

SureCross DX85 Remote I/O Device



Configurable remote I/O device with 4 discrete inputs, 4 discrete outputs, 2 analog inputs, 2 analog outputs, and a Modbus interface

Features



The SureCross™ wireless system is a radio frequency network with integrated I/O that can operate in most environments while eliminating the need for wiring runs. Systems are built around a Gateway, which acts as the wireless network master device, and one or more Nodes. A remote I/O device with a Modbus interface is used to expand the I/O of the Gateway device or the Modbus host.

- Wireless industrial I/O device with four discrete (sourcing) inputs, four discrete (sourcing) outputs, two analog inputs, and two analog outputs
- 10 to 30V dc power input
- Modbus slave remote with discrete and analog I/O
- Selectable slave address
- Modbus RTU protocol using RS-485
- The DX85...C models are certified for use in Class I, Division 2, Group A, B, C, D; and Zone 2 (Group IIC) Hazardous Locations when properly installed in accordance with the National Electrical Code, the Canadian Electrical Code, LCIE/ATEX, or applicable local codes/regulations (see Specifications)

For additional information and a complete list of accessories refer to Banner Engineering's website, www.bannerengineering.com/surecross.

Models

Model	Environmental Rating	I/O
DX85M4P4M2M2	IP67, NEMA 6	Discrete Inputs: Four Sourcing
DX85M4P4M2M2C	IP20, NEMA 1 Class I, Division 2, Group A, B, C, D Hazardous Locations (see <i>Specifications</i>)	Discrete Outputs: Four Sourcing Analog Inputs: Two 0-20 mA Analog Outputs: Two 0-20 mA

Hookup Diagrams

Modbus Register Table

I/O Point	Modbus Holding Register		I/O Type	Units	I/O Range		Holding Register Representation		Terminal Block Labels
	Gateway or DX85	Any Node			Min. Value	Max. Value	Min. (Dec.)	Max. (Dec.)	
1	1	1 + (Node# × 16)	Discrete IN 1	-	0	1	0	1	DI1
2	2	2 + (Node# × 16)	Discrete IN 2	-	0	1	0	1	DI2
3	3	3 + (Node# × 16)	Discrete IN 3	-	0	1	0	1	DI3
4	4	4 + (Node# × 16)	Discrete IN 4	-	0	1	0	1	DI4
5	5	5 + (Node# × 16)	Analog IN 1	mA	0.0	20.0	0	65535	AI1
6	6	6 + (Node# × 16)	Analog IN 2	mA	0.0	20.0	0	65535	AI2

Warranty: Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture found to be defective at the time it is returned to the factory during the warranty period. This warranty does not cover damage or liability for the improper application of Banner products. This warranty is in lieu of any other warranty either expressed or implied.

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I/O Point	Modbus Holding Register		I/O Type	Units	I/O Range		Holding Register Representation		Terminal Block Labels
	Gateway or DX85	Any Node			Min. Value	Max. Value	Min. (Dec.)	Max. (Dec.)	
7	7	7 + (Node# × 16)	Reserved						
8	8	8 + (Node# × 16)	Device Message						
9	9	9 + (Node# × 16)	Discrete OUT 1	-	0	1	0	1	DO1
10	10	10 + (Node# × 16)	Discrete OUT 2	-	0	1	0	1	DO2
11	11	11 + (Node# × 16)	Discrete OUT 3	-	0	1	0	1	DO3
12	12	12 + (Node# × 16)	Discrete OUT 4	-	0	1	0	1	DO4
13	13	13 + (Node# × 16)	Analog OUT 1	mA	0.0	20.0	0	65535	AO1
14	14	14 + (Node# × 16)	Analog OUT 2	mA	0.0	20.0	0	65535	AO2
15	15	15 + (Node# × 16)	Control Message						
16	16	16 + (Node# × 16)	Reserved						

5-pin Euro-Style Hookup

Wiring the 5-pin Euro-style connector depends on the model and power requirements of the device.



Wire No.	Wire Color	Gateway, GatewayPro, DX85	FlexPower Gateway, Data Radio	10–30V dc Power	Battery Power
1	Brown	10 to 30V dc	10 to 30V dc	10 to 30V dc	
2	White	RS485 / D1 / B / +	RS485 / D1 / B / +		
3	Blue	dc common (GND)	dc common (GND)	dc common (GND)	dc common (GND)
4	Black	RS485 / D0 / A / -	RS485 / D0 / A / -		
5	Gray	Comms Gnd	3.6 to 5.5V dc		3.6 to 5.5V dc

Connecting dc power to the communication pins will cause permanent damage. For FlexPower devices, do not apply more than 5.5V to the gray wire (BAT terminal in models with the mini-board).

DX80...C Hookup

Wiring power to the DX80...C models varies depending the power requirements of the model.

Terminal Block Label	Gateway, DX85*	10–30V dc Power	Battery Power**
V+	10 to 30V dc	10 to 30V dc	
Tx	RS485 / D1 / B / +		
V-	dc common (GND)	dc common (GND)	dc common (GND)
Rx	RS485 / D0 / A / -		

Terminal Block Label	Gateway, DX85*	10–30V dc Power	Battery Power**
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B+

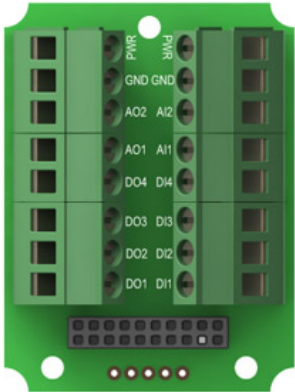
3.6 to 5.5V dc

* Connecting dc power to the communication pins will cause permanent damage.

** For FlexPower devices, do not apply more than 5.5V to the gray wire.

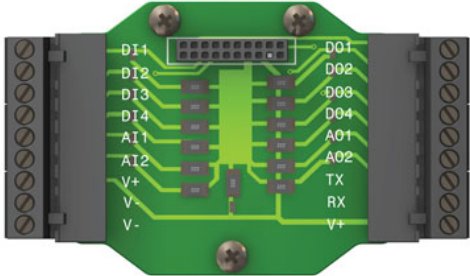
Terminal Blocks and Wiring

Terminal Block (IP67 Base)



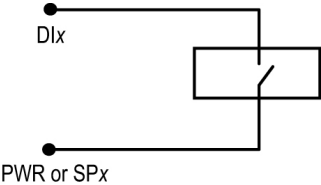
- AIx or Ax. Analog IN x.
- AOx. Analog OUT x.
- DIx. Discrete IN x.
- DOx. Discrete OUT x.
- GND. Ground/dc common.
- PWR. Power, 10 to 30V dc power connection.

Terminal Block (IP20 Base)

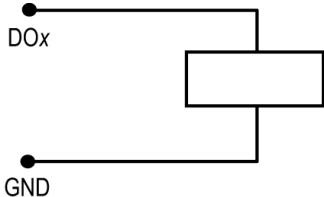


- AIx or Ax. Analog IN x.
- AOx. Analog OUT x.
- DIx. Discrete IN x.
- DOx. Discrete OUT x.
- RX. RS485 / D0 / A - (Gateway only)
- TX. RS485 / D1 / B / + (Gateway only)
- V+. Power, 10 to 30V dc power connection.
- V-. Ground/dc common.

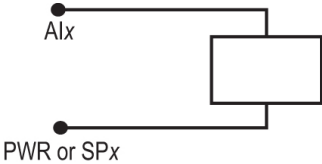
Discrete Input Wiring (PNP)



Discrete Output Wiring (PNP)

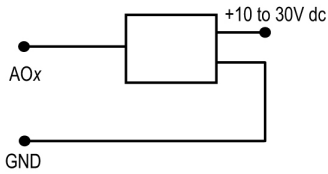


Analog Input Wiring (10 to 30V dc Power)



Do not exceed analog input ratings for analog inputs. Only connect sensor outputs to analog inputs.

Analog Output Wiring



Connecting dc power to the communication pins will cause permanent damage.

Additional Information

For additional information, including installation and setup, weatherproofing, device menu maps, troubleshooting, and a list of accessories, please refer to the SureCross™ Wireless I/O Network product manual, Banner part number [132607](#).

Setting the Slave ID on a DX85 Remote I/O Device

On a DX85 Modbus RTU Remote I/O device, use the rotary dials to set the device's Slave ID.



With the left dial acting as the left digit and the right dial acting as the right digit, the Slave ID can be set from 01 through F7, allowing for 247 slaves.

Verify Communications on the DX85 Modbus RTU Remote I/O

After powering up, verify the DX85 is communicating properly.

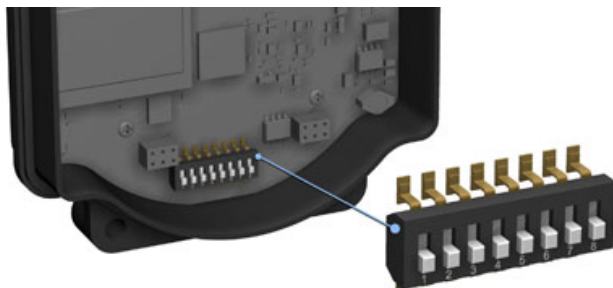
Verify LED 1 is on and green.

Status	LED 1	LED 2
Power ON	Green ON	-
Device Error	Red flashing	Red flashing
Modbus Communication Active	-	Yellow flashing
Modbus Communication Error	-	Red flashing

The Modbus communication LEDs refer to the communication between the DX85 and what it is connected to (host system, Gateway, Data Radio, etc).

Device Configuration

DIP Switch Changes



Before making any changes to the DIP switch positions, disconnect the power. For devices with batteries integrated into the housing, remove the battery.

Accessing the DIP Switches

To access the 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.

Device Settings

Use the DIP switches 1 through 4 on the board to set the baud rate and parity.

	DIP Switches			
	1	2	3	4
Baud Rate: 19200	OFF*	OFF*		
Baud Rate: 38400	OFF	ON		
Baud Rate: 9600	ON	OFF		
Baud Rate: 19200	ON	ON		
Parity: None			OFF*	OFF*
Parity: Even			OFF	ON
Parity: Odd			ON	OFF
Parity: None			ON	ON

* Default configuration

Specifications

Many of the parameters are configurable. These values represent factory defaults unless otherwise noted.

General

Power

Requirements: +10 to 30V dc (For European applications: +10 to 24V dc, $\pm 10\%$)*
Consumption: Less than 1.4 W (60 mA) at 24V dc

Housing

Material: Polycarbonate
Weight: 0.26 kg (0.57 lbs)

Mounting

Fasteners: #10 or M5 (M5 hardware included)
Max. Tightening Torque: 0.56 N·m (5 in-lbf)

Interface

Two LEDs, bi-color

Wiring Access

Wiring Access: Four PG-7 type, one ½-inch NPT type, one 5-pin Euro-style male connector
Max. Tightening Torque: 0.56 N·m (5 in-lbf)

* Power: For European applications, power the DX80 from a Limited Power Source as defined in EN 60950-1.

Discrete Inputs

Discrete Inputs

Four, sourcing

Discrete Input Rating

3 mA max current at 30V dc

Discrete Input ON Condition

Greater than 8V

Discrete Input OFF Condition

Less than 5V

Analog Inputs

Analog Inputs

Two, 0 to 20 mA

Analog Input Rating

24 mA

Accuracy

0.1% of full scale +0.01% per °C

Resolution

12-bit

Discrete Outputs

Discrete Outputs

Four, sourcing

Discrete Output Rating

100 mA max current at 30V dc
ON State Saturation: Less than 3V at 100 mA
OFF State Leakage: Less than 10 µA

Discrete Output ON Condition

Supply minus 2V

Discrete Output OFF Condition

Less than 2V

Discrete Output State Following Timeout

De-energized (OFF)

Analog Outputs

Analog Outputs

Two, 0 to 20 mA

Accuracy

0.1% of full scale +0.01% per °C

Resolution

12-bit

Communication

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

DX8x Models: IEC IP67; NEMA 6
DX8x...C Models: IEC IP20; NEMA 1
DX8x...C Models, in a suitable enclosure: Class I, Division 2, Group A, B, C, D. T4 -40 to +80° C (when installed in a suitable enclosure)

Operating Conditions

Temperature: -40 to +85° C
Humidity: 95% max. relative (non-condensing)

Radiated Immunity

10 V/m, 80-2700 MHz (EN61000-6-2)

Shock and Vibration

Rating: IEC 68-2-6 and IEC 68-2-7

Shock: 30g, 11 millisecond half sine wave, 18 shocks

Vibration: 0.5 mm p-p, 10 to 60 Hz

Refer to the SureCross™ DX80 Wireless I/O Network product manual, Banner p/n [132607](#), for installation and waterproofing instructions.

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

Classified Area Certifications (DX85...C Models)

CSA

CSA: Class I, Division 2, Groups A, B, C, D (Ex/AEx nA II). Certificate: 1921239

LCIE/ATEX

LCIE/ATEX: Zone 2 (Group IIC), (II 3G / Ex nA IIC). Certificate: LCIE 09 ATEX 1035 U



Included with Device (DX85 with IP67 Housing)

Included with Device	Model	Qty	Item
DX80 Access Hardware Kit	BWA-HW-002	4	Plastic threaded plugs, PG-7
		4	Nylon gland fittings, PG-7
		4	Hex nuts, PG-7
		1	Plug, 1/2" NPT
		1	Nylon gland fitting, 1/2" NPT
Mounting Hardware Kit	BWA-HW-001	4	Screw, M5-0.8 x 25mm, SS
		4	Screw, M5-0.8 x 16mm, SS
		4	Hex nut, M5-0.8mm, SS
		4	Bolt, #8-32 x 3/4", SS
PTFE Tape	BWA-HW-003	1	PTFE Tape
SureCross Literature CD	79685	1	SureCross Literature CD
Cable	MQDC1-506	1	Cable, 5-pin Euro (single ended), Straight, 2m

Included with Device (DX85...C Models)

Included with Device	Model	Qty	Item
Mounting Hardware Kit	BWA-HW-001	4	Screw, M5-0.8 x 25mm, SS
		4	Screw, M5-0.8 x 16mm, SS
		4	Hex nut, M5-0.8mm, SS
		4	Bolt, #8-32 x 3/4", SS
SureCross Literature CD	79685	1	SureCross Literature CD
Cable	MQDC1-506	1	Cable, 5-pin Euro (single ended), Straight, 2m
	BWA-HW-011	1	IP20 Screw Terminal Headers (2 pack)

Warnings Violation

The manufacturer does not take responsibility for the violation of any warning listed in this document.

Personnel Protection

WARNING... Not to be used for personnel protection. Never use these products for personnel protection. Doing so could lead to serious injury or death. These products do NOT include the self-checking redundant circuitry necessary to allow their use in personnel safety applications. A failure or malfunction can cause either an energized or de-energized output condition. Consult your current Banner Safety Products catalog for safety products that meet OSHA, ANSI, and IEC standards for personnel protection.

Do Not Modify

Make no modifications to this product. Any modifications to this product not expressly approved by Banner Engineering could void the user's authority to operate the product. Contact the Factory for more information.

Warranty Statement

WARRANTY: Banner Engineering Corp. warrants its products to be free from defects for one year. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture found to be defective at the time it is returned to the factory during the warranty period. This warranty does not cover damage or liability for the improper application of Banner products. This warranty is in lieu of any other warranty either expressed or implied.

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