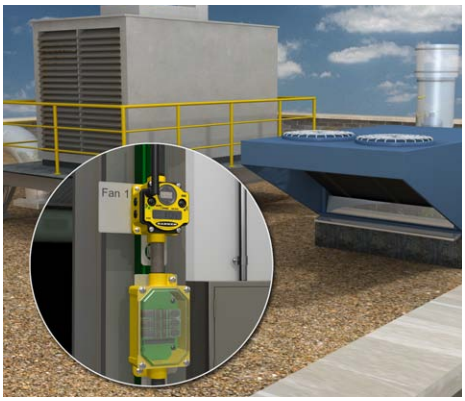
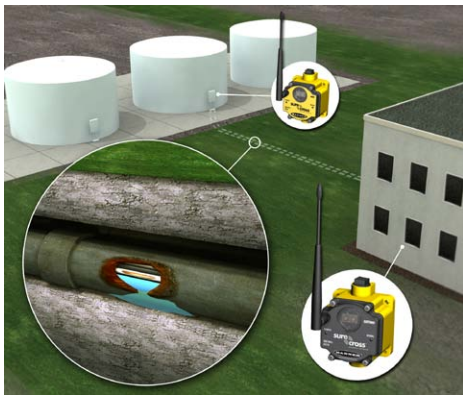
Facilities and Maintenance Wireless Applications

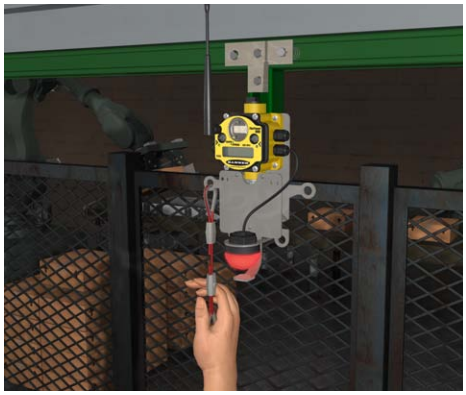
Predictive maintenance operations · Energy monitoring · Conduit and wire replacement · Facility operations · Water and wastewater operations









Banner Engineering Corp. 9714 Tenth Ave. No., Minneapolis, MN USA 55441 • Phone: 763.544.3164 • www.bannerengineering.com • Email: sensors@bannerengineering.com

General Questions about Wireless Technology

What frequencies are used and do I need a license?

Banner's SureCross radios use the Industrial, Scientific, and Medical (ISM) bands, which do not require a license. The SureCross product line includes both 900 MHz (North America) and the 2.4 GHz (Global) models.

How do I know my data is secure and will this interfere with any of our existing wireless networks?

Banner's SureCross system does not pose a security threat to any existing networks because the SureCross system cannot physically route malicious TCP/IP packets. The SureCross protocol only carries sensor data values. It is not possible to gain access to the organization's main network through the SureCross wireless system and it is not possible for the SureCross wireless system to receive a web page or executable file over the wireless communication layer.

The SureCross protocol only carries I/O data, making it impossible for a malicious executable file to be transmitted. This protocol does not operate like an open protocol such as Wi-Fi and is not subject to the risks of an open protocol.

For more information on the security of Banner's wireless technology, refer to the Wireless Security technical note. Read these technical notes on TDMA and FHSS for more detailed information about how the SureCross wireless I/O products work.

How far can the signal travel?

When using the standard 150 mW radios and the 2 dB antenna that ships with the radio, the signal will travel up to three miles with a clean line of sight. Higher gain antennas or the higher watt radios can send a signal between five and ten miles with line of sight. The 900 MHz FHSS technology signal can penetrate floors, walls, and other indoor obstructions and the integrated site survey capability evaluates RF signal strength to ensure your network works before it is installed. No software required.

Can I install multiple networks in my facility?

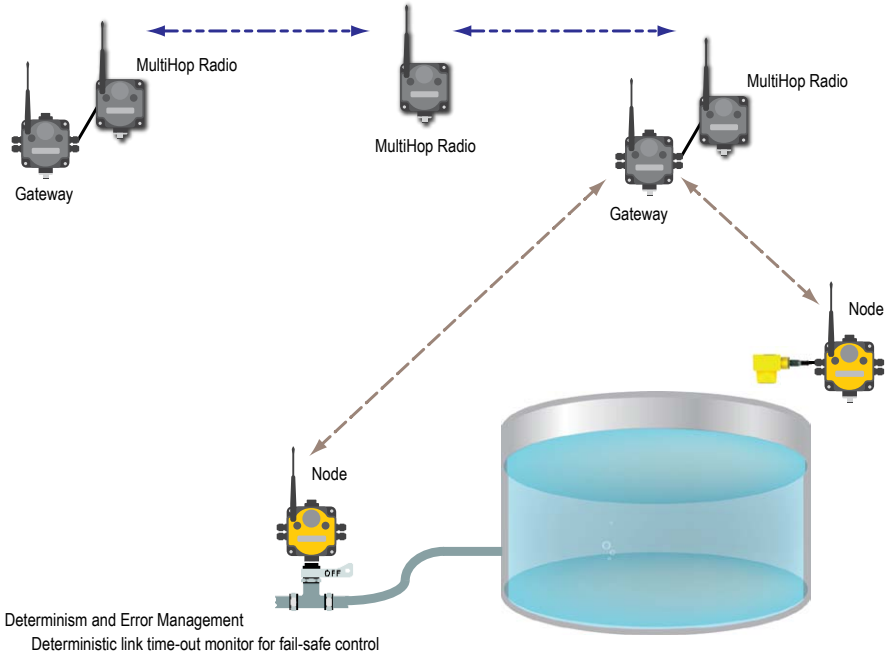
Yes. To prevent networks from interfering with each other, the Gateway and all its Nodes exchange a binding code that prevents radios outside the network from communicating with the Gateway. This is similar to "pairing" your wireless headset to your phone, but is more secure.

What are the advantages of a deterministic system?

Our deterministic system defines how network endpoints behave during the loss of communications. The network identifies when the communications link is lost and sets relevant outputs to user-defined conditions. Once the radio signal is re-established, the network returns to normal operation.

How long will the battery power last in a FlexPower application?

Banner's efficient power management technology enables a single battery power supply to provide continuous power to the radio but intermittent power to a sensor and offers a multi-year battery life. Our FlexPower technology also enables a Node to be powered by solar or 10–30V dc. Different sensors can be evaluated for battery life.



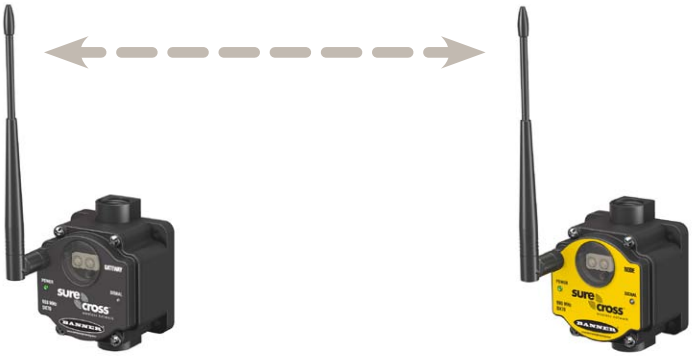
Determinism and Error Management

Deterministic link time-out monitor for fail-safe control

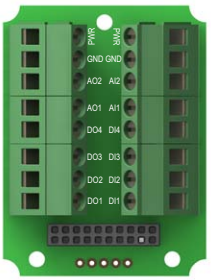
Outputs are configured to go to predefined states until the radio link recovers

Banner Engineering Corp. 9714 Tenth Ave. No., Minneapolis, MN USA 55441 • Phone: 763.544.3164 • www.bannerengineering.com • Email: sensors@bannerengineering.com

Product Overview: DX70 Point-to-Point Networks



- Only one Gateway and one Node per network
- Binding done with the two rotary switches
- I/O is pre-mapped: input 1 on Gateway mapped to output 1 on Node
- Requires 10–30V dc power, no FlexPower Nodes
- No LCD or push-buttons
- Blinking LEDs indicate radio signal strength
- Analog inputs are 0 to 20 mA only
- No Modbus or Ethernet communications options



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

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

Communication Signal Strength

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

Blink Rate	Definition
Every 1/8 second	Fewer than 3% missed packets
Every 1/4 second	Between 3% and 25% missed packets
Every 1/2 second	Between 26% and 50% missed packets
Every 1 second	More than 50% missed packets

Related Links:

DX70 Datasheet/Manual

Banner Engineering Corp. 9714 Tenth Ave. No., Minneapolis, MN USA 55441 • Phone: 763.544.3164 • www.bannerengineering.com • Email: sensors@bannerengineering.com

Binding DX70s

Binding the DX70 Gateway and Node

Binding Nodes to their Gateway ensures the Nodes only exchange data with the Gateway they are bound to. The Gateway automatically generates a unique extended addressing code when the Gateway enters binding mode. This code is then transmitted to all radios within range that are also in binding mode. After a Node is bound, the Node accepts data only from the Gateway to which it is bound. The extended addressing code defines the network, and all radios within a single network must use the same code.

If the power is applied and the Power LED is solid green and the Signal LED is solid red for more than thirty seconds (indicating an RF link error), the devices need to be bound. To bind your DX70 pair, follow these instructions.

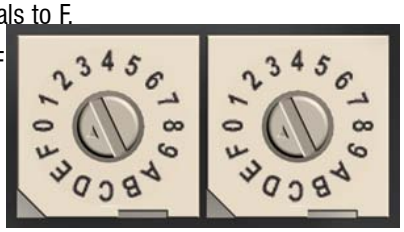
1. Install the supplied antennas to both the Gateway and Node.

2. Apply power to both devices and position the Gateway and Node at least two meters apart.

The Power LED is solid green and the Signal LED is solid red, indicating an RF link error.*

3. Remove the rotary dial access covers.

4. On the Gateway, set both the left and right rotary dials to 0, then set both the left and right rotary dials to F.



5. The Gateway enters binding mode. Note that both rotary dials for each device must be changed to F after applying power, not before applying power. Both the POWER and SIGNAL LEDs flash red.

6. On the Node, set both the left and right rotary dials to 0, then set both rotary dials to F.

The Node enters binding mode and waits for the Gateway to respond. Both the Gateway's and Node's LEDs alternately flash red during pairing. After the devices are successfully bound, the Node's LEDs are solid red for a few seconds and the Node automatically exits binding mode. The Node Power LED is solid green and Signal LED is solid red, indicating the Node is bound. Binding should take less than twenty seconds.

7. Change the Gateway's rotary dials to a valid Network ID.

Valid Network IDs are 01 through 32, in decimal, established using both rotary dials. The left dial may be set to 0, 1, 2, or 3. The right dial may be set from 0 to 9 when the left dial is at 0, 1, or 2; or set to 0 through 2 when the left dial is at 3. (Positions A through F are invalid network ID numbers.)**

8. The Node automatically synchronizes to the Gateway and establishes a radio link in less than a minute.

When a radio link is established, the Power LED is green and the Signal LED flashes yellow on both devices to indicate the signal strength.

9. On the Node, set both the left and right rotary dials back to 0, or any position other than F.

10. Replace both the rotary dial access covers.

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

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

** When multiple networks operate in the same area, assign a unique Network ID (NID) to the Gateway device within each bound pair. For more information about collocated networks and Network IDs, refer to the Troubleshooting section.

Related Links:

DX70 Datasheet/Manual

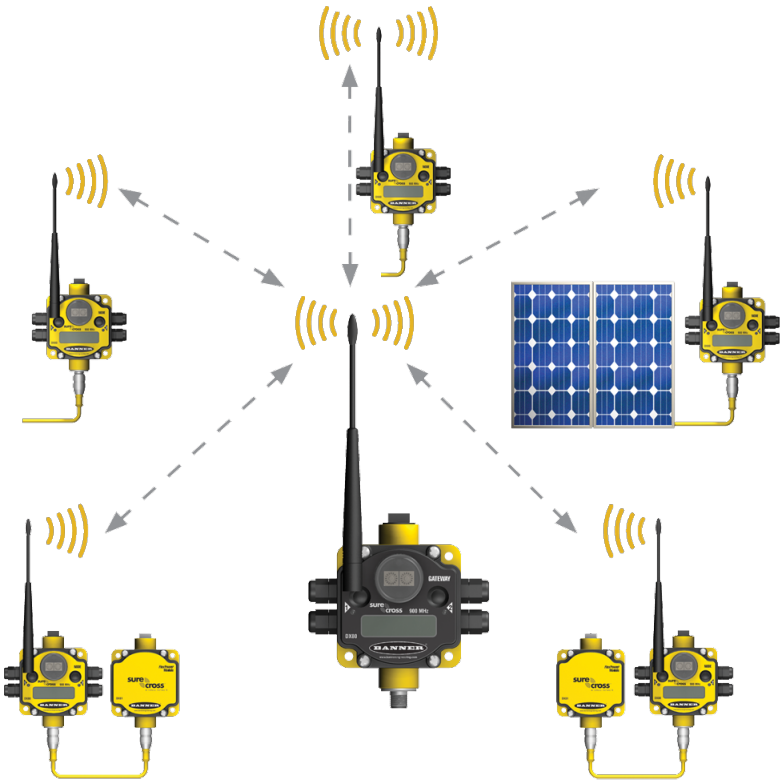
Product Overview: DX80 Point-to-MultiPoint Networks

Analog Inputs

- 0–20 mA
- 4–20 mA
- 0–10V dc
- Pt100 RTD
- Thermocouple

Discrete Inputs

- Sinking/Sourcing
- Contact



Sensors

- Photoelectric
- Ultrasonic
- Inductive
- Capacitive
- Vibration
- Thermocouple

Signal Inputs

- Temperature
- Humidity
- Level
- Pressure
- Flow

Gateway

- I/O or Communications
- Modbus RTU
- Modbus/TCP
- EtherNet/IP
- RS-485/RS-232

- Gateway can support up to 47 Nodes with any mix of I/O
- Battery option: FlexPower Nodes and solar power capability
- Analog inputs: DIP switch selectable between 0–20 mA and 4–20 mA; 0–10V, thermocouple, RTD, and counter inputs available
- I/O mapping configurable by software; no license agreement or hardware keys
- Intrinsically Safe Nodes: Class 1 Div 1, Class 1 Div 2

Related Links:

SureCross DX80 Product Manual

Banner Engineering Corp. 9714 Tenth Ave. No., Minneapolis, MN USA 55441 • Phone: 763.544.3164 • www.bannerengineering.com • Email: sensors@bannerengineering.com

Product Overview: Performance Point-to-MultiPoint Networks

SureCross Performance Radio Features

- Increased radio transmit power of 1 Watt
- DIP switch configurable to transmit at 250 mW for DX80 compatibility
- 12 I/O models allow for up to 12 discrete inputs, 12 discrete outputs, or a combination of inputs and outputs not exceeding 12
- Some models offer “universal” analog inputs for user configurability between mA and V inputs

Analog Inputs

- 0–20 mA
- 4–20 mA
- 0–10V dc
- Pt100 RTD
- Thermocouple

Discrete Inputs

- Sinking
- Sourcing
- Contact

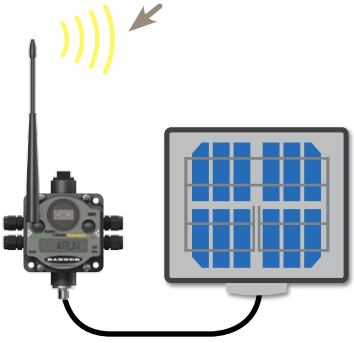
Sensors

- Photoelectric
- Ultrasonic
- Inductive
- Capacitive
- Vibration
- Thermocouple

Signal Inputs

- Temperature
- Level
- Pressure
- Flow

Up to 6 mile range
(with 2 dBm antenna)



Battery option: FlexPower Nodes and solar power capability

Gateway

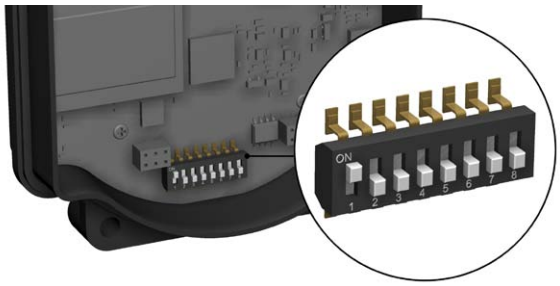
- I/O or Communications
- Modbus RTU; Modbus/TCP; EtherNet/IP
- RS-485/RS-232
- Gateway can support up to 47 Nodes with any mix of I/O
- I/O mapping configurable by software; no license agreement or hardware keys

Performance “E” housing (IP54) with integrated battery

Related Links:

SureCross DX80 Product Manual

Binding DX80s and Performance Models



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.

On the Gateway

Step 1. Disconnect the Gateway from its power source.

Step 2. Remove the Gateway's top cover.

Step 3. Move DIP switch 1 to the ON position. Extended Addressing Mode is activated using DIP switch 1. (Refer to the Device Configuration section of the device's data sheet for instructions on accessing the DIP switches.)

Step 4. Apply power to the Gateway.

Step 5. 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.

On the Node

Step 1. Disconnect the Node from its power source. For Nodes powered by a battery integrated into the housing, remove the battery for at least one minute.

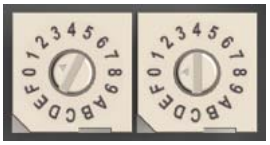
Step 2. Remove the Node's top cover.

Step 3. Move DIP switch 1 to the ON position.

Step 4. Apply power to the Node. For Nodes powered by a battery integrated into the housing, replace the battery.

Step 5. Triple click button 2 to enter binding mode. The Node enters binding mode and locates the Gateway in binding mode. The red LEDs flash alternately. After the Node is bound, the LEDs are both solid red for a few seconds. The Node cycles its power, then enters RUN mode.

Step 6. Use both of the Node's rotary dials to assign a valid decimal Device Address (between 01 and 48). The left rotary dial represents the tens digit (0 through 4) and the right dial represents the ones digit (0 through 9) of the Device Address.



Step 7. Repeat these steps for all Nodes that need to communicate to this Gateway.

On the Gateway

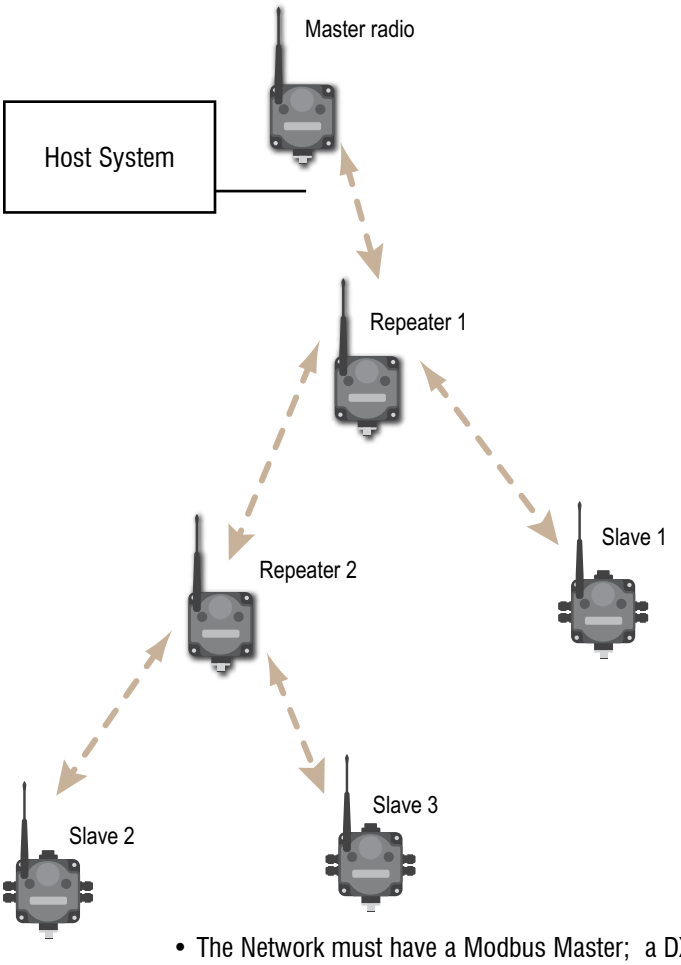
Step 1. Single click either button 1 or button 2 on the Gateway to exit binding mode and reboot.

Related Links:

SureCross DX80 Product Manual

Banner Engineering Corp. 9714 Tenth Ave. No., Minneapolis, MN USA 55441 • Phone: 763.544.3164 • www.bannerengineering.com • Email: sensors@bannerengineering.com

Product Overview: MultiHop (Host Controlled)



MultiHop Radio Master Mode. Within a network of MultiHop radios, there is only one master radio for the wireless network. This master radio controls the overall timing of the network and is always the parent device for the other MultiHop radios. The host system connects to this master radio. (This master radio is not a Modbus master device.)

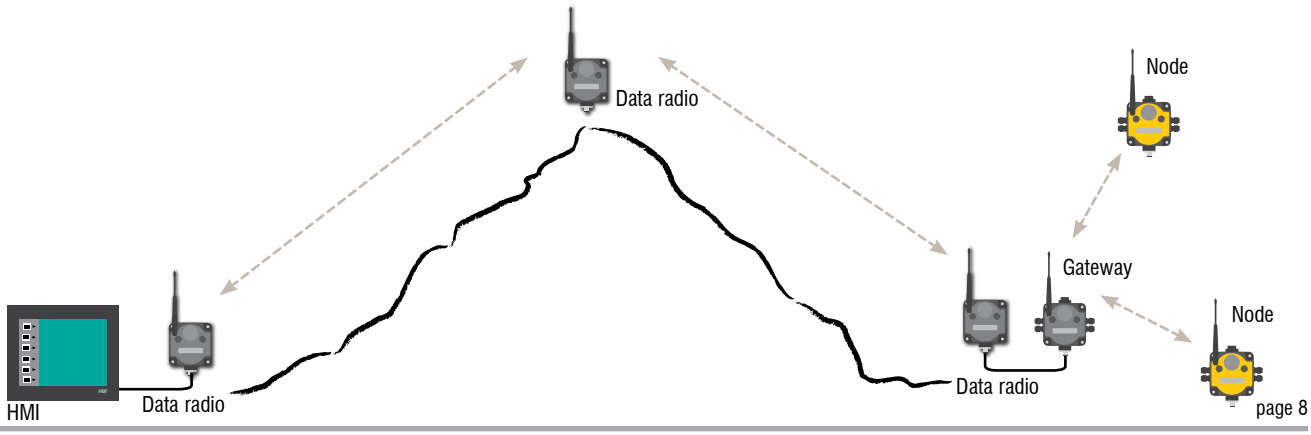
MultiHop Radio Repeater Mode. When a MultiHop radio is set to repeater mode, it acts as both a parent and a child. The repeater receives data packets from its parent, then re-transmits the data packet to the children within the repeater's network. The incoming packet of information is retransmitted on both the radio link and the local (wired) serial link.

MultiHop Radio Slave Mode. The slave radio is the end device of the MultiHop radio network. A radio in slave mode does not re-transmit the data packet on the radio link, only on the local (wired) serial bus.

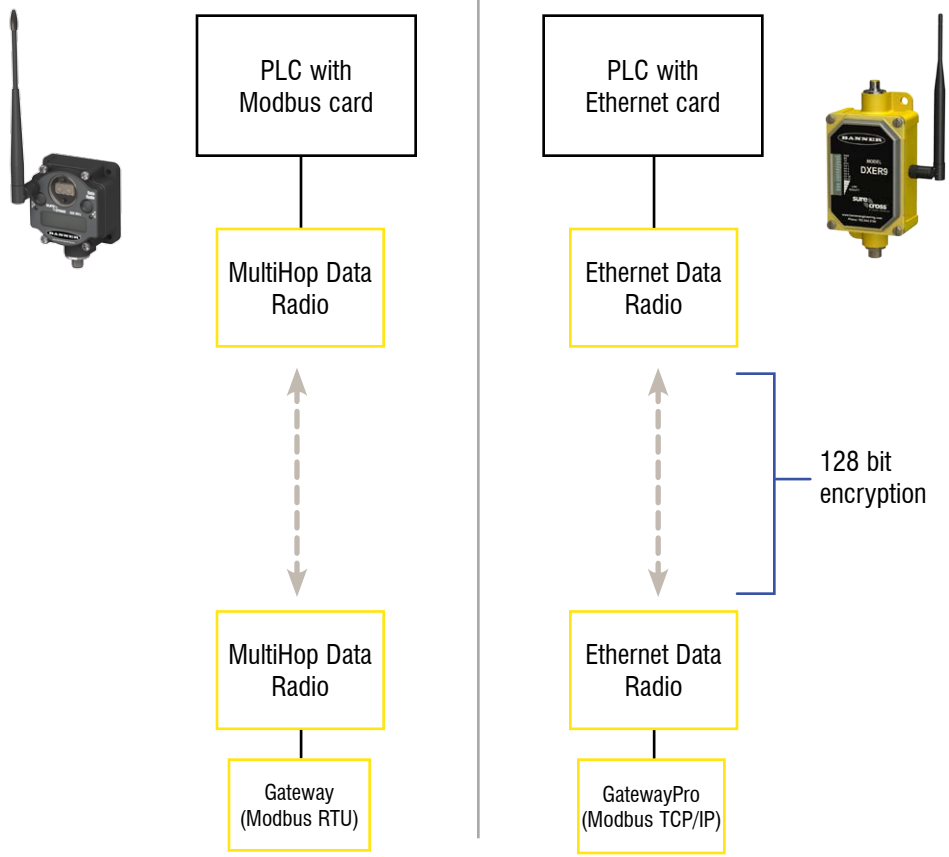
Related Links:

SureCross MultiHop Quick Start Guide

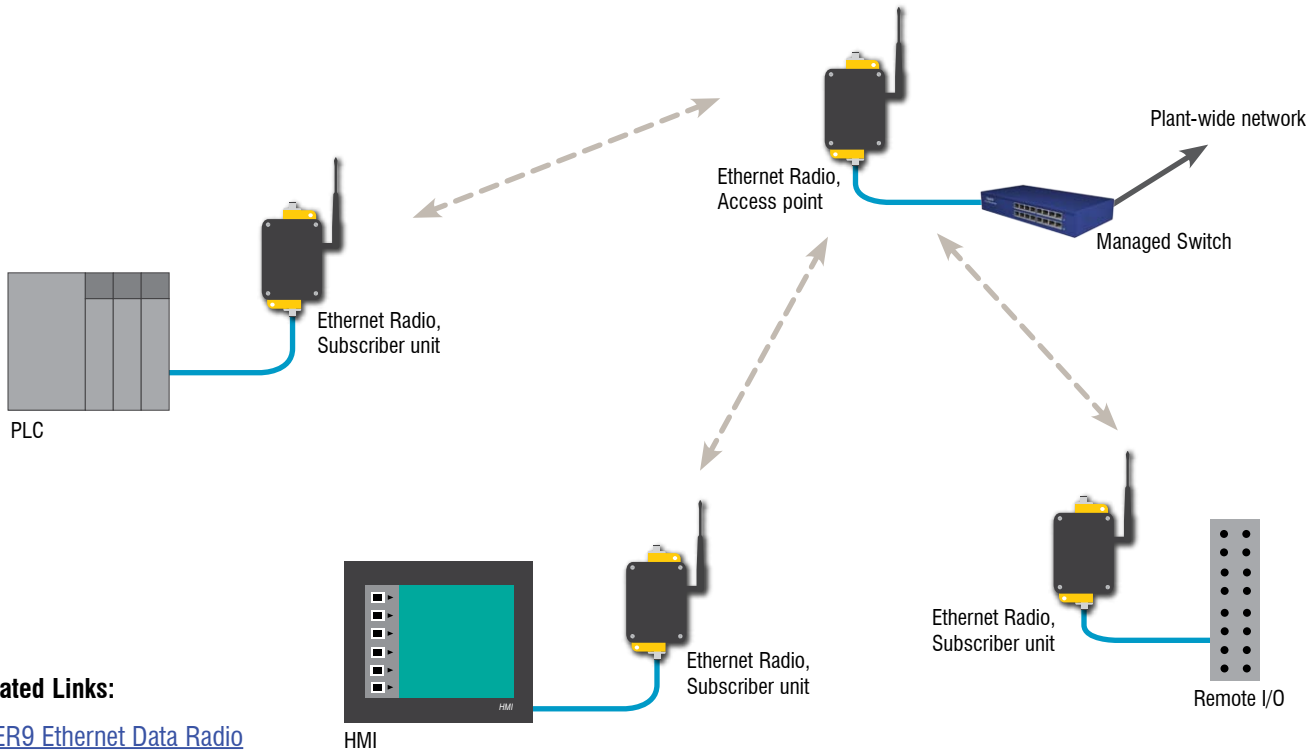
- The Network must have a Modbus Master; a DX83 or DX85 can be used as a MODBUS MASTER as well as an HMI, or PLC. (Do not confuse Modbus master with the master MultiHop radio.)
- Networks will "self" form and "heal"
- Multiple REPEATER capability - REPEATERS do require more power that SLAVES
- 50+ devices per MASTER
- 250 mW and 1 watt, DIP switch selectable power
- One radio: switch selectable MASTER, REPEATER or SLAVE radio
- 5-10 mile range with repeaters
- Various I/O configuration, analog, digital, thermocouple, thermistor, counter
- MODBUS and Transparent Mode options available by DIP switch selection on serial radios



Product Overview: Data Radios



Ethernet Data Radio - Example Network Diagram



Related Links:

DXER9 Ethernet Data Radio
MultiHop Quick Start Guide
MultiHop Data Radio (Model M-H)

Product Overview: Products for Hazardous Locations

Classified Areas Certifications

Certifications (DX99, Intrinsically Safe, Metal Housing)

CSA

Class I, Division 1, Groups A, B, C, D; Class II, Division 1, Groups E, F, G; Class III, Division 1; Certificate: 2008243
Ex ia IIC T4 AEx ia IIC T4

LCIE/ATEX

Zone 0 (Group IIC) and Zone 20 (Group II) Certificate: LCIE 08 ATEX 6098 X **
Ex II 1 GD Ex ia IIC T4 Ex iaD 20 Ta +82°C IP68

FlexPower™ technology driven by one lithium primary battery integrated into the housing

Classified Areas Certifications

DX99, Intrinsically Safe, Polycarbonate Housing

CSA

Class I, Division 1, Groups A, B, C, D; Certificate: 2008243
Ex ia IIC AEx ia IIC T4

LCIE/ATEX

Zone 0 (Group IIC), Temperature Class T4; Certificate: LCIE 08 ATEX 6098 X ***
II 1 G
Ex ia IIC T4

FlexPower™ power input requires power from the DX81H Battery Supply Module

Related Links:

Hazardous Locations Definitions
Classified Areas Products webpage
Class I, Div 1 Control Drawings

Site Survey (Radio Signal Strength Analysis)

Conducting a Site Survey analyzes the radio signal strength between the Gateway and any Node within the network.

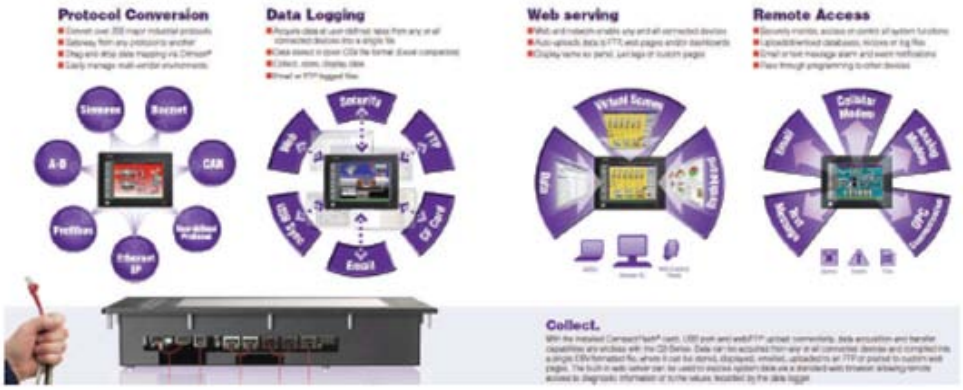
Site Survey results are listed as a percentage of data packets received and indicate the signal strength of the received signal.

Green. Packets received at a strong signal strength. A strong signal strength is greater than −90 dBm at the receiver.

Yellow. Packets received at a good signal strength. A good signal is between −90 and −100 dBm at the receiver.

Red. Packets received at a weak signal strength. A weak signal is less than −100 dBm at the receiver.

Missed. Packets not received on the first transmission and requiring a retry.



Related Links:

SureCross DX80 Product Manual
How to Conduct a Site Survey

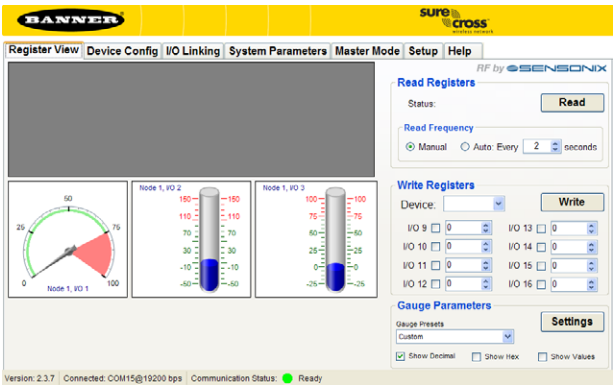
Product Overview: User Configuration Tool (UCT)

The User Configuration Tool, or 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.

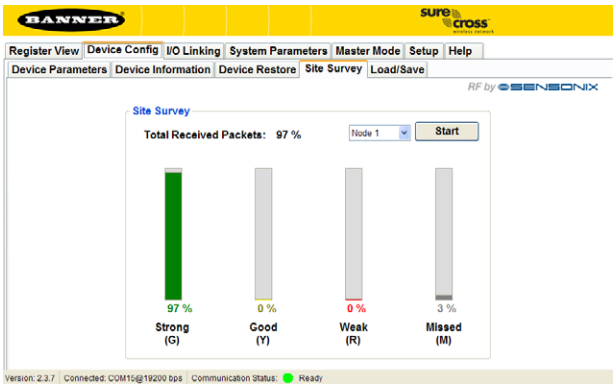
The UCT requires a USB to RS-485 (model number BWA-HW-006) converter cable to pass information between your computer and the Gateway.

This software is free and the latest version in both 32-bit and 64-bit versions are always available for download from the Wireless Software page on Banner Engineering's website. (The Wireless Software webpage also includes instructions about how to determine if your computer is 32-bit or 64-bit.)

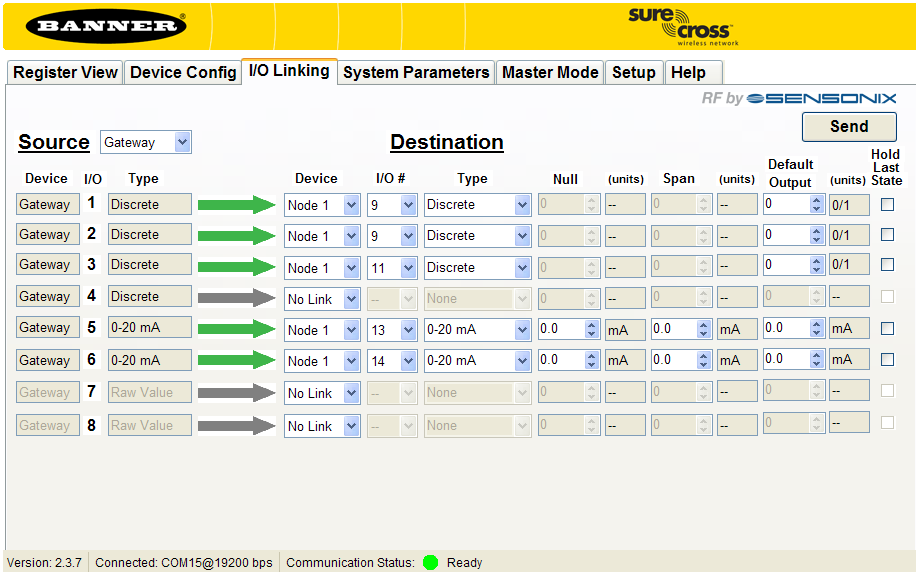
Part No: 81325
Model No: BWA-HW-006
Description: Adapter cable, USB to RS485, for use with the User Configuration Tool software (UCT)
Price Ea: $117



Use the Register View screen to graphically display specified Node I/O values. Up to three values can be graphically displayed as either a dial, a thermometer, or a discrete on/off status.



Use the Site Survey screen to conduct a Site Survey between the Gateway and a selected Node.



The I/O Linking screen allows you to easily link one SureCross device's inputs to another SureCross device's outputs, as long as both devices are part of the wireless network.

Related Links:

User Configuration Tool Manual

Product Overview: Power Options and Accessories

Part No: 76972
Model No: DX81
Description: Battery Supply Module with mounting hardware

Part No: 82864
Model No: DX81H
Description: Battery Supply Module with mounting hardware, for DX99 polycarbonate housing devices

Part No: 77674
Model No: DX81P6
Description: Battery Supply Module, 6 “D” cells, with mounting hardware

Part No: 81057
Model No: BWA-SOLAR-001
Description: FlexPower Solar Supply, includes panel (13 11/16” x 15 3/16”), controller, rechargeable battery pack, mounting hardware

Part No: 78261
Model No: BWA-BATT-001
Description: Lithium “D” cell, single

Part No: 78473
Model No: BWA-BATT-003
Description: Rechargeable battery pack, controller, wiring

Related Links:

Accessories List

- Easy-to-use interface box to electrically isolate sensor outputs
- Accepts up to 6 discrete PNP sourcing outputs
- Six independent SPST relay outputs
- Six yellow indicator LEDs signal when the relay is energized

Model: IB6RP
Price Ea: $177

Enclosures and Mounting

Part No.	Model No.	Description	Price
11320	BWA-EF14128	Enclosure Fiberglass Hinged 14"x12"x8"	$135
11321	BWA-EF1086	Enclosure Fiberglass Hinged 10"x8"x6"	$95
11322	BWA-EF866	Enclosure Fiberglass Hinged 8"x6"x6"	$85
11326	BWA-PA1412	Panel, 14 x 12	$26
11327	BWA-PA108	Panel, 10 x 8	$22
11328	BWA-PA86	Panel, 8 x 6	$10
11329	BWA-PM12	Pole Mount, 12 inch	$73
11340	BWA-PM8	Pole Mount, 8 inch	$55
11341	BWA-PM6	Pole Mount, 6 inch	$52

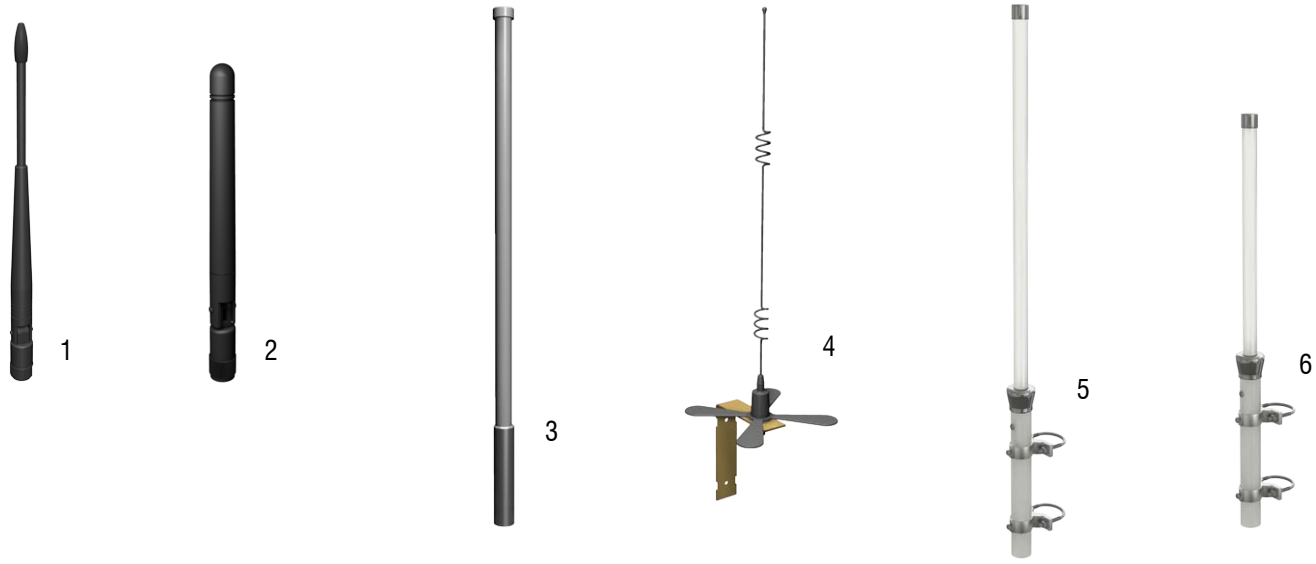
Part No.	Model No.	Description	Price
77161	SMBDX80DIN	Bracket assembly, DIN rail, flat mount	$4

Related Links:

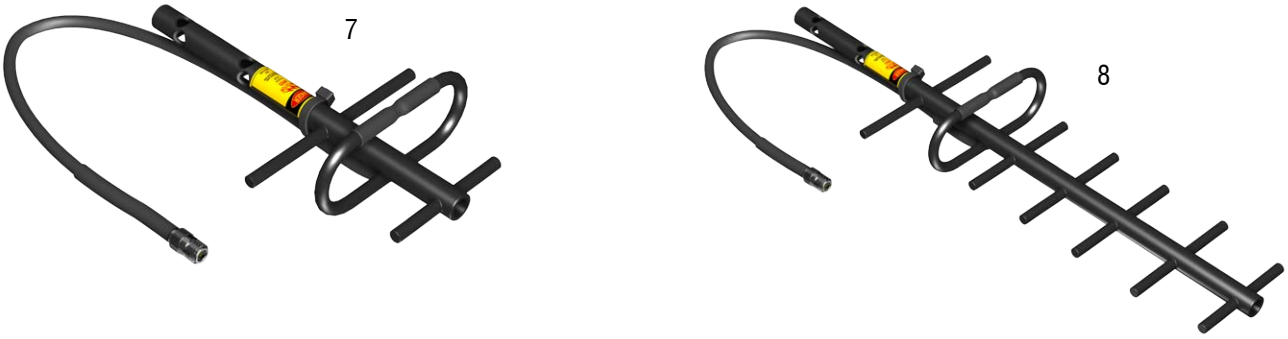
Accessories List (PDF)
Accessories webpage

Product Overview: Antennas and Antenna Accessories

Omni-Directional Antennas



Directional (Yagi) Antennas



	Part No	Model No	Description
1	76908	BWA-9O2-C	902-928 MHz, 2 dBi, RP-SMA Male (ships with 900 MHz DX80 devices)
2	77816	BWA-2O2-C	2.4 GHz, 2 dBi, RP-SMA Male, Rubber swivel, 3 1/4" (ships with 2.4 GHz DX80 devices)
	77817	BWA-2O5-C	2.4 GHz, 5 dBi, RP-SMA Male, Rubber swivel, 6 1/2"
	77818	BWA-2O7-C	2.4 GHz, 7 dBi, RP-SMA Male, Rubber swivel, 9 1/4"
3	77481	BWA-9O6-A	902-928 MHz, 6 dBd, N Female, Fiberglass, 71.5" Outdoor
4	77819	BWA-9O5-B	902-928 MHz, 5 dBd/7.2 dBi, N Female, with Ground Plane, 32" Indoor/Outdoor
5	81080	BWA-2O8-A	2.4 GHz, 8.5 dBi, N Female, 24" Indoor/Outdoor
6	81081	BWA-2O6-A	2.4 GHz, 6 dBi, N Female, 16" Indoor/Outdoor
7	77479	BWA-9Y6-A	890-960 MHz, 6.5 dBd, N Female, 6.8" x 13" Outdoor
8	77480	BWA-9Y10-A	890-960 MHz, 10 dBd, N Female, 6.8" x 24" Outdoor

Surge Suppressors

Part No: 79296
Model No: BWC-LMRSFRPB
Description: Surge Suppressor, bulkhead, RP-SMA Type

Part No: 12477
Model No: BWC-LFNBMN-DC
Description: Surge Suppressor, bulkhead, N-Type, dc Blocking

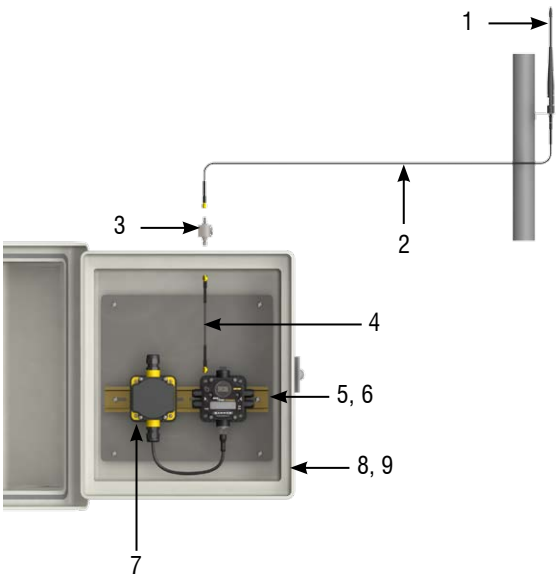
Antenna Cables

Part No	Model No	Description
77486	BWC-1MRSMN05	LMR100 RP-SMA to N Male, 0.5M
77820	BWC-1MRSMN2	LMR100 RP-SMA to N Male, 2M

Part No	Model No	Description
78544	BWC-1MRSFRSB0.2	RG58, RP-SMA to RP-SMAF Bulkhead, 0.2M
78337	BWC-1MRSFRSB1	RG58, RP-SMA to RP-SMAF Bulkhead, 1M
78338	BWC-1MRSFRSB2	RG58, RP-SMA to RP-SMAF Bulkhead, 2M
77488	BWC-1MRSFRSB4	RG58, RP-SMA to RP-SMAF Bulkhead, 4M

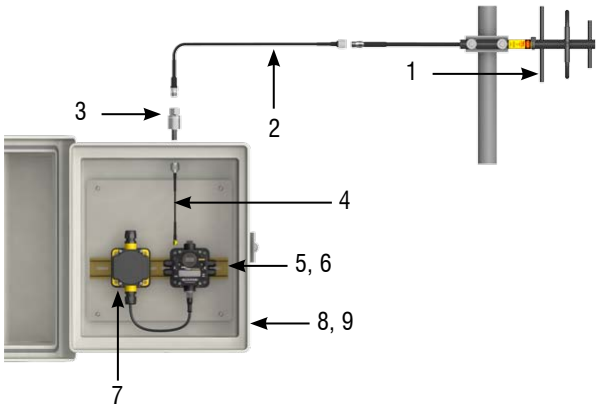
Part No	Model No	Description
77489	BWC-4MNFN3	LMR400 N Male to N Female, 3M
77490	BWC-4MNFN6	LMR400 N Male to N Female, 6M
77821	BWC-4MNFN15	LMR400 N Male to N Female, 15M
77822	BWC-4MNFN30	LMR400 N Male to N Female, 30M

Banner Engineering Corp. 9714 Tenth Ave. No., Minneapolis, MN USA 55441 • Phone: 763.544.3164 • www.bannerengineering.com • Email: sensors@bannerengineering.com



Mounting an RP-SMA Antenna Remotely

Model Number		Description
1	BWA-902-C	Antenna, Omni, 902-928 MHz, 2 dBd, Rubber Swivel, RP-SMA MALE
	BWA-905-C	Antenna, Omni, 902-928 MHz, 5 dBd, Rubber Swivel, RP-SMA MALE
2	BWC-1MRSFRSB02	RG58 Cable, RP-SMA TO RP-SMA Female Bulkhead, 0.2 m
	BWC-1MRSFRSB1	RP-SMA TO RP-SMA Female Bulkhead, 1 m
	BWC-1MRSFRSB2	RG58 Cable, RP-SMA TO RP-SMA Female Bulkhead, 2 m
	BWC-1MRSFRSB4	RG58 Cable, RP-SMA TO RP-SMA Female, Bulkhead, 4 m
3	BWC-LMRSFRPB	Surge Suppressor, Bulkhead, RP-SMA Type, 900 MHz/2.4 GHz
4	BWC-1MRSFRSB02	RG58 Cable, RP-SMA TO RP-SMA Female Bulkhead, 0.2 m
	BWC-1MRSFRSB1	RG58 Cable, RP-SMA TO RP-SMA Female Bulkhead, 1 m
	BWC-1MRSFRSB2	RG58 Cable, RP-SMA TO RP-SMA Female, Bulkhead, 2 m
	BWC-1MRSFRSB4	RG58 Cable, RP-SMA TO RP-SMA Female, Bulkhead, 4 m



Mounting an N-Type Antenna Remotely

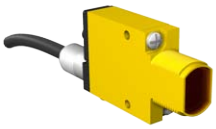
Model Number		Description
1	BWA-9Y6-A	Antenna, Yagi, 900 MHz, 6.5 dBd, N Female
	BWA-9Y10-A	Antenna, Yagi, 900 MHz, 10 dBd, N Female
	BWA-906-A	Antenna, Omni, 900 MHz, 6 dBd, Fiberglass, N Female
	BWA-905-B	Antenna, Omni, 900 MHz, 5 dBd/7.2 dBi, With ground plane, N Female
2	BWC-4MNFN3	LMR400 Cable, N-Male to N-Female, 3 Meters
	BWC-4MNFN6	LMR400 Cable, N-Male to N-Female, 6 Meters
	BWC-4MNFN15	LMR400 Cable, N-Male to N-Female, 15 Meters
	BWC-4MNFN30	LMR400 Cable, N-Male to N-Female, 30 Meters
3	BWC-LFNBMN-DC	Surge Suppressor, Bulkhead, N-Type, 900 MHz/2.4 GHz
4	BWC-1MRSMN05	LMR200 Cable, RP-SMA to N-Male, 0.5 Meters
	BWC-1MRSMN2	LMR200 Cable, RP-SMA to N-Male, 2 Meters

Model Number		Description
5	DIN-35-105	DIN Rail section, 105 mm long, 35 mm design
6	SMBDX80DIN	Bracket Assembly, DIN Rail, for DX80
7	DX81	DX81 FlexPower Battery Supply Module
	DX81P6	DX81P6 FlexPower Battery Supply 6-Pack
8	BWA-EF14128	Fiberglass enclosure, 14"x 12" x 8"
9	BWA-PA1412	Internal panel, 14" x 12"

Related Links:

Antenna Basics
SureCross DX80 Product Manual

Product Overview: FlexPower Sensors



Part No	Model No	Description
78447	SM312LPQD-78447	MINI-BEAM, Low Power, 5V, Polarized Retroreflective, 3 m
78419	SM312DQD-78419	MINI-BEAM, Low Power, 5V, Diffuse, 38 cm

Banner Part No: 80922
Model No: T30UFDNCQ
Description: Ultra-Sonic, T30U, 3.6 to 5V Low Power, 300 mm to 3 m Range, 1-wire serial interface

Part No	Model No	Description
79610	M12FTH1Q	Temperature and Humidity Sensor, ±2% Accuracy, 1-wire serial interface
81050	M12FTH2Q	Temperature and Humidity Sensor, ±3.5% Accuracy, 1-wire serial interface

Banner Humidity Sensor Calibration Statement. This calibration statement (also available online) lists the chain with which the calibration of Banner humidity sensors is traceable to NIST standards.

Product Note for the Temperature and Humidity Sensor.

Banner Part No: 75390
Model No: QT50ULBQ6-75390
Description: Ultra-Sonic, QT50U, 200 mm to 8 m Range

Banner Part No: 10710 (Emitter), 10711 (Receiver)
Model No: QS30WEQ (Emitter), QS30WRQ (Receiver)
Description: WORLD-BEAM, QS30, Range up to 100 feet

Other Sensors or Sensor Components

Part No	Model No	Description
10406	BWA-THERMISTOR-001	NTC Thermistor, 2 KOhms, +/-0.2%C
81930	FTH-FIL-001	Temperature and Humidity Sensor Filter, Aluminum Grill Filter Cap (default filter cap)
81931	FTH-FIL-002	Temperature and Humidity Sensor Filter, Stainless Steel Sintered Filter, 10 micrometer porosity
14275	BWA-S612-30-100	NoShok Series 612 Submersible Level Transmitter, model 612-30-1-1-N-100, 0 to 30 psig, 100' cable
14276	BWA-S612-15-100	NoShok Series 612 Submersible Level Transmitter, model 612-15-1-1-N-100, 0 to 15 psig, 100' cable

Product Overview: EZ-LIGHTs

Download the EZ-LIGHT product brochure for more information about the variety of EZ-LIGHTs available from Banner.

K80L with audible alarm

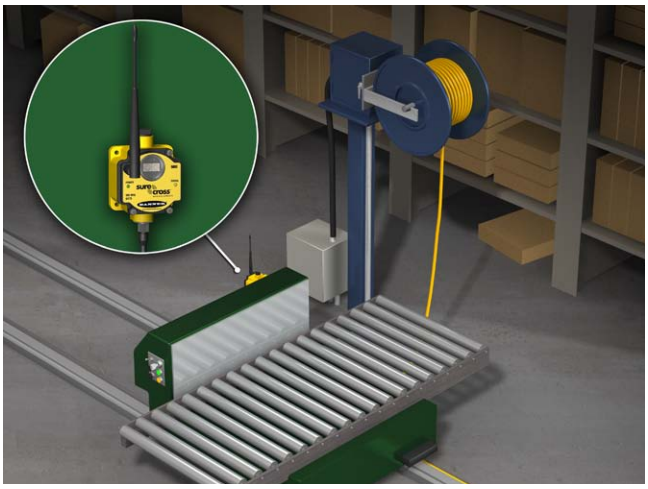
K50L with audible alarm

Daylight Visible EZ-LIGHT Traffic Lights

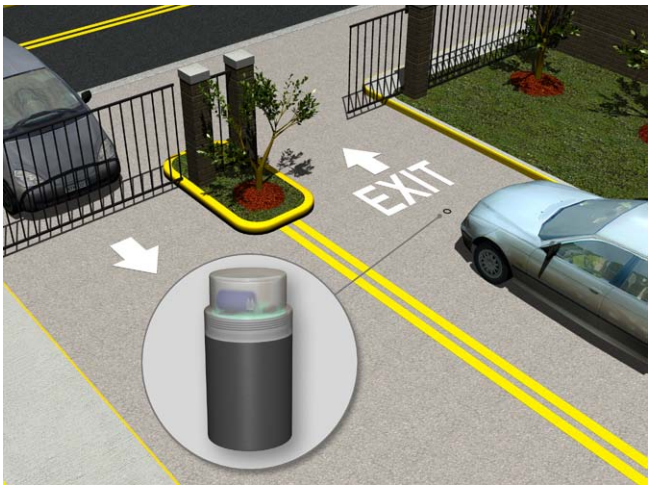
TL50 Tower Lights with audible alarm and TL50 Tower Lights without audible alarm

Applications

Environmental Controls

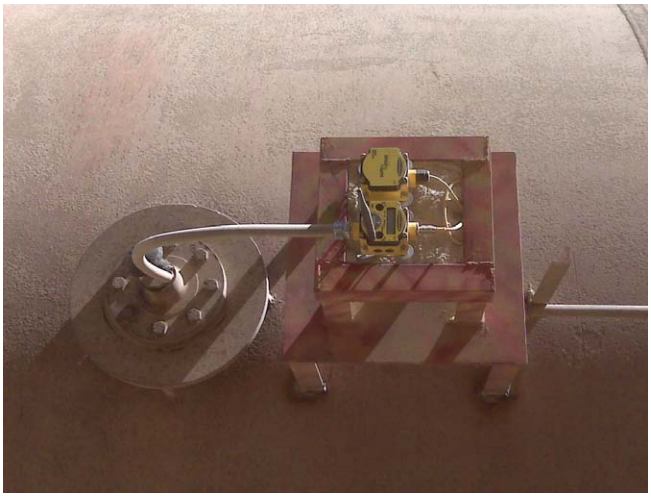


Replacing Cables on a Transport Cart



Opening Gates in a Gated Community

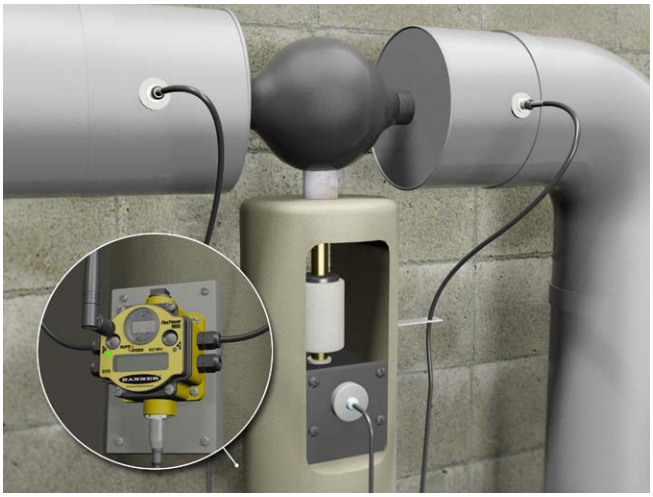
Controlling Temperature and Humidity for a Cabinet Maker



Monitoring Temperatures in a Rotating Kiln

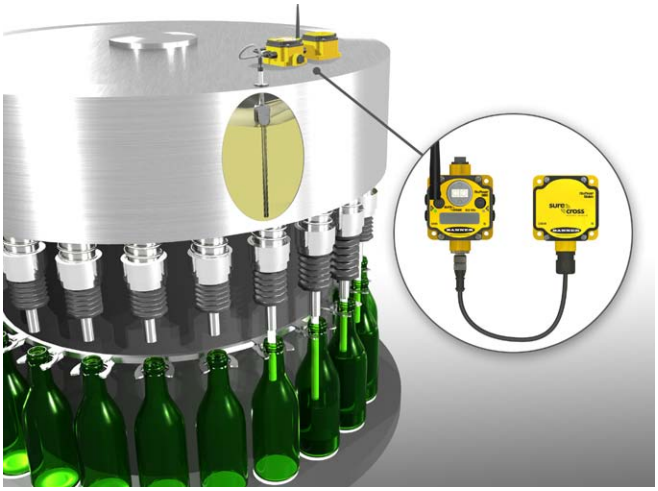
Monitoring Retention Pond Levels

Calling an AGV for Parts

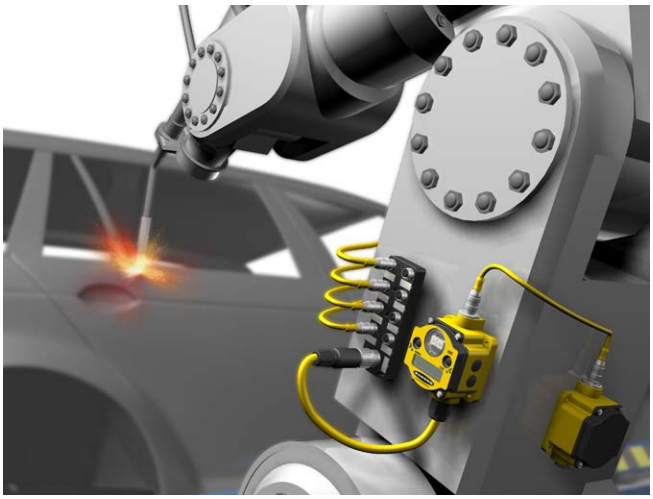


Monitoring Valve Temperatures in a Power Plant

Monitoring Temperature and Humidity in a Commercial Greenhouse



Monitoring Level and Pressure in a Rotary Filler

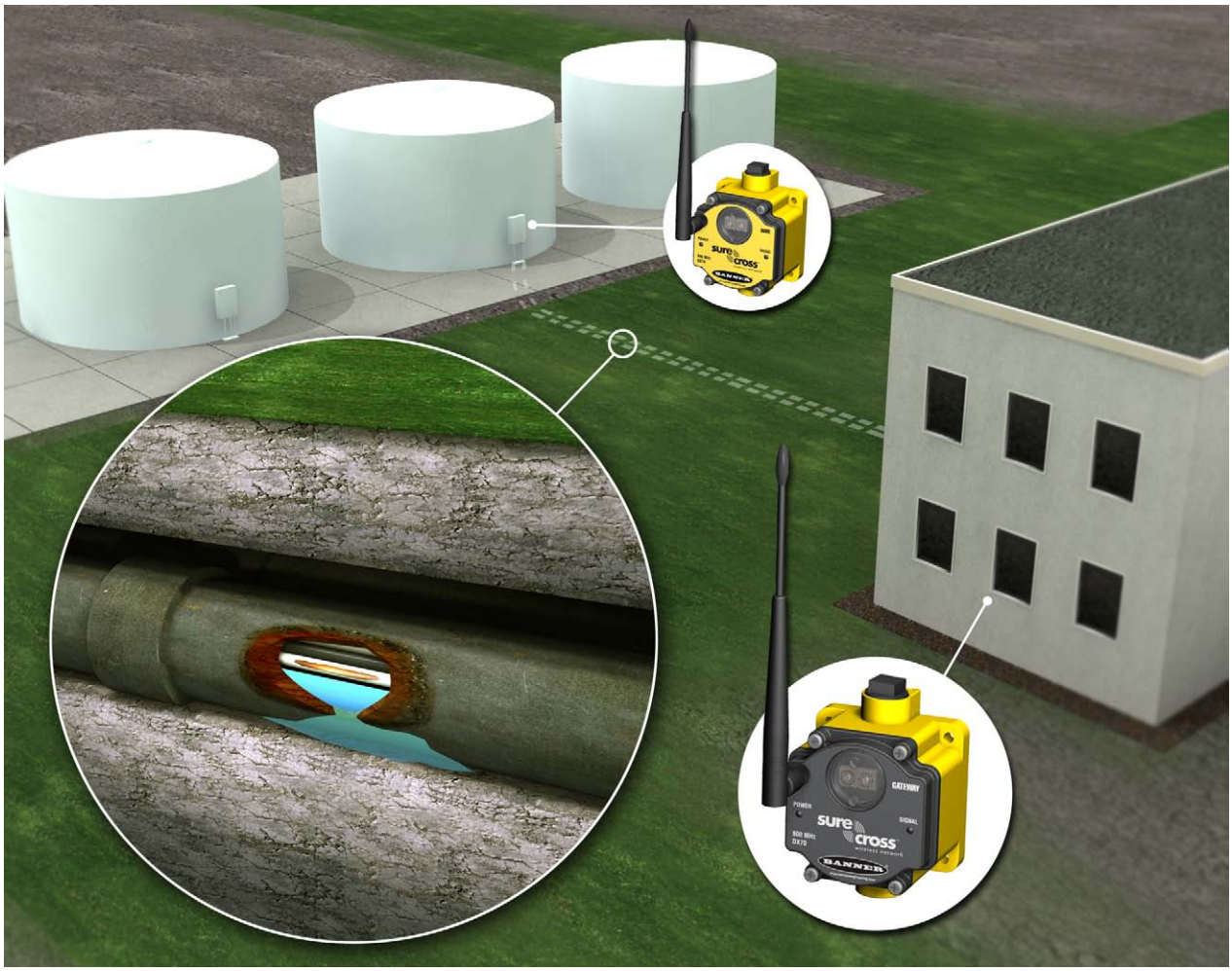


Retrofitting a Homerun Cable

Calculating Machine Run Time

Banner Engineering Corp. 9714 Tenth Ave. No., Minneapolis, MN USA 55441 • Phone: 763.544.3164 • www.bannerengineering.com • Email: sensors@bannerengineering.com

Application: Failed Conduit Replacement



The traditional method for resolving these situations is to have new conduit runs trenched or bored at great expense and inconvenience or continue to operate in a time-consuming manual approach.

But, does implementing a new conduit run prevent line condensation or corroding wires from occurring again?

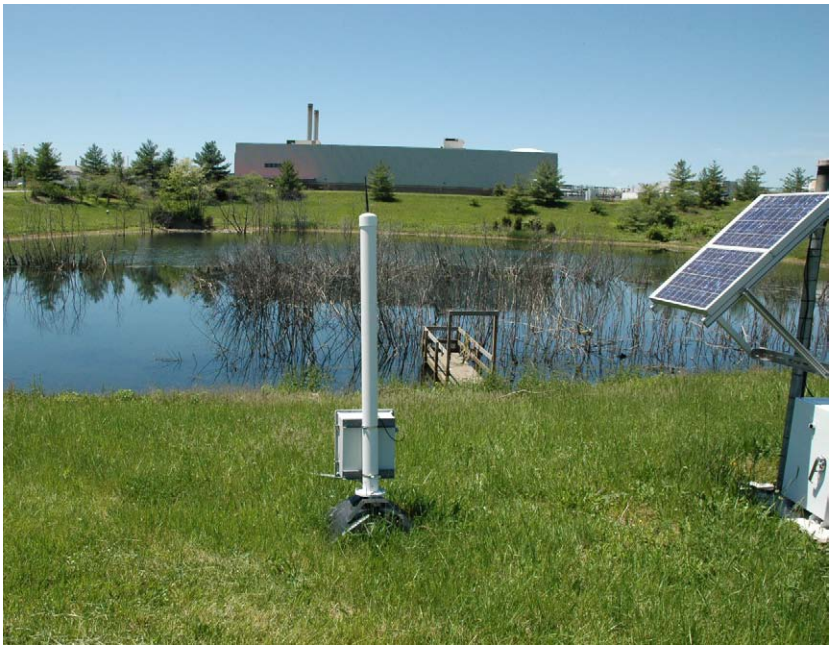
Or will it allow you to expand your capabilities and add more sensors and controls in the future?

A better option might be to implement a solution that allows you to handle your current needs as well as giving you the option for future expansion without the cost or inconvenience of disturbing your facilities operations.

Application Note

Failed Conduit Replacement

Application: Environmental Water Retention Monitoring



Objective: Monitor rain water run-off levels in ponds and/or tanks to comply with EPA and Clean Water Act Requirements.

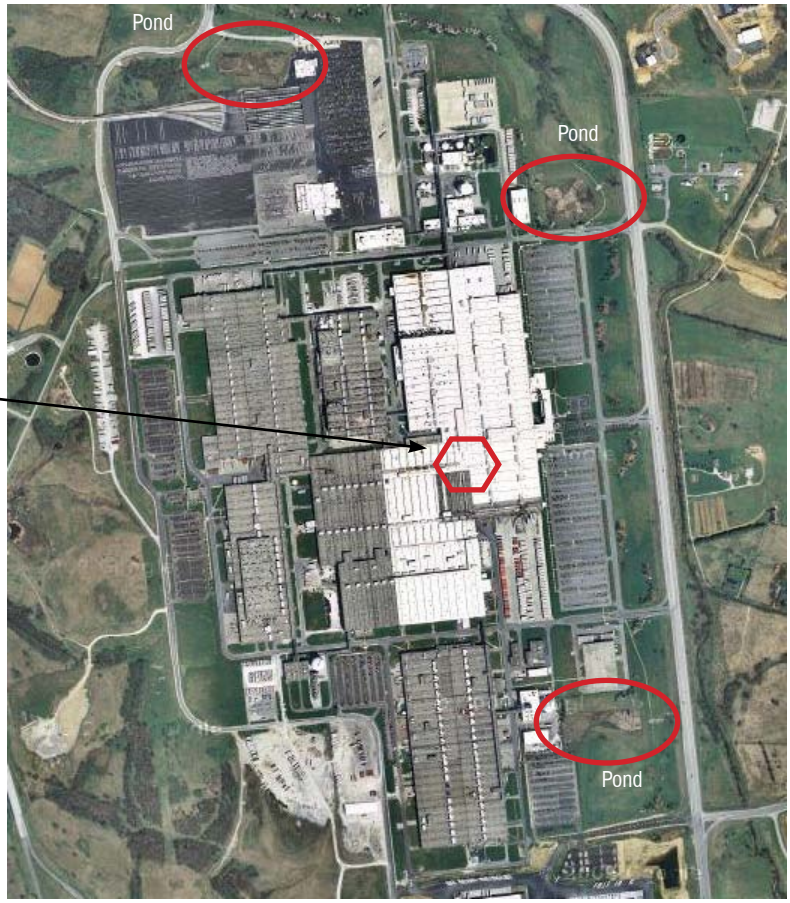
Solution: Banner SureCross Wireless I/O

A submersible pressure transducer is placed in each pond and is connected to the battery-powered wireless Node on the bank.

Benefit: Lower cost compliance with EPA and Clean Water Act requirements.

Note: In this example of the Toyota Georgetown, KY (TMMK) plant, the three retention ponds are separated by up to a mile and several buildings.

This level monitoring application used MultiHop data radios to transmit level information back to a central control location.



Application Note

Monitoring Retention Pond Levels

Application: Predictive Maintenance, Continuous Monitoring

Objective: Reduce PM maintenance on bearings and couplers; implement full time monitoring for over-temperature and/or vibration.

Solution: Banner SureCross Wireless I/O

Several configurations are possible:

- Banner Temperature Nodes will accept thermocouple inputs directly
- Banner I/O Nodes will accept T-GAGE non-contact sensor inputs for applications that cannot use a thermocouple, such as for rotating shafts or liquid temperatures measurements

DX80 FlexPower Node with analog or discrete I/O

T-GAGE series:

- Non-contact temperature sensor
- Analog or discrete

For more information, go to the T-GAGE section of the Banner Engineering website or download this M18T analog output datasheet.

Application Notes

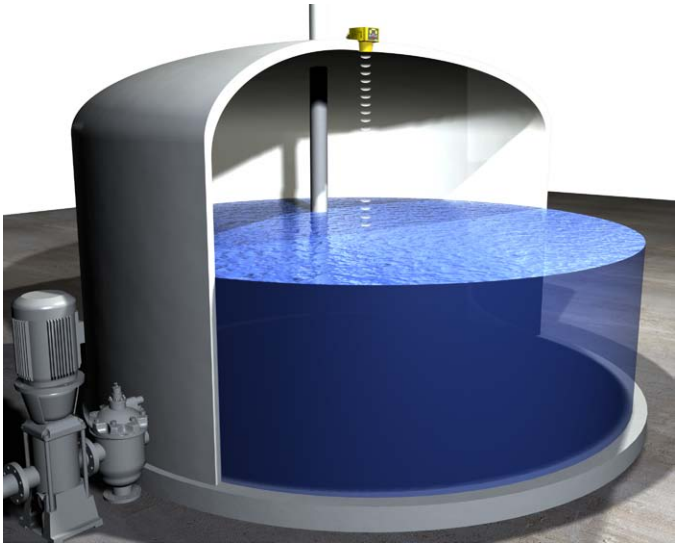
Predictive Maintenance: Motor Temperature
Predictive Maintenance: Valve Temperatures in a Power Plant

Application: Tank Farm Level Monitoring

Objective: Provide continuous remote level monitoring and control of the tanks.

Solution: Banner SureCross Wireless I/O

Benefit: Cost-effective solution.



DX80 FlexPower Node with analog or discrete I/O

U-GAGE Series:

- Non-contact level sensor
- Analog or discrete

Application Notes

Monitoring Level and Pressure in a Rotary Filler
Monitoring Day Tank Levels
Controlling Water Tower Pumps

Application: Locating an Activated Emergency Shower

Objective: Monitor emergency devices such as eye wash stations and defibrillator and notify plant security and the medical team if they are used.

Solution: Banner SureCross Wireless I/O

Benefit: Improve the medical response time.

Note: Banner wireless Nodes accept a wide range of input signals: presence, pressure, flow, etc.

For outside applications, the Node will accept three thermocouple inputs. This allows monitoring of heat tape to make sure the tape has not failed.

ANSI Z358.9 (2009) for Safety Showers and Eye Wash Stations requires certain compliance issues.

Application Note

Locating an Activated Emergency Shower Station

Banner Engineering Corp. 9714 Tenth Ave. No., Minneapolis, MN USA 55441 • Phone: 763.544.3164 • www.bannerengineering.com • Email: sensors@bannerengineering.com

Application: Energy Conservation (Process)

Objective: Reduce expenses by controlling the process and having accurate readings from the entire system instantly. Save additional costs on the installation by using a wireless solution for all remote monitoring and control.

Input types will vary; communication is required with any device in the plant with either facilities or production.

Initial points: Steam pressure and temperature, air pressure, building differential pressure and temp, process water temperature

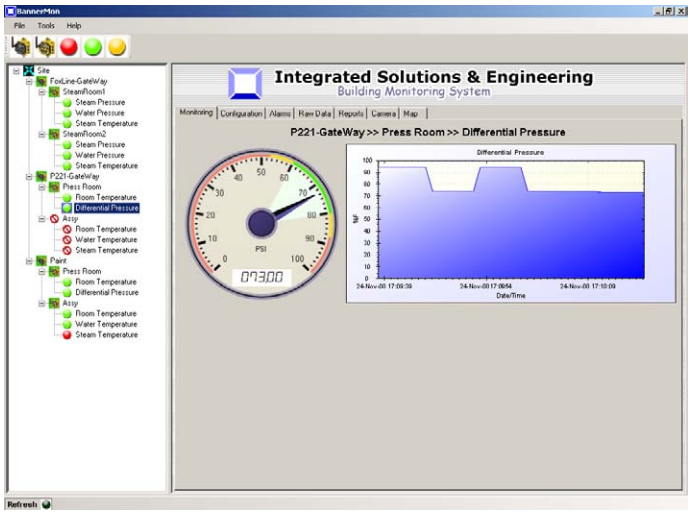
Solution: Banner SureCross Wireless I/O

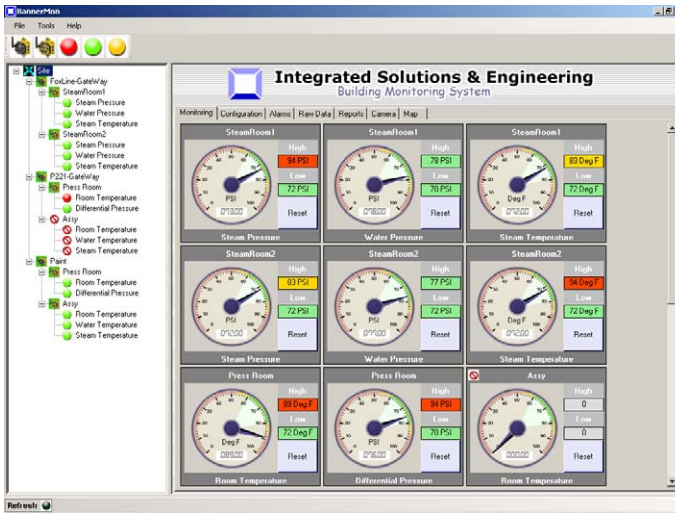
Benefit: The new information will lead to ways of improving system efficiencies and reducing energy consumption.

Note: The plant area is over 850,000 sq ft.

The Gateway is in the center of the plant and uses a high-gain antenna mounted above the height of the production line to reduce obstructions and ensure a robust signal with the various Nodes.

The 50 Nodes could be mounted anywhere, monitoring processes in or outside the building or providing wireless I/O directly on tools in production.





Application Note

Monitoring Power Use to Avoid Peak Use Charges
Managing an HVAC System to Improve Efficiency

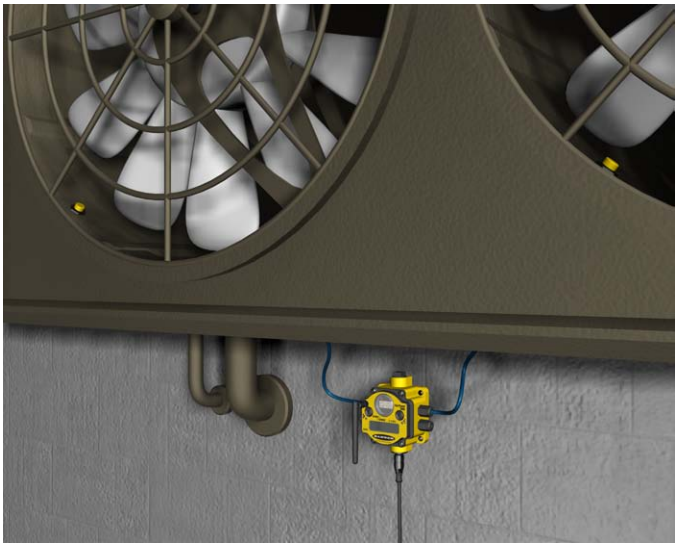
Application: Energy Conservation (Fans and Lighting)

Objective: Turn on and off network exhaust fans, lighting, etc. to conserve energy and lower costs with controlled shut-downs through master scheduling and remote control.

Solution: Banner SureCross Wireless I/O

Benefit: Loads that are otherwise left running during non-production periods, such as breaks, lunch, shift change, and weekends, can now be monitored and controlled, scheduled or event driven, using the host energy management system.

Note: Various 'Node enclosure kits' are assembled and pre-wired with an internal power supply and relays to replicate and monitor the existing manual start/stop NO/NC and the associated starter/ contactor.



Application Note

Monitoring Power Use to Avoid Peak Use Charges
Managing an HVAC System to Improve Efficiency

Links

Banner Engineering Corp Wireless Products Website

Frequently Asked Questions/Knowledgebase

SureCross DX80 Products

SureCross DX80 Product Manual

SureCross DX80 User Configuration Tool (Software)

SureCross DX80 Quick Start Guide

SureCross DX70 Manual

Data Radios

MultiHop (M-H) Data Radio Datasheet

MultiHop Quick Start Guide

Ethernet Data Radio Datasheet

Applications

Wireless Applications LIbrary

Other Banner Products

EZ-LIGHTs

Banner Engineering Corp. 9714 Tenth Ave. No., Minneapolis, MN USA 55441 • Phone: 763.544.3164 • www.bannerengineering.com • Email: sensors@bannerengineering.com

more sensors, more solutions

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.

THIS LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER EXPRESS OR IMPLIED (INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), AND WHETHER ARISING UNDER COURSE OF PERFORMANCE, COURSE OF DEALING OR TRADE USAGE.

This Warranty is exclusive and limited to repair or, at the discretion of Banner Engineering Corp., replacement. **IN NO EVENT SHALL BANNER ENGINEERING CORP. BE LIABLE TO BUYER OR ANY OTHER PERSON OR ENTITY FOR ANY EXTRA COSTS, EXPENSES, LOSSES, LOSS OF PROFITS, OR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES RESULTING FROM ANY PRODUCT DEFECT OR FROM THE USE OR INABILITY TO USE THE PRODUCT, WHETHER ARISING IN CONTRACT OR WARRANTY, STATUTE, TORT, STRICT LIABILITY, NEGLIGENCE, OR OTHERWISE.**

Banner Engineering Corp. reserves the right to change, modify or improve the design of the product without assuming any obligations or liabilities relating to any product previously manufactured by Banner Engineering Corp.

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.

Lightning Arrestors/Surge Protection. 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.

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. Banner Engineering reserves the right to update or change documentation at any time. For the most recent version of any documentation, please refer to our website: www.bannerengineering.com.

Banner Engineering Corp. 9714 Tenth Ave. No., Minneapolis, MN USA 55441 • Phone: 763.544.3164 • www.bannerengineering.com • Email: sensors@bannerengineering.com