Using a Solar Power System to Power any 4–20 mA Loop or Modbus Transmitter

Banner's FlexPower Solar Assembly can be used to power most remote sensors. The system works with loop powered analog sensors, Modbus transmitters, or any device that can run on a typical power budget of around 12V and 20mA of constant current. This system can provide 20 mA of continuous current at 12V in almost any overcast region of the world. In sunnier regions, it can provide two to four times this amount.

To provide continuous power the following BOM is sufficient:

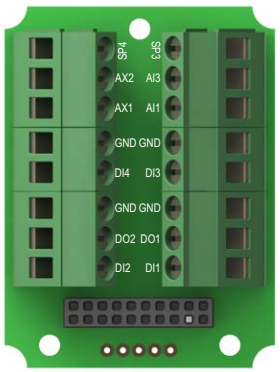
BWA-SOLAR-001 FlexPower Solar Supply

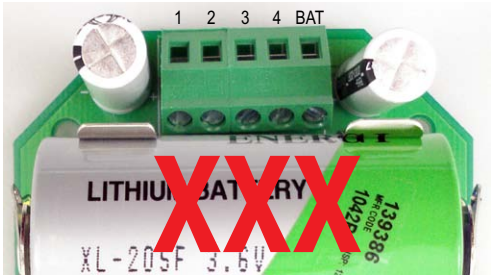
DX80DR2M-H1E MultiHop Radio, "E" Housing

CSRB-M1250M125.47M125.73 Splitter Cable, 5-pin Euro QD, male truck, two female branches, black

FIC-M12M5 Field wirable, 5-pin male connector, 12 mm (not shown)

The MultiHop M-H1E model was selected for this application because it provides a variety of I/O connections and an RS485 connection for Modbus. Other FlexPower Nodes are also good models for this type of installation.





Remove the battery when powering from the FlexPower Solar Assembly. This is NOT a rechargeable battery and it will explode.

Integrated batteryM-H1E Models (RS-485)

1. 10 to 30V dc (optional)
2. RS-485 / D1 / B / +
3. dc common (GND)
4. RS-485 / D0 / A / -

Wiring for the Solar Assembly to 0–20 mA Sensor

Step 1. Cut and strip back the longer end of the splitter cable.

Step 2. Wire the splitter cable into the M-H1E wiring board as shown.

This example is for a 4–20 mA loop-powered sensor.

From the solar panel:

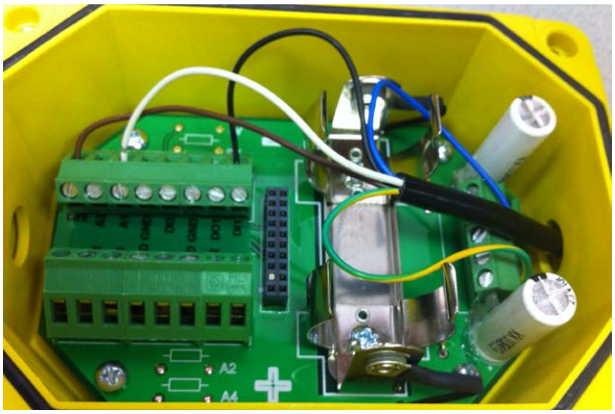
- Blue wire: to ground
- Green wire: to +5V

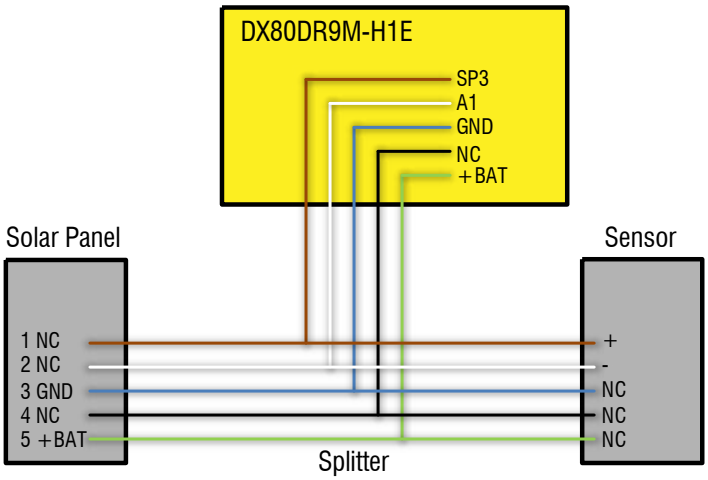
To the sensor:

- Brown wire: boosted power 12 to 24V
- White wire: analog 4–20 from sensor
- Black wire: not used

Step 3. Wire the sensor to the field wireable 5-pin Euro-style connector.

- Wire pin 1 (brown) to the sensors power supply.
- Wire pin 2 (white) to the 4–20 mA loop.





Wiring diagram of solar panel, DX80DR9M-H1E, and 4–20 mA loop-powered sensor using splitter cable.

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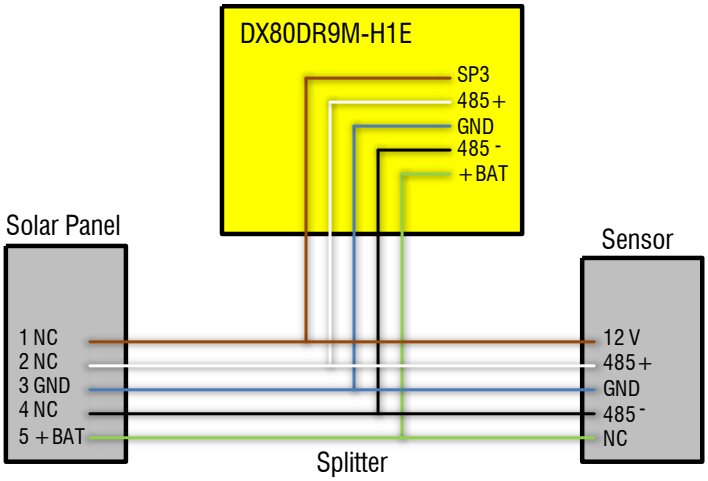
Wiring for the Solar Assembly to RS485 Sensor

Alternate wire configurations are possible. For example, the wiring shown below provides a connection for a Modbus sensor via RS485 where:

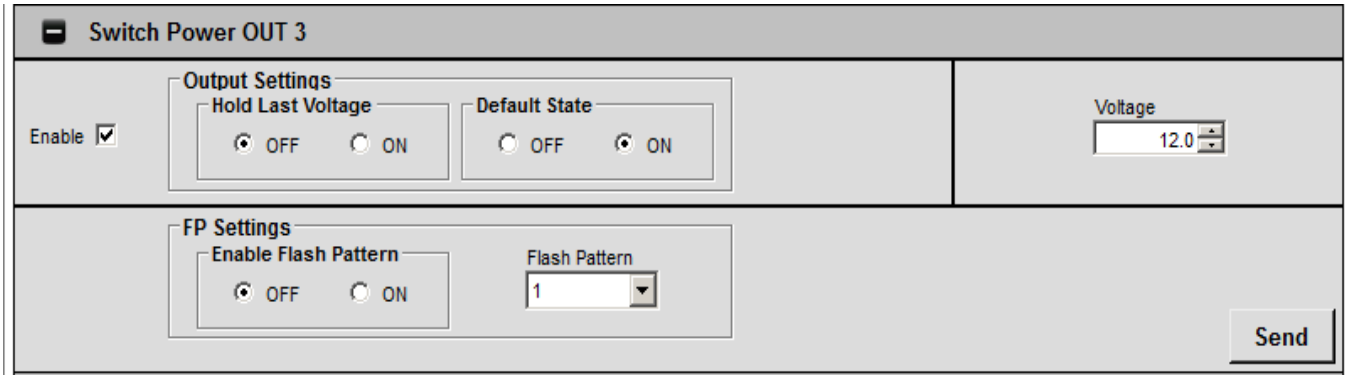
- Pin 1 (brown) is the sensor power supply
- Pin 2 (white) is RS485 +
- Pin 3 (blue) is GND
- Pin 4 (black) is RS485 –



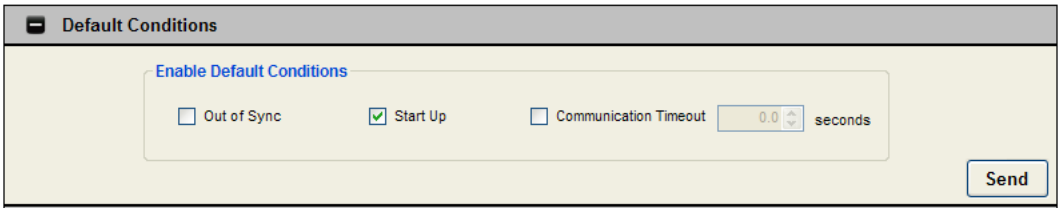
Wiring diagram of solar panel, DX80DR9M-H1E, and Modbus sensor using splitter cable.

Step 4. Using the MultiHop Configuration Tool (Device Config, Device Parameters screen), configure the switch power output to be "always on" by selecting Enable, Default State ON, and setting the voltage.

To conserve power, use the lowest voltage setting (often about 12V) that works reliably with your sensor. Note that loop-powered sensors require 2V more than their minimum value because of the drop across the analog input circuit on the Analog Input connection of the DX80DR9M-H1E.



Step 5. Under the Default Conditions section of this screen, select "Start Up" to set this switch power output as soon as the MultiHop radio turns on.

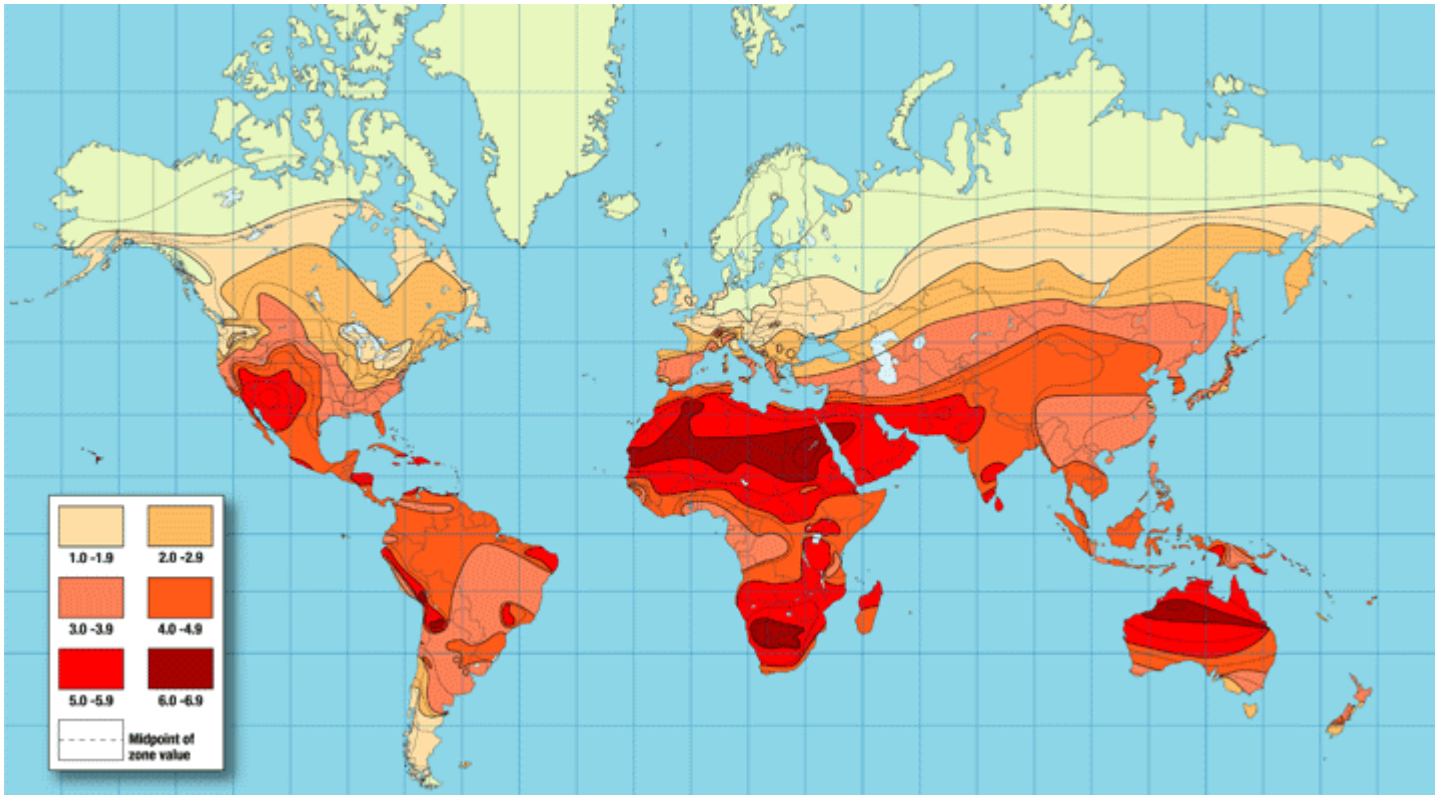


Step 6. Cycle power to DX80DR2M-H1E to active the changes to the configuration.

Note: When powering sensors and star topology DX80 Nodes, use the User Configuration Tool (UCT) to configure the switch output power. For more information, refer to the technical note titled: *Configuring for Continuous Switch Power or Host Controlled Switch Power*, p/n b_3099584. Tech Note b_3099584 can be downloaded from http://www.bannerengineering.com/en-US/wireless/surecross_web_faqs#config.

Solar Power Availability

To determine how much the FlexPower Solar Supply and DX80 system can supply, first determine how much sun in your region using the following insolation chart.



Source for image: http://www.altestore.com/howto/Solar-Electric-Power/Reference-Materials/Solar-Insolation-Map-World/a43/

Use the following tables to determine the maximum continuous current available based on region and voltage.

Region	Voltage (V)	Current (mA)
1.0–1.9	5	70
	12	22
	24	10
2.0–2.9	5	140
	12	44
	24	20
3.0–3.9	5	210
	12	66
	24	30
4.0–4.9	5	280
	12	88
	24	40

Banner's FlexPower Solar Supply provides 5V directly. To supply another voltage (12, 24, etc) use the MultiHop Configuration Tool to set the switch power output on the DX80DR2M-H1E.

You can double or triple the current available by using two or three FlexPower Solar Supply systems.