

Datasheet

The DXM150-S1 Wireless Modbus Slave can connect directly to an RS-485 serial bus or to a wireless ISM network as a remote Modbus Slave device.



- Power options include 12 to 30 V dc with or without a battery backup, or 12 V dc solar panel with a sealed lead acid battery
- Local I/O options: isolated discrete inputs, universal inputs, SPDT (Form C) relay outputs, NMOS outputs, and Analog outputs (0 to 10 V)
- ISM radios available in either a 900 MHz band or 2.4 GHz band for local wireless networks



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:

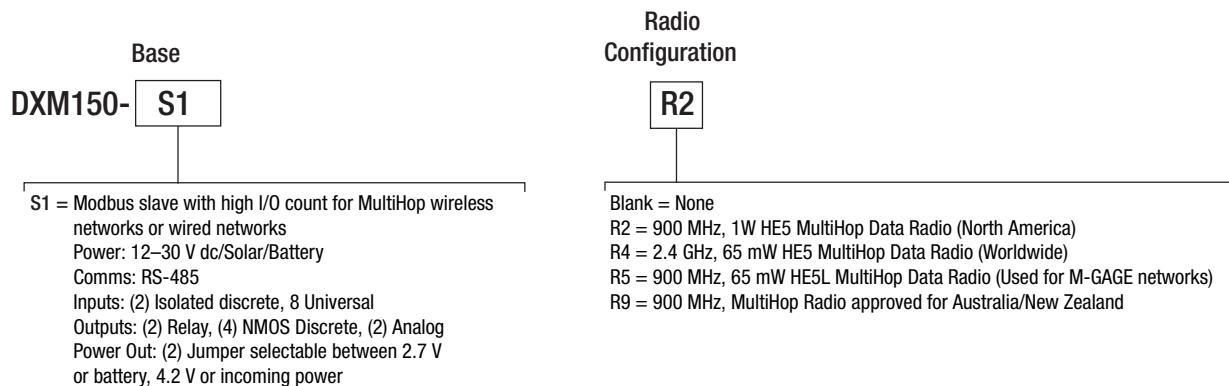
- **Never operate a 1 Watt radio without connecting an antenna**
- Operating 1 Watt radios without an antenna connected will damage the radio circuitry.
- To avoid damaging the radio circuitry, never apply power to a Sure Cross® Performance or Sure Cross MultiHop (1 Watt) radio without an antenna connected.



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 DXM150-S1 Models



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

| Models | Description |
|-----------|---------------------------------|
| DXM150-S1 | DXM150-S1 Wireless Modbus Slave |



| Models | Description |
|-------------|--|
| DXM150-S1R2 | DXM150-S1 Wireless Modbus Slave base with MultiHop ISM 900 MHz radio |

DXM150 Documentation List

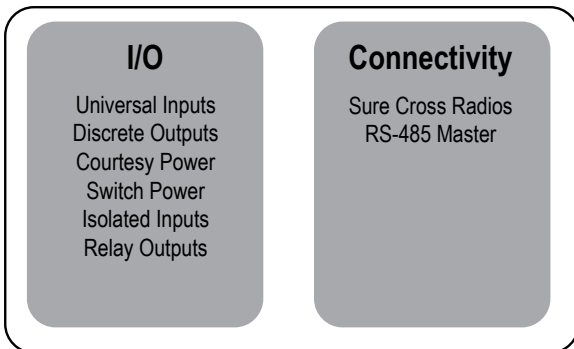
For more information about the DXM Modbus Slave family of products, please see additional documentation and videos on the Banner website: www.bannerengineering.com/wireless.

- DXM Wireless Controller Sell Sheet, p/n [194063](#)
- DXM150-B1 Wireless Controller Datasheet, p/n [178136](#)
- DXM150-B2 Wireless Controller Datasheet, p/n [195952](#)
- DXM150-Bx Wireless Controller Instruction Manual, p/n [190038](#)
- DXM150-S1 Modbus Slave Datasheet, p/n [160171](#)
- DXM150-S2 Modbus Slave Datasheet, p/n [200634](#)
- DXM150-Sx Modbus Slave Instruction Manual, p/n [195455](#)
- DXM ScriptBasic Instruction Manual, p/n [191745](#)
- DXM Controller Configuration Quick Start, p/n [191247](#)
- DXM Configuration Tool software (p/n [b_4447978](#))
- DXM Configuration Tool Instruction Manual, p/n [158447](#)
- DXM EDS [Configuration file](#) for Allen-Bradley PLCs
- EIP Configuration File for DXM 1xx-BxR1 and R3 models (p/n [194730](#))
- Activating a Cellular Modem (p/n [b_4419353](#))
- Additional technical notes and videos

Technical notes, configuration examples, and ScriptBasic program examples are available at <http://www.bannerengineering.com>.

DXM150-S1 Wireless Modbus Slave System Overview

Banner's DXM Logic Controller integrates Banner's wireless radio and local I/O for a remote I/O device.



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
- Isolated inputs
- Relay outputs
- Battery backup
- Solar controller

Connectivity—The integrated Sure Cross® wireless radio enables Modbus connectivity to remote sensors, indicators, and control equipment.

Wired Connectivity

Field Bus: Modbus RS-485 Master

Wireless Connectivity

Sure Cross MultiHop 900 MHz, or MultiHop 2.4 GHz

Specifications

MultiHop Radio Specifications

Radio Range¹

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

Antenna Minimum Separation Distance

900 MHz, 150 mW and 250 mW: 2 m (6 ft)
900 MHz, 1 Watt: 4.57 m (15 ft)
2.4 GHz, 65 mW: 0.3 m (1 ft)

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

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 Tool
Data format: 8 data bits, no parity, 1 stop bit

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

Power Consumption

20 mA average at 12 Volts

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

Discrete Inputs

Optically isolated AC input type
Input to output isolation: 2.5 kV

Universal Inputs

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

Counters, Synchronous

32-bits unsigned
10 ms clock rate minimum

Selectable (Jumper) Power Out

Output on pin 45, jumper selects 2.7 V or battery
Output on pin 35, jumper selects 4.2 V or incoming power
100 mA maximum

Indicators

Four LEDs, four control buttons, one LCD

Construction

Polycarbonate; DIN rail mount option

Communication Protocol

Modbus RTU Slave

Analog Outputs (DAC)

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

Relay Outputs

SPDT (Form C) relay
250 V ac, 16 A

Environmental Specifications

Operating Conditions²

–40 °C to +85 °C (–40 °F to +185 °F) (Electronics); –20 °C to +80 °C (–4 °F to +176 °F) (LCD)
Micro CD Card (if applicable): –25 °C to +85 °C (–13 °F to +185 °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)

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 Operating the devices at the maximum operating conditions for extended periods can shorten the life of the device.

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

Short-Range Omni Antennas

BWA-2O2-D—Antenna, Dome, 2.4 GHz, 2 dBi, RP-SMA Box Mount
 BWA-9O2-D—Antenna, Dome, 900 MHz, 2 dBi, RP-SMA Box Mount
 BWA-9O2-RA—Antenna, Rubber Fixed Right Angle, 900 MHz, 2 dBi, RP-SMA Male Connector

Medium-Range Omni Antennas

BWA-9O5-C—Antenna, Rubber Swivel, 900 MHz 5 dBi, RP-SMA Male Connector
 BWA-2O5-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", 2 trilobular/self-threading screws
 BWA-AH10DR—DIN Rail Kit, 10", 2 trilobular/self-threading screws
 BWA-AH12DR—DIN Rail Kit, 12", 2 trilobular/self-threading screws

Misc Accessories

BWA-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
 BWA-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-2MRSFRS6—LMR200, RP-SMA Male to RP-SMA Female Bulkhead, 6 m
 BWC-4MNFN6—LMR400 N-Type Male to N-Type Female, 6 m

Long-Range Omni Antennas

BWA-9O8-AS—Antenna, Fiberglass, 3/4 Wave, 900 MHz, 8 dBi, N-Type Female Connector
 BWA-2O8-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, Class I Division 2 (Groups A, B, C, D) Rated
[BWA-SOLAR PANEL 20W](#)—Solar Panel, 12 V, 20 W, Multicrystalline, 573 × 357 × 30, "L" style mounting bracket included (does not include controller)

Warnings

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.

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. 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.

For patent information, see www.bannerengineering.com/patents.