# WIRELESS SENSOR NETWORKS


## Point-to-Point DX70 page 385

- Bridges I/O between one Gateway and one Node on the same radio frequency band
- Provides plug-and-play installation with direct I/O mapping between Gateway and Node
- Offers discrete and analog I/O in the same unit
- Provides built-in signal strength LED indicator

## Point-to-Multipoint DX80 page 388

- Includes a Gateway and one or more Nodes that operate on the same radio frequency band
- Accommodates a combination of Nodes and *Flex*Power™ Nodes in each network
- Offers discrete, analog & discrete, temperature and M-GAGE™ Nodes
- Gateways directly connect to Modbus RTU, EtherNet/IP, Modbus TCP/IP and other industrial protocols

## Intrinsically Safe DX99 page 396

- Certified for operation in Class I Div 1 and ATEX Zone 0 locations
- Powers all radio communications and an external sensing device
- Offers a choice of installation brackets and antenna feed throughs

## MultiHop Radio DX80 page 398

- Selectable power levels up to 1 watt transmit power; license-free operation up to 4 watt EIRP, with a high-gain antenna, in the U.S. and Canada for 900 MHz
- *Flex*Power power input options allow for +10 to 30V dc, solar or battery power sources

## Ethernet Radio page 399

- Long-range point-to-multipoint wireless ethernet network with up to 16 subscriber units
- RF transmission rate is 1.5AABPS
- Built-in spectrum analyser

## Accessories page 400

- A wide selection of power supplies for Gateways, Nodes and sensors
- Modbus RTU remote I/O for expanding Gateway I/O capacity
- A complete selection of cordsets for easy wiring
- Antennas, cables and accessories for virtually every location challenge

# Wireless Solutions

**Specify Your Wireless Solution in 3 Simple Steps**

1. Radio and Antenna Options
2. Wireless Network Architectures
3. SureCross Wireless family features

## 1. Radio and Antenna Options

Banner recommends conducting a site survey to verify range in your location.

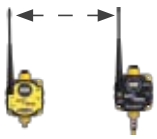
**900 MHz —** recommended for use in North America

**2.4 GHz —** Global wireless standard

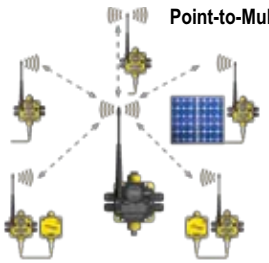
**Antenna Options**
Internal
External
High-gain remote

## 2. Wireless Network Architectures

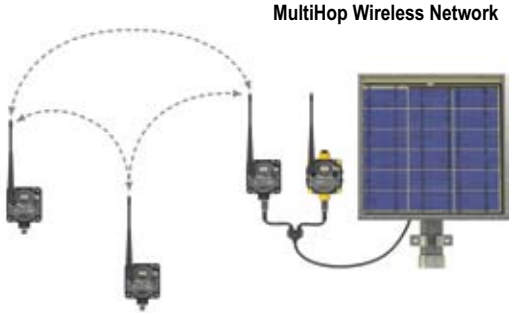
**DX70 Point-to-Point**



**DX80 and DX99 Point-to-Multipoint**



**MultiHop Wireless Network**



## 3. SureCross™ Wireless Family Features

| **DX70** IP67 | **DX80** IP67 | **DX80..C** IP20 CID2 | **DX80** IP67 | **DX80..C** IP20 CID2 | **DX99** IP67 CID1 | **MultiHop Radio** IP67 | **Ethernet Radio** IP67 |
|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |
| **Power:** 10 to 30V dc | **Gateways** ***Flex*Power:** 10 to 30V dc Solar | | **Nodes** ***Flex*Power:** 10 to 30V dc Battery Solar | | **Intrinsically Safe Nodes** ***Flex*Power:** Battery | ***Flex*Power:** 10 to 30V dc Battery Solar | ***Flex*Power:** 10 to 30V dc |
| **I/O:** Discrete Analog | **I/O:** Discrete Analog **Networks:** Modbus RTU Master & Slave EtherNet/IP Modbus TCP/IP | | **I/O:** Discrete Analog Counter Temp — Thermocouple RTD Temp and relative humidity | | **I/O:** Discrete Analog Temp — Thermocouple RTD | **Data:** RS-232 RS-485 Ethernet | **Data:** Ethernet (900 MHz only) |


# SureCross™
## DX70 Point-to-Point I/O Wireless Pairs

- DX70 models deliver an economical, dedicated wireless industrial I/O solution
- A network includes a Gateway and one Node that operate in the same radio frequency band
- Each Gateway and Node pair provides direct I/O mapping and plug-n-play installation
- 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) bands
- Open design supports inputs from sensors and devices made by Banner and other manufacturers
- The unique radio binding technology enables multiple DX70 pairs to be located within range of each other
- Models include discrete and analog I/O in a single device
- 900 MHz and 2.4 GHz models accommodate worldwide communication standards
- Rugged IP67/NEMA 6 design enabling simple installation

Photoelectrics Sensors
Fiber Optic Sensors
Special Purpose Sensors
Measurement & Inspection Sensors
Vision
Wireless
Lighting & Indicators
Safety Light Screens
Safety Laser Scanners
Fiber Optic Safety Systems
Safety Controllers & Modules
Safety Two-Hand Control Modules
Safety Interlock Switches
Emergency Stop & Stop Control

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page 400

WIRELESS
DX70
DX80
DX99
MultiHop
Ethernet Radio

Wireless Control to Eliminate Coil

Wireless Monitoring of Rotary Table

Wireless Control of HVAC System


Node


Gateway

**ONLINE**
AUTOCAD, STEP, IGES & PDF

DX70 Point-to-Point

## DX70, 10-30V dc

| | Frequency | I/O | Gateway Models* | Node Models* |
|---|---|---|---|---|
|   | 900 MHz | **Discrete:** Four selectable inputs, four PNP outputs<br>**Analog:** Two selectable inputs, two outputs (0-20 mA) | **DX70G9X6S4P4M2M2** | **DX70N9X6S4P4M2M2** |
| | 2.4 GHz | | **DX70G2X6S4P4M2M2** | **DX70N2X6S4P4M2M2** |
| | 900 MHz | **Gateway Discrete:** Four selectable inputs, eight PNP outputs<br>**Node Discrete:** Eight selectable inputs, four PNP outputs | **DX70G9X6S4P8** | **DX70N9X6S8P4** |
| | 2.4 GHz | | **DX70G2X6S4P8** | **DX70N2X6S8P4** |

* To order the internal antenna models, replace the **S** as the 9th digit with a **W**. Internal antennas require an additional week for manufacture and shipping. For example, **DX70N9X6S4P4M2M2** is the model for the external antenna and **DX70N9X6W4P4M2M2** is the model for the internal antenna.

# SureCross™ DX70 Specifications

| | |
|---|---|
| **Radio (See DX80 p. 394)** | |
| **Range*** | **900 MHz**: Up to 4.8 kilometers (3 miles)<br>**2.4 GHz:** Up to 3.2 kilometers (2 miles) |
| **Transmit Power** | **900 MHz:** 21 dBm Conducted<br>**2.4 GHz:** 18 dBm Conducted, ≤ 20 dBm EIRP |
| **Spread Spectrum Technology** | FHSS (Frequency Hopping Spread Spectrum) |
| **Antenna Connector** | Ext. Reverse Polarity SMA, 50 Ohms |
| **Antenna Max. Tightening Torque** | 0.45 N·m (4 in·lbf) |
| **Link Timeout** | 1 or 4 seconds |
| **General** | |
| **Power**** | +10 to 30V dc<br>For European applications: +10 to 24V dc ±10% |
| **Power Consumption** | Less than 1.4 W (60 mA) at 24V dc |
| **Mounting** | #10 or M5 (M5 hardware included) |
| **M5 Fasteners Max. Tightening Torque** | 0.56 N·m (5 in·lbf) |
| **Case Material** | Polycarbonate |
| **Weight** | 0.26 kg (0.57 lb) |
| **Indicators** | Green/Red Power LED, Yellow/Red Signal LED |
| **External Cable Glands** | Two 1/2-inch NPT type |
| **Cable Glands Max. Tightening Torque** | 0.56 N·m (5 in·lbf) |
| **Environmental** | |
| **Environmental Rating** | IEC IP67; NEMA 6 |
| **Operating Temperature** | −40° to +85° C (Electronics) |
| **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<br>**Shock**: 30g, 11 millisecond half sine wave, 18 shocks<br>**Vibration**: 0.5 mm p-p, 10 to 60 Hz |

* With the standard 2 dB antenna. 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.
** For European applications, power the DX70 from a Limited Power Source as defined in EN 60950-1.
*** Operating the devices at the maximum operating conditions for extended periods can shorten the life of the device.

# SureCross™ DX80 Point-to-Multipoint Wireless I/O Network

- An industrial wireless I/O network that can operate in extreme environments while eliminating the need for costly wiring runs
- A basic network consists of a Gateway system controller and one or more Nodes that monitor and/or control I/O in remote locations
- Nodes are easily deployed throughout a facility for gathering data to be concentrated at the Gateway
- Bi-directional communication between the Gateway and Node(s), including fully acknowledged data transmission
- 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) bands
- *Flex*Power™ options allow for +10-30V dc, solar and battery power sources
- 900 MHz and 2.4 GHz models accommodate worldwide communication standards
- Rugged IP67/NEMA 6 design enabling simple plug-and-play installation
- Installation is fast and easy with flexible mounting and power options

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**DX85 Modbus RTU Remote I/O**
Used to expand I/O capacity when connected to a Data Radio or Gateway (see page 394)

## DX80 Gateways

- Gateways are the master of Banner's SureCross Wireless Network
- Modbus RTU over RS-485 communication capability is integrated into every Gateway
- Gateway models are available with discrete, analog and a mix of both I/O types
- IP20 housing option is certified for Class I Div 2 areas

## DX80 Nodes

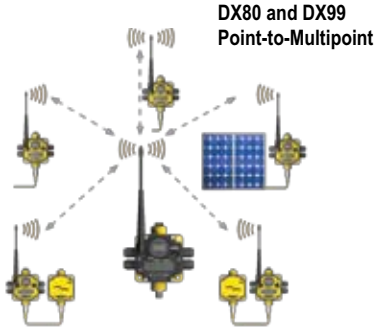
- The Node collects the data and wirelessly transmits it to the Gateway
- Nodes may be powered by either 10 to 30V dc battery or solar power options
- Models are available in a variety of input/output options
- IP20 housing option is certified for Class I Div 2 areas

**User Configuration Tool**
**RS-485 to USB Adapter Cable**
**BWA-HW-006** RS-485 to USB adapter cable is used to connect the DX80 Gateway to a computer. Download your free configuration software at bannerengineering.com/wireless


## DX80 Gateways and Node


DX80 Gateway


DX80 Node



## DX80 EtherNet/IP and Modbus TCP Gateways

| | Frequency | I/O | Models |
|---|---|---|---|
|  DX80P2T6S  DX80P9T6S  DX83 | 900 MHz | DX80 GatewayPro Modbus/TCP to EtherNet/IP protocol converter | DX80P9T6S |
| | 2.4 GHz | | DX80P2T6S |
| | 900 MHz | DX80 GatewayPro (Modbus/TCP) with advanced web-based configuration capabilities | DX80P9A6S |
| | 2.4 GHz | | DX80P2A6S |
| | No Radio | Protocol Conversion: Modbus RTU to Modbus TCP/IP or EtherNet/IP | DX83T |
| | | Advanced user configuration model | DX83A |

## DX80 Modbus RTU Gateways, 10–30V dc

| | Frequency | Base | I/O | Models* |
|---|---|---|---|---|
|  DX80 IP67  DX80..C IP20 External Terminal Strips CID2 certified | 900 MHz | IP67 | **Discrete:** Six selectable inputs, six PNP outputs | DX80G9M6S6P6 |
| | | IP20 | | DX80G9M6S6P6C |
| | 2.4 GHz | IP67 | | DX80G2M6S6P6 |
| | | IP20 | | DX80G2M6S6P6C |
| | 900 MHz | IP67 | **Discrete:** Six selectable inputs, six NPN outputs | DX80G9M6S6N6 |
| | | IP20 | | DX80G9M6S6N6C |
| | 2.4 GHz | IP67 | | DX80G2M6S6N6 |
| | | IP20 | | DX80G2M6S6N6C |
| | 900 MHz | IP67 | **Analog:** Four inputs, four outputs (0-20 mA) | DX80G9M6S0P0M4M4 |
| | | IP20 | | DX80G9M6S0P0M4M4C |
| | 2.4 GHz | IP67 | | DX80G2M6S0P0M4M4 |
| | | IP20 | | DX80G2M6S0P0M4M4C |
|  DX80 IP67  DX80..C IP20 External Terminal Strips CID2 certified | 900 MHz | IP67 | **Analog:** Four inputs, four outputs (0-10V) | DX80G9M6S0P0V4V4 |
| | | IP20 | | DX80G9M6S0P0V4V4C |
| | 2.4 GHz | IP67 | | DX80G2M6S0P0V4V4 |
| | | IP20 | | DX80G2M6S0P0V4V4C |
| | 900 MHz | IP67 | **Discrete:** Four selectable inputs, four PNP outputs **Analog:** Two inputs, two outputs (0-20 mA) | DX80G9M6S4P4M2M2 |
| | | IP20 | | DX80G9M6S4P4M2M2C |
| | 2.4 GHz | IP67 | | DX80G2M6S4P4M2M2 |
| | | IP20 | | DX80G2M6S4P4M2M2C |
| | 900 MHz | IP67 | **Discrete:** Four selectable inputs, four PNP outputs **Analog:** Two inputs, two outputs (0-10V) | DX80G9M6S4P4V2V2 |
| | | IP20 | | DX80G9M6S4P4V2V2C |
| | 2.4 GHz | IP67 | | DX80G2M6S4P4V2V2 |
| | | IP20 | | DX80G2M6S4P4V2V2C |
| | 900 MHz | IP67 | **Discrete:** Eight selectable inputs, four PNP outputs (When your wireless network does not include a host system, the eight input/four output Gateway must be mapped to the four input/eight output Node.) | DX80G9M6S8P4 |
| | | IP20 | | DX80G9M6S8P4C |
| | 2.4 GHz | IP67 | | DX80G2M6S8P4 |
| | | IP20 | | DX80G2M6S8P4C |
| | 900 MHz | IP67 | **Discrete:** Four selectable inputs, eight PNP outputs (When your wireless network does not include a host system, the four input/eight output Gateway must be mapped to the eight input/four output Node.) | DX80G9M6S4P8 |
| | | IP20 | | DX80G9M6S4P8C |
| | 2.4 GHz | IP67 | | DX80G2M6S4P8 |
| | | IP20 | | DX80G2M6S4P8C |

* To order the internal antenna models, replace the **S** as the 9th digit with a **W**. Internal antennas require an additional week for manufacture and shipping. For example, **DX80G9M6S0P0V4V4** is the external antenna model and **DX80G9M6W0P0V4V4** is the internal antenna model.

ACCESSORIES page 400

## DX80 Nodes, 10-30V dc—Analog and Discrete

| | Frequency | Base | I/O | Models* |
|---|---|---|---|---|
|  DX80 Node IP67 | 900 MHz | IP67 | **Discrete:** Four selectable inputs, four PNP outputs **Analog:** Two inputs, two outputs (0-20 mA) | **DX80N9X6S4P4M2M2** |
| | | IP20 | | **DX80N9X6S4P4M2M2C** |
| | 2.4 GHz | IP67 | | **DX80N2X6S4P4M2M2** |
| | | IP20 | | **DX80N2X6S4P4M2M2C** |
|  DX80..C IP20 External Terminal Strips CID2 certified | 900 MHz | IP67 | **Discrete:** Four selectable inputs, four PNP outputs **Analog:** Two inputs, two outputs (0-10V) | **DX80N9X6S4P4V2V2** |
| | | IP20 | | **DX80N9X6S4P4V2V2C** |
| | 2.4 GHz | IP67 | | **DX80N2X6S4P4V2V2** |
| | | IP20 | | **DX80N2X6S4P4V2V2C** |

## DX80 Nodes, *Flex*Power—Analog and Discrete

| | Frequency | Base | I/O | Models* |
|---|---|---|---|---|
|  QT50ULBQ6-75390 DX81 DX80 Node | 900 MHz | IP67 | **Discrete:** Two selectable inputs, two NMOS sinking outputs **Analog:** Two inputs (0-20 mA, depending on configuration) **Switched Power Outputs** | **DX80N9X2S2N2M2** |
| | | IP20 | | **DX80N9X2S2N2M2C** |
| | 2.4 GHz | IP67 | | **DX80N2X2S2N2M2** |
| | | IP20 | | **DX80N2X2S2N2M2C** |
| | 900 MHz | IP67 | **Discrete:** Two selectable inputs, two NMOS sinking outputs **Analog:** Two inputs (0-10V, depending on configuration) **Switched Power Outputs** | **DX80N9X2S2N2V2** |
| | | IP20 | | **DX80N9X2S2N2V2C** |
| | 2.4 GHz | IP67 | | **DX80N2X2S2N2V2** |
| | | IP20 | | **DX80N2X2S2N2V2C** |

## *Flex*Power™ Node with Switched Power Outputs

| | Frequency | Base | I/O | Models* |
|---|---|---|---|---|
|  | 900 MHz | IP67 | **Discrete:** Two selectable inputs, one NMOS sinking output **Analog:** One input (0-20 mA) **Switched Power Outputs** Battery integrated into the housing | **DX80N9X1S2N1M1** |
| | 2.4 GHz | | | **DX80N2X1S2N1M1** |
| | 900 MHz | | **Discrete:** Two selectable inputs, one NMOS sinking output **Analog:** One input (0-10V) **Switched Power Outputs** Battery integrated into the housing | **DX80N9X1S2N1V1** |
| | 2.4 GHz | | | **DX80N2X1S2N1V1** |

* All Nodes on this page are available with internal antennas. To order the internal antenna models, replace the **S** as the 9th digit with a **W**. Internal antennas require an additional week for manufacture and shipping. For example, **DX80N9X2S2N2M2** is the model number for the external antenna device and **DX80N9X2W2N2M2** is the internal antenna device. Models with batteries integrated into the housing are so noted. All other *Flex*Power Nodes can be powered using 10-30V dc, battery or solar power options. Power supplies are sold separately (see page 400).

# DX80 Nodes, 10-30V dc—Discrete

| | Frequency | Base | I/O | Models* |
|---|---|---|---|---|
| DX80 Node IP67  DX80..C IP20 External Terminal Strips CID2 certified  | 900 MHz | IP67 | **Discrete:** Six selectable inputs, six PNP outputs | **DX80N9X6S6P6** |
| | | IP20 | | **DX80N9X6S6P6C** |
| | 2.4 GHz | IP67 | | **DX80N2X6S6P6** |
| | | IP20 | | **DX80N2X6S6P6C** |
| | 900 MHz | IP67 | **Discrete:** Six selectable inputs, six NPN outputs | **DX80N9X6S6N6** |
| | | IP20 | | **DX80N9X6S6N6C** |
| | 2.4 GHz | IP67 | | **DX80N2X6S6N6** |
| | | IP20 | | **DX80N2X6S6N6C** |
| | 900 MHz | IP67 | **Discrete:** Eight selectable inputs, four PNP outputs (When your wireless network does not include a host system, the eight input/four output Node must be mapped to the four input/eight output Gateway.) | **DX80N9X6S8P4** |
| | | IP20 | | **DX80N9X6S8P4C** |
| | 2.4 GHz | IP67 | | **DX80N2X6S8P4** |
| | | IP20 | | **DX80N2X6S8P4C** |
| | 900 MHz | IP67 | **Discrete:** Four selectable inputs, eight PNP outputs (When your wireless network does not include a host system, the four input/eight output Node must be mapped to the eight input/four output Gateway.) | **DX80N9X6S4P8** |
| | | IP20 | | **DX80N9X6S4P8C** |
| | 2.4 GHz | IP67 | | **DX80N2X6S4P8** |
| | | IP20 | | **DX80N2X6S4P8C** |

* All Nodes on this page are available with internal antennas. To order the internal antenna models, replace the **S** as the 9th digit with a **W**. Internal antennas require an additional week for manufacture and shipping. For example, **DX80N9X6S6P6** is the model number for the external antenna device and **DX80N9X6W6P6** is the internal antenna device.

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## DX80 Nodes, 10-30V dc—Analog

| | Frequency | Base | I/O | Models* |
|---|---|---|---|---|
|  DX80 Node IP67 | 900 MHz | IP67 | **Analog:** Four inputs, four outputs (0-20 mA) | **DX80N9X6S0P0M4M4** |
| | | IP20 | | **DX80N9X6S0P0M4M4C** |
| | 2.4 GHz | IP67 | | **DX80N2X6S0P0M4M4** |
| | | IP20 | | **DX80N2X6S0P0M4M4C** |
|  DX80 Node IP20 (C1D2 certified) | 900 MHz | IP67 | **Analog:** Four inputs, four outputs (0-10V) | **DX80N9X6S0P0V4V4** |
| | | IP20 | | **DX80N9X6S0P0V4V4C** |
| | 2.4 GHz | IP67 | | **DX80N2X6S0P0V4V4** |
| | | IP20 | | **DX80N2X6S0P0V4V4C** |

## Counter DX80 Nodes, *Flex*Power

| | Frequency | Base | I/O | Counter Input | Models* |
|---|---|---|---|---|---|
|  DX80N9X1S2A1 | 900 MHz | IP67 | **Discrete:** Two selectable inputs, two NMOS sinking outputs<br>**Counter:** Two selectable inputs | User selectable<br>10 kHz event counter(s)<br>25 kHz frequency counter(s) | **DX80N9X2S4A2** |
| | | IP20 | | | **DX80N9X2S4A2C** |
| | 2.4 GHz | IP67 | | | **DX80N2X2S4A2** |
| | | IP20 | | | **DX80N2X2S4A2C** |
| | 900 MHz | IP67 | **Discrete:** One selectable inputs, one NMOS sinking output<br>**Counter:** One selectable input<br>Battery integrated into the housing | | **DX80N9X1S2A1** |
| | 2.4 GHz | | | | **DX80N2X1S2A1** |

* To order the internal antenna models, replace the **S** as the 9th digit with a **W**. Internal antennas require an additional week for manufacture and shipping. For example, **DX80N9X2S4A2** is the model number for the external antenna device and **DX80N9X2W4A2** is the internal antenna device. Models with batteries integrated into the housing are so noted. All other *Flex*Power models may powered using 10-30V dc, battery or solar power options. Power supplies are sold separately. (see page 400).

## Solar DX80 Nodes

| | Frequency | I/O | Models† |
|---|---|---|---|
| DX80N9X2S-CS1 and BWA-SOLAR-001  | 900 MHz | **Discrete Inputs:** Two selectable<br>**Switch Power:** One continuous<br>**Analog Inputs:** Two (0–20 mA)<br>**Thermistor:** One<br>**Battery Status:** One<br>**Discrete Output:** One NMOS sinking | **DX80N9X2S-CS1** |
| | 2.4 GHz | | **DX80N2X2S-CS1** |

† Required *Flex*Power solar supply is sold separately (see page 400).

## Temperature DX80 Nodes, *Flex*Power

| | Frequency | Base | I/O | Models* |
|---|---|---|---|---|
| DX80N2X2S2N2TC  | 900 MHz | IP67 | **Thermocouple:** Three inputs, one thermistor CJC input<br>**Discrete:** Two selectable inputs, two NMOS sinking outputs | **DX80N9X2S2N2T** |
| | | IP20 | | **DX80N9X2S2N2TC** |
| | 2.4 GHz | IP67 | | **DX80N2X2S2N2T** |
| | | IP20 | | **DX80N2X2S2N2TC** |
| | 900 MHz | IP67 | **RTD:** Four three-wire inputs | **DX80N9X2S0P0R** |
| | | IP20 | | **DX80N9X2S0P0RC** |
| | 2.4 GHz | IP67 | | **DX80N2X2S0P0R** |
| | | IP20 | | **DX80N2X2S0P0RC** |

## Temperature and Relative Humidity DX80 Nodes

| | Frequency | Base | I/O | Models* |
|---|---|---|---|---|
|  | 900 MHz | IP67 | Two temp/RH *Flex*Sensor inputs | **DX80N9X2S2S** |
| | 2.4 GHz | | | **DX80N2X2S2S** |
| | 900 MHz | | One temp/RH *Flex*Sensor input<br>Battery integrated into the housing | **DX80N9X1S1S** |
| | 2.4 GHz | | | **DX80N2X1S1S** |

**Temperature & Relative Humidity *Flex*Sensors**

**M12FTH1Q**
Temperature and relative humidity sensor ±2%

**M12FTH2Q**
Temperature and relative humidity sensor ±3.5% (Both offer NIST traceability)

* To order the internal antenna models, replace the **S** in the 9th digit with a **W**. Internal antennas require an additional week for manufacture and shipping. For example, **DX80N9X2S2S** is the model number for the external antenna device and **DX80N9X2W2S** is the internal antenna device. Models with batteries integrated into the housing are so noted. All other *Flex*Power Nodes may be powered using 10-30V dc, battery or solar power options. Power supplies are sold separately. (see page 400).

## M-GAGE™ DX80 Nodes

| | Frequency | Base | Description | Models† |
|---|---|---|---|---|
| DX80N2X1W0P0ZR  | 900 MHz | IP67 | M-GAGE sensor with an internal antenna and a battery integrated into an easy-to-embed Node housing | **DX80N9X1W0P0ZR** |
| | 2.4 GHz | | | **DX80N2X1W0P0ZR** |

† The M-GAGE Nodes are powered by a 3.6V lithium D cell integrated into the housing.

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## DX85 Modbus RTU Remote I/O

| | Base | I/O | Models |
|---|---|---|---|
| | IP67 | **Discrete:** Six PNP inputs, six PNP outputs | **DX85M6P6** |
| | IP20 | | **DX85M6P6C** |
| DX85  | IP67 | **Analog:** Four inputs, four outputs (0-20 mA) | **DX85M0P0M4M4** |
| | IP20 | | **DX85M0P0M4M4C** |
| | IP67 | **Discrete:** Four PNP inputs, four PNP outputs<br>**Analog:** Two inputs, two outputs(0-20 mA) | **DX85M4P4M2M2** |
| | IP20 | | **DX85M4P4M2M2C** |
| DX85..C  | IP67 | **Discrete:** Eight PNP inputs, four PNP outputs<br>(When your wireless network does not include a host system, the eight input/four output devices must be mapped to the four input/eight output devices.) | **DX85M8P4** |
| | IP20 | | **DX85M8P4C** |
| | IP67 | **Discrete:** Four sourcing inputs, eight sourcing outputs<br>(When your wireless network does not include a host system, the four input/eight output devices must be mapped to the eight input/four output devices.) | **DX85M4P8** |
| | IP20 | | **DX85M4P8C** |

## SureCross™ DX80 Specifications

| | |
|---|---|
| **Radio** | |
| **Range*** | **900 MHz**: Up to 4.8 kilometers (3 miles); **2.4 GHz:** Up to 3.2 kilometers (2 miles) |
| **Transmit Power (150 mW radios)** | **900 MHz:** 21 dBm Conducted; **2.4 GHz:** 18 dBm Conducted, ≤ 20 dBm EIRP |
| **Spread Spectrum Technology** | FHSS (Frequency Hopping Spread Spectrum) |
| **Antenna Connector** | Ext. Reverse Polarity SMA, 50 Ohms |
| **Antenna Max. Tightening Torque** | 0.45 N·m (4 in·lbf) |
| **Link Timeout** | **Gateway**: Configurable, up to 2 minutes **Node**: Defined by Gateway |

* With the standard 2 dB antenna. 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.

More on next page

# SureCross™ DX80 Specifications (cont'd)

| | |
|---|---|
| **General** | |
| **Power*** | +10 to 30V dc (For European applications: +10 to 24V dc, ± 10%)<br>***Flex*Power:** +10 to 30V dc or 3.6 to 5.5V dc low power option (For European applications: +10 to 24V dc, ± 10% or 3.6 to 5.5V dc low power option)<br>**Integrated Battery models:** 3.6V dc low power option from an internal battery |
| **Power Consumption** | Less than 1.4 W (60 mA) at 24V dc |
| **Mounting** | #10 or M5 (M5 hardware included) |
| **M5 Fasteners Max. Tightening Torque** | 0.56 N·m (5 in·lbf) |
| **Case Material** | Polycarbonate |
| **Weight** | 0.26 kg (0.57 lb.)<br>**Integrated battery models:** 0.30 kg (0.65 lbs)<br>**IP20 models:** 0.23 kg (0.50 lbs) |
| **Indicators** | Two LED, bi-color |
| **Switches** | Two Push Buttons |
| **Display** | Six Character LCD |
| **Connection**** | 5-pin M12 Euro-style quick disconnect (QD cable is included with DX80 product) |
| **External Cable Glands**** | Four PG-7 type, One 1/2 NPT type |
| **Cable Glands Max. Tightening Torque**** | 0.56 N·m (5 in·lbf) |
| **Gateway Communications** | |
| **Interface** | 2-wire RS-485 |
| **Baud Rates** | 9.6k, 19.2k (default), or 38.4k |
| **Data Format** | 8 data bits, no parity, 1 stop bit |
| **Protocol** | Modbus RTU |
| **Environmental** | |
| **Environmental Rating** | **Internal wiring terminals**: IEC IP67; NEMA 6 **External wiring terminals**: IEC IP20; NEMA 1 |
| **Environmental Rating (external wiring terminals, in suitable enclosure)** | External wiring block models: Class I, Division 2, Group A, B, C, D;<br>T4 −40 to +80° C |
| **Operating Temperature** | **Electronics:** −40 to +85° C **LCD:** −20 to +80° C |
| **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<br>**Shock**: 30g, 11 millisecond half sine wave, 18 shocks<br>**Vibration**: 0.5 mm p-p, 10 to 60 Hz |
| **Compliance, Radio** | |
| **900 MHz Models** | FCC ID TGUDX80: This device complies with FCC Part 15, Subpart C, 15.247<br>IC: 7044A-DX8009 |
| **2.4 GHz Models** | FCC ID UE300DX80-2400: This device complies with FCC Part 15, Subpart C, 15.247<br>ETSI/EN: In accordance with EN 300 328: V1.7.1 (2006-05)<br>IC: 7044A-DX8024 |
| **Certification (DX8x..C External Wiring Terminals and IP20 Housings)** | Class I, Division 2, Groups A, B, C, D. Certificate: 1921239<br>Ex/AEx nA II<br><br>LCIE/ATEX Zone 2 (Group IIC). Certificate: LCIE 10 ATEX 1012 X<br>II 3G<br>Ex nA IIC T4 |

* For European applications, power the DX80 from a Limited Power Source as defined in EN 60950-1.
** IP67 models only
*** Operating the devices at the maximum operating conditions for extended periods can shorten the life of the device.

# SureCross™ DX99
## Intrinsically Safe *Flex*Power™ Nodes

- The DX99 is a state-of-the-art combination of wireless communication, battery technology and intrinsically safe electronics
- All models are certified for operation in Class I Division 1 and ATEX Zone 0 locations
- Discrete, analog and temperature input types are available
- Battery power supply provides power for third-party 4-20 mA and NAMUR process sensors
- DX99 Nodes are designed to work with DX80 Gateways installed beyond the hazardous area
- DX99 *Flex*Power Nodes are available in two different housing materials: metal and polycarbonate
- Banner is working on expanding the I/O options for our DX99 product line; visit bannerengineering.com for the most up to date models

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Banner offers a variety of mounting brackets and antenna feed throughs that meet IS ratings, visit www.bannerengineering.com for ordering information.


**ONLINE**
AUTOCAD, STEP, IGES & PDF

## DX99 Nodes, *Flex*Power™—Class I, Div 1 and Zone 0 (Metal Housing)

| | Frequency | Boost Power | Certifications | I/O | Metal Housing Models* |
|---|---|---|---|---|---|
|  | 900MHz | 18V | Class I, Division 1,Groups A, B, C, D; Class II, Division 1, Groups E, F, G; Class III, Division 1 Ex ia IIC T4 AEx ia IIC T4<br><br>LCIE/ATEX Zone 0 (Group IIC) and Zone 20 (Group II) II 1 GD Ex ia IIC T4 Ex iaD 20 IP68 T82°C | **Discrete:** Two selectable inputs **Analog:** Two inputs (0-20 mA) | **DX99N9X1S2N0M2X0D2** |
| | 2.4GHz | | | | **DX99N2X1S2N0M2X0D2** |
| | 900MHz | 10V | | | **DX99N9X1S2N0M2X0D1** |
| | 2.4GHz | | | | **DX99N2X1S2N0M2X0D1** |
| | 900MHz | 18V | | **Discrete:** Two selectable inputs **Analog:** Two inputs (0-10V dc) | **DX99N9X1S2N0V2X0D2** |
| | 2.4GHz | | | | **DX99N2X1S2N0V2X0D2** |
| | 900MHz | 10V | | | **DX99N9X1S2N0V2X0D1** |
| | 2.4GHz | | | | **DX99N2X1S2N0V2X0D1** |
| | 900MHz | N/A | | **Discrete:** Two selectable inputs **Thermocouple:** Three inputs, one thermistor CJC input | **DX99N9X1S2N0T4X0D0** |
| | 2.4GHz | | | | **DX99N2X1S2N0T4X0D0** |
| | 900MHz | N/A | | **RTD:** Four three-wire inputs | **DX99N9X1S0N0R4X0D0** |
| | 2.4GHz | | | | **DX99N2X1S0N0R4X0D0** |
| | 900 MHz | N/A | | 2 Bridge inputs 2 Discrete Sinking inputs | **DX99N9X1S2N0B2X0D0** |
| | 2.4 GHz | | | | **DX99N2X1S2N0B2X0D0** |

* To order the internal antenna models replace the S as the 9th digit with a W. For example, **DX99N9X1S2N0M2X0D2** is the external antenna model and **DX99N9X1W2N0M2X0D2**.
Metal housing models are only available with external antennas and are powered by a 3.6V D cell lithium battery integrated into the housing.
Mounting and intrinsically safe antenna installation accessories are available for the metal housing models.

# SureCross™ DX99 Specifications

| | |
|---|---|
| **General** | |
| **Power** | ***Flex*Power:** 3.6 to 5.5V dc low power option |
| **Power Consumption** | Application dependant |
| **M5 Fasteners Max. Tightening Torque** | 0.56 N·m (5 in·lbf) |
| **Case Material and Weight** | **Metal Housing:** 2.23 kg (4.9 lb.) |
| **Indicators** | Two LED, bi-color |
| **Switches** | Two Push Buttons |
| **Display** | Six Character LCD |
| **External Cable Glands** | Four PG-7 type, One $^1/_2$ NPT type (Poly) & Metal: 2 $^1/_2$" NPT, 1 $^3/_4$" NPT-M36 |
| **Cable Glands Max. Tightening Torque** | 0.56 N·m (5 in·lbf) |
| **Environmental** | |
| **Environmental Rating** | **Intrinsically safe, metal housing:** IEC IP68 |
| **Operating Temperature** | −40 to +70° C |
| **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<br>**Shock**: 30g, 11 millisecond half sine wave, 18 shocks **Vibration**: 0.5 mm p-p, 10 to 60 Hz |
| **Reference DX80 for Radio & Antenna specs (p. 394)** | |
| **Certifications** | **DX99, Intrinsically Safe, Metal Housing** |
| | Class I, Division 1,Groups A, B, C, D;<br>Class II, Division 1, Groups E, F, G;<br>Class III, Division 1<br>Ex ia IIC T4 AEx ia IIC T4 — Certificate 2008243(LR 41887) |
| | LCIE/ATEX Zone 0 (Group IIC) and Zone 20 (Group II)<br>II 1 GD Ex ia IIC T4<br>Ex iaD 20 IP68 T82°C — Certificate LCIE 08 ATEX 6098X |

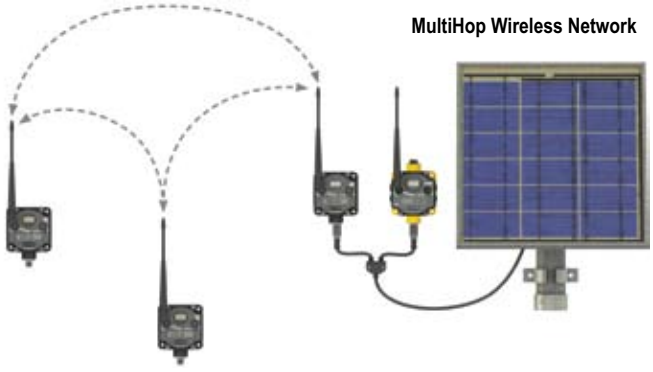
# SureCross™ DX80 MultiHop Data Radio

## Wireless Network

- Selectable power levels up to 1 watt transmit power; license-free operation up to 4 watt EIRP, with a high-gain antenna, in the U.S. and Canada for 900 MHz
- *Flex*Power power input options allow for +10 to 30V dc, solar or battery power
- Serial communication style (RS-232 or RS-485) is user selectable
- Multiple hops allow for an extended range
- Message routing improves link performance
- SureCross architecture creates self-forming and self-healing wireless networks
- DIP switches select operational modes: master, repeater or slave
- Built-in site survey mode enables rapid assessment of a location's RF transmission properties
- FHSS radios operate and synchronize automatically; selectable network IDs reduce interference from collocated networks
- Banner is constantly working on new models with I/O variations, contact factory for the latest model information

ACCESSORIES page 400

**DX85 Modbus RTU Remote I/O**
Used to expand I/O capacity when connected to a Data Radio or Gateway (see page 394)


## DX80 MultiHop Data Radios, *Flex*Power

| Description | Frequency | Transmit Power | Models* |
|---|---|---|---|
| **MultiHop Radio** | 900 MHz | DIP switch selectable up to 1 Watt | **DX80DR9M-H** |
| | 2.4 GHz | 100 mW EIRP | **DX80DR2M-H** |

* Banner is constantly working on new models with I/O variations. Contact factory for the latest model information.

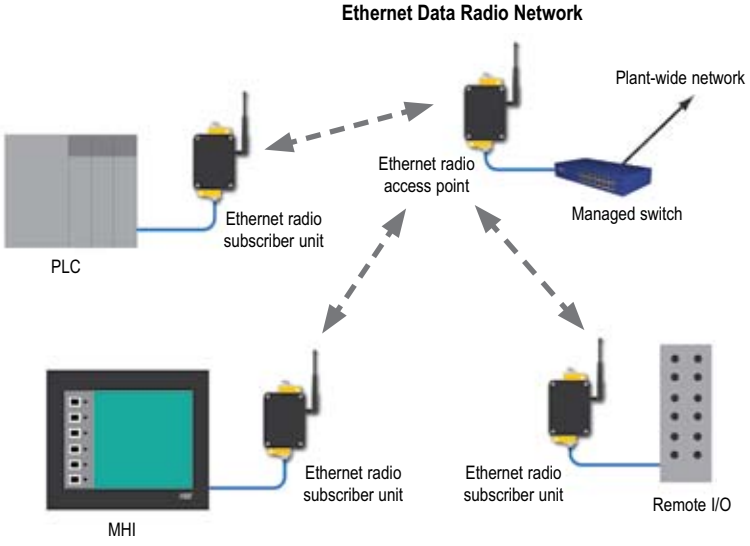
## DX80 MultiHop Data Radio Specifications

Visit bannerengineering.com for more information.

ACCESSORIES
page 400


# SureCross™ DX80 Ethernet
## Wireless Network

- Industrial grade, long-range, 900 MHz radio used to create point-to-multipoint configurations of wireless Ethernet networks
- RF transmission rate of 1.536 Mb/s and a throughput of 935 Kb/s
- 128 bit AES encryption for Ethernet data packets
- Sub-block error detection and retransmission
- Automatic scan or manual override for the best of the 12 communication channels
- Indicator LEDs for channel selection and signal strength
- Point-to-multipoint configurations with up to 16 subscriber units
- User configuration via internal web page
- Built-in spectrum analyzer and firmware upgrading





WIRELESS
DX70
DX80
DX99
MultiHop
Ethernet Radio

## SureCross™ DX80 Ethernet Radio, 10-30V dc

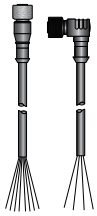
| Description | Frequency | Transmit Power | Models* |
|---|---|---|---|
| **Ethernet Radio** | 900 MHz | 150 mW | **DXER9** |

## DX80 Ethernet Data Radio Specifications

Visit bannerengineering.com for more information.

## Cordsets

| Euro QD | | |
|---|---|---|
| See page 685 | | |
| Length | Threaded 5-Pin | |
| | Straight | Right-Angle |
| 0.50 m | MQDC1-501.5 | — |
| 1.83 m | MQDC1-506 | MQDC1-506RA |
| 5.57 m | MQDC1-515 | MQDC1-515RA |
| 9.14 m | MQDC1-530 | MQDC1-530RA |



Additional cordset information available. See page 679.

## Brackets

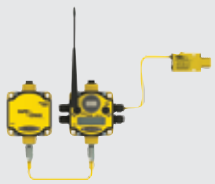
| DX80 | DX99 | |
|---|---|---|
|  pg. 653 |  |  |
| SMBDX80DIN | BWA-HW-019 | BWA-HW-020 |

Additional bracket information available. See page 620.

## *Flex*Power Accessories

| Description | | Model |
|---|---|---|
|  | *Flex*Power Battery 6-pack delivers and manages dc voltage from six 3.6V lithium D cell batteries. | DX81P6 |
|  | *Flex*Power Battery Supply Module delivers and manages dc voltage from one 3.6V lithium D cell battery. **Replacement battery:** BWA-BATT-001 | DX81 |
|  | *Flex*Power Battery Supply Module delivers and manages dc voltage from one 3.6V lithium D cell battery and used to power the polycarbonate housed Intrinsically Safe DX99 devices. **Replacement battery:** BWA-BATT-001 | DX81H |
|  | *Flex*Power Solar Supply includes solar panel, controller, and rechargeable battery pack. **Replacement battery pack:** BWA-BATT-003 | BWA-SOLAR-001 |

## Sensors Optimized for *Flex*Power Devices

| Description | | Model |
|---|---|---|
|  | The low-power **MINI-BEAM** is designed to work with the *Flex*Power Nodes. | Retro: **SM312LPQD-78447** Diffuse: **SM312DQD-78419** |
|  | A long-range ultrasonic sensor designed to work with the *Flex*Power Nodes. | **QT50ULBQ6-75390** |

## K50 Optimized for *Flex*Power Devices

| Description | | Model |
|---|---|---|
|  | K50 EZ-LIGHT, 3 color, with push button | **K50FGYRPB1Q** |

## DC Power Supplies, 24V dc

| Description | Model |
|---|---|
| 500 mA, Demo kit power supply | **PS24W** |
| 700 mA, 5-pin Euro-style QD, Hardwired AC power connection | **EZAC-E-QE5** |
| 200 mA, DX80 low-profile housing | **PS24DX** |

## Relay Box

| Description | Model |
|---|---|
| Interface Relay Box, 18-26V dc inputs, isolated relay outputs | **IB6RP** |

## *Flex*Sensor Models*

**T30UFDNCQ**
Discrete, ultrasonic, 3 m range

**QS30WEQ (emitter)**
**QS30WRQ (receiver)**
Photoelectric pair up to 100' range

**M12FTH1Q**
Temperature and relative humidity sensor ±2%

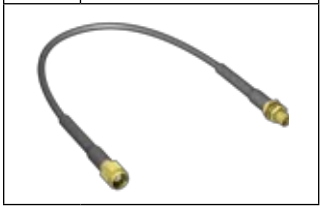
**M12FTH2Q**
Temperature and relative humidity sensor ±3.5%
(Both offer NIST traceability)

* *Flex*Sensors are used with the DX80 Temp and Relative humidity Node

## Antenna Cables

| LMR400 N Male to N Female | |
|---|---|
| Length | Straight Model |
| 3 m | BWC-4MNFN3 |
| 6 m | BWC-4MNFN6 |
| 15 m | BWC-4MNFN15 |
| 30 m | BWC-4MNFN30 |

| RP-SMA to RP-SMA Bulkhead | |
|---|---|
| Length | Straight Model |
| 0.2 m | BWC-1MRSFRSB0.2 |
| 1 m | BWC-1MRSFRSB1 |
| 2 m | BWC-1MRSFRSB2 |
| 4 m | BWC-1MRSFRSB4 |



| RP-SMA Male to N Male | |
|---|---|
| Length | Straight Model |
| 0.5 m | BWC-1MRSMN05 |
| 2 m | BWC-1MRSMN2 |

## Antenna Feed Throughs

| Description | | Model |
|---|---|---|
|  | Antenna Feed through, SS, 1/2" NPT | BWA-HW-016 |
| | Antenna Feed through, SS, 3/4" NPT | BWA-HW-017 |

## Surge Protection

| Description | | Model |
|---|---|---|
|  | 900 MHz/2.4 GHz surge suppressor with bulkhead N connector | BWC-LFNBMN |
|  | 900 MHz/2.4 GHz surge suppressor with bulkhead and RP-SMA | BWC-LMRSFRPB |
|  | Surge suppressor, bulkhead, N-Type and dc Blocking | BWC-LFNBMN-DC |

## User Configuration Tool RS-485 to USB Adapter Cable*


**BWA-HW-006** RS-485 to USB adapter cable is used to connect the DX80 Gateway to a computer. Download your free configuration software at bannerengineering.com/wireless

* MQDMC-401 adapter cable for connecting BWA-HW-006 to DX80...C housing models

## Enclosures

| Description | | Model |
|---|---|---|
|  | Enclosure Fiberglass Hinged 14" x 12" x 8" | BWA-EF14128 |
| | Enclosure Fiberglass Hinged 10" x 8" x 6" | BWA-EF1086 |
| | Enclosure Fiberglass Hinged 8" x 6" x 6" | BWA-EF866 |
| | Panel, 14" x 12" | BWA-PA1412 |
| | Panel, 10" x 8" | BWA-PA108 |
| | Panel, 8" x 6" | BWA-PA86 |
| | Pole Mount, 12" | BWA-PM12 |
| | Pole Mount, 8" | BWA-PM8 |
| | Pole Mount, 6" | BWA-PM6 |

## Antennas

| Description | | Model |
|---|---|---|
|  | 6.5 dBd Yagi,<br>900 MHz with N Female | BWA-9Y6-A |
|  | 10 dBd Yagi with<br>N Female pigtail connector | BWA-9Y10-A |
|  | 6 dBd OMNI,<br>900 MHz, Fiberglass with N Female | BWA-9O6-A |
| | 5 dBd OMNI, fiberglass with ground plane and<br>N Female pigtail connector | BWA-9O5-B |
|  | 2.4 GHz OMNI,<br>2 dBi, Rubber Swivel, RP-SMA Male | BWA-2O2-C |
| | 2.4 GHz OMNI,<br>5 dBi, Rubber Swivel, RP-SMA Male | BWA-2O5-C |
| | 2.4 GHz OMNI,<br>7 dBi, Rubber Swivel, RP-SMA Male | BWA-2O7-C |
| | 900 MHz OMNI,<br>2 dBi, RP-SMA Male | BWA-9O2-C |
|  | 2.4 GHz OMNI,<br>6 dBi, Fiberglass,<br>16 inches, Outdoor | BWA-2O6-A |
| | 2.4 GHz OMNI,<br>8.5 dBi, Fiberglass,<br>24 inches, Outdoor | BWA-2O8-A |