Sure Cross® GatewayPro (KR)

Datasheet

The Sure Cross® wireless system is a radio frequency network with integrated I/O that operates in most environments to eliminate the need for wiring runs.

- 10 to 30 V dc power input
- Modbus serial interface and Ethernet interface
- Site Survey analyzes the network's signal strength and reliability and displays the results on the Gateway's LCD
- Frequency Hopping Spread Spectrum (FHSS) technology ensures reliable data delivery within the unlicensed Industrial, Scientific, and Medical (ISM) band
- Transceivers provide bidirectional communication between the Gateway and Node, including fully acknowledged data transmission

For additional information, updated documentation, and a list of accessories, refer to Banner Engineering's website, *www.bannerengineering.com/wireless*.

Models	Feature	Frequency
DX80P2T6S-KR	Modbus/TCP or EtherNet/IP communication protocol	2.4 GHz ISM Band

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.

GatewayPro

A GatewayPro combines the wireless capability of the standard Gateway with the protocol converter of a DX83 Ethernet Bridge, resulting in a device that is the master of the wireless network and a slave to an Industrial Ethernet network.

The GatewayPro is treated the same as a standard Gateway, with the GatewayPro providing Modbus/TCP or EtherNet/IP slave access to all the information on the wireless network instead of the Modbus 485 slave interface the standard Gateway provides. There are two basic models of the GatewayPro:

- **DX80P*T6*.** The T6 model acts as a protocol converter only, offering the Modbus/TCP or EtherNet/IP communication protocols.
- **DX80P*A6*.** The A6 model includes DX80 wireless network configuration, Modbus RTU master, Modbus/TCP client/server, Script Basic, e-mail, data logging, and trending.

Connect a host controller system to the GatewayPro using its industrial Ethernet connection. To connect the GatewayPro to the host system without using an Ethernet switchbox/hub, some host systems may require a crossover cable.

By default, the GatewayPro is configured to use Modbus/TCP. To use EtherNet/IP, connect the GatewayPro to a managed switch and you must use the Web Configuration tool to select EtherNet/IP. For more information, see *SureCross Wireless I/O Product Manual* or *Host Configuration Manual*.

Setting Up Your Wireless Network

To set up and install your wireless network, follow these steps.

Disconnect the power from your Sure Cross devices.

1. Configure the DIP switches of all devices.
2. If your device has I/O, connect the sensors to the Sure Cross devices. If your device does not have I/O, skip this step.
3. Refer to the wiring diagrams to apply power to all devices.
   - For housed models, the Gateway's LED 1 is solid green and the Node's LED 2 flashes red to indicate there is no radio link to the Gateway.
   - For board-level models, the Gateway's LED is solid green and the Node's LED flashes red to indicate there is no radio link to the Gateway.

4. Form the wireless network by binding the Nodes to the Gateway. If the binding instructions are not included in the datasheet, refer to the product manual for binding instructions.
5. Observe the LED behavior to verify the devices are communicating with each other.
   - For housed models, the Gateway's LED 1 is solid green and the Node's LED 1 flashes green to indicate it is communicating with the Gateway.
   - For board-level models, the Gateway's LED is solid green and the Node's LED flashes green to indicate it is communicating with the Gateway.
6. Configure any I/O points to use the sensors connected to the Sure Cross devices.
7. Conduct a site survey between the Gateway and Nodes. If the site survey instructions are not included in this datasheet, refer to the product manual for detailed site survey instructions.
8. Install your wireless sensor network components. If installation instructions are not included in this datasheet, refer to the product manual for detailed installation instructions.

For additional information, including installation and setup, weatherproofing, device menu maps, troubleshooting, and a list of accessories, refer to one of the following product manuals.

- Sure Cross® Quick Start Guide: *128185*
- Sure Cross® Wireless I/O Network Instruction Manual: *132607*
- Web Configurator Instruction Manual (used with "Pro" and DX83 models): *134421*
- Host Controller Systems Instruction Manual: *132114*

Configure the DIP Switches

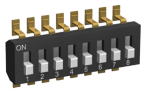
Before changing DIP switch positions, disconnect the power. DIP switch changes are not recognized until after power is cycled to the device.

For parameters not set via DIP switches, use the User Configuration Tool (UCT) to make configuration changes. For parameters set using the DIP switches, the DIP switch positions override any changes made using the User Configuration Tool.

Accessing the Internal DIP Switches

To access the internal DIP switches, follow these steps:

1. Unscrew the four screws that mount the cover to the bottom housing.
2. Remove the cover from the housing without damaging the ribbon cable or the pins the cable plugs into.
3. Gently unplug the ribbon cable from the board mounted into the bottom housing.
4. Remove the black cover plate from the bottom of the device's cover.
   The DIP switches are located behind the rotary dials.



After making the necessary changes to the DIP switches, place the black cover plate back into position and gently push into place. Plug the ribbon cable in after verifying that the blocked hole lines up with the missing pin. Mount the cover back onto the housing.

DIP Switch Settings

	Switches			
Device Settings	**1**	**2**	**3**	**4**
Rotary dial address mode	OFF *			
Extended address mode	ON			

* Default configuration

Address Mode

The SureCross wireless devices may use one of two types of addressing modes: rotary dial addressing or extended addressing. In **rotary dial** address mode, the left rotary dial establishes the network ID and the right rotary dial sets the device ID. The wireless network is restricted to a maximum of 16 devices.

Extended address mode uses a security code to "bind" Nodes to a specific Gateway. Bound Nodes can only send and receive information from the Gateway to which they are bound. In extended address mode, wireless networks may contain up to 48 radio devices. For more information on extended address mode, refer to the SureCross™ Wireless I/O Network product manual.

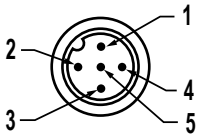
The device ships in rotary dial address mode by default, with the DIP switch in the OFF position. To use extended address mode, change the DIP switch to the ON position.

Wire Your Sure Cross® Device

Use the following wiring diagrams to first wire the sensors and then apply power to the Sure Cross devices.

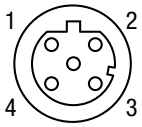
5-pin M12/Euro-style Wiring for Gateways and DX85s

Wiring the 5-pin Euro-style connector depends on the model and power requirements of the device. Connecting power to the communication pins will cause permanent damage.

5-pin M12/Euro-style Male Connector	Pin	Wire Color	Description
	1	Brown	10 to 30 V dc
	2	White	RS485 / D1 / B / +
	3	Blue	dc common (GND)
	4	Black	RS485 / D0 / A / –
	5	Gray	Comms Gnd

Industrial Ethernet Wiring

Use the 4-pin industrial Ethernet connection to connect the radio network to an Ethernet-based host system.

4-pin Industrial Ethernet Connector	Pin	Wire Color	Description
	1	White/orange	+ Tx
	2	White/blue	+Rx
	3	Orange	–Tx
	4	Blue	–Rx

LED Behavior for the Gateways

Verify all devices are communicating properly. The radios and antennas must be a minimum distance apart to function properly. Recommended minimum distances are:

900 MHz 150 mW and 250 mW radios: 6 feet
900 MHz 1 Watt radios: 15 feet
2.4 GHz 65 mW radios: 1 foot

LED 1	LED 2	Gateway Status
Solid green		Power ON
Flashing red	Flashing red	Device Error
	Flashing amber	Modbus Communication Active
	Flashing red	Modbus Communication Error

For Gateway and Ethernet Bridge systems, active Modbus communication refers to the communication between the Gateway and the Ethernet Bridge. For GatewayPro systems, the Modbus communication LEDs refer to the communication internal to the GatewayPro. For Gateway-only systems, the Modbus communication LEDs refer to the communication between the Gateway and its host system (if applicable).

Modbus Register Table

I/O Point	Modbus Holding Register	
	Gateway	Any Node
1	1	1 + (Node# × 16)
2	2	2 + (Node# × 16)
3	3	3 + (Node# × 16)
4	4	4 + (Node# × 16)
5	5	5 + (Node# × 16)
6	6	6 + (Node# × 16)
7	7	7 + (Node# × 16)
8	8	8 + (Node# × 16)
9	9	9 + (Node# × 16)

I/O Point	Modbus Holding Register	
	Gateway	Any Node
10	10	10 + (Node# × 16)
11	11	11 + (Node# × 16)
12	12	12 + (Node# × 16)
13	13	13 + (Node# × 16)
14	14	14 + (Node# × 16)
15	15	15 + (Node# × 16)
16	16	16 + (Node# × 16)

Specifications

Performance 2.4 GHz Korean Radio Specifications

Radio Range[1]
2.4 GHz, 65 mW: Up to 3.2 km (2 miles)

Antenna Minimum Separation Distance
2.4 GHz, 65 mW: 0.3 m (1 ft)

Radio Transmit Power
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)

2.4 GHz Compliance for Korean Radio Models
KCC-CRM-BE2-DX

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 Tool (UCT) software
Node: Defined by Gateway

Communication Specifications

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

Modbus/TCP, EtherNet/IP
Interface: 4-wire Industrial Ethernet
Data rate: 10/100 Mbps, full or half duplex, auto sensing

GatewayPro-KR Specifications

Supply Voltage
10 V dc to 30 V dc (Outside the USA: 12 V dc to 24 V dc, ± 10%)
Consumption: Less than 2.9 W (120 mA) at 24 V dc

Housing
Polycarbonate housing and rotary dial cover; polyester labels; EDPM rubber cover gasket; nitrile rubber, non-sulphur cured button covers
Weight: 0.26 kg (0.57 lbs)
Mounting: #10 or M5 (SS M5 hardware included)
Max. Tightening Torque: 0.56 N·m (5 lbf·in)

Interface
Two bi-color LED indicators
Two buttons
Six character LCD

Wiring Access
One 5-pin threaded M12/Euro-style male quick disconnect
One 4-pin female industrial Ethernet connection

Certifications

CE

Environmental Specifications

Operating Conditions
–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

Environmental Ratings
IEC IP67; NEMA 6

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

Included with Device ('Pro Models)

The following items ship with the 'Pro radios.

[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.

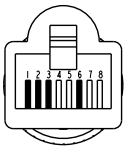
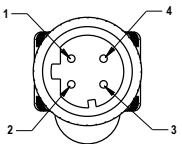
- BWA-HW-001: Mounting Hardware Kit, containing four M5-0.8 x 25mm SS screws, four M5-0.8 x 16mm SS screws, four M5-0.8mm SS hex nuts, and four #8-32 x 3/4" SS bolts
- BWA-9O2-C (900 MHz) or BWA-2O2-C (2.4 GHz): Antenna, 2 dBd Omni, Rubber Swivel RP-SMA Male. (Not included with Internal antenna models)
- Quick Start Guide (128185 for DX80 Gateways or 152653 for MultiHop models)
- MQDC1-506: 5-Euro (single ended) straight cable, 2m (Not included with FlexPower devices)
- BWA-EX2M: Ethernet crossover cable, M12 industrial/RJ45, 2 meter

Accessories

Ethernet Cables

Use a crossover cable to connect the GatewayPro or DX83 Ethernet Bridge to a host system without using an Ethernet switchbox or hub. When using a switchbox or hub, use a straight cable.

RSCD RJ45 Ethernet to 4-Pin M12/Euro-Style Cordsets

Model	Length	Style	Dimensions	Pinout
BWA-E2M	2 m (6.6 ft)	Straight RSCD RJ45 440		 1 = White/orange (+Tx) 2 = Orange (-Tx) 3 = White/blue (+Rx) 4 = N/C 5 = N/C 6 = Blue (-Rx) 7 = N/C 8 = N/C
BWA-E8M	8 m (26.2 ft)			 1 = White/Orange (+Tx) 2 = White/Blue (+Rx) 3 = Orange (-Tx) 4 = Blue (-Rx)
BWA-EX2M	2 m (6.6 ft)	Crossover RSCD RJ45CR 440		

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.

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