

Solar Power Charge Controller Connection & Operation



Connection Instructions

- 1) Mount board using spacers supplied to a panel—vertical is best for air flow. **DO NOT ENCLOSE IN SMALL PLASTIC BOX.**
- 2) Solar Start up 12.5 volts, shutdown 10 volts.
- 3) Connect Solar Panel and verify LCD Display starts. Software version and serial number displays for 3-5 seconds then cycles through solar status items. **When tightening hold connector firmly with small needle nose pliers. Use non-oxidation grease is also a good idea to prevent corrosion.**
- 4) Connect (-) output wire to System (-)
- 5) Connect (+) output to a fuse or breaker rated at 3 amps. (Breaker is best) on EACH charge controller output.
- 6) Connect other side of breaker to system (+) or Battery. Turn on Breaker.
- 7) Charge controller will automatically set maximum power point and track the level of sun.
- 8) Battery **MUST** be connected to operate.
- 9) Multiple Charge Controller boards can be parallel output connected to increase system power. There is no limit to how many can be used.
- 10) “Hot” indicates thermal protection is active as the board is over **140 Degrees F**. Too much solar input, or too hot of ambient air around the board can cause this to occur.
- 11) **CAUTION—Board can get hot enough to burn fingers— DO NOT TOUCH WHILE IN OPERATION.**



(-)(+) To Battery (Fused / Circuit Breaker)

****IMPORTANT****
Use a **Voltmeter** and be certain of the **Polarity PRIOR** to connection

DO NOT GROUND solar panel wires as they **MUST remain floating. Ground Frame only.**

Panel open circuit voltage **MUST** be between **13 and 30 volts. Series / Parallel panels up to 35 watts MAXIMUM total Solar Power (STC Ratings)**

Also a **3 amp Output Fuse or Circuit Breaker** is **HIGHLY recommended** to prevent a fire due to an abnormal operating Condition.

LCD Display Information

The LCD Display scrolls through the items every 25 seconds. Title is displayed, then the number follows. Daily totals will remain after sunset and until the next daylight. At night the CPU slows to conserve power and minimize battery drain below 0.0075 amps (7.5 mA).

The LCD Display is not a high precision meter however it's designed to show Relative Levels so the user can determine how well the system is working at any given time. Accuracy is better at higher power levels and ranges from about 20% at 1 Watt to about 5% at 25 Watts.



- Solar Input Voltage
- Battery Voltage
- Output Current in Amps
- Output Power in Watts
- Peak Power in Watts
- Amp Hours Today
- Board Temperature Deg. F

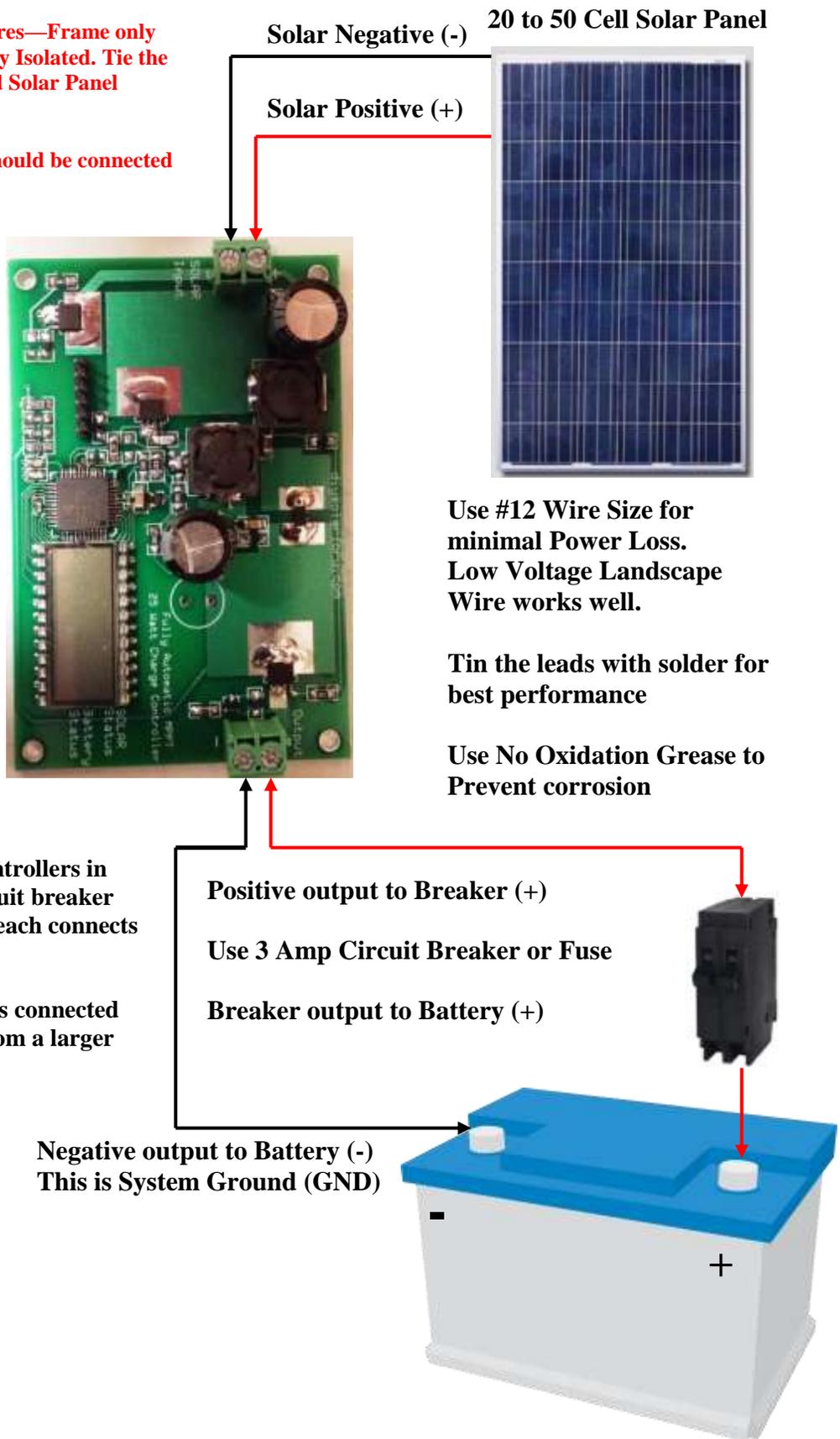
WARRANTY: DIY Solar warranties the board against defects for a period of **TWO YEARS** from the date of purchase. This warranty covers defects in materials or workmanship only. DIY Solar's only remedy is to repair or replace at our discretion any defective board. User must obtain an RMA by contacting us at: diysolarforu@gmail.com. User assumes all risk associated with the use of this product and agrees to hold harmless DIY Solar. It's up to the user to properly install and use the product. This Warranty does NOT cover misuse, neglect, or accidental damage of any kind.

System Connection Diagram

IMPORTANT:

Do NOT Ground solar panel wires—Frame only
Each Panel MUST be electrically Isolated. Tie the Battery (-) to Earth Ground and Solar Panel Frame to Earth Ground only.

Each Charge controller input should be connected to its own solar panel (s).



Theory of Operation for 12 Volt System

At the heart of the DIY Solar Charge Controller is a very efficient DC-DC Power converter which transfers over 90% of the Panels energy to the system. The Power Converter is controlled by a Microprocessor which performs the Maximum Power Tracking, collects and tabulates data, and drives the LCD display. The Solar Charge controller works from below 1 Watt to over 25 Watts of Output (35 Watt STC rated Solar Panel). No Adjustments needed as the board is fully automatic and will adapt to any panel within its specification limits.

Our customized Maximum Power Tracking routine adjusts the power transfer over 2500 times per second to yield maximum performance even in partial shading of the Solar Panels from shadows (Trees, Utility Poles ect.). Rapid Sunlight changes on a partly sunny day are not a problem either. The Microprocessor monitors input and output parameters while always seeking the maximum power possible. There are 2 control loops working together to get every last watt of power from the Solar Panel. The result is up to **2 TIMES** the Power that a PWM charge controller would deliver with the same Solar Panel. **Simple PWM Controllers DO NOT DO POWER CONVERSION.**

When the solar input voltage exceeds 12.5 volts at sunrise the Solar Charge Controller switches from NIGHT mode to DAY mode and transfers the previous day's totals to memory. The Power Stage is turned on and Solar energy begins to charge the system battery. The LCD display cycles through the daytime parameters... Battery Voltage, Panel Voltage, Amps output, Power Output, Peak Power, Amp Hours, and Board Temperature. If the system Battery is at **14.4 volts AND the current is less than 0.2 amps** then the charger shuts off until the Battery drops to **13.5 volts**. The LCD Display will indicate "**Bat**" "**Ful**" and display the voltage and amp hours input for the current day.

After Sunset when the panel voltage drops below 10 volts the Power Stage is turned off and the LCD Display switches to NIGHT mode. The LCD Display cycles through the Battery Voltage and the last 7 Days Amp Hour Totals. The Processor slows to keep Battery Drain below 0.0075 amps.

Just hook it up and start enjoying the benefits of Solar Power!

The Solar Charge Controller is designed for many years of reliable operation using components rated for High Temperature Operation however it does not run anywhere near that temperature assuring long operating life. The Board is protected from reverse battery, input short circuit, reverse power flow, over current, over temperature, and reversed Solar Panel connections. **It is NOT however protected from excessive input voltage over 40 volts** open circuit voltage. Above 30 volts "O.L." will display. Do Not Connect a panel with more than 50 cells or a combination of series connected panels that exceeds 50 cells. The Solar Charge Controller was designed and optimized with a 36 cell (17 volt MPPT) panel but the Charge Controller will work from 20 to 50 cells with very high performance. 36 cell count Solar Panels are common and will work well with the Charge Controller.