

# Half-Pint Solar Power System

## User Instructions



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# Introduction

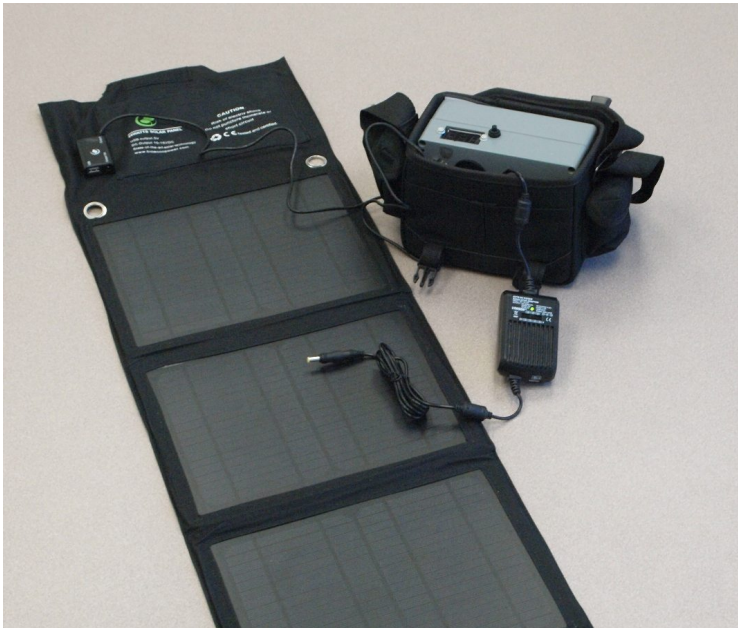


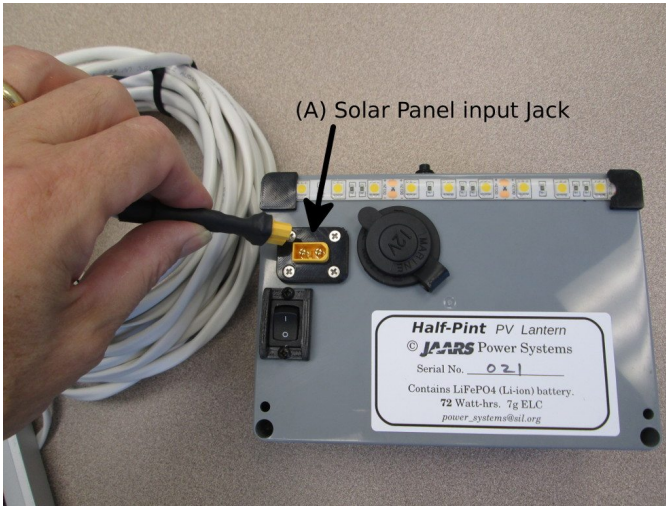
Figure 1: Half-Pint with Bioenno 28 W folding solar panel

The Half-Pint may be used to power devices that run on 12-volts dc, up to 65 W. The included dc-dc converter supplies 5 V on a USB connector for charging tablets and cell phones, and can also provide 15 V to 24 V regulated dc for laptops, BGANs, etc.

The Half-Pint is designed to power a 4 watt tablet or convertible computer for 8 hours a day plus run it's built-in 1.5W LED lighting strip in the evening. Although the Half-Pint can store 72 wathours of energy, your repeating daily loads should be about 36 wathours or less, to allow for power on cloudy days. See <http://www.powermon.org/store/archives/1393> for an explanation of wathours and estimates of wathours needed for various electronics, and how to estimate the solar panel size you need.

The Half-Pint can also be used to run computers that draw more power than a tablet, with reduced average daily run time. It is also usable for running LED lights or portable electronics like cameras, BGANs, digital audio recorders and pocket LED projectors.

## Charging



Plug a 15 W to 65 W solar panel into the yellow XT60 input jack (A) to charge. GTIS Power systems can supply you adapters and extension cords for various solar panels.

**Warning: Reverse polarity can destroy the electronics in early models of the Half-Pint. (Serial #s below 024) If you make your own cables, double check the polarity! See Appendix C.**

The Half-Pint is full when the voltmeter reads above 13.8 V. Recharge time with a 30 W solar panel is about 3.5 hours on a clear day. Larger panels shorten the charging time. 65 watts is the maximum solar panel size. Solar panels should be of the “12-volt” type, with an open circuit voltage (Voc) of 19 V to 24 V.

# Using the Half-Pint

The On-Off rocker switch (E) must be in the “On” position for the Half-Pint to either charge or discharge. Only turn it “Off” for transport or storage. The voltmeter (B) will show the battery voltage whenever the LED strip is lit by pushing the meter/LED pushbutton (C). The meter can be used for troubleshooting or to estimate the charge level of the Half-Pint (See Appendix A).

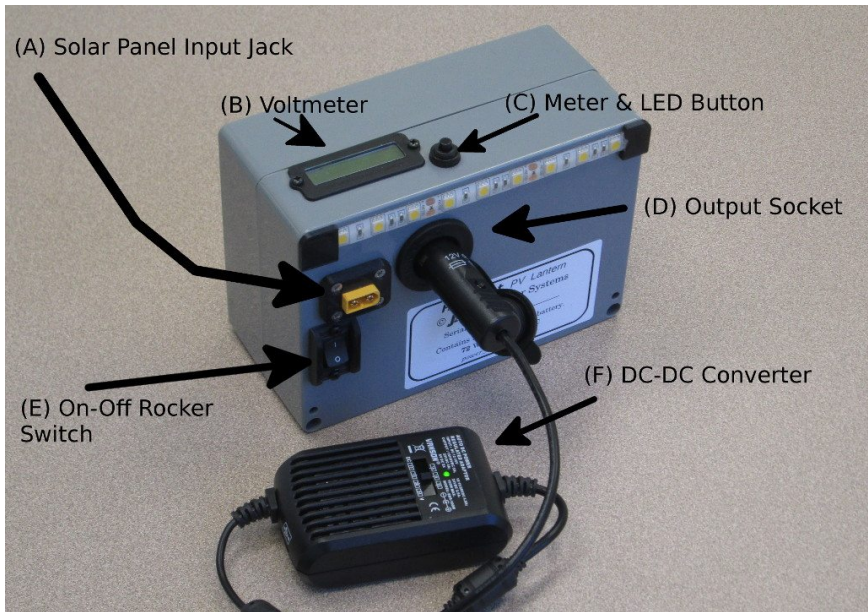


Figure 2: Parts of the Half-Pint

The Half-Pint has a 12 V cigarette lighter socket (D) for powering your equipment. The universal dc-dc adapter, (E) plugs into the 12 Volt socket in the Half-Pint. This adapter can be set to different voltages depending on the device being charged. Most laptop computers will need 19v dc. Contact [power\\_systems@sil.org](mailto:power_systems@sil.org) if you need help finding a power tip to fit your computer. The dc-dc adapter can also simultaneously charge a phone or tablet through the USB connector at 5 V up to 2.0 amps.

In some cases you may want to purchase a 12 V “auto” adapter made specifically for your computer or electronics which can be plugged directly into the 12 V socket on the Half-Pint. Dell computers need a special Dell adapter, which we keep in stock at GTIS Power Systems in Waxhaw.

## “Dead” Battery Warning

The Half-Pint will start beeping when it’s battery is nearly dead at about 12.5 V. Turning off the on-off switch (E) will silence the beeper and prevent further discharging. When solar power becomes available, turn the rocker switch back on to charge. The beeping should stop after a few minutes of recharging, but if it continues to beep, briefly turn the rocker switch off then back on again while charging to silence it.

If you ignore the beeper, and continue to discharge the Half-Pint, the battery in the Half-Pint disconnects itself when voltage runs down to 10.0 V. The Half-Pint will appear dead and not display anything on the voltmeter. As soon as you connect a functioning solar panel, it will wake up, start recharging and resume normal operation.

## Storage

The battery in the Half-Pint likes to be in a partially charged state while in storage. Run the battery partially down to a resting voltage of  $\sim 13.2$  V and turn off the rocker switch for storage.

Recharge and partially discharge the batteries every six months. While left in storage, the battery may self-discharge to 10v and disconnect itself, showing no voltage. Connecting a solar panel will wake it up and start recharging.

Store the Half-Pint at temperatures below 35 °C (95 °F).

# Precautions

## Water

The Half-Pint is water resistant, but not waterproof. Do not leave it outdoors in heavy rain or immerse it in water. If water gets inside the case, turn off the rocker switch and allow the Half-Pint to dry thoroughly before using it.

## Heat

Cooler temperatures will improve the lifetime of the battery and electronics. Whenever possible, shade the Half-Pint from direct sunlight.

## Battery Failure

The Half-Pint contains a smart LiFePO<sub>4</sub> battery. The expected life is over 5 years with heavy use. When it gets old and fails, its internal electronics board will prevent it from charging or discharging. **Do not attempt to bypass** the circuit board inside the battery and force charge a failed battery because **it can catch on fire!**

Contact [power\\_systems@sil.org](mailto:power_systems@sil.org) for replacement batteries or parts.

# Appendix A

## Digital Voltmeter Readings

The values in the table below are estimates and will vary depending on the accuracy of your meter, the size of your loads, and the length of time the battery has been resting with no load or panel connected. Half-Pint display meters may read as much as 0.3 Volts lower or higher than actual value.

% Charged	Voltage While Charging	Voltage After Discharging and Resting 10 Min.
90% to 100%	$\geq 13.7$ V	$\geq 13.3$ V
About 75%	13.5 V	13.2 V to 13.3 V
About 50%	13.3 V	13.1 V
About 25%	13.1 V	12.9 V
Fully Discharged	12.9 V	12.7 V

## Bargraph Voltmeter Readings

If you have the optional bargraph voltmeter, be aware that the lithium battery's flat discharge curve fools the meter into thinking it's got 3 bars most of the time. When it drops down as low as 2 bars – 50%, it actually has only around 15% left and will drop very rapidly after that.



# Appendix B

## Maximum Wattages

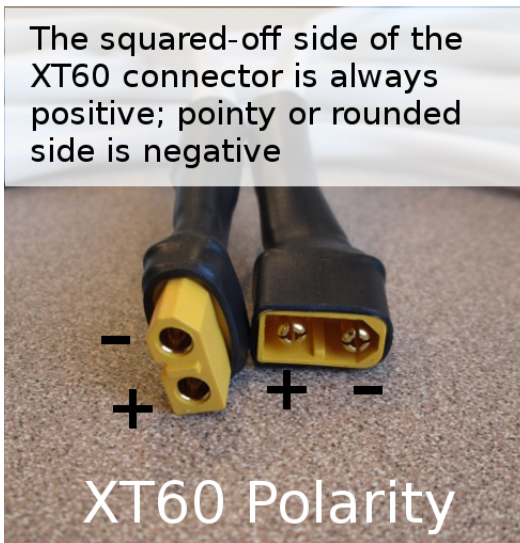
Solar panel input – 65 watts (panel rating)

Total DC output – 65 watts continuous

*Exceeding 65 watts output will shorten the lifespan of the battery and might trip the internal thermal breaker. (It will self-reset after a few minutes.)*

# Appendix C

## Correct Polarity of the XT60 Connectors



**Caution:** Half-Pint serial #s below 24 can be damaged by reverse polarity from the panel.