FlexPower Counter Node Features

Configurable Node with two selectable counter inputs, two selectable discrete inputs, and two NMOS discrete outputs

The Sure Cross® wireless system is a radio frequency network with integrated I/O that operates in most environments to eliminate the need for wiring runs.

- Wireless industrial I/O device with two selectable discrete inputs, two selectable discrete pulse counter inputs (rate or event; sinking, sourcing, or self-energized), and two NMOS discrete outputs
- User selectable 10 kHz event counter(s) and/or 25 kHz rate counter
- FlexPower® power options allow for +10 to 30 V DC, solar, and battery power sources for low power applications.
- DIP switches for user configuration
- Frequency Hopping Spread Spectrum (FHSS) technology and Time Division Multiple Access (TDMA) control architectures ensure reliable data delivery within the unlicensed Industrial, Scientific, and Medical (ISM) band
- Transceivers provide bidirectional communication between the Gateway and Node, including fully acknowledged data transmission
- Lost RF links are detected and relevant outputs set to user-defined conditions
- The DX80...C models are certified for use in Class I, Division 2, Group A, B, C, D; Zone 2 (Category 3G) Hazardous Locations when properly installed in accordance with the National Electrical Code, the Canadian Electrical Code, or applicable local codes/regulations (see Specifications)

For additional information, updated documentation, and a list of accessories, refer to Banner Engineering's website, www.bannerengineering.com.

Models	Frequency	Environmental Rating	I/O
DX80N9X2S4A2	900 MHz ISM Band	IP67, NEMA 6	**Inputs**: Two selectable discrete, two selectable counter **Outputs**: Two NMOS sinking discrete
DX80N2X2S4A2	2.4 GHz ISM Band		
DX80N9X2S4A2C	900 MHz ISM Band	IP20, NEMA 1 Class I, Division 2, Group A, B, C, D Hazardous Locations (see *Specifications*)	
DX80N2X2S4A2C	2.4 GHz ISM Band		

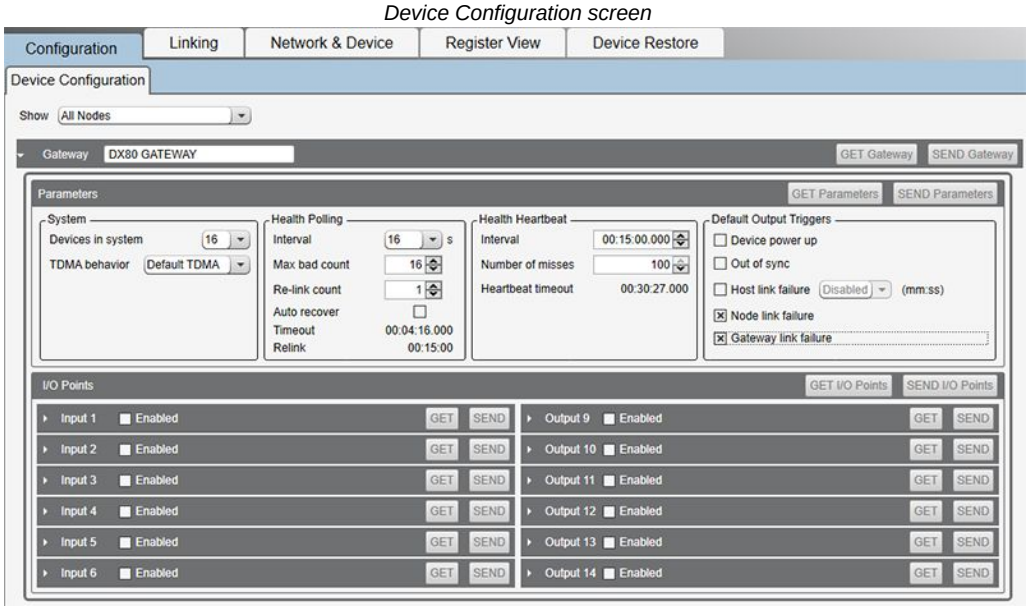
Internal antenna models are also available. For more information, contact your local Banner Engineering Corp. representative.

WARNING:
- **Do not use this device for personnel protection**
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction can cause either an energized (on) or de-energized (off) output condition.

DX80 Performance Configuration Software

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

Device Configuration screen



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

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

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

Setting Up Your Wireless Network

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

For complete instructions, including binding, configuration, installation, weatherproofing, device menu maps, troubleshooting, and a list of accessories, refer to Sure Cross® Wireless I/O Network Instruction Manual (p/n 132607)

1. Disconnect the power from your Sure Cross® devices.
2. Configure the DIP switches of all devices. DIP switch configurations are always listed in the product's datasheet.
3. If your device has I/O, connect the sensors to the Sure Cross devices. Available I/O is always listed in the product's datasheet. If your device does not have I/O, skip this step.
4. Refer to the wiring diagrams to apply power to all devices.
    - For housed models, the Gateway's LED 1 is solid green and the Node's LED 2 flashes red to indicate there is no radio link to the Gateway.
    - For board-level models, the Gateway's LED is solid green and the Node's LED flashes red to indicate there is no radio link to the Gateway.
5. Form the wireless network by binding the Nodes to the Gateway.
6. Observe the LED behavior to verify the devices are communicating with each other.
    - For housed models, the Gateway's LED 1 is solid green and the Node's LED 1 flashes green to indicate it is communicating with the Gateway.
    - For board-level models, the Gateway's LED is solid green and the Node's LED flashes green to indicate it is communicating with the Gateway.
7. Configure any I/O points to use the sensors connected to the Sure Cross devices.
8. Conduct a site survey between the Gateway and Nodes.
9. Install your wireless sensor network components.

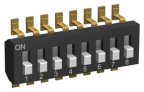
Configure the DIP Switches

Before changing DIP switch positions, disconnect the power[1]. Any changes made to the DIP switches are not recognized until after power is cycled to the device. For parameters not set using the DIP switches, use the configuration software to make configuration changes. For parameters set using the DIP switches, the DIP switch positions override any changes made using the configuration software.

[1] For devices powered by batteries integrated into the housing, triple-click button 2, then double-click button 2 to reset the device without removing the battery.

Access the Internal DIP Switches

Follow these steps to access the internal DIP switches.



1. Unscrew the four screws that mount the cover to the bottom housing.
2. Remove the cover from the housing without damaging the ribbon cable or the pins the cable plugs into.
3. Gently unplug the ribbon cable from the board mounted into the bottom housing. Skip this step if there is no ribbon cable (integrated battery models) or the ribbon cable is glued down (for C housing models or for Class I, Division 2 certified devices).
4. Remove the black cover plate from the bottom of the device's cover.
   The DIP switches are located behind the rotary dials.
5. Make the necessary changes to the DIP switches.
6. Place the black cover plate back into position and gently push into place.
7. If necessary, plug the ribbon cable in after verifying that the blocked hole lines up with the missing pin.
8. Mount the cover back onto the housing.

DIP Switch Settings

	Switches							
Device Settings	**1**	**2**			**5**	**6**	**7**	**8**
Rotary switch address mode	OFF*							
Extended address mode	ON							
Modbus or UCT configured (overrides switches 3-8)		OFF*						
DIP switch configured		ON						
Discrete IN #1 Sinking (NPN)					OFF*			
Discrete IN #1 Sourcing (PNP)					ON			
Discrete IN #2 Sinking (NPN)						OFF*		
Discrete IN #2 Sourcing (PNP)						ON		
Counter 2: rate (frequency) counter							OFF*	
Counter 2: event counter							ON	
Report Rate 16 seconds								OFF*
Report Rate 1 second								ON

* Default configuration

Address Mode

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

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

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

Counter Input Type

Select from the two types of counters:

- **Frequency (rate) counter**—Calculates the frequency of the input signal, in Hz
- **Event counter**—Counts the total number of times an input signal changes to the OFF/0 state for NPN input type or ON/1 for PNP or Float input types

The counter values are saved in EEPROM every hour. After power up, the saved value is restored as the beginning count. Setting the counter using the preset or clear functions saves the preset value or zeroes in EEPROM. The counter increments on the falling edge of an input signal when the signal level crosses the threshold.

Discrete Input Type
Select the type of discrete input sensors to use with this device: sourcing (PNP) sensors or sinking (NPN) sensors.

Modbus/Software or DIP Switch Configured
In Modbus/Software Configured mode, use the Key definition for "{keyrefName}" not found in the DITA map. or a Modbus command to change the device parameters. DIP switch positions 3 through 8 are ignored. In DIP Switch Configured mode, use the DIP switches to configure the parameters listed in the table.

Report Rate
The report rate defines how often the device reports inputs to the Gateway. For FlexPower™ applications, setting the report rate/interval to longer intervals extends the battery life.

DIP Switch Settings (Counter DIP Switches)
The counter input DIP switches define the characteristics of the counter inputs.

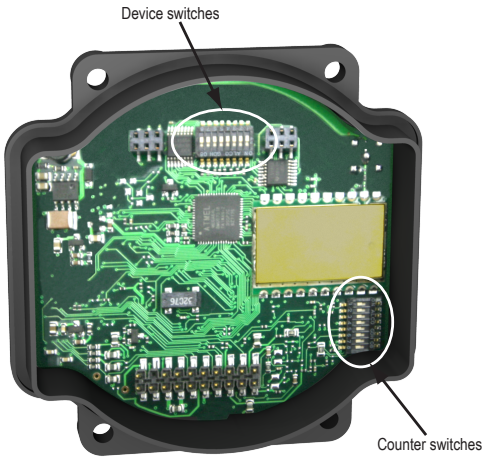
	Counter Input 1 DIP Switches				Counter Input 2 DIP Switches			
Device Settings	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Low threshold (0.25V)	OFF*							
High threshold (1.5V)	ON							
Debounce enabled		OFF*						
Debounce disabled		ON						
Self-energized input (e.g. mag pickup)			OFF*	OFF*				
Enable PNP (sourcing)			OFF	ON				
Enable NPN (sinking)			ON	OFF				
Debounce enabled					OFF*			
Debounce disabled					ON			
Self-energized input (e.g. mag pickup)						OFF*	OFF*	
Enable PNP (sourcing)						OFF	ON	
Enable NPN (sinking)						ON	OFF	
Low threshold (0.25V)								OFF*
High threshold (1.5V)								ON

* Default configuration

Debounce establishes how to examine a signal's transitions. The factory default setting is to activate the input filtering to compensate for unclean state transitions. To turn off the input filtering, set the switch to the ON position.

Inputs. Counter switches 6 and 7 define the inputs as self-energized, sinking (NPN), or sourcing (PNP). A self-energized input does not require pull-up or pull-down devices for proper operation. A magnetic pick-up is a self-energized input. The input threshold can be adjusted to compensate for low amplitude signals.

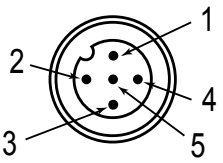
Threshold. The counter has a selectable input threshold of 0.25V or 1.5V. For sinking (NPN) or sourcing (PNP) inputs, set the threshold to 1.5V.



Wire Your Sure Cross® Device
Use the following wiring diagrams to first wire the sensors and then apply power to the Sure Cross devices.

Apply Power to the Node

Integral 5-pin M12 male quick-disconnect connector wiring depends on the model and power requirements of the device. Not all models can be powered by 10 to 30 V DC and not all models can be powered by 3.6 to 5.5 V DC. Refer to "FlexPower Counter Node Specifications" on page 10 to verify the power requirements of your device. For *Flex*Power devices, do not apply more than 5.5 V to the gray wire.

5-pin M12 (male) Quick Disconnect Connector	Pin	Wire Color	Nodes Powered by 10 to 30 V DC	Nodes Powered by Battery or Battery Pack
	1	Brown	10 to 30 V DC	
	2	White		
	3	Blue	DC common (GND)	DC common (GND)
	4	Black		
	5	Gray		3.6 to 5.5 V DC

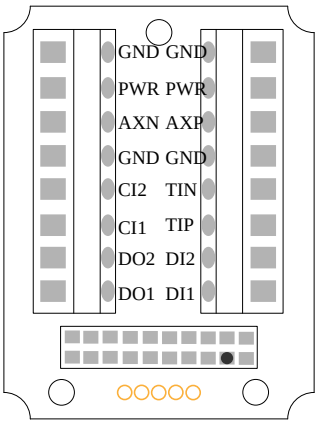
DX80...C Wiring

Wiring power to the DX80...C models varies depending the power requirements of the model. Connecting DC power to the communication pins (Tx/Rx) causes permanent damage. For *Flex*Power devices, do not apply more than 5.5 V to the B+ terminal.

Wiring for the C housing models

Terminal Label	Gateway and DX85	10 V DC to 30 V DC Powered Nodes	Battery-Powered Nodes
V+	10 V DC to 30 V DC	10 V DC to 30 V DC	
Tx/+	RS485 / D1 / B / +		
V–	DC common (GND)	DC common (GND)	DC common (GND)
Rx/–	RS485 / D0 / A / -		
B+			3.6 V DC to 5.5 V DC

Terminal Block (IP67 Housing)



AXN, AXP. Not used; do not make any wiring connections to these terminals

CI*x*. Counter IN *x*

DI*x*. Discrete IN *x*

DO*x*. Discrete OUT *x*

GND. Ground/DC common connection

PWR. 10 V DC to 30 V DC power connection

TIN, TIP. Not used; do not make any wiring connections to these terminals

Ignore alternate labeling referring to other models that use this board.

Terminal Block (IP20 Housing)

For the DX8*x*...C models, PWR in the wiring diagram refers to V+ on the wiring board and GND in the wiring diagram refers to V- on the wiring board. Ignore alternate labeling referring to other models that use this board.

All Models	FlexPower Serial Interface Models Only	FlexPower Counter Models Only
B+. 3.6 V DC to 5.5 V DC (use for battery powered models only)	CM*x*. Serial interface connection; for non-serial interface models, do not make any wiring connections to these terminals	CI*x*. Counter IN *x*
DI*x*. Discrete IN *x*		
DO*x*. Discrete OUT *x*		
RX/-. Serial communication line for the Gateway. No connection for Nodes		
SP*x*. Switch Power; provides variable power sources for external devices		

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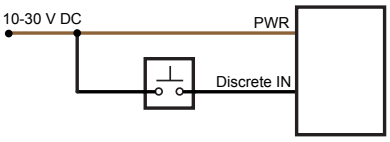
All Models	FlexPower Serial Interface Models Only	FlexPower Counter Models Only
TX/+. Serial communication line for the Gateway; no connection for Nodes		
V+. 10 V DC to 30 V DC power connection		
V–. Ground/DC common connection		

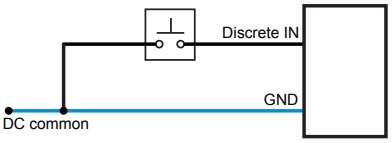
Wiring Diagrams for Discrete Inputs

Connecting power to the communication pins will cause permanent damage. For the DX8*x*...C models, PWR in the wiring diagram refers to V+ on the wiring board and GND in the wiring diagram refers to V- on the wiring board. To power the sensor using the switch power output (SPx), replace the PWR with SPx in these wiring diagrams.

Discrete Input Wiring for PNP Sensors



Discrete Input Wiring for NPN Sensors

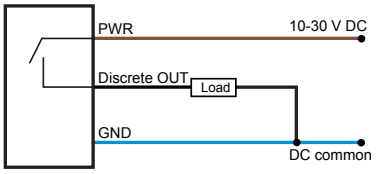


Wiring Diagrams for Discrete Outputs

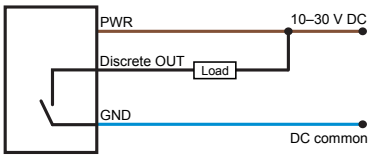
Connecting power to the communication pins will cause permanent damage. For the DX8*x*...C models, PWR in the wiring diagram refers to V+ on the wiring board and GND in the wiring diagram refers to V- on the wiring board. To power the sensor using the switch power output (SPx), replace the PWR with SPx in these wiring diagrams.

Refer to the specifications or the models table to determine if your device has PNP or NPN/NMOS discrete outputs.

Discrete Output Wiring (PNP)



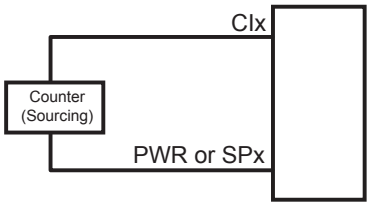
Discrete Output Wiring (NPN or NMOS)



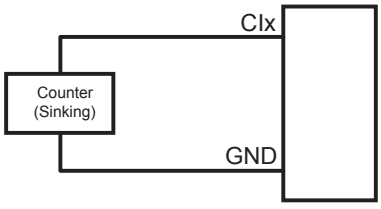
Wiring Diagrams for Counter Inputs

Connecting power to the communication pins will cause permanent damage. For the DX8*x*...C models, PWR in the wiring diagram refers to V+ on the wiring board and GND in the wiring diagram refers to V- on the wiring board.

Counter Inputs (Sourcing/PNP)



Counter Inputs (Sinking/NPN)



LED Behavior for the Nodes

Nodes do not sample inputs until they are communicating with the Gateway.

The radios and antennas must be a minimum distance apart to function properly. Recommended minimum distances are:

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

LED behavior for the Nodes

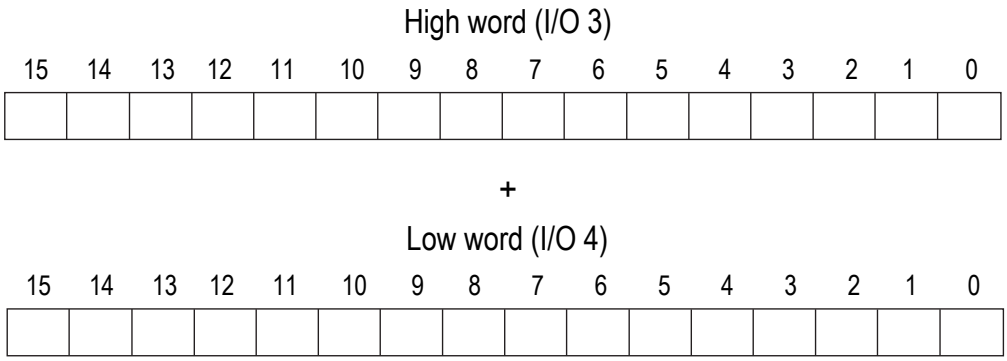
LED 1	LED 2	Node Status
Flashing green		Radio Link Ok
Flashing red	Flashing red	Device Error
	Flashing red, 1 per 3 sec	No Radio Link

Configuration Instructions

Modbus Register Table (Event and Rate Counter)

I/O	Modbus Holding Register		I/O Type	I/O Range		Holding Register Representation		Terminal Block Labels
	Gateway	Any Node		Min.	Max.	Min. (Dec.)	Max. (Dec.)	
1	1	1 + (Node# × 16)	Discrete IN 1	0	1	0	1	DI1
2	2	2 + (Node# × 16)	Discrete IN 2	0	1	0	1	DI2
3	3	3 + (Node# × 16)	Event Count 1 (high)**	0	65535	0	65535	CI1
4	4	4 + (Node# × 16)	Event Count 1 (low)**	0	65535	0	65535	
5	5	5 + (Node# × 16)	Rate Count (Hz)	0	65535	0	65535	CI2
6	6	6 + (Node# × 16)						
7	7	7 + (Node# × 16)	Reserved					
8	8	8 + (Node# × 16)	Device Message					
9	9	9 + (Node# × 16)	Discrete OUT 1	0	1	0	1	DO1
10	10	10 + (Node# × 16)	Discrete OUT 2	0	1	0	1	DO2
11	11	11 + (Node# × 16)	Clear Counter 1	0	1	0	1	
12	12	12 + (Node# × 16)						
13	13	13 + (Node# × 16)	Clear Counter 2	0	1	0	1	
14	14	14 + (Node# × 16)						
15	15	15 + (Node# × 16)	Control Message					
16	16	16 + (Node# × 16)	Reserved					

** Two consecutive 16-bit unsigned registers are combined to represent one 32-bit unsigned number for a maximum total count of 4,294,967,295.



Modbus Register Table (Two Event Counters)

I/O	Modbus Holding Register		I/O Type	I/O Range		Holding Register Representation		Terminal Block Labels
	Gateway	Any Node		Min.	Max.	Min. (Dec.)	Max. (Dec.)	
1	1	1 + (Node# × 16)	Discrete IN 1	0	1	0	1	DI1
2	2	2 + (Node# × 16)	Discrete IN 2	0	1	0	1	DI2

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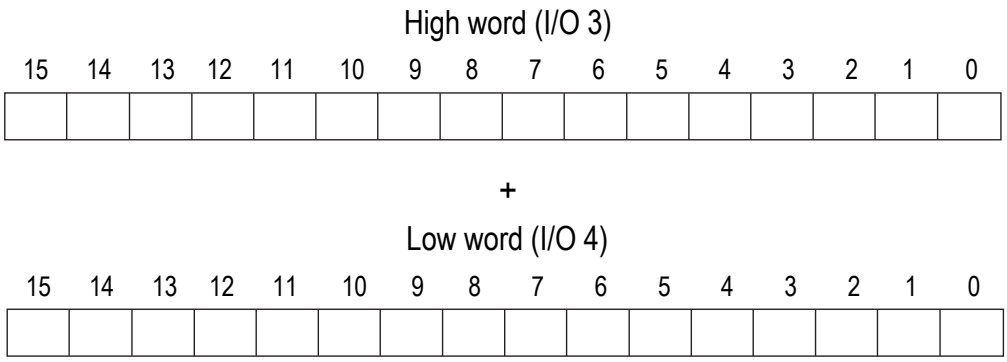
I/O	Modbus Holding Register		I/O Type	I/O Range		Holding Register Representation		Terminal Block Labels
	Gateway	Any Node		Min.	Max.	Min. (Dec.)	Max. (Dec.)	
3	3	3 + (Node# × 16)	Event Count 1 (high)**	0	65535	0	65535	CI1
4	4	4 + (Node# × 16)	Event Count 1 (low)**	0	65535	0	65535	
5	5	5 + (Node# × 16)	Event Count 2 (high)**	0	65535	0	65535	CI2
6	6	6 + (Node# × 16)	Event Count 2 (low)**	0	65535	0	65535	
7	7	7 + (Node# × 16)	Reserved					
8	8	8 + (Node# × 16)	Device Message					
9	9	9 + (Node# × 16)	Discrete OUT 1	0	1	0	1	DO1
10	10	10 + (Node# × 16)	Discrete OUT 2	0	1	0	1	DO2
11	11	11 + (Node# × 16)	Clear Counter 1	0	1	0	1	
12	12	12 + (Node# × 16)						
13	13	13 + (Node# × 16)	Clear Counter 2	0	1	0	1	
14	14	14 + (Node# × 16)						
15	15	15 + (Node# × 16)	Control Message					
16	16	16 + (Node# × 16)	Reserved					

** Two consecutive 16-bit unsigned registers are combined to represent one 32-bit unsigned number for a maximum total count of 4,294,967,295.



Event Counter Presets

The event counter input can be preset from the Node menu system or from a host system using Advanced Control Messages. The LCD menu system on the Node allows the user to preset event counter values on each available counter input. From the host system, each device has allocated Node registers 7, 15, and 16 that send preset data to the event counter. When power is applied to the Node, the counter value is reset to the last saved value. The counter value is saved every hour.

Setting the counter using the preset or clear functions saves the preset value or zeroes in EEPROM.

Setting the Counter Preset using Register Commands

The event counter input is a 32-bit value that can be preset using the parameter control codes 143 (0x8F) and 144 (0x90). Parameter control code 143 writes the lower half [15:0] of the counter and code 144 writes the upper half [31:16] of the counter.

Select which counter to preset by defining the Counter Select Mask. The first bit position of the mask (bit 0, right justified) selects the first counter and the second bit position selected the second counter. Set the Node's register 16 to the high or low data value. Read Node register 7 for the transfer acknowledgement. Write to Node register 16 before writing to Node register 15.

There are 16 Modbus holding registers for each Sure Cross device. To calculate the registers for other Nodes, use this equation: Register number = I/O# + (Node # × 16). For example, the Gateway is always device 0 (or Node 0), so the Gateway's holding registers are registers 1 through 16. The registers for Node 1 are 17 through 32 and the registers for Node 2 are 33 through 48.

Node Reg 16	Low or High Value	
Node Reg 15	143 or 144 (0x8F or 0x90)	Counter Select Mask
Node Reg 7	Acknowledge Code 143 or 144	Acknowledge Counter Select Mask

Preset Node 2's counter to 20,567,001

To preset Node 2's counter 2 to the value 20,567,001 (hex 0139 D3D9), follow these steps:

1. Write the upper word to the counter using control code 144 (0x90).

Node Reg 48	0139	
Node Reg 47	0x90	2
Node Reg 39	0x90	2

2. Write the lower word to the counter using control code 143 (0x8F).

Node Reg 48	D3D9	
Node Reg 47	0x8F	2
Node Reg 39	0x8F	2

The counter has been preset to 20,567,001 (0x0139 D3D9)

Setting the Counter Preset Using the Menu System

To manually enter a counter preset, follow the LCD menu flow using the diagram shown.

1. Single click button 1 to move across the top level menus. Click button 1 until the display shows IOCFG.
2. Click button 2 to enter the I/O Configuration submenu structure.
3. Single click button 1 to move across the I/O points. Single click button 2 to enter the preset configuration for the desired I/O point. I/O 3 is the event counter and I/O 5 is the rate counter.
4. The screen displays the counter number, usually CNTR 1 or CNTR 2. Single click button 2 to move down the menu structure.
5. Use the right rotary switch to begin setting the counter preset. Digit selection begins with the least significant digit (the right-most digit). After selecting the least significant digit of the counter preset, single click button 1 to advance left to the next significant digit.
6. Use the right rotary switch to select the second digit. Single click button 1 to advance to the next digit.
7. When the counter preset has been entered, single click button 2 to save the value. The second screen of counter preset digits displays only when more than four digits are necessary. The preset counter may be set from zero to 4,000,000,000.
8. Double click button 2 to exit this menu. If you try to leave this menu without resetting the rotary switch back to its network address position, the menu system prompts you to correct the switch setting before returning to RUN mode. The prior network address setting displays.
9. Single click button 2 to enter the new network address. The new address is confirmed.
10. Single click button 2 to save the network address and return to the IOCFG menu and RUN mode.

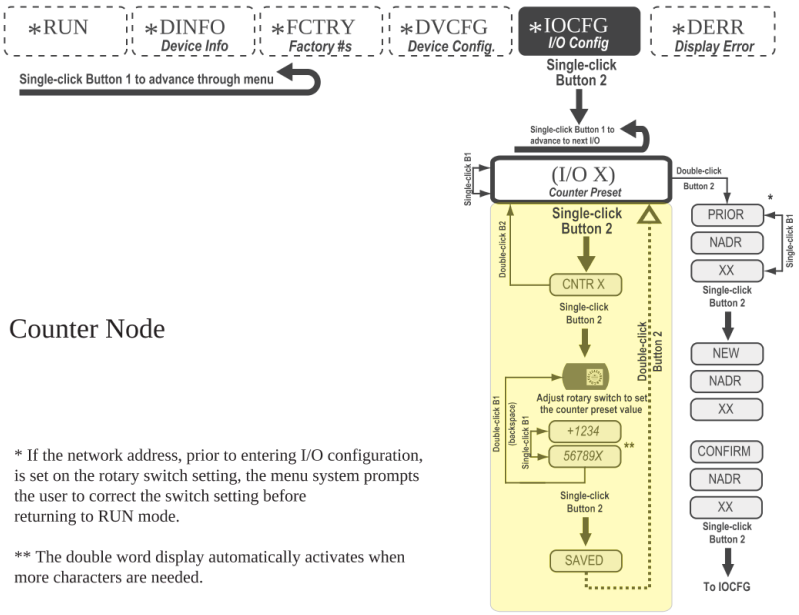
Clearing the Event Counter

To clear the event counter,

- Map a push button on a Gateway to Node register 11 to clear a counter when the button is pressed; or
- From a host system, write a 1 to Node register 11 for counter 1 or Node register 13 for counter 2.

Setting the counter using the preset or clear functions saves the preset value or zeroes in EEPROM.

Counter Node Menu Structure



* If the network address, prior to entering I/O configuration, is set on the rotary switch setting, the menu system prompts the user to correct the switch setting before returning to RUN mode.

** The double word display automatically activates when more characters are needed.

FlexPower Counter Node Specifications

Supplied Antenna

A 2 dB antenna ships with this device. High-gain antennas are available, but the transmit power and range depends on the antenna gain, environment, and line of sight. Always verify your wireless network's range by performing a Site Survey.

Range

900 MHz: Up to 4.8 kilometers (3 miles)

2.4 GHz: Up to 3.2 kilometers (2 miles)

Transmit Power

900 MHz: 21 dBm Conducted

2.4 GHz: 18 dBm Conducted, less than or equal to 20 dBm EIRP

900 MHz Compliance (150 mW)

Contains FCC ID: TGUDX80: FCC Part 15, Subpart C, 15.247

Contains IC: 7044A-DX8009

2.4 GHz Compliance (DX80-2400 Radio Module)

Radio module is indicated by the product label marking

Contains FCC ID: UE300DX80-2400: FCC Part 15, Subpart C, 15.247

Radio Equipment Directive (RED) 2014/53/EU

Contains IC: 7044A-DX8024

ANATEL: 15966-21-04042

ANATEL
Agência Nacional de Telecomunicações

Spread Spectrum Technology

FHSS (Frequency Hopping Spread Spectrum)

Link Timeout

Gateway: Configurable, up to 2 minutes

Node: Defined by Gateway

Power

Requirements: +10 to 30 V DC or 3.6 to 5.5 V DC low power option (For European applications: +10 to 24 V DC, ± 10% or 3.6 to 5.5 V DC low power option)

Consumption: Less than 1.4 W (60 mA) at 24 V DC

Housing

Polycarbonate

Weight: 0.26 kg (0.57 lbs)

Mounting: #10 or M5 (M5 hardware included)

Maximum Tightening Torque: 0.56 N·m (5 in·lbf)

Antenna

Ext. Reverse Polarity SMA, 50 Ohms

Max Tightening Torque: 0.45 N·m (4 in·lbf)

Interface

Indicators: Two bi-color LEDs

Buttons: Two

Display: Six-character LCD

Wiring Access

Four PG-7, One 1/2-inch NPT, One 5-pin M12 male connector

Discrete Input Rating

3 mA max current at 30 V DC

Discrete Input Sample/Report Rates

125 milliseconds

Discrete Input ON Condition

PNP: Greater than 8 V

NPN: Less than 0.7 V

Discrete Input OFF Condition

PNP: Less than 5 V

NPN: Greater than 2 V or open

Counter Inputs

Threshold: 1.5 V or 0.25 V (Sinking or sourcing selected inputs require the 1.5V threshold setting)

Debouce: DIP Switch Selectable. Enable debounce to filter a noisy input signal that may lead to false triggers.

Event Counter: Pulse input rating 1 Hz to 10 kHz (For battery-powered devices, the recommended input rating is less than 1 kHz)

Rate (Frequency) Counter: 1 Hz to 25 kHz

Discrete Output Rating (NMOS)

Less than 10 mA max current at 30 V DC

ON-State Saturation: Less than 0.7 V at 20 mA

Discrete Output Update Rate

1 second

Discrete Output ON Condition

Less than 0.7 V

Discrete Output OFF Condition

Open

Output State Following Timeout

De-energized (OFF)

Environmental Rating

DX80 Models:IEC IP67; NEMA 6

DX80...C Models: IEC IP20; NEMA 1 (In a suitable enclosure: Class I, Division 2, Group A, B, C, D; T4 −40 to 80° C)

Operating Conditions

–40 °C to +85 °C (–40 °F to +185 °F) (Electronics); –20 °C to +80 °C (–4 °F to +176 °F) (LCD)

95% maximum relative humidity (non-condensing)

Radiated Immunity: 10 V/m (EN 61000-4-3)

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

Shock and Vibration

All models meet IEC 60068-2-6 and IEC 60068-2-27 testing criteria

Shock: 30G 11 ms duration, half sine wave per IEC 60068-2-27

Vibration: 10 Hz to 55 Hz, 0.5 mm peak-to-peak amplitude per IEC 60068-2-6

Certifications for DX8x...C (External Wiring Terminal) and DX8x...E Models

C US	CSA: Class I Division 2 Groups ABCD, Class I Zone 2 AEx/Ex nA II T4 — Certificate: 1921239
Ex	ATEX: II 3 G Ex nA IIC T4 Gc (Group IIC Zone 2) — Certificate LCIE 10 ATEX 1012 X
	Refer to the Class I Division 2/Zone 2 control drawings (p/n 143086) for wiring specifications and limitations. Install the device in a suitable enclosure with provision for connection of Division 2 / Zone 2 wiring methods in accordance with local codes, as acceptable to the local inspection authority having jurisdiction. All battery-powered devices must only use the lithium battery manufactured by Xeno, model XL-205F (Banner model number **BWA-BATT-001**).

Included with the DX80 and DX80...C Models

- **BWA-HW-002**: DX80 Access Hardware Kit, containing four PG-7 plastic threaded plugs, four PG-7 nylon gland fittings, four PG-7 hex nuts, one 1/2-inch NPT plug, and one 1/2-inch nylon gland fitting. (Not included with IP20 DX80...C models)
- **BWA-HW-001**: Mounting Hardware Kit, containing four M5-0.8 × 25mm SS screws, four M5-0.8 × 16 mm SS screws, four M5-0.8 mm SS hex nuts, and four #8-32 × 3/4" SS bolts
- **BWA-HW-003**: PTFE tape
- **BWA-9O2-C** (900 MHz) or **BWA-2O2-C** (2.4 GHz): Antenna, 2 dBd Omni, Rubber Swivel RP-SMA Male (not included with internal antenna models)
- **MQDC1-506**: 5-pin M12 (single ended) straight cordset, 2 m (not included with FlexPower devices)
- **BWA-HW-011**: IP20 Screw Terminal Headers (2 pack) (included only with the IP20 DX80...C models)
- Product datasheet and product family Quick Start Guide (128185 for Performance models or 152653 for MultiHop models)

Warnings

WARNING:

- **Do not use this device for personnel protection**
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction can cause either an energized (on) or de-energized (off) output condition.

IMPORTANT: Please download the complete DX80 FlexPower Counter Node technical documentation, available in multiple languages, from www.bannerengineering.com for details on the proper use, applications, Warnings, and installation instructions of this device.

IMPORTANT: Por favor descargue desde www.bannerengineering.com toda la documentación técnica de los DX80 FlexPower Counter Node, disponibles en múltiples idiomas, para detalles del uso adecuado, aplicaciones, advertencias, y las instrucciones de instalación de estos dispositivos.

IMPORTANT: Veuillez télécharger la documentation technique complète des DX80 FlexPower Counter Node sur notre site www.bannerengineering.com pour les détails sur leur utilisation correcte, les applications, les notes de sécurité et les instructions de montage.

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

Exporting Sure Cross® Radios. It is our intent to fully comply with all national and regional regulations regarding radio frequency emissions. **Customers who want to re-export this product to a country other than that to which it was sold must ensure the device is approved in the destination country.** The Sure Cross wireless products were certified for use in these countries using the antenna that ships with the product. When using other antennas, verify you are not exceeding the transmit power levels allowed by local governing agencies. This device has been designed to operate with the antennas listed on Banner Engineering's website and having a maximum gain of 9 dBm. Antennas not included in this list or having a gain greater than 9 dBm are strictly prohibited for use with this device. The required antenna impedance is 50 ohms. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen such that the equivalent isotropically radiated power (EIRP) is not more than that permitted for successful communication. Consult with Banner Engineering Corp. if the destination country is not on this list.

IMPORTANT:
- **Never operate a 1 Watt radio without connecting an antenna**
- Operating 1 Watt radios without an antenna connected will damage the radio circuitry.
- To avoid damaging the radio circuitry, never apply power to a Sure Cross® Performance or Sure Cross MultiHop (1 Watt) radio without an antenna connected.

IMPORTANT:
- **Electrostatic discharge (ESD) sensitive device**
- ESD can damage the device. Damage from inappropriate handling is not covered by warranty.
- Use proper handling procedures to prevent ESD damage. Proper handling procedures include leaving devices in their anti-static packaging until ready for use; wearing anti-static wrist straps; and assembling units on a grounded, static-dissipative surface.

Banner Engineering Corp Limited Warranty

Banner Engineering Corp. warrants its products to be free from defects in material and workmanship for one year following the date of shipment. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture which, at the time it is returned to the factory, is found to have been defective during the warranty period. This warranty does not cover damage or liability for misuse, abuse, or the improper application or installation of the Banner product.

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

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