SureCross FlexPower Solar Supply Assembly

Datasheet

The FlexPower Solar Supply provides autonomous power for continuous wireless sensing and monitoring applications in a compact, plug-and-play power solution. The battery pack recharges in direct sunlight and supplies power to the SureCross devices autonomously without sunlight.

- FlexPower Solar Supply with rechargeable battery pack provides reliable power (nominal 5.0 V dc) for applications with higher power demands than a standard DX81 or DX81P6 can supply
- Solar Supply includes the panel, charge controller, rechargeable battery pack, and mounting hardware (ac wall charger sold separately)
- Weather resistant environmental enclosure

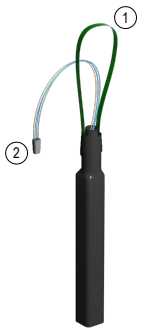
For additional information, updated documentation, and accessories, refer to Banner Engineering's website, *www.bannerengineering.com/surecross*.

Model	Nominal Output Voltage	Replacement Battery Pack
BWA-SOLAR-001	5.0 V dc	BWA-BATT-003 Replacement battery and controller pack

Replacing the Rechargeable Battery Pack

When the rechargeable batteries need to be replaced, order model number BWA-BATT-003. This replacement part includes the batteries, controller, and wiring.

CAUTION: Properly dispose of your used battery according to local regulations by taking it to a hazardous waste collection site, an e-waste disposal center, or any other facility qualified to accept NiMH batteries. As with all batteries, these are a fire, explosion, and severe burn hazard. Do not burn or expose them to high temperatures. Do not crush, disassemble, or expose the contents to water.

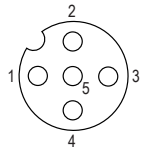


To replace the battery pack, follow these steps.

1. Remove the sign-post top cap.
2. Gently remove the battery and controller assembly by pulling the strap (1).
3. Unplug the core pack from the sign post top cap (2).
4. Plug the new core pack in and insert the core pack into the tube.
5. Mount the cap securely and tighten.
6. Charge the replacement solar core pack for 8 to 16 hours using the ac wall charger (sold separately as an accessory).

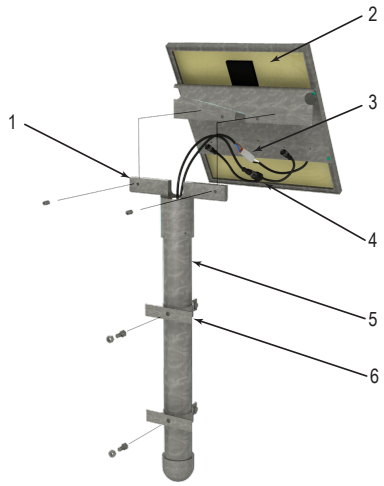
   This solar core pack ships from the factory with a partial charge, but charging ensures your battery pack has enough power to operate efficiently regardless of weather conditions and sun availability.

5-pin Euro-Style Wiring for BWA-SOLAR-001

5-pin Euro-Style Female Connector	Wire No.	Wire Color	Description
	3	Blue	dc common (GND)
	5	Gray	5 V dc nominal

Installing the Solar Supply Assembly

Before you install the Solar Supply, charge the solar core battery pack for 8 to 16 hours using the optional ac wall charger. Though this solar core pack ships from the factory with a partial charge, this recharge ensures your battery pack has enough power to operate effectively after installation regardless of initial weather conditions and sun availability.



1 Sign-post top cap
2 Solar panel
3 Connector from battery pack to the optional charger or to the solar panel.
4 Splitter cable that goes to the SureCross devices (not included)
5 Pipe assembly
6 Mounting clamps

To assemble your solar power device, follow these installation instructions:

1. Connect the pipe clamps as shown, positioning the clamps about 10 inches apart.
2. Insert the solar panel assembly into the sign-post top cap and align the mounting holes.
3. Insert the supplied set screws into the sign-post top cap and through the solar panel mounting plate. Tighten.
4. Connect the two cables protruding from the pipe assembly.

   One cable ends in a gray connector; connect this to the cable coming from the solar panel. The second cable is black with a Euro-style connector; this plugs into the SureCross device or devices that the solar assembly is powering.
5. Mount to a flat surface.

Solar Application Information

Insolation and Autonomy

In every solar/battery powered application there are two important parameters that help determine how much usable energy can be harnessed from the available sunlight:

- Insolation is the amount of solar radiation falling on an area per unit time. Insolation can be characterized as an equivalent number of hours of direct sunlight per day required to maintain a desired load.
- Autonomy is a measure of how long the assembly will supply power without sunlight. Autonomy depends on the load and battery capacity, but it is also affected by battery temperature. A fully charged battery in our assembly will supply 350 mW with 10 days of autonomy. Ten days of 100% autonomy means that the battery is able to carry the load through 10 days of darkness or 20 days with half the required sunlight.

The SureCross FlexPower Solar Supply supports many applications including wireless network range extension, remote sensing, and wireless 4 to 20 mA transmitter operation and monitoring. These typical 350 mW applications require an average winter insolation of 1 kW-hr/m^2 per day. This is equivalent to an average of 80 minutes of sunlight shining directly

on the solar panel per day during the least sunny time of the year. Locations that will provide this amount of sunlight include most locations between the Arctic Circle and Antarctic Circle. For average daily sunlight estimates please refer to an insolation map of your installation location or consult with a Banner Sales Application Engineer.

Load Shedding

Without sunlight, the supply is powered exclusively from the battery. When the battery is mostly depleted, the controller disconnects the load, or sheds the load. This load shedding lasts until the solar panel recharges the battery to a sufficient operating level, which can require up to five minutes of full sunlight.

Solutions for Additional Power

Some applications require more power than one SureCross FlexPower Solar Supply can deliver. If load shedding is unacceptable and a standalone solar assembly does not meet your power requirements, consider adding a DX81P6 Battery Supply Module battery backup or consider using more than one solar assembly connected in parallel. See page six for example configurations.

- Battery Backup. The DX81P6 can supply backup power to a 350 mW load for up to 30 days of autonomy after solar autonomy is exhausted.
- Parallel Assemblies. SureCross FlexPower Solar Supplies are modular and can be connected in parallel.

Along with the benefit of additional power, parallel assemblies also offer redundancy and flexibility.

When used in parallel, multiple SureCross FlexPower Solar Supplies recharge independently for added system flexibility when direct sunlight is unavailable. Multiple panels can be positioned in different directions to maximize recharging at different times of available sunlight. Partial shade from trees or buildings is a common problem in solar applications because partial shade prevents individual solar panels from generating power to recharge the battery. When multiple assemblies are used, partial shade results in a partial system recharge instead of a zero system recharge.

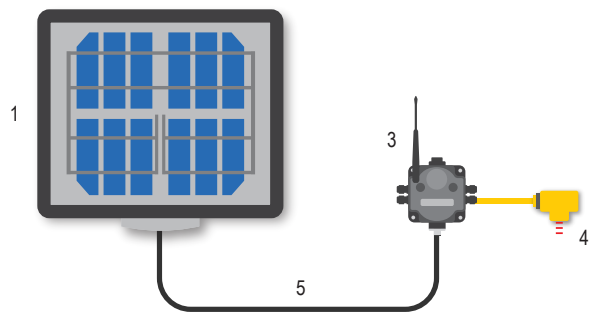
Temperature and Location Considerations

The SureCross FlexPower Solar Supply can be expected to drive a 350 mW load with 10 days of autonomy at battery temperatures between –10 °C to 45 °C (14 °F to 113 °F). Because lower temperatures decrease battery capacity, applications in very cold climates require extra consideration. The SureCross FlexPower Solar Supply will stop recharging the battery at temperatures greater than 45 °C because of battery limitations. All these factors contribute to decreasing system autonomy and may require additional power regardless of insolation.

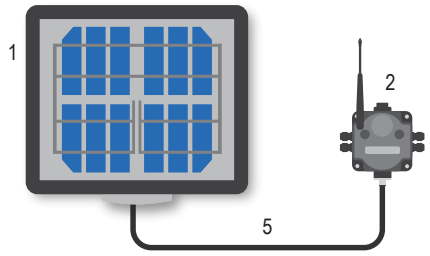
Be aware that because much of the earth has typical insolation values that are 2 to 6 times higher than 1kW-hr/m^2 per day, it may be possible to get more power from your SureCross FlexPower Solar Supply. In some high insolation locations, it is possible for two SureCross FlexPower Solar Supply Assemblies to supply up to 2 W continuously with four days of autonomy.

If you have any questions or need help determining the best solution for your solar application, please contact a Banner Applications Engineer to help you find the right solution.

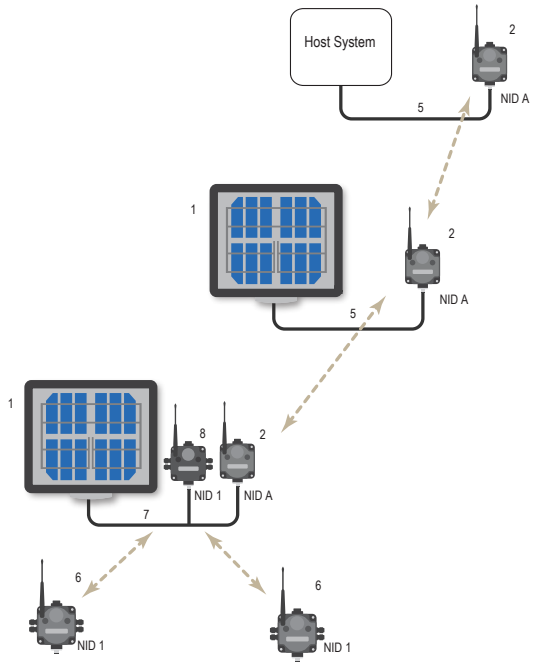
Example Solar Powered Systems



For installations without wired power, the solar powered assembly may be used to power data radios, FlexPower Gateways, or FlexPower Nodes connected to sensors that require more power than a single battery unit can supply.



Powering a data radio or data radio repeater with a solar panel allows for the expansion of the wireless network to installations with no reliable power source.



This example system shows a solar power system powering data radios and Gateways, expanding the wireless network far beyond the limits of wired power sources.

Item	Model No.	Description
1	BWA-SOLAR-001	FlexPower Solar Supply, includes panel, solar controller, rechargeable batteries, and mounting materials
2	DX80DR*M-H	MultiHop Data Radio, 900 MHz or 2.4 GHz
3	DX80N9X2S2N2M2	FlexPower Node, 900 MHz, Boost Power, 2 discrete IN, 2 NMOS discrete OUT, 2 analog IN (2.4 GHz also available)
4	QT50U-75390	U-GAGE Long range ultra-sonic sensor, low power consumption
5	MQDC1-501.5	Cable, RS-485 quick disconnect, 5-pin Euro, straight, 0.5 m [1]
6	DX80N...	DX80 or DX80 Performance FlexPower Node or 10 to 30 V dc Node
7	CSRB-M1250M125.47M125.73	Cable, RS-485, quick disconnect, 5-pin Euro, male trunk, female branches
8	DX80G*M2S-P	Performance FlexPower Gateway, Serial RS-485 Interface, No I/O

[1] For RS-232 communications, an RS-232 crossover cable must be used between the RS-485 and the data radio or Gateway.

Battery Backup Feature

The FlexPower Solar Supply can be ORed with the DX81P6 Battery Supply Module using the CSRB-M1253.28M1253.28M1253.28 splitter cable. When the solar panel temporarily disconnects the load because of a lack of sunlight, the DX81P6 Battery Supply Module supports the system and powers the load. This battery backup can support a sensor system consisting of a 2-wire transmitter powered continuously with 15 V at 20 mA and a DX80 Node transmitting once per second for up to 30 days.

Specifications

Solar Supply

- Nominal output voltage: 5.0 V dc
- Maximum output current: 1000 mA
- Continuous output current: 70 mA per hour of sunlight/day
- Total weight: 4.70 kg (10.35 lbs)

Solar Panel

- Power Rating: 13.5 W at 9 V
- Non-load voltage: 9 V
- Short-circuit current: 1.5 A
- Solar cells: Polycrystalline
- Dimensions: 348 mm × 386 mm × 19 mm (13 11/16” × 15 3/16” × 3/4”)

Battery System

- Type: NiMH
- Nominal voltage: 6 V dc
- Capacity: 17.5 amp hours

Mechanical

- Housing: Aluminum
- Support bracket: Aluminum
- Hardware: Zinc plated steel
- Mounting angle: 60°
- Effective projected area: 117 in^2

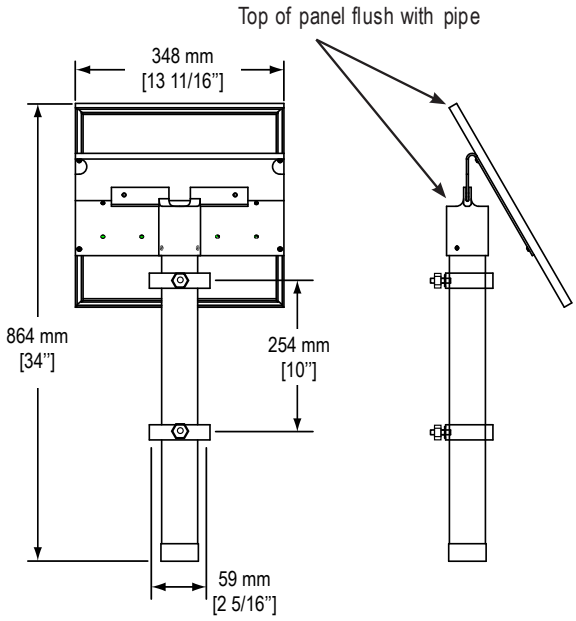
Environmental

- Recommended operating temperature: –10 to 45 °C (14 to 113 °F) [2]
- Max. operating temperature range: –30 to 50 °C (–22 to 122 °F)
- Operating humidity: 95% max. relative (non-condensing)
- Outdoor rated: Direct sunlight required

Dimensions

As assembled at the factory, the top of the solar panel is flush with the pipe for mounting against a wall. The panel mounting screws can be loosened and the panel slipped higher or lower as needed.

The mounting brackets are shown here positioned 10” apart, but can be adjusted as needed.



[2] Battery capacity is reduced and recharging is less efficient outside this temperature range. The controller inhibits charging when the temperature is greater than 45 °C (113 °F). Protecting the battery from temperature extremes prolongs battery life.

Accessories

Replacement Parts for BWA-SOLAR-001		
Models	Description	
BWA-BATT-003	Rechargeable battery pack, controller, and wiring for BWA-SOLAR-001	
BWA-SOLAR-CHARGER	Wall charger for BWA-BATT-003 battery pack.	
BWA-SPANEL-001	Solar Panel, Replacement Only	

For FlexPower Devices		
Models	Description	
CSRB-M1250M125.47M125.73	Splitter cable, 5-pin Euro-style QD, No trunk male, two female branches, black (shown). Use to split power between two FlexPower or solar powered devices. DO NOT use this cable to connect a FlexPower devices to a 10 to 30 V dc powered device.	
CSRB-M1253.28M1253.28M1253.28	Splitter cable, for dual power sources, 5-pin Euro female to 2 5-pin Euro males, 1 m truck and branches. Used to connect one FlexPower device (data radio, FlexPowered Gateway, etc) to two power sources, such as the FlexPower Solar Supply and DX81P6 Battery Pack.	

Model	Description
BWA-HW-009	Solar assembly hardware pack, includes brackets, bolts, and set screws

Warnings

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