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 Gateway or MultiHop 900 MHz or 2.4 GHz radio models 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

**Important:** Please download the complete DXM100-B1 Wireless Controller technical documentation, available in multiple languages, from www.bannerengineering.com for details on the proper use, applications, Warnings, and installation instructions of this device.

**Important:** Por favor descargue desde www.bannerengineering.com toda la documentación técnica de los DXM100-B1 Wireless Controller, disponibles en múltiples idiomas, para detalles del uso adecuado, aplicaciones, advertencias, y las instrucciones de instalación de estos dispositivos.

**Important:** Veuillez télécharger la documentation technique complète des DXM100-B1 Wireless Controller sur notre site www.bannerengineering.com pour les détails sur leur utilisation correcte, les applications, les notes de sécurité et les instructions de montage.

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

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

**Important:**
- Electrostatic discharge (ESD) sensitive device
- ESD can damage the device. Damage from inappropriate handling is not covered by warranty.
- Use proper handling procedures to prevent ESD damage. Proper handling procedures include leaving devices in their anti-static packaging until ready for use; wearing anti-static wrist straps; and assembling units on a grounded, static-dissipative surface.
Model Key for the DXM100-B1 Models

**DXM100-B1**

B1 = Modbus controller for data aggregation of sensors and wireless networks
Power: 12–30 V DC/Solar/Battery
Comms: RS-485, CAN, RS-232 w/flow or secondary RS-485
Inputs: (4) universal IN
Outputs: (4) NMOS OUT, (2) analog OUT (0–10 V or 4–20 mA)
Power Out: (2) Selected 5 V or 16 V switched power, (1) 5 V courtesy power

**Blank** = None
Blank = None
R1 = 900 MHz, 1 W PES Performance Radio (North America)
R2 = 900 MHz, 1 W HE5 MultiHop Data Radio (North America)
R3 = 2.4 GHz, 65 mW PES Performance Radio (Worldwide)
R4 = 2.4 GHz, 65 mW HE5 MultiHop Data Radio (Worldwide)
R5 = 900 MHz, 65 mW HE5L MultiHop Data Radio (Used for M-GAGE networks)
R8 = 900 MHz, Performance Radios approved for Australia/New Zealand
R9 = 900 MHz, MultiHop Radio approved for Australia/New Zealand

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

<table>
<thead>
<tr>
<th>Models</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DXM100-B1R1</td>
<td>DXM100-B1 Wireless Controller with DX80 ISM 900 MHz radio</td>
</tr>
<tr>
<td>DXM100-B1R2</td>
<td>DXM100-B1 Wireless Controller with DX80 ISM 900 MHz MultiHop radio</td>
</tr>
<tr>
<td>DXM100-B1R3</td>
<td>DXM100-B1 Wireless Controller with DX80 ISM 2.4 GHz radio</td>
</tr>
<tr>
<td>DXM100-B1R4</td>
<td>DXM100-B1 Wireless Controller with DX80 ISM 2.4 GHz MultiHop radio</td>
</tr>
</tbody>
</table>

Cellular Communication—Controllers accept Banner GSM and LTE modems only. Cellular modems are ordered separately as accessories under the following part numbers:

- GSM/3G (HSPA): SXI-GSM-001
- LTE-Verizon: SXI-LTE-001

DXM100 Documentation

For more information about the DXM100 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 Modbus Slave Datasheet, p/n 195454
- DXM100-S2 Modbus Slave Datasheet, p/n 195231
- DXM100-Sx Modbus Slave Instruction Manual, p/n 188231
- DXM ScriptBasic Instruction Manual, p/n 191745
- DXM Controller API Protocol, p/n 186221
- DXM Controller Configuration Quick Start, p/n 191247
- SolutionsKit-AG1 Quick Start Guide, p/n212028
- DXM Configuration Software v4 (p/n b_4496867)
- DXM Configuration Software v4 Instruction Manual, p/n 209933
- DXM EDS Configuration file for Allen-Bradley PLCs
- EIP Configuration File for DXM 1xx-BxR1 and R3 models, p/n 194730
- Banner CNS Web Service Quick Start Guide, p/n 201126
- Banner CNS Web Service Instruction Manual, p/n 178337
- Activating a Cellular Modem, p/n b_4419353
- Additional technical notes and videos

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

System Overview for the B1 Models

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).
**I/O**
- Universal Inputs
- Discrete Outputs
- Courtesy Power
- Switch Power

**Connectivity**
- Cellular
- Sure Cross Radios
- Ethernet
- RS-485 Master
- RS-485 Slave

**Logic Controller**
- Action Rules
- Programming Language
- Scheduler
- Push to the Cloud
- Data Logging
- SMS and Email
- SMS Control

**User Interface**
- LCD Screen
- LED Indicators

### 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

### Connectivity
The DXM100’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 Controller
- Area Network (CAN)

#### Wireless Connectivity
- Sure Cross Wireless Radio: DX80 900 MHz, DX80 2.4 GHz, MultiHop 900 MHz, or MultiHop 2.4 GHz
- Cellular modem: LTE (United States) or GSM (outside the United States)

### Logic Controller
Program the DXM100’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
- Use for low complexity solutions
- SMS text message Notifications
- E-mail Notifications
- Push data on conditions

#### Text Programming Language
- ScriptBasic
- Use when Action Rules can’t supply a solution

#### Scheduler
- Time/calendar-based events
- Astronomical clock

#### Data Logging
- Cyclic Data/Event logging
- E-mail log files

#### SMS Commanding
- Read/Write Local Registers
- Upload data to the cloud-based data service
- 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 DXM100, processes, or equipment.

#### User programmable LCD
- Binding Sure Cross radios
- Conducting a Site Survey
- Viewing sensor information
- Viewing the system’s status

#### User Defined LED indicators

### Applications Overview
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

Performance Radio Specifications

<table>
<thead>
<tr>
<th>Radio Range</th>
<th>900 MHz, 1 Watt: Up to 9.6 km (6 miles)</th>
<th>2.4 GHz, 65 mW: Up to 3.2 km (2 miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antenna Minimum Separation Distance</td>
<td>900 MHz, 1 Watt: 4.57 m (15 ft)</td>
<td>2.4 GHz, 65 mW: 0.3 m (1 ft)</td>
</tr>
<tr>
<td>Radio Transmit Power</td>
<td>900 MHz, 1 Watt: 30 dBm (1 W) conducted (up to 36 dBm EIRP)</td>
<td>2.4 GHz, 65 mW: 18 dBm (65 mW) conducted, less than or equal to 20 dBm (100 mW) EIRP</td>
</tr>
</tbody>
</table>

Spread Spectrum Technology

FHSS (Frequency Hopping Spread Spectrum)

900 MHz Compliance (1 Watt)

FCC ID UE3RM1809: FCC Part 15, Subpart C, 15.247
IC: 7044A-RM1809

2.4 GHz Compliance

FCC ID UE300DX80-2400: FCC Part 15, Subpart C, 15.247
RED Directive 2014/53/EU
IC: 7044A-DX8024

Antenna Connection

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

Link Timeout

Gateway: Configurable via User Configuration Software
Node: Defined by Gateway

MultiHop Radio Specifications

<table>
<thead>
<tr>
<th>Radio Range</th>
<th>900 MHz, 1 Watt: Up to 9.6 km (6 miles)</th>
<th>2.4 GHz, 65 mW: Up to 3.2 km (2 miles)</th>
</tr>
</thead>
<tbody>
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<td>Antenna Minimum Separation Distance</td>
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</tr>
</tbody>
</table>

Spread Spectrum Technology

FHSS (Frequency Hopping Spread Spectrum)

900 MHz Compliance (1 Watt)

FCC ID UE3RM1809: FCC Part 15, Subpart C, 15.247
IC: 7044A-RM1809

2.4 GHz Compliance (MultiHop)

FCC ID UE300DX80-2400: FCC Part 15, Subpart C, 15.247
RED Directive 2014/53/EU
IC: 7044A-DX8024

Antenna Connection

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

Radio Packet Size (MultiHop)

900 MHz: 175 bytes (85 Modbus registers)
2.4 GHz: 75 bytes (37 Modbus registers)

RS-485 Communication Specifications

Communication Hardware (MultiHop RS-485)

Interface: 2-wire half-duplex RS-485
Baud rates: 9.6k, 19.2k (default), or 38.4k via DIP switches; 1200 and 2400 via the MultiHop Configuration Software
Data format: 8 data bits, no parity, 1 stop bit

RS-232 Communication Specifications

Communication Hardware (MultiHop RS-232)

Interface: 2-wire RS-232
Baud rates: 9.6k, 19.2k (default), or 38.4k via DIP switches; 1200 and 2400 via the MultiHop Configuration Software
Data format: 8 data bits, no parity, 1 stop bit

---

1 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.

2 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.
Power and I/O 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

Power Consumption
35 mA average at 12 Volts (exclusive of load)

Solar Power
12 V sealed lead acid battery
2 A maximum charge current
12 V, 20 W maximum solar panel

Solar Power Battery Charging
1 A maximum with 20 Watt solar panel

Switched Power Out
Two selectable 5 V or 16 V outputs
5 V: 400 mA maximum
16 V: 125 mA maximum

Construction
Polycarbonate; DIN rail mount option

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

Security Protocols
VPN, SSL, and HTTPS

Logging
8 GB maximum; removable Micro SD card format

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

Environmental Specifications

Operating Conditions
–20 °C to +60 °C (–4 °F to +140 °F)
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

Environmental Rating
IEC IP20

Certifications
(CE approval only applies to 2.4 GHz models)
(NOM approval only applies to 900 MHz models)

Required Overcurrent Protection

WARNING: Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

Overcurrent protection is required to be provided by end product application per the supplied table.
Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.
Supply wiring leads < 24 AWG shall not be spliced.
For additional product support, go to www.bannerengineering.com.

<table>
<thead>
<tr>
<th>Supply Wiring (AWG)</th>
<th>Required Overcurrent Protection (Amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>5.0</td>
</tr>
<tr>
<td>22</td>
<td>3.0</td>
</tr>
<tr>
<td>24</td>
<td>2.0</td>
</tr>
<tr>
<td>26</td>
<td>1.0</td>
</tr>
<tr>
<td>28</td>
<td>0.8</td>
</tr>
<tr>
<td>30</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Required Overcurrent Protection

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
BWCLFBN0M-DC—Surge Suppressor, bulkhead, N-Type, dc Blocking, N-Type Female, N-Type Male

Misc Accessories
BWC-CG.5-3X5.6-10—Cable Gland Pack; 1/2-inch NPT, Cordgrip for 3 holes of 2.8 to 5.6 mm diam, qty 10
BWC-HW-052—Cable Gland and Vent Plug Pack: includes 1/2-inch NPT gland, 1/2-inch NPT multi-cable gland, and 1/2-inch NPT vent plug, qty 1 each

Antenna Cables
BWC-1MRSMN05—LMR100 RP-SMA to N-Type Male, 0.5 m
BWC-2MRSRFSR6—LMR200, RP-SMA Male to RP-SMA Female Bulkhead, 6 m
BWC-4MNFN6—LMR400 N-Type Male to N-Type Female, 6 m

3 Operating the devices at the maximum operating conditions for extended periods can shorten the life of the device.
Short-Range Omni Antennas
- BWA-902-D—Antenna, Dome, 2.4 GHz, 2 dBi, RP-SMA Box Mount
- BWA-902-R—Antenna, Rubber Fixed Right Angle, 900 MHz, 2 dBi, RP-SMA Male Connector

Medium-Range Omni Antennas
- BWA-902-C—Antenna, Rubber Swivel, 900 MHz 5 dBi, RP-SMA Male Connector
- BWA-20S-C—Antenna, Rubber Swivel, 2.4 GHz 5 dBi, RP-SMA Male Connector

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

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

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. 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, 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. Any misuse, abuse, or improper application or installation of this product or use of the product for personal protection applications when the product is identified as not intended for such purposes will void the product warranty. Any modifications to this product without prior express approval by Banner Engineering Corp will void the product warranties. All specifications published in this document are subject to change; Banner reserves the right to modify product specifications or update documentation at any time. Specifications and product information in English supersede that which is provided in any other language. For the most recent version of any documentation, refer to: www.bannerengineering.com.

Notas Adicionales
Información México: La operación de este equipo está sujeta a las siguientes dos condiciones: 1) es posible que este equipo o dispositivo no cause interferencia perjudicial y 2) este equipo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada.

Banner es una marca registrada de Banner Engineering Corp. y podrán ser utilizadas de manera indistinta para referirse al fabricante. "Este equipo ha sido diseñado para operar con las antenas tipo Omnidireccional para una ganancia máxima de antena de 6 dBd y Yagi para una ganancia máxima de antena 10 dBd que en seguida se enlistan. También se incluyen aquellas con aprobación ATEX tipo Omnidireccional siempre que no excedan una ganancia máxima de antena de 6dBd. El uso con este equipo de antenas no incluidas en esta lista o que tengan una ganancia mayor que 6 dBd en tipo omnidireccional y 10 dBd en tipo Yagi, quedan prohibidas. La impedancia requerida de la antena es de 50 ohms."

<table>
<thead>
<tr>
<th>Antenas SMA</th>
<th>Modelo</th>
<th>Antenas Tipo-N</th>
<th>Modelo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antena, Omni 902-928 MHz, 2 dBi, junta de caucho, RP-SMA Macho</td>
<td>BWA-902-C</td>
<td>Antena, Omni 902-928 MHz, 6 dBi, fibra de vidrio, 1800mm, N Hembra</td>
<td>BWA-906-A</td>
</tr>
<tr>
<td>Antena, Omni 902-928 MHz, 5 dBi, junta de caucho, RP-SMA Macho</td>
<td>BWA-905-C</td>
<td>Antena, Yagi, 900 MHz, 10 dBd, N Hembra</td>
<td>BWA-9Y10-A</td>
</tr>
</tbody>
</table>
Mexican Importer

Banner Engineering de México, S. de R.L. de C.V.
David Alfaro Siqueiros 103 Piso 2 Valle oriente
San Pedro Garza Garcia Nuevo León, C. P. 66269
81 8363.2714