5	Link Timeout	
Off	4 seconds *	
On	1 second	

* Default positions. Input 1 is not available when the lost link output is selected.

** The lost link option is only available on the 4P4M2M2 models.

To access the switches, remove the cover from the base and disconnect the ribbon cable from the cover. Carefully use a paper clip or small screwdriver to remove the inside rear cover plate, exposing the circuitry. The eight switch positions run from left to right as shown. The default pin positions are off.

When reconnecting the ribbon cable, note the blank locating position (missing pin) in the cover connector and the mating plugged hole in the base connector.

Verifying Power and Communications

After applying power to the devices, the Power LED is solid green. Until communication is established, the Signal LEDs are solid red. When communication is established, the Signal LED flashes yellow; the frequency of the flash indicates the communication signal strength.

Status	Power LED	Signal LED
Power Applied	● Green Solid	—
RF Link Error	● Green Solid	● Red Solid
RF Link Good	● Green Solid	☀ Yellow Flash
Binding Mode	☀ Red Flash	☀ Red Flash
Successful Binding (Node)	● Red Solid*	● Red Solid*

If testing the devices before installation, verify the devices are at least two meters apart to avoid over-driving the link.

* For three seconds

Communication Signal Strength

The rate at which the Signal LED blinks yellow indicates the signal strength between the Gateway and Node.

Blinks every 1/8 second
 Blinks every 1/4 second
 Blinks every 1/2 second
 Blinks every 1 second

Less than 3% missed packets
 Between 3% and 25% missed packets
 Between 26% and 50% missed packets
 More than 50% missed packets

SureCross™ DX70 Wireless System

Installation - Mounting

Avoid Direct Sunlight

To minimize the damaging effects of ultra-violet radiation, avoid mounting the devices facing intense direct sunlight.

- Mount the DX70 within a protective enclosure,
- Mount the DX70 under an overhang or other source of shade,
- Install the DX70 indoors, or
- Face the units north when installing outside.

Avoid Collecting Rain

When possible, mount the DX70 where rain or snow will drain away from the unit.

- Mount the units vertically so that precipitation, dust, and dirt do not accumulate on permeable surfaces.
- Avoid mounting the units on flat or concave surfaces, especially if the display will be pointing up.

Reduce Chemical Exposure

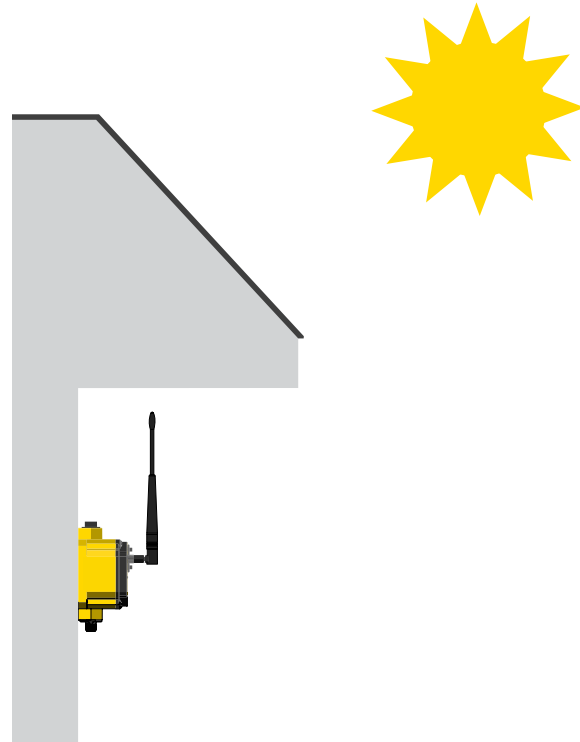
Before installing the DX70 units in a chemically harsh environment, contact Banner for more information regarding the life-expectancy. Solvents, oxidizing agents, and other chemicals can damage the DX70.

Minimize Mechanical Stress

While the DX70 is very durable, it is a sophisticated electronic device that is sensitive to shock and excessive loading.

- Avoid mounting the units to an object that may be shifting or vibrating excessively. High levels of static force or acceleration may damage the housing or electronic components.
- Do not subject the DX70 to external loads. Do not step on the DX70 or use it as a handgrip.
- Do not allow long lengths of cable to hang from the DX70 glands. Cabling heavier than 100 grams should be supported instead of allowed to hang from the DX70 housing.

Ideal Mounting Conditions



Installation - Weather-Proofing Plugs

If the DX70 is mounted outdoors or will be exposed to moisture, dirt, or dust, follow these steps to weatherproof the units.

Watertight 1/2" NPT Plug

Seal the 1/2" NPT port if it is not used. To install a watertight NPT plug:

1. Wrap 12 to 16 passes of PTFE tape evenly across the length of the threads.
2. Manually thread the plug into the housing port until reaching some resistance.
3. Using a 9/16" crescent wrench, turn the plug until all the plug's threads are engaged by the housing port.

Antenna Installation

When installing a remote antenna system, always include a lightning arrester/coaxial surge protector in the system. Remote antenna systems installed without a lightning arrester invalidate the Banner warranty of the SureCross™ family of devices. A remote antenna system is any antenna system where the antenna is not connected directly to the radio and typically use coaxial cable to connect the antenna to the radio.

Lightning arrestors should be properly grounded and mounted at ground level near where the cabling enters a building. Install the lightning arrester indoors or inside a weatherproof enclosure to minimize corrosion or component deterioration. For best results, mount the lightning arrester as close to the ground as possible to minimize the length of the ground connection.

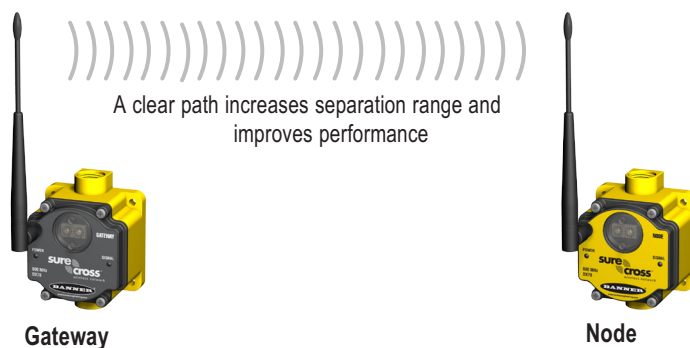
No surge protector can absorb all lightning strikes. Do not touch the SureCross devices or any equipment connected to the SureCross devices during a thunderstorm.

Quick Tips

Clear Communication Paths

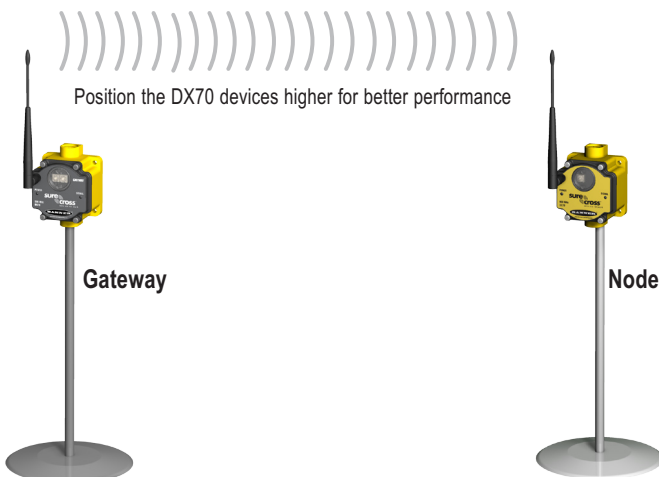
A wireless network can be hindered by radio interference and obstructions in the path between a receiver and transmitter.

To achieve the best radio performance, carefully consider the installation locations for each of the devices.



Increase Height of DX70 Units

Orient the external antenna vertically for optimal RF communication. If necessary, consider increasing the height of the DX70 position to improve reception.



SureCross™ DX70 Wireless System

Maintenance and Parts Installation

Main Body Gasket

Check the main body gasket any time the DX70 is opened. Replace the gasket when it is damaged, discolored, or showing signs of wear. The gasket must be:

- Fully seated within its channel along the full length of the perimeter, and
- Positioned straight within the channel with no twisting, stress, or stretching.

Rotary Switch Access Cover O-Ring

Check the rotary switch access cover o-ring any time the access cover is removed. Replace the o-ring when it is damaged, discolored, or showing signs of wear. The o-ring should be:

- Seated firmly against the threads without stretching to fit or without bulging loosely, and
- Pushed against the flanged cover.

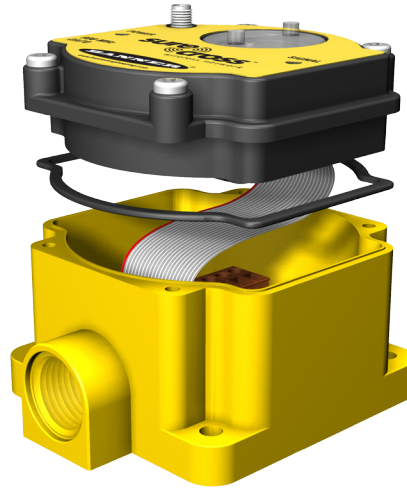
When removing or closing the rotary switch access cover, manually twist the cover into position. Do not allow cross-threading between the cover and the DX70 face.

Once the cover is in place and manually tightened, use a small screwdriver (no longer than five inches total length) as a lever to apply enough torque to bring the rotary switch access cover even with the DX70 cover surface.

Replacing O-Rings

Please refer to the list of replacement parts included within this guide and contact Banner Engineering with any questions.

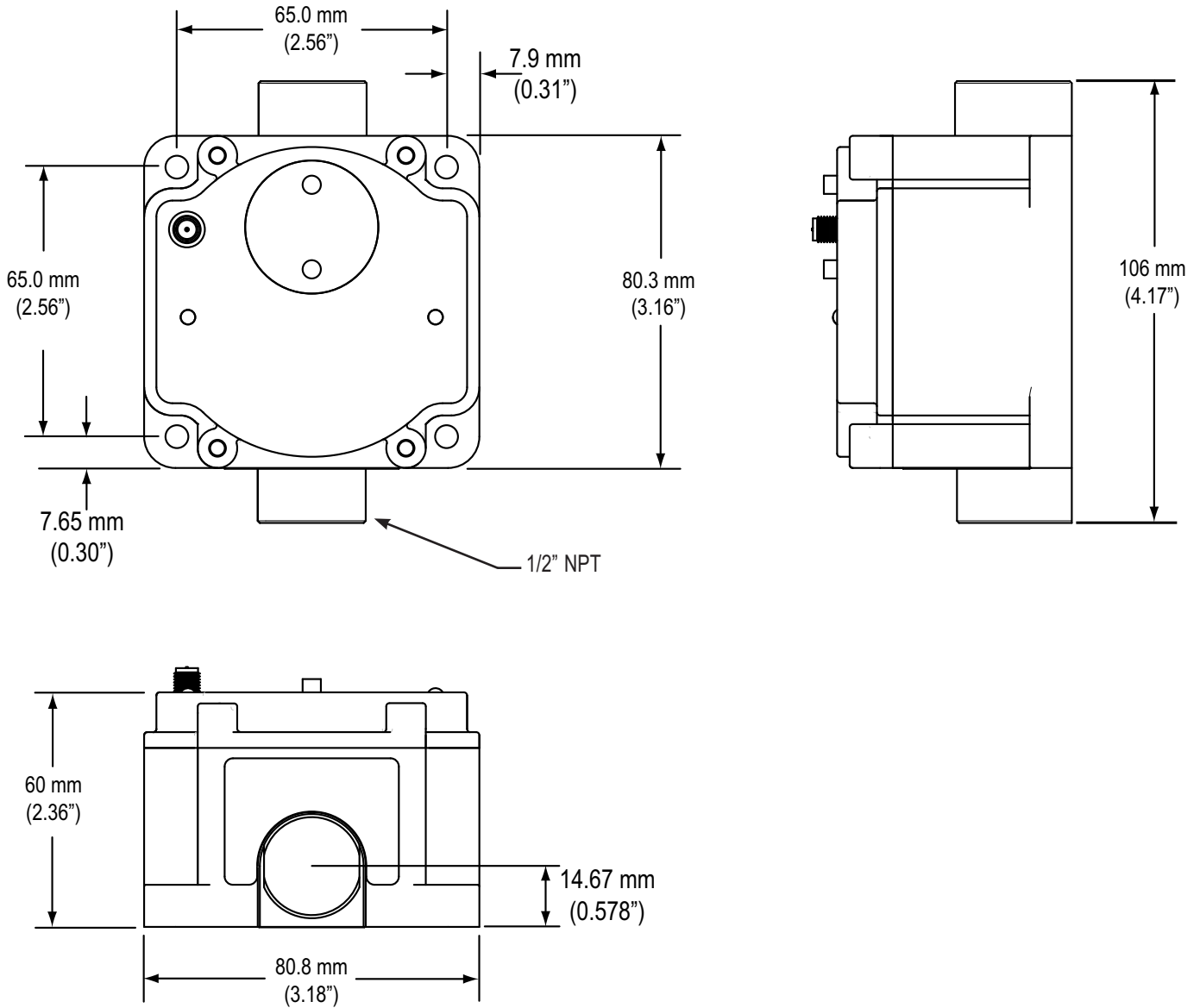
Main Body Gasket



Rotary Access O-Ring



DX70 Gateway and Node Dimensions



SureCross™ DX70 Wireless System

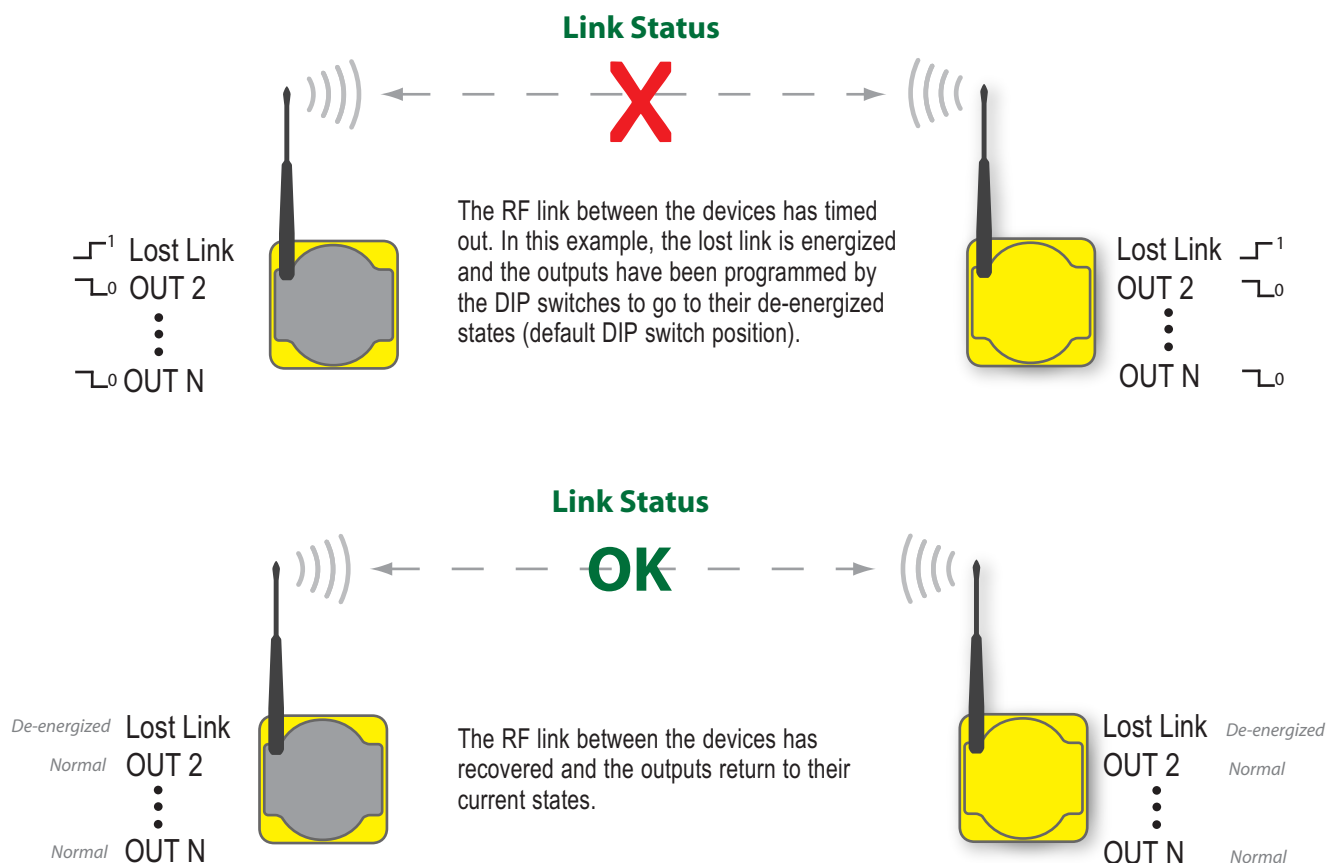
Troubleshooting

RF Link Time-Out and Recovery

The SureCross™ DX70 wireless devices employ a deterministic link time-out method to address RF link interruption or failure. As soon as a specific RF link fails, all pertinent wired outputs are brought to a predefined state until the link is recovered (default DIP switch setting). Through this process, users of Banner wireless networks can be assured that disruptions in the communications link result in predictable system behavior.

The link time-out feature uses a fully-acknowledged polling method to determine the RF link status of each device on the network. If after a specified number of sequential polling cycles a device does not acknowledge a message, the devices consider the link to be timed out. Once a link has timed out, the units must send and receive a specified number of good RF communications packets before the link is reinstated. Outputs are restored to current values when the link is recovered.

The lost link option is only available on the 4P4M2M2 models.



A wireless network can be hindered by radio interference and by obstructions in the path of the receiver and transmitter. To achieve the best radio performance possible, carefully consider the installation locations for all devices. The need for a clear path increases as the transmission distance increases.

Problem Description	Possible Solutions
Basic power-up issues	
No LEDs	<ul style="list-style-type: none"> Recheck the power connections and power requirements. DX70 devices require 10 to 30V dc.
DX70 devices will not synchronize	
Signal LED is solid red or flashing red for more than 30 seconds	<ul style="list-style-type: none"> If the devices are less than two meters apart, they may not communicate properly (radios may saturate). The devices may be too far apart to achieve sync – consult factory for options.

Accessories and Replacement Parts - 900 MHz and 2.4 GHz

	Model Number	Description
Antennas	BWA-9Y6-A	Antenna, Yagi, 890-960 MHz, 6.5 dBd, N Female
	BWA-9Y10-A	Antenna, Yagi, 890-960 MHz, 10 dBd, N Female
	BWA-9O2-C	Antenna, Omni, 902-928 MHz, 2 dBi, Rubber Swivel, RSMA Male
	BWA-9O6-A	Antenna, Omni, 902-928 MHz, 6 dBd, Fiberglass, N Female
	BWA-9O5-B	Antenna, Omni, 902-928 MHz, 5 dBd/7.2 dBi, With ground plane, N Female
	BWA-2O2-C	Antenna, Omni, 2.4 GHz, 2 dBi, Rubber Swivel, RSMA Male
	BWA-2O5-C	Antenna, Omni, 2.4 GHz, 5 dBi, Rubber Swivel, RSMA Male
	BWA-2O7-C	Antenna, Omni, 2.4 GHz, 7 dBi, Rubber Swivel, RSMA Male
	For more information on antenna specifications and the options available for your system, please contact the applications engineers at Banner Engineering Corp. For general information regarding antennas, please refer to <i>Antenna Basics</i> , Banner document p/n 132113.	
Hardware	BWA-HW-001	Mounting Hardware
	SMBDX80DIN	DIN Rail Adapter
	BWA-HW-003	Tape, PTFE Sealant
	BWA-HW-004	Replacement Seal Pack (O-Ring, Gasket, Rotary Cover)
	BWA-CG.5-10	Cable Glands, 1/2-inch NPT, Cordgrips for cable diameters 0.17 to 0.45 inches, 10 pieces
	BWA-HP.5-10	Dummy Hole Plugs, 1/2-inch NPT, 10 pieces
	BWA-QD5.5	Prewired 5-pin Euro Connector for 1/2-inch NPT Hub entrance
	BWA-QD8.5	Prewired 8-pin Euro Connector for 1/2-inch NPT Hub entrance
	BWA-QD12.5	Prewired 12-pin Euro Connector for 1/2-inch NPT Hub entrance
Power	SPS101Q	DC Power Supply, 120 mA, 12-30V dc, 5-pin Euro
	SPS101QP	DC Power Supply, 120 mA, 12-30V dc, 5-pin Euro, pigtail
	PS24W	DC Power Supply, 500 mA, 24V dc
	EZAC-E-QE5	DC Power Supply, 700 mA, 24V dc, 5-pin M12 Euro QD, Hardwired AC Power Conn.
	EZAC-E-QE5-QS5	DC Power Supply, 700 mA, 24V dc, 5-pin M12 Euro QD, 5-pin Mini QD AC Power Conn.
Surge Suppressors	BWC-LFNMN	Surge Suppressor, 900 MHz/2.4 GHz
	BWC-LFNBMN	Surge Suppressor, Bulkhead, 900 MHz/2.4 GHz
	BWC-LMRSFRPB	Surge Suppressor, Bulkhead, (RPSM Type), 900 MHz/2.4 GHz
Cabling	BWA-RIBBON-001	Ribbon Cable, 20-pin DBL socket
	MQDC1-506	Cordset, Quick Disconnect, 5-pin Euro, Straight, 2 m
	MQDC-806	Cordset, Quick Disconnect, 8-pin Euro with Shield, Straight, 2 m
	MQDC-1210	Cordset, Quick Disconnect, 12-pin Euro, Straight, 3 m
Cabling, Antenna	BWC-1MRSMN05	LMR200, RSMA to N Male, 0.5 m
	BWC-1MRSMN2	LMR200, RSMA to N Male, 2 m
	BWC-1MRSFRSB4	RG58, RSMA to RSMAF Bulkhead, 4 m
	BWC-1MRSFRSB1	RG58, RSMA to RSMAF Bulkhead, 1 m
	BWC-1MRSFRSB2	RG58, RSMA to RSMAF Bulkhead, 2 m
	BWC-1MRSFRSB0.2	RG58, RSMA to RSMAF Bulkhead, 0.2 m
	BWC-4MNFN3	LMR400, N Male to N Female, 3 m
	BWC-4MNFN6	LMR400, N Male to N Female, 6 m

SureCross™ DX70 Wireless System

	Model Number	Description
	BWC-4MNFN15	LMR400, N Male to N Female, 15 m
	BWC-4MNFN30	LMR400, N Male to N Female, 30 m
	There is a wide range of antenna cabling available. Please contact Banner Engineering for more information or for specific lengths and connectors.	

Always install and properly ground a qualified surge suppressor when installing a remote antenna system. Remote antenna configurations installed without surge suppressors located less than 1 meter from the radio device invalidate the Banner Engineering Corp. warranty. Always 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.

Agency Certifications - 900 MHz

The SureCross family of radio devices are approved for use in the following countries.

North America

Canada

This Class A digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouiller du Canada. Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Classe A prescrites dans le Règlement sur le brouillage radioélectrique édictés par le ministère des Communications du Canada.

United States of America

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.

It is Banner Engineering's 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 that the device is approved in the destination country. Consult with Banner Engineering if the destination country is not on this list.

FCC Certification - 900 MHz

FCC Certification

The DX80 Module complies with Part 15 of the FCC rules and regulations.

FCC ID: TGUDX80 This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Notices

IMPORTANT: The DX80 Modules have been certified by the FCC for use with other products without any further certification (as per FCC section 2.1091). Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

IMPORTANT: The DX80 Modules have been certified for fixed base station and mobile applications. If modules will be used for portable applications, the device must undergo SAR testing.

IMPORTANT: If integrated into another product, the FCC ID label must be visible through a window on the final device or it must be visible when an access panel, door, or cover is easily removed. If not, a second label must be placed on the outside of the final device that contains the following text: **Contains FCC ID: TGUDX80.**

Note

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna,
- Increase the separation between the equipment and receiving module,
- Connect the equipment into an outlet on a circuit different from that to which the receiving module is connected, and/or
- Consult the dealer or an experienced radio/TV technician for help.

Antenna Warning **WARNING:** This device has been tested with Reverse Polarity SMA connectors with the antennas listed in Table 1 Appendix A. When integrated into OEM products, fixed antennas require installation preventing end-users from replacing them with non-approved antennas. Antennas not listed in the tables must be tested to comply with FCC Section 15.203 (unique antenna connectors) and Section 15.247 (emissions).

FCC-Approved Antennas

WARNING: This equipment is approved only for mobile and base station transmitting devices. Antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter.

DX80 Module may be used only with Approved Antennas that have been tested with this module.

Part Number	Antenna Type	Maximum Gain
—	Integral antenna	Unity gain
BWA-901-x	Omni, 1/4 wave dipole	≤2 dBi
BWA-902-C	Omni, 1/2 wave dipole, Swivel	≤2 dBi
BWA-906-A	Omni Wideband, Fiberglass Radome	≤8.2 dBi
BWA-905-B	Omni Base Whip	≤7.2 dBi
BWA-9Y10-A	Yagi	≤10 dBi

Table 1. Type certified Antenna

SureCross™ DX70 Wireless System

Agency Certifications - 2.4 GHz

The SureCross family of radio devices are approved for use in the following countries.

Europe

European Union

The 2.4 GHz radios are approved for operation in all European Union countries. Any special usage instructions are listed.

Austria

Belgium

Bulgaria - Authorization required for outdoor and public service use.

Cyprus

Czech Republic

Denmark

Estonia

Finland

France - In Guyane (French Guiana) and La Réunion (Reunion Island), outdoor use not allowed.

Germany

Greece

Hungary

Ireland

Italy - If used outside of own premises, general authorization is required.

Latvia

Lithuania

Luxembourg - General authorization is required for public service.

Malta

Netherlands

Poland

Portugal

Romania

Slovakia

Slovenia

Spain

Sweden

United Kingdom

Non-European Union Countries

Iceland

Liechtenstein

Norway

Switzerland

Asia

India

It is Banner Engineering's 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 that the device is approved in the destination country. Consult with Banner Engineering if the destination country is not on this list.

FCC Certification - 2.4 GHz

FCC Certification

The DX80 Module complies with Part 15 of the FCC rules and regulations.

FCC ID: UE300DX80-2400 This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Notices

IMPORTANT: The DX80 Modules have been certified by the FCC for use with other products without any further certification (as per FCC section 2.1091). Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

IMPORTANT: The DX80 Modules have been certified for fixed base station and mobile applications. If modules will be used for portable applications, the device must undergo SAR testing.

IMPORTANT: If integrated into another product, the FCC ID label must be visible through a window on the final device or it must be visible when an access panel, door, or cover is easily removed. If not, a second label must be placed on the outside of the final device that contains the following text: **Contains FCC ID: UE300DX80-2400.**

Note

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna,
- Increase the separation between the equipment and receiving module,
- Connect the equipment into an outlet on a circuit different from that to which the receiving module is connected, and/or
- Consult the dealer or an experienced radio/TV technician for help.

Antenna Warning WARNING: This device has been tested with Reverse Polarity SMA connectors with the antennas listed in Table 1 Appendix A. When integrated into OEM products, fixed antennas require installation preventing end-users from replacing them with non-approved antennas. Antennas not listed in the tables must be tested to comply with FCC Section 15.203 (unique antenna connectors) and Section 15.247 (emissions).

FCC-Approved Antennas

WARNING: This equipment is approved only for mobile and base station transmitting devices. Antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter.

DX80 Module may be used only with Approved Antennas that have been tested with this module.

Part Number	Antenna Type	Maximum Gain
—	Integral antenna	Unity gain
BWA-202-C	Omni, 1/2 wave dipole, Swivel	≤2 dBi
BWA-205-C	Omni, Collinear, Swivel	≤5 dBi
BWA-207-C	Omni, Coaxial Sleeve, Swivel	≤7 dBi

Table 1. Type certified Antenna

SureCross™ DX70 Wireless System

Specifications

General

Power*	+10 to 30V dc (For European applications: +10 to 24V dc ±10%)
Power Consumption	Less than 1.4 W (60 mA) at 24V dc
Mounting	#10 or M5 (M5 hardware included)
M5 fasteners – Max. Tightening Torque	0.56 N•m (5 in•lbf)
Case Material	Polycarbonate
Weight	0.26 kg (0.57 lb)
Indicators	Green/Red Power LED, Yellow/Red Signal LED
External Cable Glands	Two 1/2-inch NPT type
Cable Glands, Max Tightening Torque	0.56 N•m (5 in•lbf)

* For European applications, power the DX70 from a Limited Power Source as defined in EN 60950-1.

Radio

	900 MHz	2.4 GHz
Range, with standard 2 dB antenna*	Up to 4.8 kilometers (3 miles)	Up to 3.2 kilometers (2 miles)
Frequency	902 to 928 MHz ISM band	2.4 to 2.4835 GHz ISM band
Transmit Power	21 dBm Conducted	18 dBm Conducted, ≤ 20 dBm EIRP
Spread Spectrum Technology	FHSS (Frequency Hopping Spread Spectrum)	FHSS (Frequency Hopping Spread Spectrum)
Antenna Connector	Ext. Reverse Polarity SMA – 50 Ohms	Ext. Reverse Polarity SMA – 50 Ohms
Antenna – Max Tightening Torque	0.45 N•m (4 in•lbf)	0.45 N•m (4 in•lbf)
Link Timeout	1 or 4 seconds	1 or 4 seconds

* Range depends on the environment and line of sight. High-gain antennas are available to increase the range.

Inputs

Discrete Inputs (Configurable)	Four or Eight Sourcing (or Sinking) (depends on kit)
Discrete Input Rating	3 mA max current at 30V dc
Discrete Input Sample Rate	62.5 milliseconds
Discrete Report Rate	On Change of State
Discrete Input ON Condition	Greater than 8V (Less than 0.7V for sinking)
Discrete Input OFF Condition	Less than 5V (Greater than 2V or Open for sinking)
Analog Inputs	Two, 0 to 20 mA
Analog Input Sample Rate	62.5 milliseconds
Analog Report Rate	1 second or on Change of State (1% change in value)
Accuracy	0.1% of full scale + 0.01% per °C

Specifications, continued

Outputs

Discrete Outputs	Four or Eight Sourcing (depends on kit)
Discrete Output Rating	100 mA max current at 30V dc, ON-State Saturation: Less than 2V at 100 mA, OFF-State Leakage: Less than 10 µA
Discrete Output ON Condition	Supply minus 2V
Discrete Output OFF Condition	Less than 2V
Analog Outputs	Two, 0 to 20 mA
Max. End-to-end Latency*	200 milliseconds
Output State Following Timeout	Programmed by DIP switch



* From the sample point and with a good RF signal.

Environmental

Environmental Rating	IEC IP67; NEMA 6
Operating Temperature	-40 to +85° C (Electronics)
Operating Humidity	95% max. relative (non-condensing)
Radiated Immunity	10 V/m, 80-2700 MHz (EN61000-6-2)
Shock and Vibration*	IEC 68-2-6 and IEC 68-2-7 Shock: 30g, 11 millisecond half sine wave, 18 shocks Vibration: 0.5 mm p-p, 10-60 Hz

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

Compliance

900 MHz Models	FCC ID TGUDX80 - This device complies with FCC Part 15, Subpart C, 15.247 IC: 7044A-DX8009 
2.4 GHz Models	FCC ID UE300DX80-2400 - This device complies with FCC Part 15, Subpart C, 15.247 ETSI/EN: In accordance with EN 300 328: V1.7.1 (2006-05) IC: 7044A-DX8024 

SureCross™ DX70 Wireless System

The manufacturer does not take responsibility for the violation of any warning listed in this document.



**CAUTION . . .
Make no modifications
to this product.**

Any modifications to this product not expressly approved by Banner Engineering could void the user's authority to operate the product. Contact the Factory for more information.

Always use lightning arrestors/surge protection with all remote antenna systems to avoid invalidating the Banner Engineering Corp. warranty. No surge protector can absorb all lightning strikes. Do not touch the radio device or any equipment connected to the radio device during a thunderstorm.

WARRANTY: Banner Engineering Corp. warrants its products to be free from defects for one year. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture found to be defective at the time it is returned to the factory during the warranty period. This warranty does not cover damage or liability for the improper application of Banner products. This warranty is in lieu of any other warranty either expressed or implied.

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