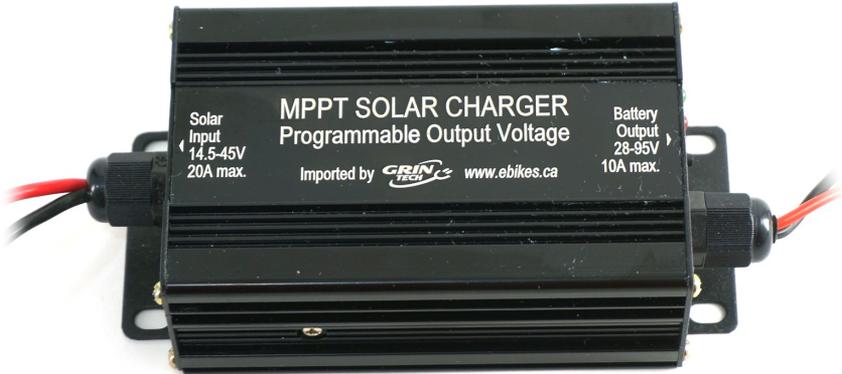


# MPPT Solar Charger

## User Manual

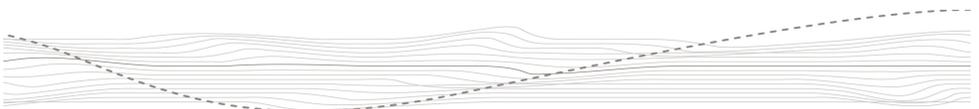


**Grin Technologies Ltd**  
Vancouver, BC, Canada  
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## 1 Introduction

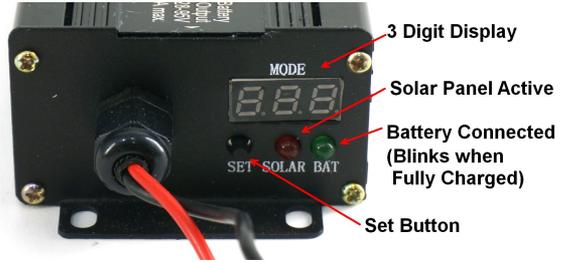
The Solar MPPT Charge Converter is a device designed to maximize the solar energy collected from 12V-24V nominal solar panels and boost this to a higher voltage for charging an ebike battery. It automatically varies the load on the panels to find the sweet spot that results in the highest charge current flowing into the pack.

The amount of charging current will therefore vary according to the solar conditions rather than being fixed like a conventional charger. When the voltage of the battery hits the max set point charge voltage, the current will gradually taper down to zero to prevent overcharging and the device will no longer maximize power draw from the panels.



## 2 Indicators

This device gives status feedback via two LEDs and a 3 digit 7 segment display.



The red SOLAR LED will light up and the device will power on when the solar panel is connected and generating more than 14V. Without solar input voltage, the unit will be off even if there is a battery hooked up to the output.

The green BATTERY LED will light up when the battery output is enabled, and flash when the final charge voltage is reached.

The 3 digit display will alternate between showing the voltage of the battery, and the current flowing out of the solar panels. Notice that this is not the same as the current flowing into the battery pack, in a boost converter the solar panel current will always be higher than the battery charging current. To see the actual battery charging current we recommend the V3 Cycle Analyst with optional Solar Current Sensor.

## 3 Programming

To program the device it must first be powered up by connecting the Solar input side to either a solar panel or a 12-36V nominal battery pack.

The programming on the device is limited to a single button with a display screen for feedback. It is tedious.

There are two menu options, an 'F' menu for use with lead acid or LiFePO4 battery packs in standard 12V increments, and an 'L' menu for lithium-ion batteries that allows custom voltage settings with 1V resolution.

Press SET button for 1 second to go into F or L menu, and then press quickly to toggle between F and L. Once you are in your desired mode, Press and hold the SET button for 3 seconds to enter this menu mode.

**F** is for pre-programmed SLA/LiFe batteries, and **L** is for custom lithium-ion. **L can be programmed, but is only active if F menu is set to "EL"**

Mode – F / L



Voltage Setting

## Entering Custom Programming Mode:

- a) Have F menu active, and hold SET button for 3 seconds. Voltage should start flashing. The selection includes preloaded 48V-72V voltage profiles, which only apply to LiFe and SLA batteries according to the table here:

Program Setting	SLA	LiFe
48V (57.6V max)	4 series 12V	16S LiFe
60V (72.0V max)	5 series 12V	20S LiFe
72V (86.0V max)	6 series 12V	24S LiFe
EL	Custom Program 28V-95V (7S-22S Lithium)	

- b) Most users will need the F mode programmed to EL for regular lithium-ion batteries.
- c) Once EL mode is selected, simply wait 10 seconds for the settings to enter memory and the device returns to the starting state.
- d) Repeat the steps to enter L mode and select it by holding on L for 3 seconds until it briefly flashes 0 after L.
- e) Press the set button to increase the voltage in 1V increments until reaching your set point. The following table is the suggested voltage setting for lithium-ion packs at both 100% and ~80% charge levels:

Nominal Voltage	100% Charge	~80% Charge
24V (7S)*	29V	28V
36V (10S)	42V	40V
48V (13S)	54V	52V
52V (14S)	58V	56V
60V (16S)	67V	64V
72V (20S)	84V	80V
80V (22S)	92V	88V

\*24V Battery must use 12V Nominal panel voltage

- f) Once the programmed voltage is at the desired set point, wait 10s for the settings to enter memory and the device to return to the starting state.

## 4 Limitations

- This device is intended for use as a solar charge controller with a solar panel input; it does not work well as a general purpose boost converter.
- The device should be used with panels that have an open circuit voltage (Voc) of 50V or less, and a max power voltage of 14.5V or higher.
- There is no input current limiting. Be sure your rated panel power will result in less than 20A maximum input current – it may damage itself if connected to a system that continuously supplies more than 20A.

### Suggested Maximum Panel Size for Safe Operation (<20A Input)

Panel V	36V Battery	48V Battery	60V Battery	72V Battery
12V Nom.	300W	350W	350W	350W
24V Nom.	300W	400W	480W	600W

- It is not waterproof – install in a manner that avoids water exposure.
- It requires ventilation to cool properly – do not put it inside a sealed box.
- It does not have robust reverse polarity protection – you will blow a fuse and possibly damage components if the battery or panels are connected in reverse.

## 5 Specifications

Parameter	Solar Input	Battery Output
Quiescent Current	30 mA	0.8mA
Minimum Voltage	14.5V	28V
Maximum Voltage	50V	95V
Maximum Current	20A (not fused)	10A (fused)

