



Introducing the SureCross™ DX80 Wireless System

The SureCross™ DX80 wireless system provides reliable monitoring without the burden of wiring or conduit installation, and can operate independently or in conjunction with a PLC and/or PC software.

The SureCross DX80 network is a deterministic system—the network identifies when the radio signal is lost and drives relevant outputs to user-defined conditions. Once the radio signal is reacquired, the network returns to normal operation.

Each wireless system consists of one Gateway and one or more Nodes that ship with factory predefined inputs and outputs. Devices may be all discrete I/O, mixed discrete and analog I/O, and *FlexPower™*.

A Gateway device acts as the master device within each radio network system. The Gateway initiates communication and reporting with the Nodes.

A radio network contains only one Gateway, but can contain many Nodes. Each Node device can be connected to a sensor or output device and reports I/O status to the Gateway.

A Gateway and Node can be arranged to extend the range of the network or to avoid obstacles in the transmission path. The Gateway receives a transmission from one Node and forwards it to another Node positioned to avoid the obstacle.

Host-connected systems can contain up to 15 nodes within a single network and may be all discrete or a mix of discrete and analog I/O. Host-connected systems allow for logic and calculations to be applied to the I/O. Inputs from Nodes within the network are transmitted to the Gateway, which communicates the information to a host device for processing. While the Gateway is the master device within the radio network, the Gateway is a slave to the Modbus network.

FlexPower devices allow for a true wireless solution as the Node can be powered by line power (10 to 30V dc) or battery power (3.6 to 5.5V dc). A SureCross DX81 battery pack and unique power management system runs the Node and a device for up to five years, depending upon the power requirements of the device. Battery life is application specific. Contact Banner Engineering's application engineers for a battery life calculation for your specific application.

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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.

DX80 Gateway and Node Front Panel Interface



Rotary Switches: Used to set Network ID & Device Address

1 Rotary Switch 1 (left)

Sets the Network ID (NID) to a hexadecimal value from 0 to F, for a total of 16 Network IDs. A Gateway and its corresponding Nodes must be assigned the same Network ID.

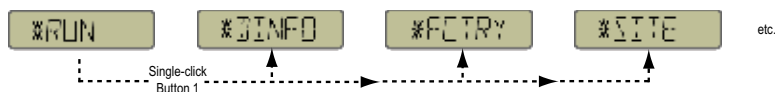
2 Rotary Switch 2 (right)

On Gateway: Sets the Gateway's LCD viewing device address. The Gateway is predefined as Device Address 0.
On Node: Sets the Node's Device Address (hexadecimal 1 to F). Each Node within a network must have a unique Node Device Address.

Push Buttons: Used to navigate the Gateway and Node menus and program device configurations

3 Push Button 1

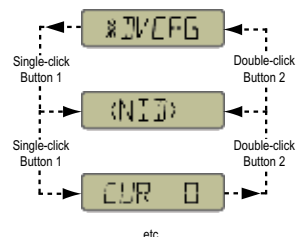
Single-click to advance across all top-level DX80 menus.



Single-click to move down interactive menus, once a top-level menu is chosen.

4 Push Button 2

Double-click to select a menu and to enter manual scrolling mode.
Double-click to move up one level at a time.



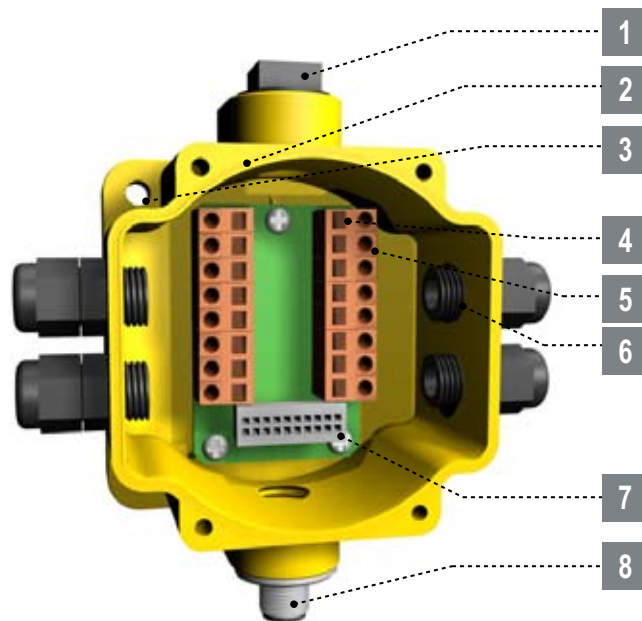
5 6 LED 1 and 2

Provide real-time feedback to the user regarding RF link status, serial communications activity, and the error state.

7 LCD Display

Six-character display provides run mode user information and shows enabled I/O point status. This display allows the user to conduct a Site Survey (RSSI) and modify other DX80 configuration parameters without the use of a PC or other external software interfaces. On the Node, after 15 minutes of inactivity, the LCD goes blank. Press any button to refresh the display.

DX80 Gateway and Node Wiring Chamber



1 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.

2 Housing
The rugged, industrial DX80 housing meets IEC IP67 standards.

3 Mounting Hole, #10/M5 Clearance
Mounting Holes accept metric M5 or UNC/UNF #10 hardware -- DIN rail mount adapter bracket available

4 Wiring Terminal Strip

5 Wiring Terminal
The 16 spring-clip type wiring terminals accept wire sizes: AWG 12-28 or 2.5 mm²

6 Port, PG-7 Gland or Blank
The PG-7 threaded ports can accept provided cable glands or blanks.

7 Ribbon Connector
Ribbon cable connects wiring base to LCD/radio.

8 5-Pin M12 Euro-style quick-disconnect fitting

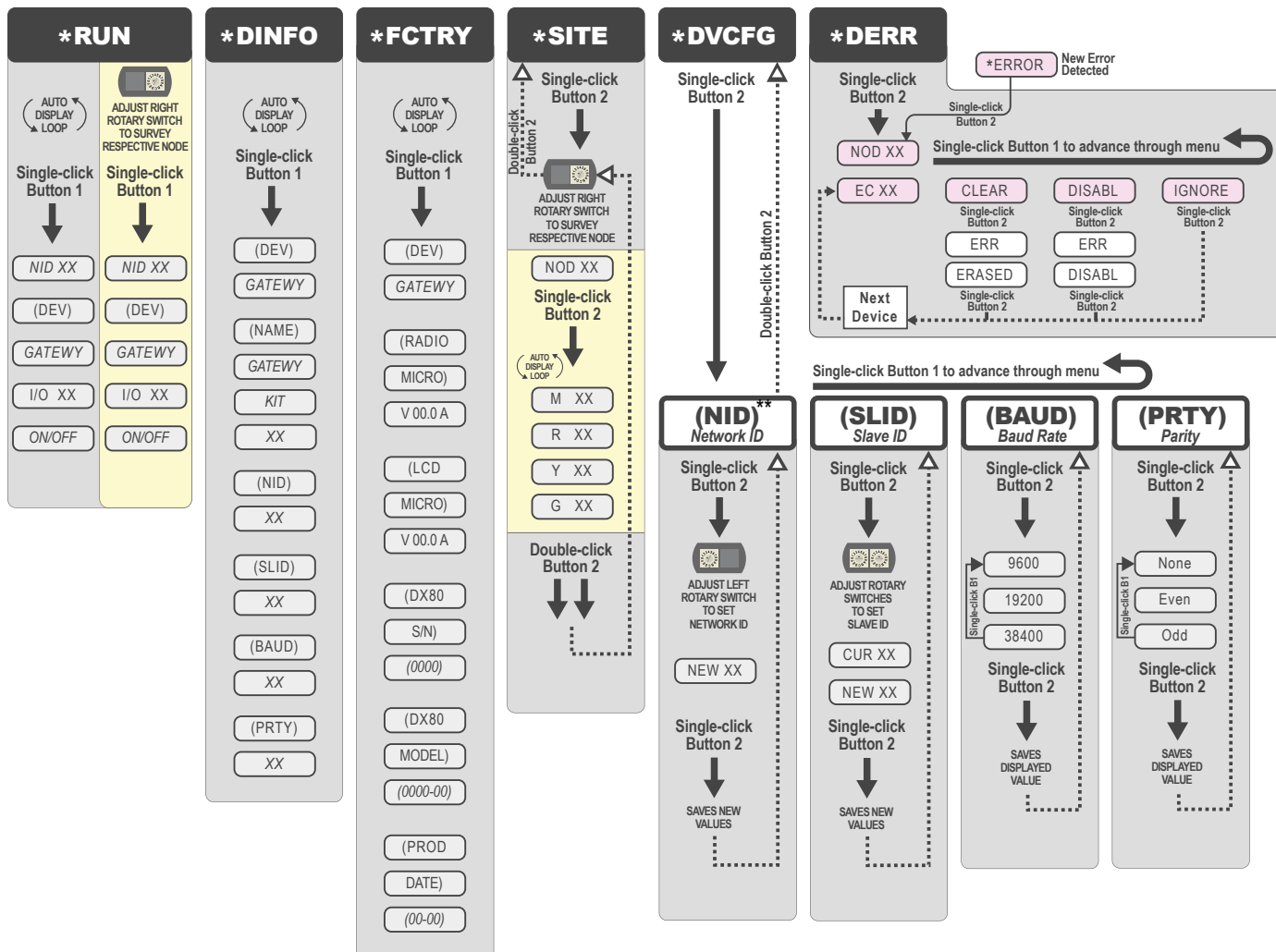
SureCross™ DX80 Quick Start Guide

SureCross™ DX80 Gateway Setup Menu

When power is applied, the DX80 immediately begins running. The display screen autoscrolls through the *RUN menu and communication begins between the Gateway and Node(s). Autoscrolling through the *RUN menu is the normal operating mode for all devices on the wireless network.

From the *RUN Menu (or any menu), single-click button 1 to advance through the top-level menus.

To return to the top level menus and autoscrolling mode, double-click button 2 twice.*** To enter manual scrolling mode, double-click button 2 at the top level menu. The device autoscrolls through the *RUN, *DINFO, and *FCTRY menus if paused on those menu headings. If the device is paused on the *SITE, *DVCFG, or *DERR menu options, the display does not autoscroll.



** The Network ID (NID) can be set at any time from the left rotary switches. Once changed, allow five seconds for the devices to update to the new NID.

*** At any point in the menu system, double-clicking Button 2 twice returns to the top level menu.

Navigating the menu:

* indicates a top level menu option

() indicates a sub-menu item

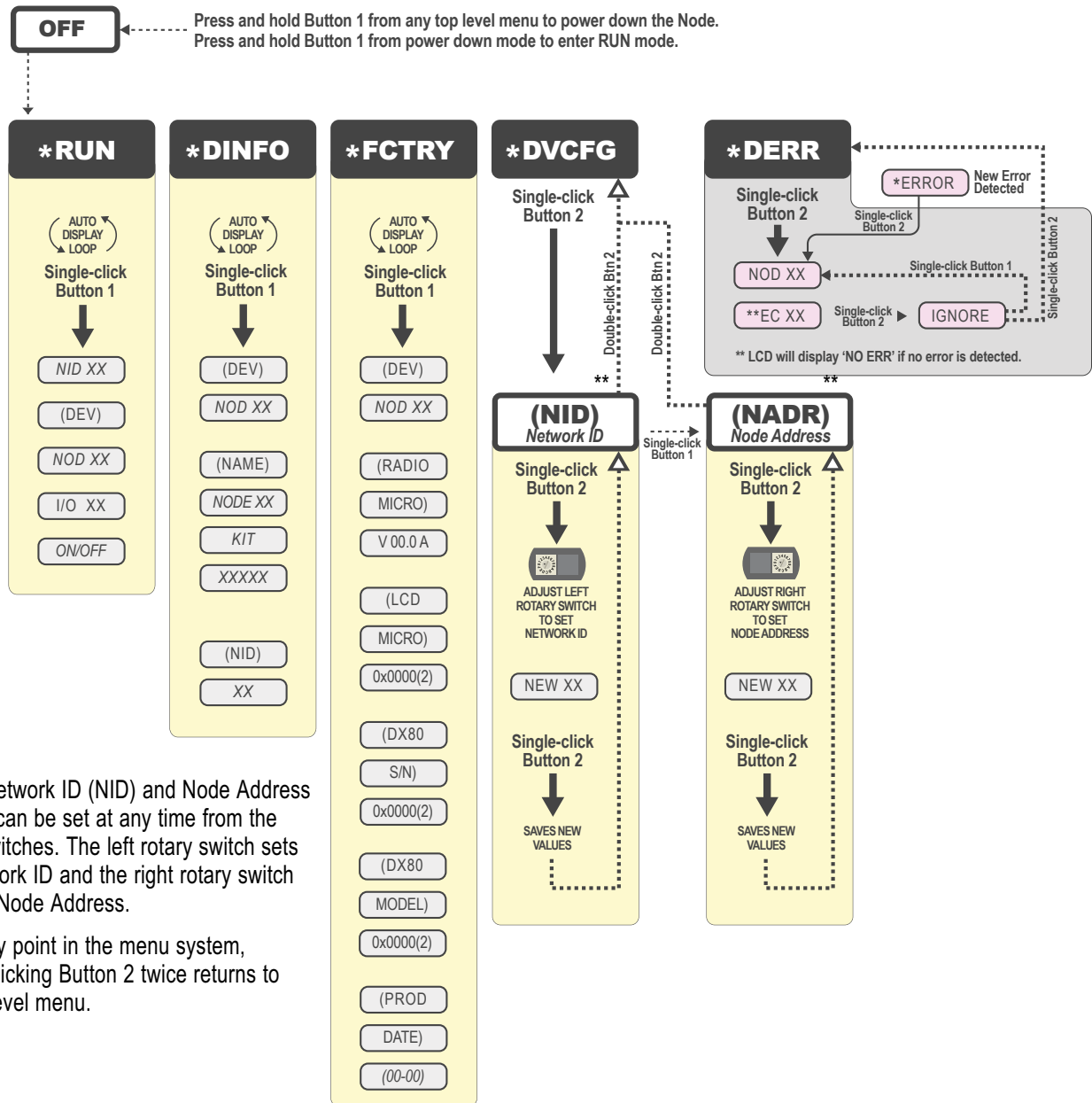
No characters indicate the value of the previous item

SureCross™ DX80 Node Setup Menu

When power is applied, the DX80 immediately enters *RUN mode. *RUN mode is the normal operating mode for all devices on the wireless network.

From the *RUN Menu (or any menu), single-click button 1 to advance through the top-level menus.

To return to the top level menus and autoscrolling mode, double-click button 2 twice.*** To enter manual scrolling mode, double-click button 2 at the top level menu. The device autoscrolls through the *RUN, *DINFO, and *FCTRY menus if paused on those menu headings. If the device is paused on the *DVCFG or *DERR menu options, the display does not autoscroll.



** The Network ID (NID) and Node Address (NADR) can be set at any time from the rotary switches. The left rotary switch sets the Network ID and the right rotary switch sets the Node Address.

*** At any point in the menu system, double-clicking Button 2 twice returns to the top level menu.

Navigating the menu:

* indicates a top level menu option

() indicates a sub-menu item

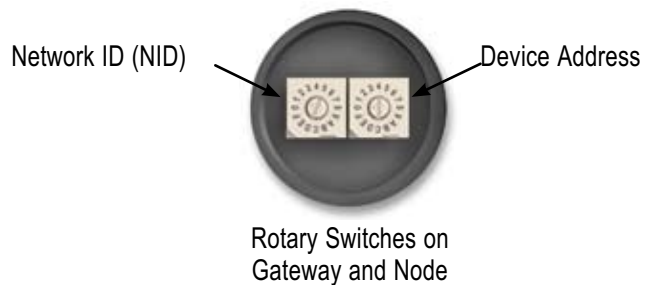
No characters indicate the value of the previous item

Node LCD Timeout: After 15 minutes of inactivity, the LCD screen stops displaying information. Press any button to refresh the display if the Node has entered this energy-saving mode.

Quick Start: **STEP 1** > Set Network ID & Device/Node Address

The wireless RF network is defined by the Network ID (NID) assigned to the Gateway and its Nodes. Each device within this common network must have a unique Device Address assigned.

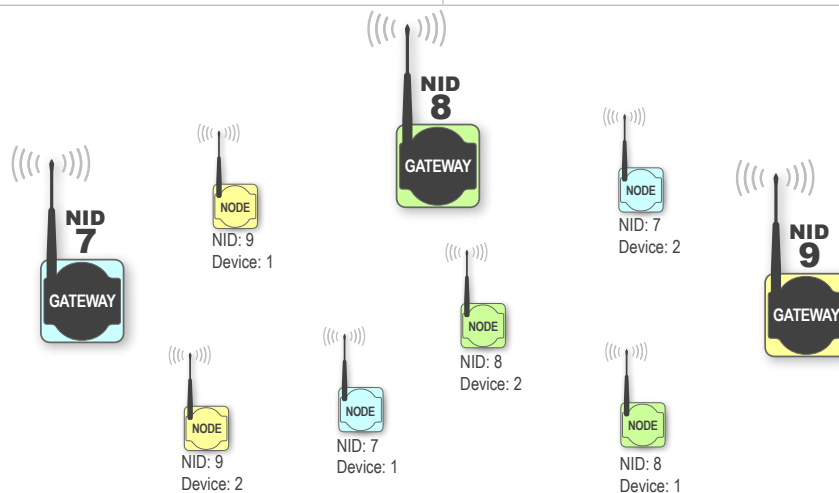
For factory configured kits, the Network ID and Device Addresses have been assigned. Otherwise, use the Rotary Switches (shown right) to define both the NID and Device Address for each device. Follow the steps below to set up your DX80 network.



	User Action	Display/Status	Notes
SET NETWORK ID	Remove rotary switch access covers.		Turn counterclockwise to remove and clockwise to tighten
	On the Gateway, set the Left Rotary Switch to 1.		The factory default NID setting on all devices is 1. Set to another Network ID when operating more than one network in the same area.
	On all Nodes (within the same network), set the Left Rotary Switch to 1.		Assign the same NID to all devices within a single network (hexadecimal 0-F).
SET DEVICE ADDRESS	On the Gateway, set the Right Rotary Switch to 0.		A Device Address of 0 on the Gateway will display settings for the Gateway itself. To view settings for another device on the network, adjust the Right Rotary Switch on the Gateway to the respective Device Address.
	On the first Node (Device Address = 1), set the Right Rotary Switch to 1.		Do not change the Device ID for preconfigured kits as this would affect the factory mapping of the I/O.
	On the second Node (Device Address = 2), set the Right Rotary Switch to 2.		
	Continue setting the Device Address for each additional Node using a unique number (.3,4,5).		
	Install rotary switch access covers. Please refer to the installation section for IP67 instructions.		A successful RF link is identified by a blinking green LED 1 on each node.

Multiple Networks

When more than one network is operating in the same space, assign a unique Network ID (NID) to each network (shown right).



Quick Start: **STEP 2** > Apply Power, Gateway

To apply power to the **Gateway**, connect the 10-30V dc cable as shown.



Gateway Pinout Diagram



Brown	1	10-30V dc Input
Blue	3	dc common

On the Gateway, the other pins are used for RS485 communications

User Action	Display/Status	Notes
Apply power...		This reading occurs only when power is applied to the Gateway.
The LCD display shows the current I/O status of the Gateway.		The Gateway starts in *RUN mode.
		Displays current Network ID (NID)
		Device is ...
		... Gateway (Device Address = 0)
		Indicates the current status of the I/O. The display cycles through each I/O point of the device, then returns to *RUN.

Quick Start: **STEP 3** > Apply Power, Node

To apply power to the **Node**, connect the 10-30V dc cable or DX81 Battery Module as shown.



Line Powered Node Pinout Diagram



Brown	1	10-30V dc Input
Blue	3	dc common

Note: Terminal block GND = dc common

User Action	Display/Status	Notes
Apply power...		This reading occurs only when power is applied to the Node.
The LCD display shows the current I/O status of the Node.		The Node starts in *RUN mode.
		Displays current Network ID (NID)
		Device is ...
		... Node 1 (Node Address = 1)
		Indicates the current status of the I/O. The display cycles through each I/O point of the device, then returns to *RUN.

Quick Start: **STEP 4** > Verify Communications, Gateway

Verify LED 1 is on and green.

Status	LED 1	LED 2
Power ON	● Green ON	—
System Error	☠ Red Flash	☠ Red Flash
Modbus Communication Active	—	☀ Yellow Flash
Modbus Communication Error	—	☠ Red Flash



> Verify Communications, Node

Verify LED 1 is flashing Green and LED 2 is off. Until communication is established with the Gateway, the Node's LED 2 flashes Red. When communication is established, the Node's LED 1 flashes Green.


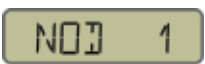



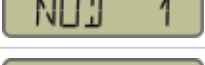
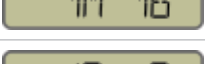
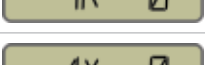
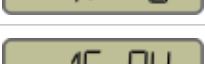
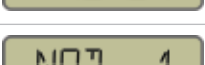
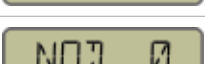





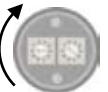
Status	LED 1	LED 2
System Error	☠ Red Flash	☠ Red Flash (1 per sec)
RF Link Ok	☀ Green Flash (1 per sec)	—
RF Link Error	—	☠ Red Flash (1 per 3 sec)



If testing the Gateway and Node before installation, verify the Gateway and Node are at least two meters apart or the communications may fail.

Quick Start: **STEP 5** > Site Survey (optional)

A site survey analyzes the radio signal between a Gateway and a specified Node and reports the number of data packets missed or received. Perform the Site Survey before permanently installing your network to ensure reliable communication. Use the Gateway to perform a site survey analysis.

	User Action	Display/Status	Notes
SITE SURVEY MENU	Remove Gateway rotary switch access cover.		
	To check the status of Node 1, change the Gateway's right rotary switch setting to 1		The Gateway is now enabled to read the status of Node 1; the display scrolls through the Node's I/O status.
	Single-click Gateway push button 1		Device Information menu
	Single-click Gateway push button 1		Factory Settings menu
	Single-click Gateway push button 1		Site Survey menu
	Single-click Gateway push button 2		Site Survey will be conducted with Node 1
SURVEY READINGS	Single-click Gateway push button 2		The Gateway analyzes the quality of the signal from the selected Node by counting the number of data packets it receives from the Node. M = Percentage of missed packets R = RED marginal signal Y = YELLOW good signal G = GREEN excellent signal When possible, install all devices in positions that optimize the percentage of YELLOW and GREEN data packets received.
	Examine reception readings (M,R,Y,G) of the Gateway at various locations. Note that the numbers displayed are a percentage. M displays the percent of missed packets while R, Y, and G display the percent of received packets.		
			
			
	Double-click Gateway push button 2		End Site Survey
RETURN TO RUN MODE	Change right rotary switch back to 0 (Gateway)		Change the device readings back to the Gateway
	Double-click Gateway push button 2		Move back to the top level menu
	Single-click Gateway push button 1		Return to RUN mode
	Single-click Gateway push button 1		
	Single-click Gateway push button 1		
	Install Gateway rotary switch access cover.		Refer to the installation instructions to create an IP67 seal.

Quick Start: **STEP 6** > Installation

Avoid Direct Sunlight

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

- Mount the DX80 within a protective enclosure,
- Mount the DX80 under an overhang or other source of shade,
- Install the DX80 indoors, or
- Face the unit north when installing outside.

Avoid Collecting Rain

When possible, mount the DX80 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

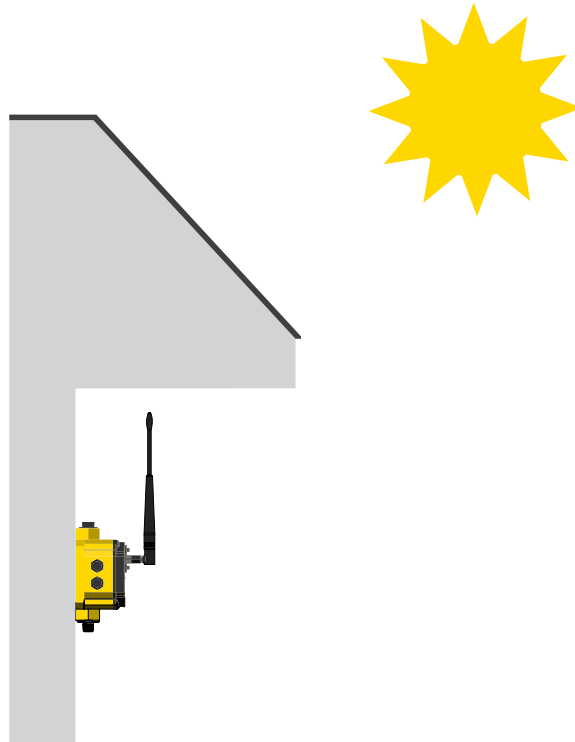
Before installing the DX80 units in a chemically harsh environment, contact Banner for more information regarding the life-expectancy. Solvents, oxidizing agents, and other chemicals will damage the DX80.

Minimize Mechanical Stress

While the DX80 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 DX80 to external loads. Do not step on the DX80 or use it as a handgrip.
- Do not allow long lengths of cable to hang from the DX80 glands. Cabling heavier than 100 grams should be supported instead of allowed to hang from the DX80 housing.

Ideal Mounting Conditions



Installation - Weather-Proofing Glands and Plugs

Watertight Glands and Plugs



If the DX80 is mounted outdoors or will be exposed to moisture, dirt, or dust, follow these steps to weatherproof the units.

Watertight Glands

To make the glands watertight:

1. Wrap four to eight passes of polytetrafluoroethylene (PTFE) tape around the threads as close as possible to the hexagonal body of the gland.
2. Manually thread the gland into the housing hole. Never apply more than 10 in-lbf of torque to the gland or its cable clamp nut.

Note, these instructions apply both to the PG-7 glands and the 1/2" NPT gland.

Rotary Switch Access Cover

Check the rotary switch access cover o-ring every 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 DX80 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 DX80 cover surface.

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.

Watertight PG-7 Plug

Seal any unused PG-7 (small) access holes with one of the supplied black plastic plugs. To install a watertight PG7 plug:

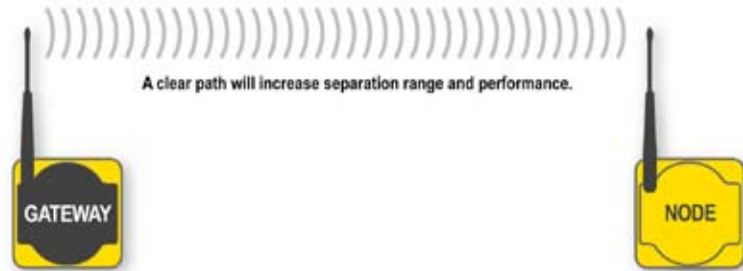
1. Wrap four to eight passes of PTFE tape around the plug's threads, as close as possible to the flanged surface.
2. Carefully thread the plastic plug into the vacant hole in the DX80 housing and tighten using a slotting screwdriver. Never apply more than 10 in-lbf torque to the plastic plug.

Quick Tips

Clear Communication Paths

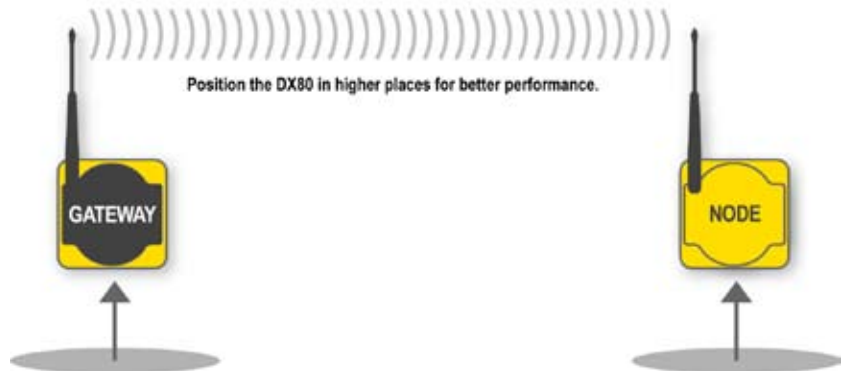
A wireless network can be hindered by radio interference and obstructions in the path between a receiver and transmitter.

To achieve the best radio performance, carefully consider the installation locations for the Gateways and Nodes.



Increase Height of DX80 Units

Orient the external antenna vertically for optimal RF communication. If necessary, consider changing the height of the DX80 position to improve reception levels.



Maintenance and Parts Installation

Main Body Gasket

Check the main body gasket every time the DX80 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 every 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 DX80 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 DX80 cover surface.

Replacing O-Rings

Please refer to the list of replacement parts on page 22 and contact Banner Engineering with any questions.

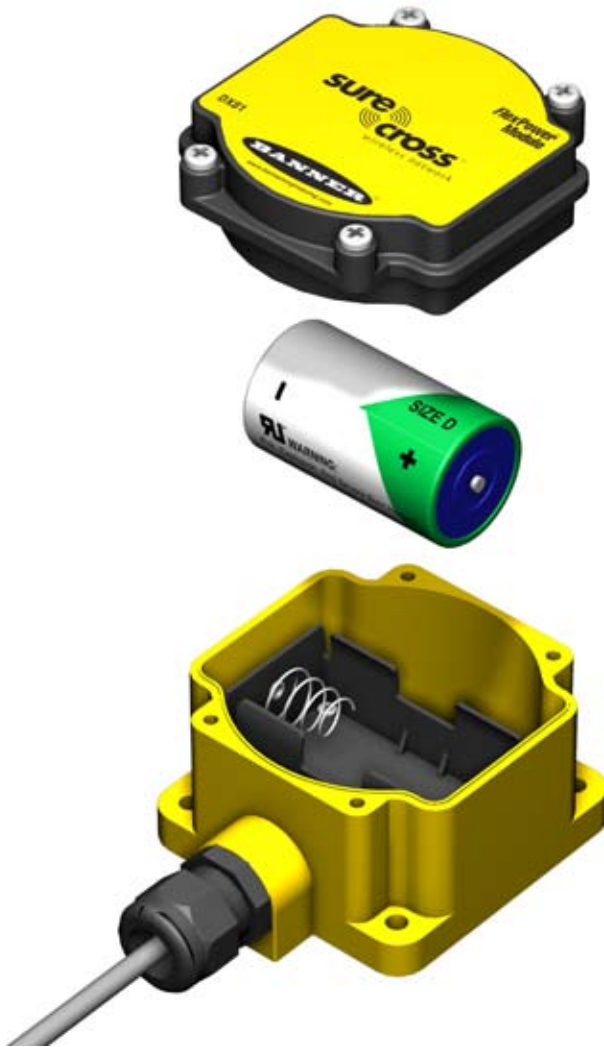
Main Body Gasket



Rotary Access O-Ring



DX80 Battery Replacement



Battery Replacement

To replace the lithium “D” cell battery in the DX81 FlexPower battery kit,

1. Remove the four screws mounting the battery pack face plate to the body.
2. Remove the face plate.
3. Remove the discharged battery and replace with a new battery. Verify the battery’s positive and negative terminals align to the positive and negative terminals of the battery holder mounted within the case.
4. After replacing the battery, allow up to 60 seconds for the device to power up.

When removing the battery, press the battery towards the negative terminal to compress the spring. Pry up on the battery’s positive end to remove from the battery holder.

Properly dispose of your used battery by taking it to a hazardous waste collection site, an e-waste disposal center, or any 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.

Host Network - Gateway

Setting up the Network and Device IDs, powering up the devices, and conducting the Site Survey for a host-connected network is the same as for the standard DX80 wireless system. All device I/O for the network is accessed using the host/master device.

To access the Modbus device, you may first need to configure system-level communication parameters on the DX80 Gateway, in addition to the serial hookups shown below. The following procedure is necessary to change the Gateway Slave ID, Baud Rate, and Parity.

Parameter	Description
Slave ID (Default = 1)	Defines the slave number (01-99) for the serial Modbus RTU protocol. When operating more than one network with a Modbus Master device, change the Slave IDs.
Baud Rate (Default = 19200)	Defines communication data rate (19.2, 38.4 or 9.6 kbps) between the Gateway and the Host through the serial interface.
Parity (Default = None)	Defines serial parity (none, even, or odd) between Gateway and Host.

Gateway (Host-Connected) Pinout Diagram



Brown	1	10-30V dc Input
White	2	RS485 / D1 / B / +
Blue	3	Ground Input
Black	4	RS485 / D0 / A / -
Gray	5	Comms Gnd

Wiring: 5-pin Euro pinouts for 485+, 485- and Comms ground

SureCross™ DX80 Quick Start Guide

Host Network - Gateway (con't)

Setting the Slave ID, Baud Rate, and Parity

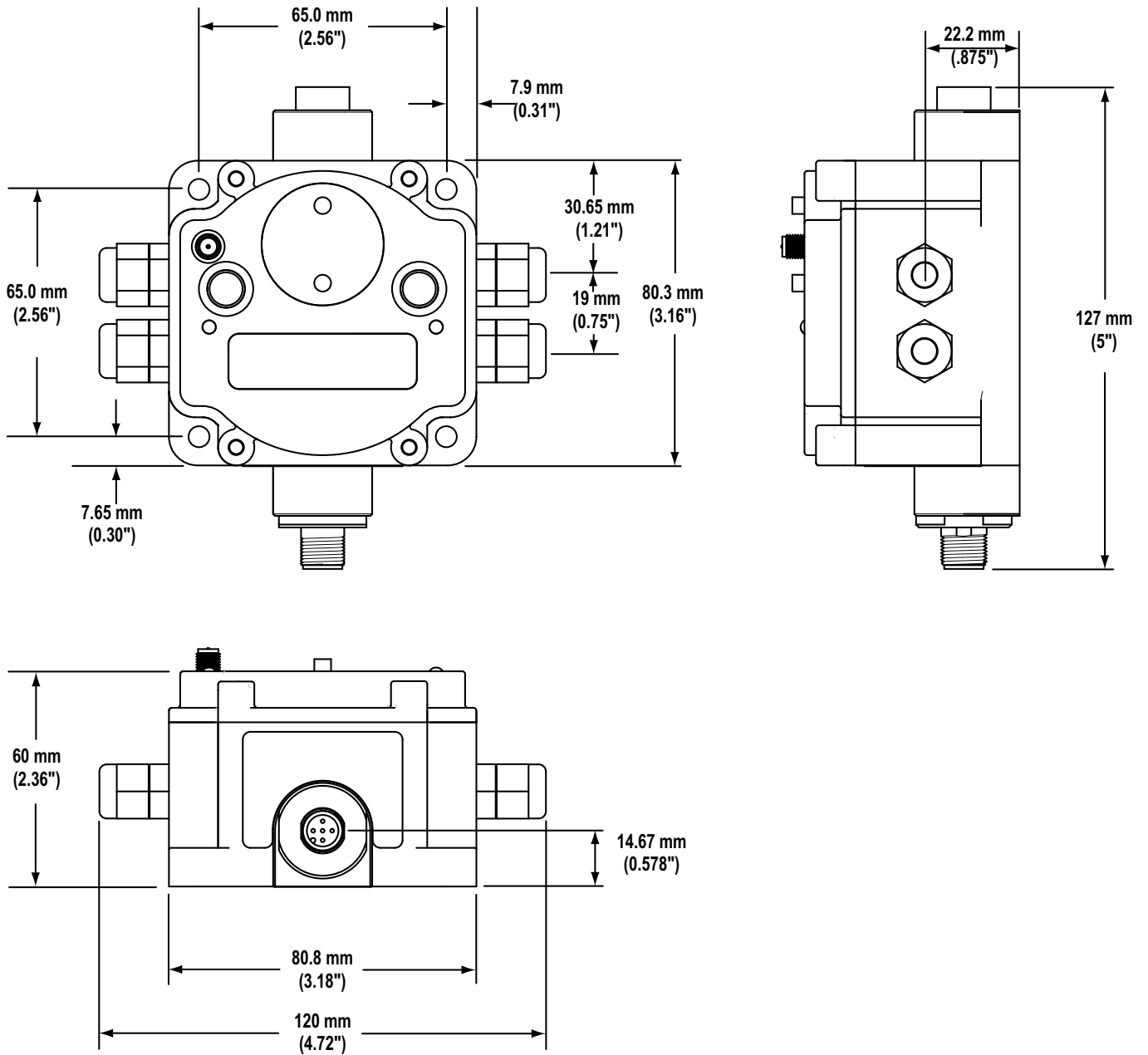
Similar to Network ID, the Slave ID, Baud Rate, and Parity parameters can be changed in the Device Configuration (*DVCFG) system menu option.

Follow the top level system menu through *DVCFG to the Slave ID (SLID) parameter. The LCD displays an alternating current value and new value for the parameter.

	User Action	Display/Status	Notes
	On the Gateway, single-click button one to move across the top level menu options to the "Device Configuration" menu		To navigate to the *DVCFG (Device Configuration) menu, see page 6.
SET SLAVE ID	Single-click Gateway push button 2		
	Single-click Gateway push button 1 to move to the Slave ID field.		Default value is 1
	Single-click Gateway push button 2		The new Slave ID is defined by the current position of the rotary switches.
	Using 0-9 on the left rotary switch and 1-9 on the right switch, set the rotary switches to the desired Slave ID		Select between 01 to 99. The factory default is set to 1. Change the Slave ID when running more than one network into the Modbus Master device.
	Single-click Gateway push button 2 to save the new Slave ID.		
SET BAUD RATE	Single-click Gateway push button 1 to move to the next menu option, the BAUD rate.		
	Single-click Gateway push button 2 to display the current setting. Single-click Gateway push button 1 to cycle through the available options. Stop on the desired setting.		The options are 9600, 19200, 38400. The factory default is 19200.
	Single-click Gateway push button 2 to save the new setting.		
SET PARITY	Single-click Gateway push button 1 to move to the next field, the PARITY field.		
	Single-click Gateway push button 2 to display the current setting. Single-click Gateway push button 1 to cycle through the available options. Stop on the desired setting.		The options are NONE, EVEN, ODD. The factory default is NONE.
	Single-click Gateway push button 2 to save the new setting.		
	Adjust the left rotary switch back to NID value.* Adjust the right rotary switch back to zero.		
	Double-click Gateway push button 2 to return to the Device Configuration (*DVCFG) menu.		
	Click Gateway push button 1 until reaching the *RUN menu option.		

* To avoid losing the network connection between the Gateway and Nodes, reset the rotary switches back to their appropriate values before leaving the *DVCFG sub-menus. If the Gateway and Nodes lose their connection, the network may take up to 20 seconds to re-synchronize.

DX80 Gateway and Node Dimensions



Troubleshooting

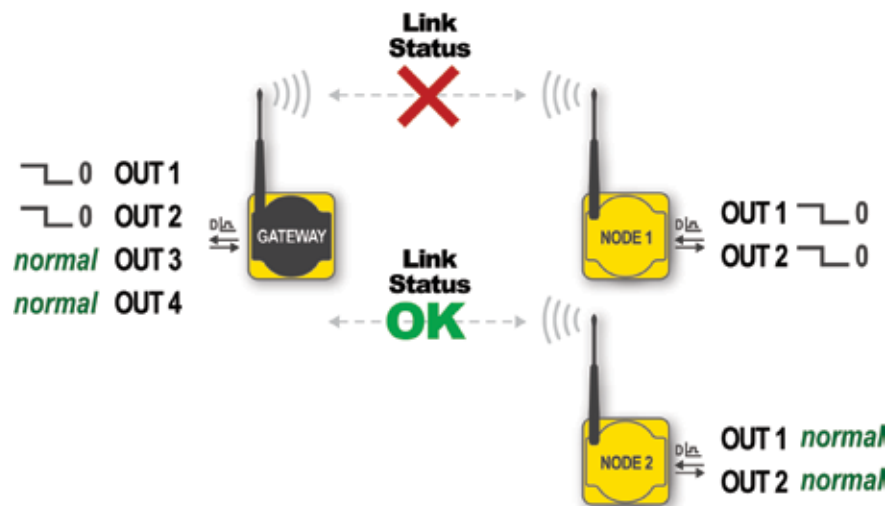
RF Link Time-Out and Recovery

The SureCross™ DX80 wireless devices employ a deterministic link time-out method to address RF link interruption or failure. As soon as a specific Node/Gateway RF link fails, all pertinent wired outputs are de-energized until the link is recovered (see component data sheet for more information.) Through this process, users of Banner wireless networks can be assured that disruptions in the communications link will result in predictable system behavior.

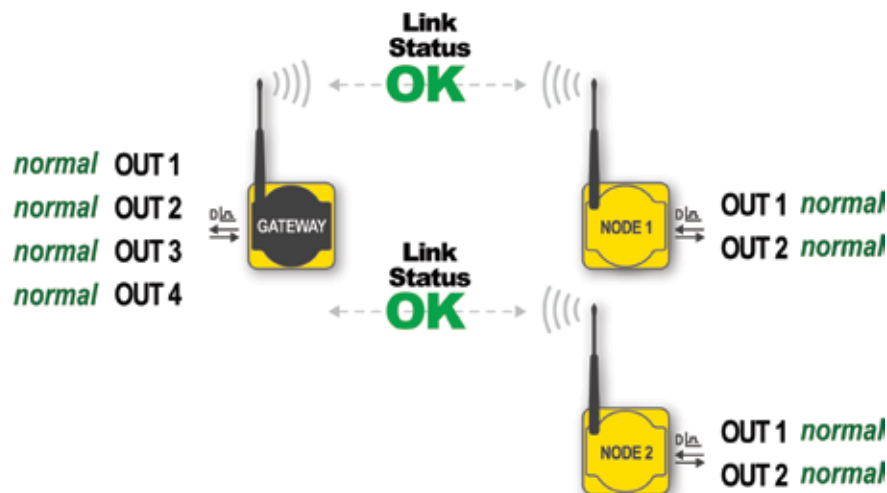
The link time-out feature uses a fully-acknowledged polling method to determine the RF link status of each Node on the network. If after a specified number of sequential polling cycles the Node does not acknowledge a message, the Gateway considers the link with the Node timed out. LCD displays on both the Node and Gateway show *ERROR. Following a time-out, the Node de-energizes outputs and the Gateway sets all outputs linked to the Node in question to a de-energized state. Inputs from the Nodes are mapped to outputs on the Gateway and are suspended during a link timeout.

Once a link has failed, the Gateway must receive a specified number of good RF communications packets from the Node in question before the link is reinstated. Outputs are restored to current values when the link is recovered.

For information regarding Host-connected systems and link time-out and recover, please refer to Banner's DX80 and Modbus Guide.



Link between Gateway and Node 1 timed out.



Link between Gateway and Node 1 recovered.

Troubleshooting (con't)

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 Gateways and Nodes. The need for a clear path increases as the transmission distance increases. Use Site Survey (RSSI) to confirm signal quality before fixing devices for permanent installation.

Problem Description	Possible Solutions
Basic power-up issues	
No LEDs, No LCD display	<ul style="list-style-type: none"> DX80 devices should immediately display 'POWER' on the LCD for the first 5-10 seconds after power is applied. For the Gateway, LED 1 will always be green when power is connected. The Node devices will flash a red LED 2 every three seconds or a green LED 1 every second depending upon the RF Link status. Battery powered devices can be put into a power-down mode using button 1 on the front panel. To put a battery device into power-down mode, hold button 1 for three to five seconds. To make a battery device come out of power-down mode, hold button 1 for three to five seconds. Recheck the power connections and power requirements. Line powered devices require 10 to 30V dc. The DX81 Battery Module provides 3.6V dc. After replacing the battery, allow up to 60 seconds for the device to power up.
DX80 devices will not synchronize	
Node flashes the red LED (no sync)	<ul style="list-style-type: none"> There are two things that MUST be set on every Node device to make it synchronize with the Gateway device: <ol style="list-style-type: none"> The Network ID on the Node must match the Gateway Network ID. (0-15) Each node within that network must have the Device ID rotary switch set to a unique number (1-15). Refer to "Getting Started – Multiple Networks, Setting Network ID" If the Gateway and Node are less than two meters apart, the devices may not communicate properly (radios may saturate). The Gateway and Node may be too far apart to achieve sync – consult factory for options. A qualified antenna should be mounted on both the Gateway and Node devices. After any system parameter changes, cycle power to cause the devices to resync with the network. If a Node device loses synchronization with the network, it is programmed to try to acquire sync for five seconds, then sleep for 15 seconds. Synchronizing may require up to 20 seconds. Recycle power on the Gateway and Node devices.
Site survey (RSSI) returns > 30 MISSED packets	
Marginal Site Survey (RSSI) results	<p>If the distance between devices is greater than about 5,000 meters (3 miles) line-of-sight *OR* objects, such as trees or man-made obstructions, interfere with the path, and the MISSED packet count exceeds 30 per 100 packets, consider the following steps:</p> <ul style="list-style-type: none"> Raise the DX80 units to a higher elevation – either by physically moving the devices or installing the antenna(s) remotely at a higher position. Use high-gain antenna(s) such as Yagi and/or Omni (see Accessories). Decrease the distance between devices.
DX80 Gateway will not talk with the host system	
No communications with the DX80 Gateway using RS485	<ul style="list-style-type: none"> Default communications parameters for the RS485 are: 1 start bit, 8 data bits, no parity, 1 stop bit and 19.2k baud. The DX80 Gateway uses Modbus RTU protocol for all communications. The supported Modbus function codes are 3, 6, and 16. Make sure the DX80 model supports RS485 serial communications. Make sure the Slave ID is set properly for the bus environment. Factory default Slave ID = 1. Factory default for the Modbus timeout is set to four seconds. RS485 termination or biasing is not supplied on the DX80 Gateway and should be provided externally to the DX80. (Termination is not required by the DX80 Gateway, proper biasing of the serial lines is required.)
RF link time-out and recovery	
DX80 Display shows *ERROR	<ul style="list-style-type: none"> The Gateway utilizes fully-acknowledged polling to ensure each Node RF link is robust. Consequently, if after a prescribed number of sequential polling cycles are not acknowledged by a Node, the Gateway considers the particular link with that Node to be timed out. All outputs on the Node in question will be set to "OFF" (discrete) or "0" (analog, regardless of type). If the Node's RF link is recovered and the Gateway can determine that enough acknowledged polling messages have been accumulated, then the link is reinstated and outputs are restored to the current values.

SureCross™ DX80 Quick Start Guide

Troubleshooting (con't)

Problem Description	Possible Solutions
I/O functionality	
Particular inputs and/or outputs are not working	<ul style="list-style-type: none"> Use manual scrolling mode within *RUN to freeze the I/O status on the LCD display for the device in question. Verify that when the input device changes state or changes value, the LCD mirrors the behavior. Also verify that the LCD on the output side mirrors the linked input's behavior. If the input device state, LCD on origination DX80, and LCD on destination DX80 all behave exactly the same, there may be a wiring issue or an interfacing problem. Consult factory.

Accessories and Replacement Parts - 900 MHz and 2.4 GHz

	Model Number	Description
Antennas		Banner offers a range of omni-directional and directional (Yagi) antennas for use with the SureCross™ DX80 wireless network. For more information on antenna specifications and the options available for your system, please contact the applications engineers at Banner Engineering Corp.
O-Rings	BWA-ORING-001	O-Ring, Rotary Access Cover, PG21
	BWA-GASKET-001	O-Ring, Body Gasket
	BWA-CLRCOVER-001	Rotary Access Cover, Clear Plastic
Hardware	BWA-HW-001	Mounting Hardware, DX80
	BWA-HW-002	Access Hardware (Plugs, Glands), DX80
	SMBDX80DIN	Bracket Assembly, DIN Rail, for DX80
	BWA-HW-003	Tape, PTFE Sealant
	BWA-HW-004	Screws, Cover Mount, #8-32 x 3/4, 18-8 SS
Power	DX81	Battery Pack Kit, DX81, with mounting hardware
	DX121	Battery Pack Kit, DX121, 6 cells
	BWA-BATT-001	Replacement Battery, 3.6V, "D" Lithium Cell
	SPS101Q	DC Power Supply, 120mA, 12-30V dc, 5-pin Euro
	SPS101QP	DC Power Supply, 120mA, 12-30V dc, 5-pin Euro, pigtail
	PS24W	DC Power Supply, 500mA, 24V dc
	EZAC-E-QE5	DC Power Supply, 700mA, 24V dc, 5-pin Euro QD
	EZAC-E-QE5-QS5	DC Power Supply, 700mA, 24V dc, 5-pin M12 Euro QD
Cabling	MQDC1-506 2M	Cord Set, 2 Meter, 5-pin, 5-conductor, MQDC1-506 2M
	MQDC1-506.5	Cord Set, 0.5 Meter, 5-pin, 5-conductor, MQDC1-506.5
	BWA-RIBBON-001	Ribbon Cable, 20 pin DBL socket
	BWC-LFNMN	Lightning Suppressor, 900 MHz, 2.4 GHz
		There is a wide range of antenna cabling available. Please contact Banner Engineering Corp for more information or for specific cable lengths and connectors.

Agency Certifications

Industry 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.

SureCross™ DX80 Quick Start Guide

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 co-located 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

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 co-located 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



**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.

All specifications published in this document are subject to change. Banner reserves the right to modify the specifications of products, prior to their order, without notice.

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.