

SureCross Performance FlexPower Gateway



Configurable *FlexPower* Gateway with a serial RS-485 interface, Modbus RTU support, and a 1 Watt radio

Features



The SureCross™ wireless system is a radio frequency network with integrated I/O that can operate in most environments while eliminating the need for wiring runs. Systems are built around a Gateway, which acts as the wireless network master device, and one or more Nodes.

- Wireless industrial Gateway with a serial RS-485 interface
- Selectable transmit power levels of 250 mW or 1 Watt and license-free operation up to 4 watt EIRP, with a high-gain antenna, in the U.S. and Canada for 900 MHz
- *FlexPower*™ power options allows for +10 to 30V dc, solar, and battery power sources for low power applications.
- Site Survey analyzes the network's signal strength and reliability
- Frequency Hopping Spread Spectrum (FHSS) technology and Time Division Multiple Access (TDMA) control architecture combine to ensure reliable data delivery within the unlicensed Industrial, Scientific, and Medical (ISM) 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
- Certified for use in Class I, Division 2, Group A, B, C, D 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, the most recent version of all documentation, and a complete list of accessories, refer to Banner Engineering's website, www.bannerengineering.com/surecross.

Models

Model	Power	Frequency	Interface
DX80G9M2S-P	+10 to 30V dc or 3.6 to 5.5V dc low power option	900 MHz ISM Band, 1 Watt or 250 mW	Serial RS-485 with Modbus RTU
DX80G2M2S-P		2.4 GHz ISM Band, 100 mW EIRP	



WARNING: Not To Be Used for Personnel Protection

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



Important: Never Operate 1 Watt Radios Without Antennas.

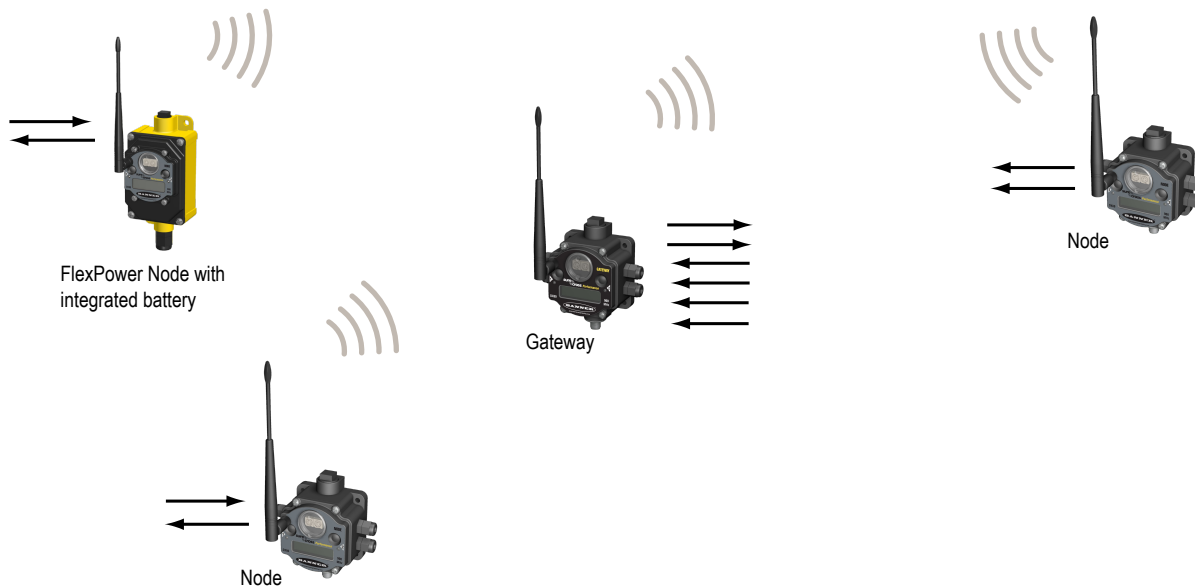
To avoid damaging the radio circuitry, never power up SureCross Performance or SureCross MultiHop (1 Watt) radios without an antenna.



The SureCross Performance Wireless Network

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

Each wireless network system consists of one Gateway and one or more Nodes. Devices ship with factory defined inputs and outputs that may be all discrete, all analog, or a mix of discrete and analog I/O.



The SureCross Performance 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.

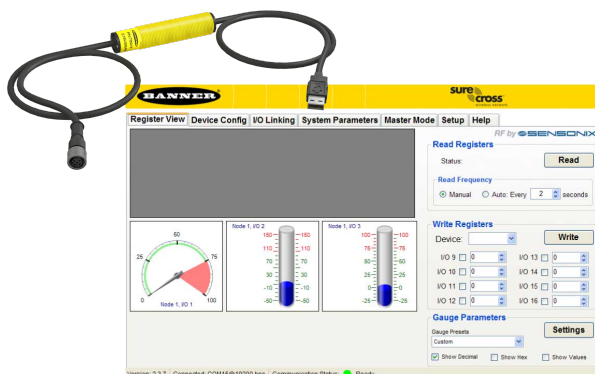
SureCross Performance Gateways and Nodes

A **Gateway** acts as the master device within each radio network, initiates communication and reporting with the Nodes, and controls the timing for the entire network.

The Gateway also holds the configuration for the network. Every wireless network must have one Gateway that schedules communication traffic and controls the I/O configuration for the network. A radio network contains only one Gateway, but can contain many Nodes. Similar to how a gateway device on a wired network acts as a “portal” between networks, the SureCross Gateway acts as the portal between the wireless network and the central control process.

A **Node** is a wireless network end-point device used to provide sensing capability in a remote area or factory. The Node collects data from sensors and communicates the data back to the Gateway. Nodes are available in a wide variety of power or input/output options. Each Node device can be connected to sensors or output devices and reports I/O status to the Gateway.

SureCross User Configuration Tool



The User Configuration Tool (UCT) offers an easy way to link I/O points in your wireless network, view I/O register values graphically, and set system communication parameters when a host system is not part of the wireless network.

The UCT requires a special USB to RS-485 (model number BWA-HW-006) converter cable to pass information between your computer and the Gateway. Download the most recent revisions of the UCT software from Banner Engineering's website: <http://www.bannerengineering.com/wireless>.

Wiring Diagrams

5-pin Euro-Style Hookup for the FlexPower Gateway

Connecting dc power to the communication pins will cause permanent damage. For FlexPower devices, do not apply more than 5.5V to the gray wire.



Wire No.	Wire Color	
1	Brown	10 to 30V dc
2	White	RS485 / D1 / B / +
3	Blue	dc common (GND)
4	Black	RS485 / D0 / A / -
5	Gray	3.6 to 5.5V dc

Additional Information

For additional information, including installation and setup, weatherproofing, device menu maps, troubleshooting, and a list of accessories, refer to one of the following product manuals

- SureCross Quick Start Guide: Banner part number [128185](#)
- SureCross Wireless I/O Network Manual: [132607](#)
- Web Configurator Manual (used with "Pro" and DX83 models): [134421](#)

Modbus Holding Registers

There are sixteen Modbus holding registers for each SureCross™ device. Calculate the holding register number for each device using the equation: Register number = I/O# + (Node# × 16).

Because the Gateway is always device 0, the Gateway's holding registers are registers 1 through 16. Registers for Node 1 are 17 through 32, as shown in the Modbus Holding Register table below. Though only ten Nodes are shown, the table can continue for as many Nodes as are used in a given network.

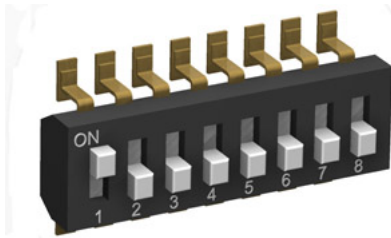
Using the equation or the Modbus Holding Registers table, the register number for I/O point 15 for Node 7 is 127.

Modbus Holding Registers								
I/O Point	Gateway	Node 1	Node 2	Node 3	Node 4	Node 5	Node 6	Node 7
1	1	17	33	49	65	81	97	113
2	2	18	34	50	66	82	98	114
3	3	19	35	51	67	83	99	115
4	4	20	36	52	68	84	100	116
5	5	21	37	53	69	85	101	117
6	6	22	38	54	70	86	102	118
7	7	23	39	55	71	87	103	119
8	8	24	40	56	72	88	104	120
9	9	25	41	57	73	89	105	121
10	10	26	42	58	74	90	106	122
11	11	27	43	59	75	91	107	123
12	12	28	44	60	76	92	108	124
13	13	29	45	61	77	93	109	125

Modbus Holding Registers								
I/O Point	Gateway	Node 1	Node 2	Node 3	Node 4	Node 5	Node 6	Node 7
14	14	30	46	62	78	94	110	126
15	15	31	47	63	79	95	111	127
16	16	32	48	64	80	96	112	128

Device Configuration

DIP Switch Changes



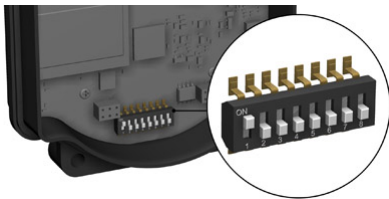
Before making any changes to the DIP switch positions, disconnect the power. For devices with batteries integrated into the housing, remove the battery for at least one minute.

DIP switch changes will not be recognized if power isn't cycled to the device.

Accessing the DIP Switches

To access the DIP switches, follow these steps:

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. For integrated battery models (no ribbon cable) and Class I, Division 2 certified devices (ribbon cable is glued down), skip this step.
4. Remove the black cover plate from the bottom of the device's cover.



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

DIP Switch Settings

Device Settings	Switches			
	1	2	3	4
Transmit Power Level: 1 Watt (30 dBm)	OFF*			
Transmit Power Level: 250 mW (24 dBm), DX80 Compatibility Mode	ON			

* Default configuration

Transmit Power Levels

These 900 MHz radios can be operated at 1 watt (30 dBm) or 250 mW (24 dBm). The default setting (DIP switch OFF) is 1 watt. While the radios operate in 1 Watt mode, they cannot communicate with 150 mW DX80 radio devices. To communicate with the 150 mW radio models, operate this radio in 250 mW mode (DIP switch ON).

For 2.4 GHz radios, this DIP switch is disabled. The transmit power for 2.4 GHz is fixed at about 100 mW EIRP (18 dBm), making the 2.4 GHz Performance models automatically compatible with the DX80 2.4 GHz models.

Hibernation Mode and Sleep Mode

While in hibernation mode, the radio does not operate. All SureCross devices powered from an integrated battery ship from the factory in hibernation mode to conserve the battery. To wake the device, press and hold button 1 for five seconds. To put any FlexPower or integrated battery SureCross radio into **hibernation mode**, press and hold button 1 for five seconds. The radio is in hibernation mode when the LEDs stop blinking, but in some models, the LCD remains on for an additional minute after the radio enters hibernation mode. After a device has entered hibernation mode, you must wait one minute before waking it.

During normal operation, the SureCross radio devices enter **sleep mode** after 15 minutes of operation. The radio continues to function, but the LCD goes blank. To wake the device, press any button.

Mixing Performance and Non-Performance Radios in the Same Network

To comply with federal regulations, the 150 mW radios and 1 Watt radios communicate differently. To mix Performance radios with non-Performance radios:







- Performance radios must operate in 250 mW mode, **not** 1 Watt mode (DIP switch 1 ON)
- Non-Performance radios must be set to use Extended Address Mode (DIP switch 1 ON)

For more detailed instructions about setting up your wireless network, refer to the Quick Start Guide, Banner document number 128185. For more information about using Performance and non-Performance radios within the same network, refer the technical note titled *Mixing Performance Radios and 150 mW Radios in the Same Network* listed on the FAQ/Knowledgebase section of Banner's Wireless Sensor Networks website.

Verify Communications

After powering up and binding the Gateway and its Nodes, verify all devices are communicating properly. Verify LED 1 is green. 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 communicating with the Gateway to which it is bound.

LED 1	LED 2	Gateway Status	Node Status
 (green on)		Power ON	
 (green flashing)			RF Link OK
 (red flashing)	 (red flashing)	Device Error	Device Error
	 (yellow flashing)	Modbus Communication Active	
	 (red flashing)	Modbus Communication Error	No radio link (when flashing once every three seconds)

For Gateway and Ethernet Bridge systems, active Modbus communication refers to the communication between the Gateway and the Ethernet Bridge. For GatewayPro systems, the Modbus communication LEDs refer to the communication internal to the Gateway Pro. For Gateway only systems, the Modbus communication LEDs refer to the communication between the Gateway and its host system (if applicable).

When testing the Gateway and Node, verify all radios and antennas are at least two meters apart or the communications may fail.

Specifications

Radio

Range

- 900 MHz (1 Watt): Up to 9.6 kilometers (6 miles) *
- 2.4 GHz: Up to 3.2 kilometers (2 miles) *

Transmit Power

Spread Spectrum Technology

FHSS (Frequency Hopping Spread Spectrum)

Antenna Connection

Ext. Reverse Polarity SMA, 50 Ohms

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

900 MHz (1 Watt): 30 dBm conducted (up to 36 dBm EIRP)
 2.4 GHz: 18 dBm conducted, less than or equal to 20 dBm EIRP

900 MHz Compliance (1 Watt Radios)

FCC ID UE3RM1809: This device complies with FCC Part 15, Subpart C, 15.247

IC: 7044A-RM1809

2.4 GHz Compliance

FCC ID UE300DX80-2400 - This device complies with FCC Part 15, Subpart C, 15.247

ETSI/EN: In accordance with EN 300 328: V1.7.1 (2006-05)

IC: 7044A-DX8024

Link Timeout

Gateway: Configurable

Node: Defined by Gateway

* With the 2 dB antenna that ships with the product. High-gain antennas are available, but the range depends on the environment and line of sight. To determine the range of your wireless network, perform a Site Survey.

General

Power*

Requirements: +10 to 30V dc or 3.6 to 5.5V dc low power option (For European applications: +10 to 24V dc, $\pm 10\%$ or 3.6 to 5.5V dc low power option)
 900 MHz Consumption: Maximum current draw is <100 mA and typical current draw is <50 mA at 24V dc. (2.4 GHz consumption is less.)

Housing

Polycarbonate
 Weight: 0.26 kg (0.57 lbs)
 Mounting: #10 or M5 (M5 hardware included)
 Max. Tightening Torque: 0.56 N·m (5 in·lbf)

Interface

Indicators: Two bi-color LEDs

Buttons: Two

Display: Six character LCD

Wiring Access

One 5-pin Euro-style male connector

* For European applications, power the DX80 from a Limited Power Source as defined in EN 60950-1.

Communication

Hardware (RS-485)

Interface: 2-wire half-duplex RS-485
 Baud Rates: 9.6k, 19.2k (default), or 38.4k
 Data Format: 8 data bits, no parity, 1 stop bit

Environmental

Environmental

Rating: IEC IP67; NEMA 6; (See UL section below for any applicable UL specifications)
 Operating Temperature: -40 to +85° C (Electronics); -20 to +80° C (LCD)
 Operating Humidity: 95% max. relative (non-condensing)
 Radiated Immunity: 10 V/m, 80-2700 MHz (EN61000-6-2)

Shock and Vibration

IEC 68-2-6 and IEC 68-2-7
 Shock: 30g, 11 millisecond half sine wave, 18 shocks
 Vibration: 0.5 mm p-p, 10 to 60 Hz

Refer to the SureCross™ DX80 Wireless I/O Network product manual, Banner p/n 132607, for installation and waterproofing instructions. Operating the devices at the maximum operating conditions for extended periods can shorten the life of the device.

Certification

FlexPower Gateway/Low-Profile Data Radio

CSA: Class I, Division 2, Groups A, B, C, D (Ex/A Ex nA II T4); Certificate: 1921239 c



LCIE/ATEX: Zone 2 (II 3G / Ex nA IIC); Certificate: LCIE 10 ATEX 1012 X



Included with Device (Low-Profile Housings)

The following items ship with the low-profile housings.

Included with Device	Model	Qty	Item
Mounting Hardware Kit	BWA-HW-001	4	Screw, M5-0.8 x 25mm, SS
		4	Screw, M5-0.8 x 16mm, SS
		4	Hex nut, M5-0.8mm, SS
		4	Bolt, #8-32 x 3/4", SS
Antenna*	BWA-902-C, or BWA-202-C	1	Antenna, 902-928 MHz, 2 dBd Omni, Rubber Swivel RP-SMA Male, or Antenna, 2.4 GHz, 2 dBd Omni, Rubber Swivel RP-SMA Male
SureCross Literature CD	79685	1	SureCross Literature CD
SureCross Quick Start Guide**		1	SureCross Quick Start Guide
Data sheet			
Cable	MQDC1-506	1	Cable, 5-Euro (single ended), Straight, 2m

* Internal antenna devices do not ship with this antenna.

** Ships with Gateways and all MultiHop radios

Warnings

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

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.

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Antenna Installation

Always 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.

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

Exporting SureCross Radios

It is our intent to fully comply with all national and regional regulations regarding radio frequency emissions. **Customers who want to re-export this product to a country other than that to which it was sold must ensure the device is approved in the destination country.** A list of approved countries appears in the *Agency Certifications* section of the product manual. The SureCross wireless products were certified for use in these countries using the antenna that ships with the product. When using other antennas, verify you are not exceeding the transmit power levels allowed by local governing agencies. Consult with Banner Engineering if the destination country is not on this list.

Limited Warranty

Banner 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 of the Banner product.

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Contact Us

For more information: Contact your local Banner representative or Banner Corporate Offices around the world.

Corporate Headquarters: Banner Engineering Corp. 9714 Tenth Ave. North, Mpls., MN 55441, Tel: 763-544-3164, www.bannerengineering.com, sensors@bannerengineering.com

Europe: Banner Engineering Europe Park Lane, Culliganlaan 2F, Diegem B-1831 BELGIUM, Tel: 32-2 456 07 80, Fax: 32-2 456 07 89, www.bannereurope.com, mail@bannereurope.com

Latin America: Contact Banner Engineering Corp. (US) or e-mail **Mexico:** mexico@bannerengineering.com; or **Brazil:** brasil@bannerengineering.com

Asia:

Banner Engineering China Shanghai Rep Office Rm. G/H/I, 28th Flr. Cross Region Plaza No. 899, Lingling Road, Shanghai 200030 CHINA, Tel: 86-21-54894500, Fax: 86-21-54894511, www.bannerengineering.com.cn, sensors@bannerengineering.com.cn

Banner Engineering Japan Cent-Urban Building 305 3-23-15, Nishi-Nakajima Yodogawa-Ku, Osaka 532-0011 JAPAN, Tel: 81-6-6309-0411, Fax: 81-6-6309-0416, www.bannerengineering.co.jp, mail@bannerengineering.co.jp

Banner Engineering Int'l Incorporated Taiwan Rep. Office 8F-2, No. 308, Sec. 1, Neihu Rd. Taipei, Taiwan 114 Phone: +886 2 8751 9966 #15 | Fax: +886 2 8751 2966, www.bannerengineering.com.tw, info@bannerengineering.com.tw

Banner Engineering India Pune Head Quarters Office, No. 1001 Sai Capital, Opp. ICC Senapati Bapat Road, Pune 411016 INDIA, Tel: 91-20-66405624, Fax: 91-20-66405623, www.bannerengineering.co.in, india@bannerengineering.com