

## 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 of or in conjunction with a PLC and/or PC software.

### The SureCross Network

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

### Gateways and Nodes

A Gateway device acts as the master device within each radio network system. The Gateway initiates communication and I/O reporting with the Nodes. A radio network contains only one Gateway, but can contain many Nodes. Each Node device can be connected to sensors or output devices and report the I/O status to the Gateway.

### Host Systems

Host-connected systems can contain up to 15 Nodes (Rotary Switch addressing) or 56 Nodes (extended addressing mode) within a single network and may be all discrete, all analog, 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 may be a slave to the Modbus network.

### FlexPower

*FlexPower* devices allow for a true wireless solution when a 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 on 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.

For installation and setup, weatherproofing, and troubleshooting information, refer to the SureCross™ DX80 Wireless I/O Network product manual, Banner p/n [132607](#). For additional information and a complete list of accessories, including FCC approved antennas, please refer to Banner Engineering's website, [www.bannerengineering.com/surecross](http://www.bannerengineering.com/surecross).



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**⚠ WARNING . . . Not To Be Used for Personnel Protection**

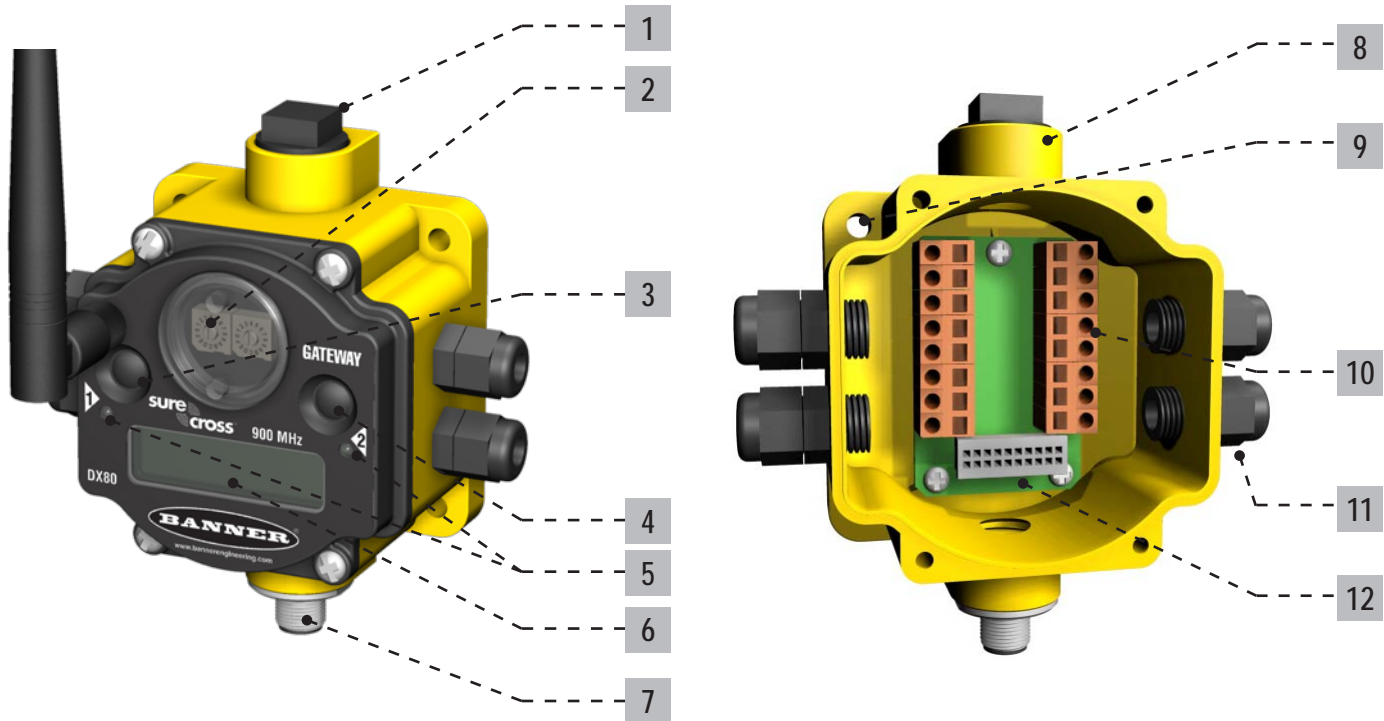
Never use these products as sensing devices for personnel protection. Doing so could lead to serious injury or death.

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



# SureCross™ DX80 Quick Start Guide

## DX80 Front Panel and Wiring Chamber



- 1** Port, NPT Gland, or Plug - If unused, install the provided plug into the 1/2 NPT threaded port. Refer to the *Installation* section of the product manual, p/n 132607, if an IP67 seal is required.
- 2** 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.  
Rotary Switch 2 (right) - Gateway: Sets the Gateway's LCD viewing device address. The Gateway is predefined as Device Address 0. Node: Sets the Node's Device Address (hexadecimal 1 to F). Each Node within a network must have a unique Node Device Address.
- 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 or to enter/exit manual scrolling mode.  
Double-click to move up one menu level at a time.
- 5** LED 1 and 2 - Provide real-time feedback to the user regarding RF link status, serial communications activity, and the error state.
- 6** 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.
- 7** 5-Pin M12 Euro-style quick-disconnect serial port
- 8** Housing - The rugged, industrial DX80 housing meets IEC IP67 standards.
- 9** Mounting Hole, #10/M5 Clearance - Mounting holes accept metric M5 or UNC/UNF #10 hardware. DIN rail mount adapter bracket available.
- 10** Wiring Terminal Strip - The 16 spring-clip type wiring terminals accept wire sizes: AWG 12-28 or 2.5 mm<sup>2</sup>
- 11** Port, PG-7 Gland or Blank - The PG-7 threaded ports can accept provided cable glands or blanks.
- 12** Ribbon Connector - Ribbon cable connects the wiring base to the LCD.

## STEP 1: Apply Power to the Gateway

1. Apply power to the **Gateway** by connecting the 10-30V dc cable as shown in the wiring diagram.  
The Gateway begins in \*RUN mode, displays the current network ID (NID), then identifies itself as a Gateway.
2. Apply power to the **Node** by connecting the 10-30V dc cable or the DX81 Battery Supply Module as shown.  
The Node starts in \*RUN mode, displays the current network ID, then identifies itself as a Node and lists the device ID. Once running, the Node begins displays its I/O points.



### 5-pin Euro-style Hookup (RS-485)

	Wire Color	Gateway, Gateway Pro, DX85*	FlexPower Gateway and Data Radio**	10-30V dc Node	FlexPower Node**
1	Brown	+10 to 30V dc Input	+10 to 30V dc Input	+10 to 30V dc Input	
2	White	RS485 / D1 / B / +	RS485 / D1 / B / +		
3	Blue	dc common (GND)	dc common (GND)	dc common (GND)	dc common (GND)
4	Black	RS485 / D0 / A / -	RS485 / D0 / A / -		
5	Gray	Comms grnd	3.6 to 5.5V dc		3.6 to 5.5V dc

\* Connecting dc power to the communication pins will cause permanent damage.

\*\* For FlexPower devices, do not apply more than 5.5V dc to the gray wire.

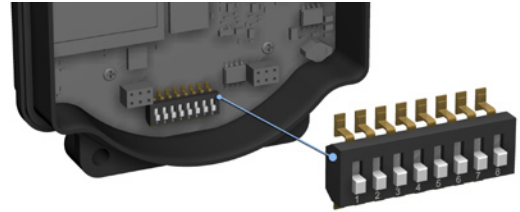
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## STEP 2: Forming Networks and Assigning Node Addresses

Extended address mode adds the ability to isolate each network by assigning a unique code, the extended address code, to all devices in a particular network. Only devices sharing the extended address code can communicate. The extended addressing mode also allows up to 56 Nodes to connect to a single Gateway. Without extended addressing, only 15 Nodes can connect to a single Gateway.

Binding DX80 devices locks Nodes to a specific Gateway by teaching the Nodes the Gateway's extended address code. After the devices are bound, the Nodes only accept data from the Gateway to which they are bound. For more information about extended addressing mode and rotary dial addressing mode, refer to the Wireless I/O Network Product manual, Banner part number [132607](#).

To select extended address mode, turn the device off. Set DIP switch 1 to the 'ON' position, then turn the device on. Do not set the DIP switch while the power is on to the device.



To automatically bind the Gateway and its Node(s), follow these steps:

### On the Gateway

1. Remove the Gateway's top cover.
2. Move DIP switch 1 to the ON position to activate Extended Addressing Mode.
3. Apply power to the Gateway.  
The LCD shows POWER, then \*RUN.
4. Triple click button 2 to enter binding mode.  
The red LEDs flash alternately when the Gateway is in binding mode. Any Node entering binding mode will bind to this Gateway. The LCD shows NETWRK BINDNG.

### On the Node

5. Remove the Node's top cover.
6. Move DIP switch 1 to the ON position to activate Extended Addressing Mode.
7. Apply power to the NODE.  
The LCD shows POWER, then \*RUN.
8. Use both of the Node's rotary dials to assign a decimal Node address (device ID) between 01 and 56.\*  
The left rotary dial represents the tens digit (0-5) and the right dial represents the ones digit (0-9) of the Node address (device ID).
9. Triple click button 2 to enter binding mode.  
The Node enters binding mode and locates the Gateway that is also in binding mode. While the Node is in binding, the LCD shows NETWRK BINDNG. When the Node is bound, the LEDs are both solid red for a few seconds. The Node cycles its power, then entering RUN mode. The LCD shows BOUND, then \*RUN.
10. Repeat steps 5 through 9 for each additional Node that needs to communicate to that Gateway.

### On the Gateway

11. Single click either button 2 or button 2 on the Gateway to exiting binding mode and reboot the Gateway.  
The Gateway exits binding mode and reboots. The LCD reads POWER, then \*RUN.

\* IMPORTANT: For special kits, indicated by device model numbers beginning in DX80K, do not change the position of the right rotary dial. Set the left rotary dial to zero.

## STEP 3: 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.

A Node will not sample its inputs until it is in sync with a Gateway.

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)

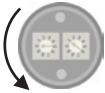




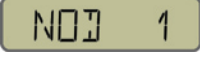


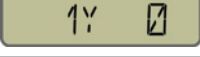

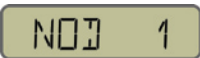
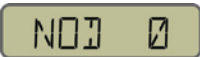




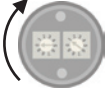


When testing the Gateway and Node before installation, verify the Gateway and Node are at least two meters apart or the communications may fail.

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## STEP 4: 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 initiate a site survey analysis.

User Action	Display/Status	Notes
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		The site survey will be conducted with Node 1
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.
Examine reception readings (G,Y,R,M) of the Gateway at various locations. Note that the numbers displayed are a rolling average of the last 12.5 seconds of radio communication.  M displays the number of missed packets while G, Y, and R display the number of received packets at those signal strengths.		G = GREEN excellent signal Y = YELLOW good signal R = RED marginal signal M = Percentage of missed packets
		
		When possible, install all devices to optimize the percentage of YELLOW and GREEN data packets received. MISSED packets can affect response time.
Double-click Gateway push button 2		End site survey
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 in the product manual (p/n 132607) to create an IP67 seal.

## STEP 5: Installation

### Antennas

Always install and properly ground a qualified surge suppressor when installing a remote antenna system. Remote antenna configurations installed without surge suppressors 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.

Banner strongly recommends you reference *Antenna Basics*, Banner p/n [132113](#), for more information on antennas.

### I/O Isolation

When connecting analog and discrete I/O to external equipment such as VFDs (Variable Frequency Drives), it may be appropriate to install interposing relays and/or loop isolation devices to protect the DX80 unit from transients, noise, and ground plane interference originating from devices or the environment. Contact Banner Engineering Corp. for more information.

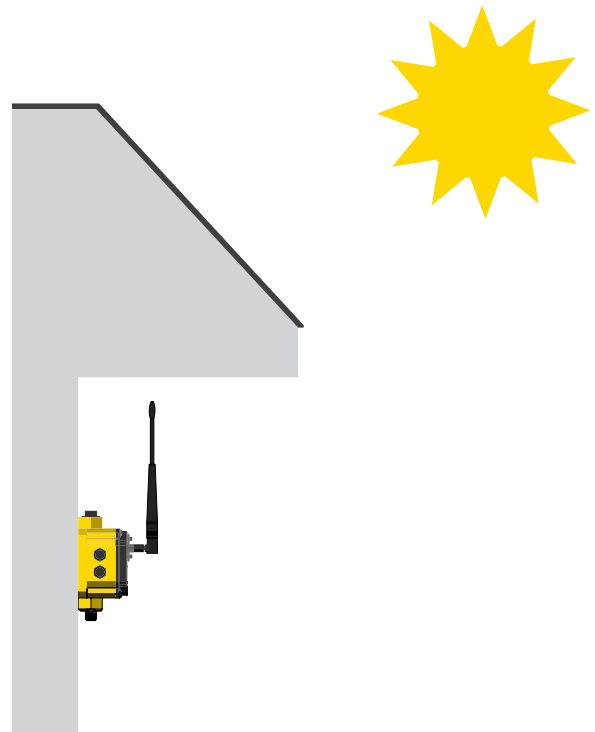
### Reduce Chemical Exposure

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.



Avoid Direct Sunlight

### 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.

For additional information, including installation and setup, weatherproofing, device menu maps, troubleshooting, and a list of accessories, please refer to the SureCross™ DX80 Wireless I/O Network product manual, Banner p/n 132607.

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. A list of approved countries appears in the SureCross DX80 Wireless Product Manual, in the Agency Certifications section. Consult with Banner Engineering if the destination country is not on this list.

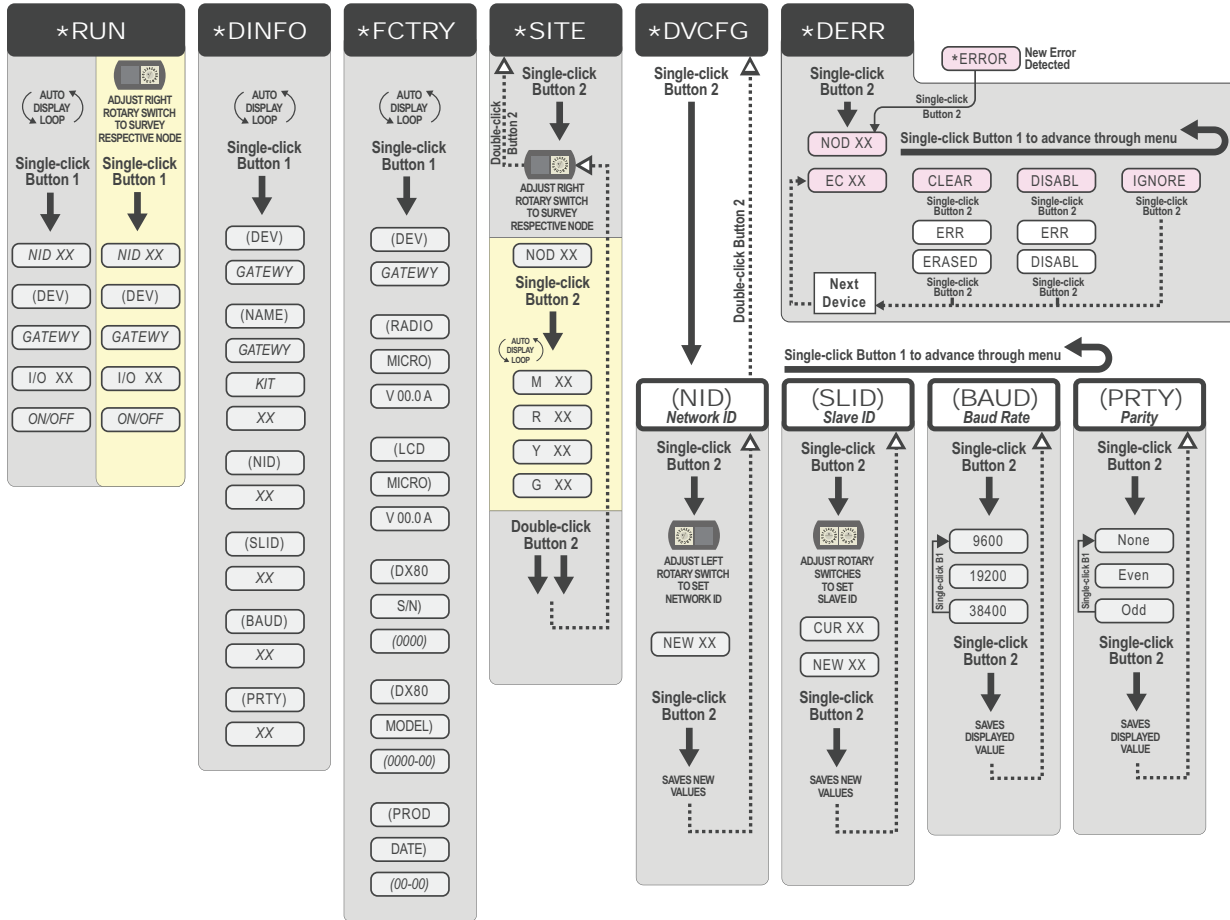
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## SureCross™ DX80 Gateway Setup Menu

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 and exit 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.

From any point in the menu system, double-click button 2 twice to return to the top level menu.

Navigating the menu:

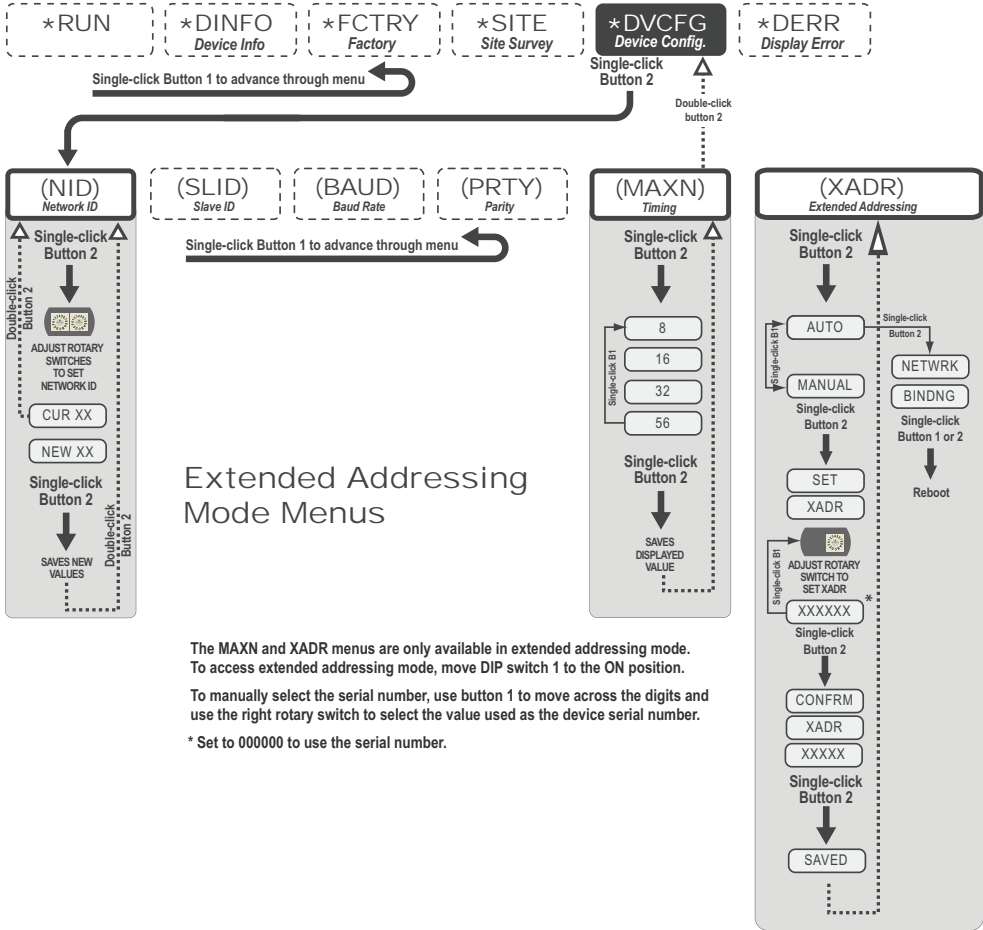
\* indicates a top level menu option

() indicates a sub-menu item

No characters indicate the value of the previous item



## Extended Addressing Gateway Menus



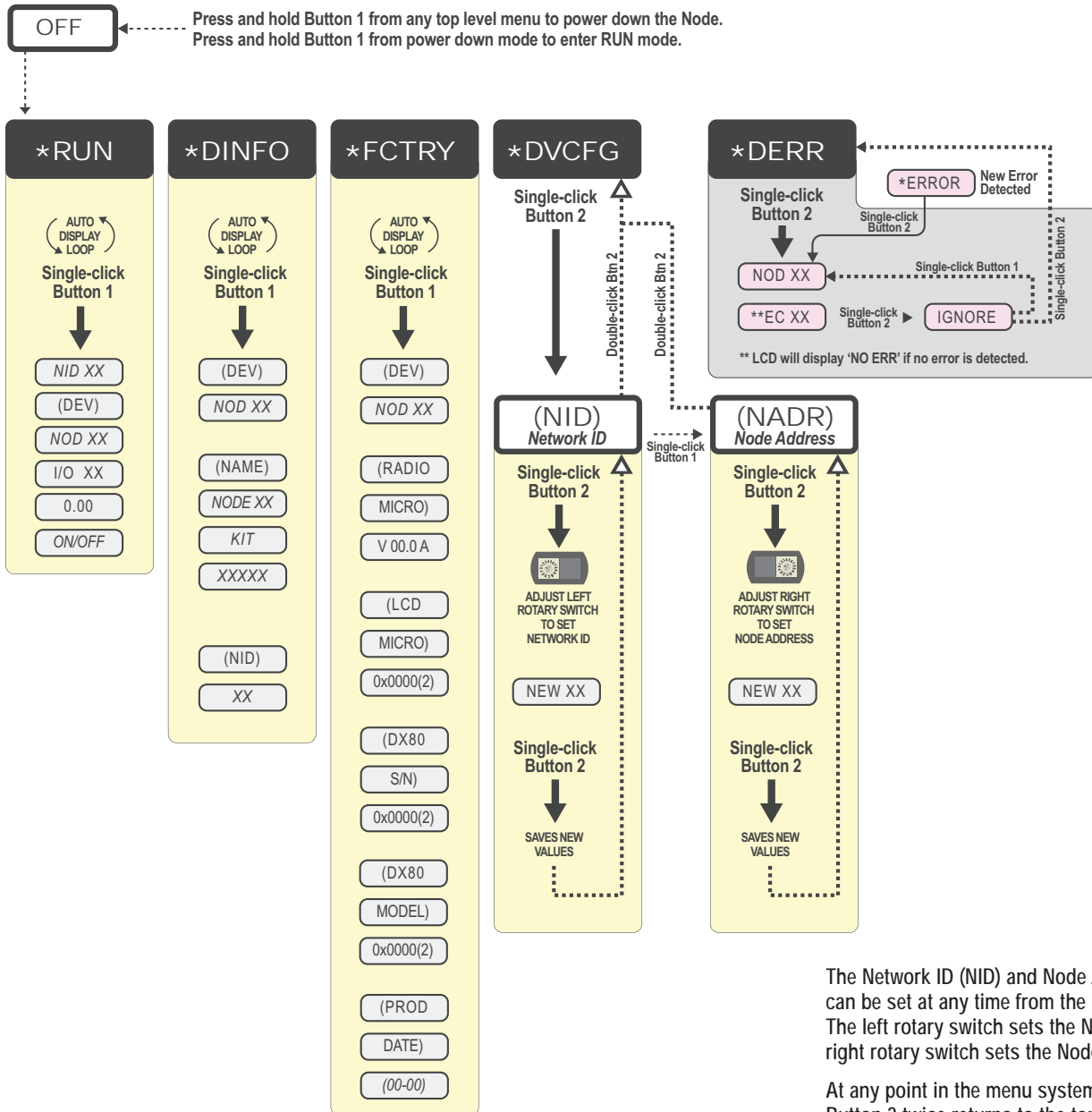
# SureCross™ DX80 Quick Start Guide

## 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.

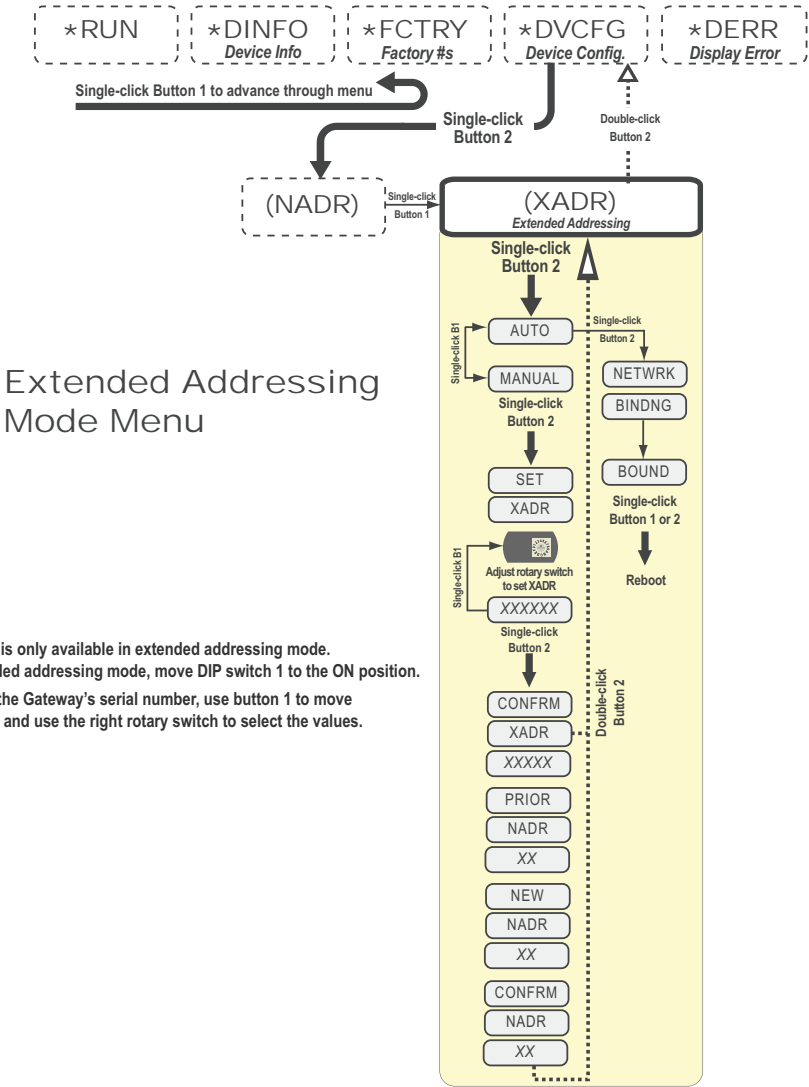
To return to the top level menus and autoscrolling mode, double-click button 2 twice. To enter and exit manual scrolling mode, double-click button 2 at the top level menu. The device autoscrolls through the \*RUN, \*DINFO, and \*FCTRY menus if paused on those menu headings. If the device is paused on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



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.

## Extended Addressing Node Menus



### Extended Addressing Mode Menu

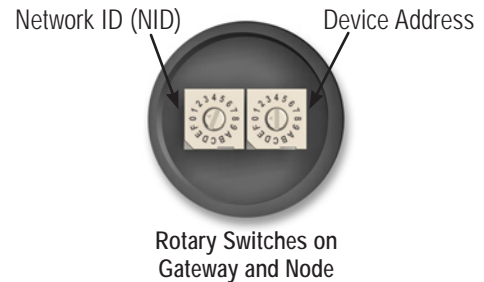
The XADR menu is only available in extended addressing mode. To access extended addressing mode, move DIP switch 1 to the ON position. To manually set the Gateway's serial number, use button 1 to move across the digits and use the right rotary switch to select the values.

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## Rotary Switch Address Mode

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.**

In rotary switch 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 15 Nodes. To use rotary switch address mode instead of extended address mode, follow these steps:



1. Disconnect the power from the Gateway and all Nodes.
2. Open the top covers of all devices and switch DIP switch 1 to the OFF (Rotary Dial Address Mode) position. Recover the devices and tighten the screws.

### Set the Network ID

3. Remove rotary switch access covers. Turn counterclockwise to remove and clockwise to tighten.
4. 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.
5. On all Nodes (within the same network), set the left rotary switch to 1. Assign the same NID to all devices in the same network (hexidecimal 0-F).

### Set the Device Address

6. On the Gateway, set the right rotary switch to 0. A device address of 0 on the Gateway displays 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.
7. On the first Node (device address = 1), set the right rotary switch to 1. Do not change the device IDs for configured kits as this would affect the factory mapping of the I/O.
8. On the second Node (device address = 2), set the right rotary switch to 2.
9. Continue setting the device address for each additional Node using a unique number (.3,4,5).

### Final Steps Steps

10. Install rotary switch access covers. Refer to the installation section of the product manual (p/n 132607) for IP67 instructions.
11. Power up the Gateway and Nodes. A successful RF link is identified by a blinking green LED 1 on each Node.

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 SureCross device or any equipment connected to the SureCross 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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