

## Datasheet

The DXM100-B1 Wireless Controller is an industrial wireless controller that facilitates Industrial Internet of Things (IIoT) applications. As a communications gateway, it interfaces local serial ports, local I/O ports, and local ISM radio devices to the internet using either a cellular connection or a wired Ethernet network connection.



- Sure Cross® DX80 Wireless Gateway or MultiHop radio with 900 MHz or 2.4 GHz ISM bands available
- Logic controller with action rules and ScriptBasic programming
- Cellular modem Internet connectivity
- Automation protocols include Modbus TCP, Modbus RTU, and EtherNet/IP™
- Secure email and text Internet messaging for alarms, alerts, and data log files
- Data logging with removable SD card
- Interactive programmable user interface with LCD and LED indicators
- Universal, on-board I/O with analog and discrete I/O
- Industry standard RS-485, Ethernet, and USB communication ports
- Multiple managed power options with battery backup



**WARNING: Not To Be Used for Personnel Protection**

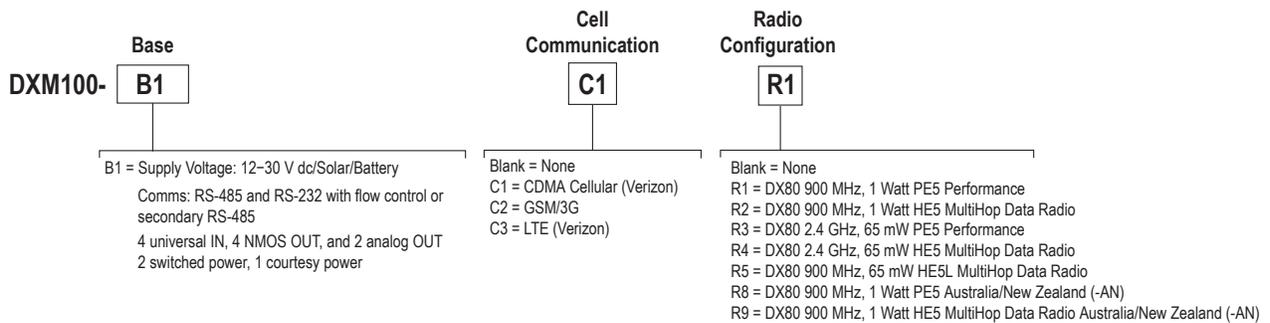
Never use this device as a sensing device for personnel **protection**. Doing so could lead to serious injury or death. This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A sensor failure or malfunction can cause either an energized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



**CAUTION: Electrostatic Discharge (ESD)**

**ESD Sensitive Device.** Use proper handling procedures to prevent ESD damage to these devices. The module does not contain any specific ESD protection beyond the structures contained in its integrated circuits. Proper handling procedures should include leaving devices in their anti-static packaging until ready for use; wearing anti-static wrist straps; and assembling units on a grounded, static-dissipative surface.

## Models



Some example models include, but are not limited to, the following:

Models	Description
DXM100-B1R1	DXM100-B1 Wireless Controller with DX80 ISM 900 MHz radio
DXM100-B1R2	DXM100-B1 Wireless Controller with DX80 ISM 900 MHz MultiHop radio
DXM100-B1R3	DXM100-B1 Wireless Controller with DX80 ISM 2.4 GHz radio
DXM100-B1R4	DXM100-B1 Wireless Controller with DX80 ISM 2.4 GHz MultiHop radio



Models	Description
DXM100-B1C1R1	DXM100-B1 Wireless Controller with Cellular CDMA and DX80 ISM 900 MHz radio
DXM100-B1C1R2	DXM100-B1 Wireless Controller with Cellular CDMA and DX80 ISM 900 MHz MultiHop radio

## DXM100 Documentation

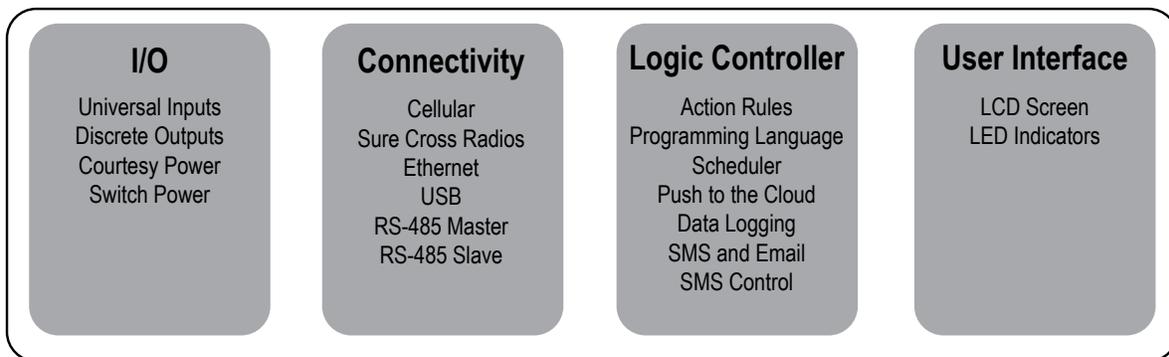
For more information about the DXM Controller family of products, please see additional documentation and videos on the Banner website: [www.bannerengineering.com](http://www.bannerengineering.com).

- DXM Wireless Controller Sell Sheet, p/n [194063](#)
- DXM100-B1 Wireless Controller Datasheet, p/n [186724](#)
- DXM100-B2 Wireless Controller Datasheet, p/n [195232](#)
- DXM100-Bx Wireless Controller Instruction Manual, p/n [190037](#)
- DXM100-S1 Wireless Modbus Slave Datasheet, p/n [195454](#)
- DXM100-S2 Wireless Modbus Slave Datasheet, p/n [195231](#)
- DXM100-Sx Wireless Modbus Slave Instruction Manual, p/n [188231](#)
- DXM ScriptBasic Instruction Manual, p/n [191745](#)
- DXM Controller Configuration Quick Start, p/n [191247](#)
- DXM Configuration Tool [software](#)
- DXM Configuration Tool Instruction Manual, p/n [158447](#)
- DXM EDS [Configuration file](#)
- Tech Note: [Activating and Provisioning Cellular Service](#)
- Additional technical notes and videos

Technical notes, configuration examples, and ScriptBasic program examples are available at [www.bannerengineering.com](http://www.bannerengineering.com).

## DXM100-Bx System Overview

Banner's DXM Logic Controller integrates Banner's wireless radio, cellular connectivity, and local I/O to provide a platform for the Industrial Internet of Things (IIoT).



**Inputs/Outputs**—On-board universal and programmable I/O ports connect to local sensors, indicators, and control equipment.

- Universal Inputs
- Discrete outputs
- Courtesy power
- Switch power
- Battery backup
- Solar controller
- DC latching outputs (DXM100-B2 models only)
- SDI-12 sensor interface (DXM100-B2 models only)

**Connectivity**—The DXM Controller's wired and wireless connectivity options make it easy to share data between local and remote equipment. The cellular modem option eliminates the need for IT infrastructures to connect remote equipment for sensing and control. The integrated Sure Cross® wireless radio enables Modbus connectivity to remote sensors, indicators, and control equipment.

### Wired **Connectivity**

Ethernet: Modbus TCP or Ethernet/IP  
Field Bus: Modbus RS-485 Master/Slave or CAN

### Wireless **Connectivity**

Sure Cross Wireless Radio: DX80 900 MHz, DX80 2.4 GHz,  
MultiHop 900 MHz, or MultiHop 2.4 GHz  
Cellular modem: CDMA (Verizon) or GSM

Logic Controller—Program the DXM Controller's logic controller using action rules and/or ScriptBasic language, which can execute concurrently. The control functions allow freedom when creating custom sensing and control sequences. The logic controller supports the Modbus protocol standards for data management, ensuring seamless integration with existing automation systems.

#### Action Rules

Supports simple logic, arithmetic and thresholding  
Low complexity solutions  
SMS text message Notifications  
E-mail Notifications  
Push data on conditions

#### Text Programming Language

ScriptBasic  
Medium complexity solutions

#### Scheduler

Time/calendar-based events  
Astronomical clock

#### Data Logging

Cyclic Data/Event logging  
E-mail log files

#### SMS Commanding

Read/Write Local Registers  
Force a push to the cloud  
Reboot controller

User Interface—A simple user interface consists of an LCD screen and four LED indicators. Use the LCD to access system status and setup, view user selectable events or data, and to bind and perform site surveys for Sure Cross radios. Configure the user programmable LEDs to indicate the status of the DXM Controller, processes, or equipment.

#### User programmable LCD

Bind Sure Cross Radios  
Site Survey  
View Sensor Information  
System Status

#### User **Defined** LED indicators

## Applications Overview

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The DXM100-B1 Wireless Controller is ideal for smart factory and facilities applications, including:

- Productivity solutions, such as
  - Call for parts, service, or maintenance
  - Pick-to-light
  - Tank level monitoring
- Predictive maintenance and continuous monitoring using
  - Vibration and temperature monitoring
  - Non-contact temperature monitoring
- Environmental monitoring and control, such as
  - Temperature and humidity monitoring

The DXM100-B1 Wireless Controller can provide visual indication using indicator lights, send text or email alerts, collect data, and interface with automation systems.

## Specifications

### Supply Voltage

12 to 30 V dc (use only with a suitable Class 2 power supply (UL) or a SELV (CE) power supply) or  
12 V dc solar panel and 12 V sealed lead acid battery

### Courtesy Power Out

One output at 5 Volts, 500 mA maximum  
No short circuit protection

### Switched Power Outputs

Two outputs at 5 or 16 Volts  
5 V: 400 mA maximum  
16 V: 125 mA maximum

### Power Consumption

35 mA average at 12 Volts

### Radio (ISM Band) Transmit Power

900 MHz at 1 Watt  
2.4 GHz at 65 mW

### Radio Range<sup>1</sup>

900 MHz, 1 Watt: Up to 9.6 km (6 miles)  
2.4 GHz, 65 mW: Up to 3.2 km (2 miles)

### Minimum Radio Separation Distance

900 MHz, 1 Watt: 4.57 m (15 ft)  
2.4 GHz, 65 mW: 0.3 m (1 ft)

### Communication Hardware (RS-232)

Baud rate: 9.6k or 19.2k (default)  
Data format: 8 bits; odd, even, or no parity; 1 stop bit

### 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

### Counters, Synchronous

32-bits unsigned  
10 ms clock rate minimum

### Universal Inputs

Sinking/Sourcing discrete, 4–20 mA analog, 0–10 V analog, counter, and  
temperature 10 kOhm thermistor

### Operating Conditions<sup>2</sup>

–40 °C to +85 °C (–40 °F to +185 °F) (Electronics); –20 °C to +80 °C (–4 °F to  
+176 °F) (LCD)  
95% maximum relative humidity (non-condensing)  
Radiated Immunity: 10 V/m (EN 61000-4-3)

### Shock and Vibration

IEC 68-2-6 and IEC 68-2-27  
Shock: 30g, 11 millisecond half sine wave, 18 shocks  
Vibration: 0.5 mm p-p, 10 to 60 Hz

### Solar Power Battery Charging

1 Amp maximum with 20 Watt solar panel

### Security Protocols

VPN, SSL, and HTTPS

### Radio Transmit Power

900 MHz, 1 Watt: 30 dBm (1 W) conducted (up to 36 dBm EIRP)  
2.4 GHz, 65 mW: 18 dBm (65 mW) conducted, less than or equal to 20 dBm  
(100 mW) EIRP

### 900 MHz Compliance (1 Watt)

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 300 328 V1.8.1 (2012-06)  
IC: 7044A-DX8024

### Spread Spectrum Technology

FHSS (Frequency Hopping Spread Spectrum)

### Antenna Connection

Ext. Reverse Polarity SMA, 50 Ohms  
Max Tightening Torque: 0.45 N-m (4 lbf-in)

### Logging

8 GB maximum; removable Micro SD card format

### Communication Protocols

Modbus RTU Master/Slave, Modbus/TCP, and Ethernet/IP

### Construction

Polycarbonate; DIN rail mount option

### Analog Outputs (DAC)

0 to 20 mA or 0 to 10 V dc output  
Accuracy: 0.1% of full scale +0.01% per °C  
Resolution: 12-bit

### Discrete Output Rating (NMOS)

Less than 1 A max current at 30 V dc  
ON-State Saturation: Less than 0.7 V at 20 mA  
ON Condition: Less than 0.7 V  
OFF Condition: Open

### Environmental Rating

IEC IP20

### Certifications



## Accessories

For a complete list of all the accessories for the Sure Cross wireless product line, please download the [Accessories List](#) (p/n b\_3147091)

### Cordsets

MQDC1-506—5-pin M12/Euro-style, straight, single ended, 6 ft  
MQDC1-530—5-pin M12/Euro-style, straight, single ended, 30 ft  
MQDC1-506RA—5-pin M12/Euro-style, right-angle, single ended, 6 ft  
MQDC1-530RA—5-pin M12/Euro-style, right-angle, single ended, 30 ft

### Static and Surge Suppressor

BWC-LFNBMN-DC—Surge Suppressor, bulkhead, N-Type, dc Blocking, N-Type  
Female, N-Type Male

### Misc Accessories

BWA-CG-5-3X5.6-10—Cable Glands: 1/2-inch NPT, Cordgrip for 3 holes of 2.8  
to 5.6 mm diam, 10 Pack  
BWA-HW-052—Cable Gland Pack: 1/2-inch NPT gland, 1/2-inch NPT multi-  
cable gland, and 1/2-inch NPT vent plug

### Antenna Cables

BWC-1MRSMN05—LMR100 RP-SMA to N-Type Male, 0.5 m  
BWC-2MRSF6—LMR200, RP-SMA Male to RP-SMA Female, 6 m  
BWC-4MNFN6—LMR400 N-Type Male to N-Type Female, 6 m

<sup>1</sup> Radio range is 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. Always verify your wireless network's range by performing a Site Survey.

<sup>2</sup> Operating the devices at the maximum operating conditions for extended periods can shorten the life of the device.

## Short-Range Omni Antennas

BWA-202-D—Antenna, Dome, 2.4 GHz, 2 dBi, RP-SMA Box Mount  
 BWA-902-D—Antenna, Dome, 900 MHz, 2 dBi, RP-SMA Box Mount  
 BWA-902-RA—Antenna, Rubber Fixed Right Angle, 900 MHz, 2 dBi, RP-SMA Male Connector

## Medium-Range Omni Antennas

BWA-905-C—Antenna, Rubber Swivel, 900 MHz 5 dBi, RP-SMA Male Connector  
 BWA-205-C—Antenna, Rubber Swivel, 2.4 GHz 5 dBi, RP-SMA Male Connector

## Enclosures and DIN Rail Kits

[BWA-AH864](#)—Enclosure, Polycarbonate, with Opaque Cover, 8 × 6 × 4  
[BWA-AH1084](#)—Enclosure, Polycarbonate, with Opaque Cover, 10 × 8 × 4  
[BWA-AH12106](#)—Enclosure, Polycarbonate, with Opaque Cover, 12 × 10 × 6  
 BWA-AH8DR—DIN Rail Kit, 8", Includes 2 Trilobular/Self-Threading Screws, and DIN Rail  
 BWA-AH10DR—DIN Rail Kit, 10", Includes 2 Trilobular/Self-Threading Screws, and DIN Rail  
 BWA-AH12DR—DIN Rail Kit, 12", Includes 2 Trilobular/Self-Threading Screws, and DIN Rail

## Long-Range Omni Antennas

BWA-908-AS—Antenna, Fiberglass, 3/4 Wave, 900 MHz, 8 dBi, N-Type Female Connector  
 BWA-208-A—Antenna, Fiberglass, 2.4 GHz, 8 dBi, N-Type Female Connector

## Long-Range Yagi Antennas

BWA-9Y10-A—Antenna, 900 MHz, 10 dBd, N-Type Female Connector

## Power Supplies

[PSD-24-4](#)—DC Power Supply, Desktop style, 3.9 A, 24 V dc, Class 2, 4-pin M12/Euro-style quick disconnect (QD)  
[PSDINP-24-13](#)—DC Power Supply, 1.3 Amps, 24 V dc, with DIN Rail Mount, Class I Division 2 (Groups A, B, C, D) Rated  
[PSDINP-24-25](#)—DC Power Supply, 2.5 Amps, 24 V dc, with DIN Rail Mount  
[BWA-SOLAR PANEL 20W](#)—Solar Panel, 12 V, 20 W, Multicrystalline, 573 × 357 × 30, "L" style mounting bracket included

## Warnings

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

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

## Banner Engineering Corp. Limited Warranty

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

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