



**30 AMP 12V/24V
SOLAR CHARGER CONTROLLER
INSTRUCTION MANUAL
for Part Number: 021-1178**



**Read this material before using this product.
Failure to do so can result in serious injury.
Save this manual.**

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IMPORTANT SAFETY INSTRUCTIONS & WARNINGS

SAVE THESE INSTRUCTIONS: This manual contains important safety and operating instructions for the Battery Tender® Solar Charger Controller.

CAREFULLY READ THESE INSTRUCTIONS BEFORE USING THE BATTERY CHARGER.

WARNING AND CAUTION LABEL DEFINITIONS:

WARNING

WARNING indicates a potentially hazardous situation, which, if not avoided, could result in serious injury or death.

CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury.

CAUTION

CAUTION used without the safety alert symbol indicates a potentially hazardous situation that if not avoided, may result in property damage.

GENERAL PRECAUTIONS

WARNING

Battery posts, terminals and related accessories contain lead and lead components, and other chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Always wash your hands after handling these devices.

WARNING

Do not operate the Solar Charger Controller with damaged wiring - Replace wires immediately if damaged.

CAUTION

WORKING WITH LEAD ACID BATTERIES AND CHARGERS: All lead acid batteries have the potential to emit gasses that may combine into a combustible or explosive mixture. In many cases, it is possible that lead acid batteries will emit these gasses during normal discharge and charging operations. Because of this potential danger, it is important that you follow the precautions recommended by both the battery and battery charger manufacturers before using either one. For example, do not exceed the recommended maximum recharge rate (charger output current limit), or remove cell caps while charging flooded batteries.

CAUTION

SOLAR CHARGER CONTROLLER LOCATION: **LOCATE** the Solar Charger Controller as far away from the battery as possible and in a well-ventilated area inside.

EXCESSIVE MOISTURE: Do not expose the Solar Charger Controller to any rain, snow, spray, or moisture of any kind. This device is **NOT** designed for outdoor use.

CHARGER ATTACHMENTS: Do not use attachments that are not recommended or sold by the charger manufacturer. To do otherwise may result in the risk of electric shock, fire, or possibly some other unforeseen potential personal injury situations.

MONITORING SEALED & NON-SEALED BATTERIES: When leaving a battery charger connected to either a sealed (AGM or GEL) or non-sealed (flooded battery) for extended periods of time (weeks, months, etc.), periodically check the battery to see if it is unusually warm. This is an indication that the battery may have a weak cell and that it could go into a thermal runaway condition. If the battery releases an excessive amount of gas or if the battery gets hotter than 130°F (55°C) during charging, disconnect the charger and allow the battery to cool. Overheating may result in plate distortion, internal shorting, drying out or other damage. For flooded batteries, also check individual cell fluid levels against manufacturer's recommendations for safe operation.

WARNING

ELECTRIC SPARK & OPEN FLAME: NEVER smoke or allow a source of electric spark or open flame in the vicinity of the battery or engine. (For example: Don't charge the battery next to a gas water heater.)

VENTILATION: Do not operate the Solar Charger Controller where ventilation is restricted. The intent here is to allow sufficient airflow to minimize and dissipate the heat generated by the Solar Charger Controller and to diffuse the gasses that may be emitted by the battery.

SOLAR CHARGER CONTROLLER MAINTENANCE: NEVER DISASSEMBLE OR ATTEMPT TO DO INTERNAL REPAIRS. THIS VOIDS THE WARRANTY. Disassembling the Solar Charger Controller incorrectly may result in the risk of electric shock or create a fire hazard.

USE BATTERY TENDER® SOLAR CHARGER CONTROLLER FOR CHARGING 12V/24V LEAD-ACID OR 12V/24V AGM OR 12V LITHIUM BATTERIES ONLY. Do **NOT** charge dry-cell batteries. Charging dry-cell batteries may cause them to burst and cause injury to persons and damage to property.

INFORMATION NOTE ABOUT DRY-CELL BATTERIES:

There are some wet, non-spillable, lead acid batteries on the market whose manufacturers' make the claim that they are dry-cell batteries. These batteries are sealed, gas-recombinant, starved electrolyte, possibly with AGM (Absorbed Glass Mat) type construction. It is perfectly safe to use the Battery Tender® Solar Charger Controller to charge these types of batteries. The dry-cell battery warning is intended for rechargeable or non-rechargeable alkaline and other similar types of batteries. If you have any doubt about the type of battery that you have, please contact the battery manufacturer before attempting to charge the battery.

NEVER charge a visibly damaged or frozen battery.

PERSONAL PRECAUTIONS

WARNING

WHEN YOU WORK NEAR LEAD-ACID BATTERIES:

1. Someone should be within range of your voice or close enough to come to your aid if you have an accident.
2. Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
3. Wear complete eye protection and protective clothing. Avoid touching your eyes while working near a battery. If battery acid contacts your skin or clothing, wash immediately with soap and water. If acid enters an eye, immediately flood the eye with running cold water for at least 10 minutes and get medical attention as soon as possible.
4. Be extra cautious when handling metal tools around a battery. If you drop a metal tool near a battery it might spark or create a short circuit between the battery terminals and some other metal part. Either event may cause a dangerous electrical shock hazard, a fire, or even an explosion.
5. Remove all personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery. A lead-acid battery can produce a short-circuited current high enough to weld a metal ring or other piece of jewelry, causing a severe burn.

PRODUCT SPECIFICATIONS

BATTERY TENDER® SOLAR CHARGER CONTROLLER

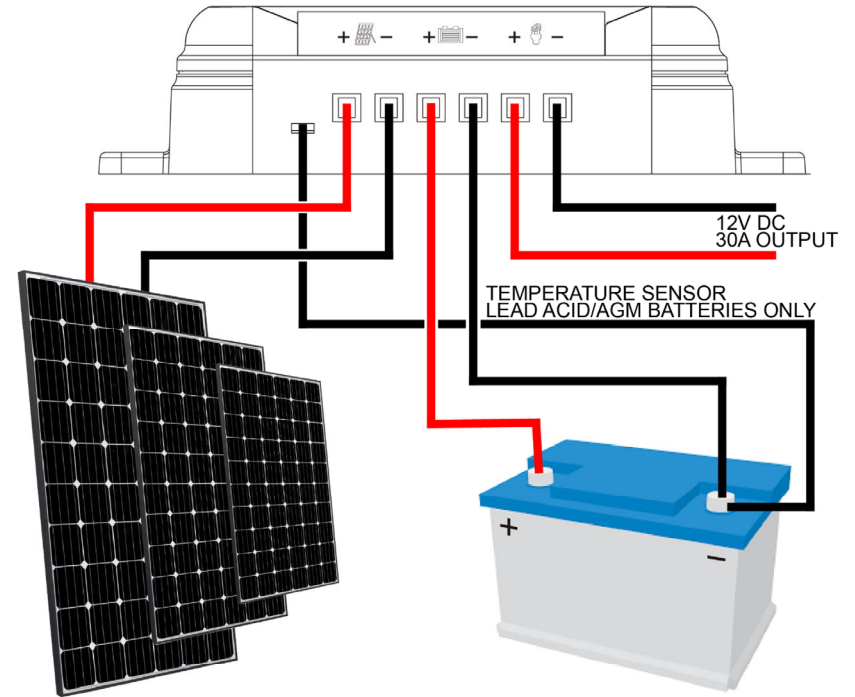
Max Input Voltage	50 Volt
Max Input Power	12Volt 450Watt / 24Volt 900Watt
Max Output	12VDC, 30Amp
USB Output	5VCD, 2x, 3.4 Amp Max
Controller Part Number	021-1178
Working Temperature	14 to 104°F (-10 to 40°C)
Dimensions	Length 7.5", Width 4.25", Height 2.0"
Warranty	2 years
Certification	CE

PRODUCT OVERVIEW

Below is a list of items that should be included in your retail box:

- 1) 1 - Solar Charger Controller
- 2) 1 - Temperature Sensor Cable
- 3) 1 - Instruction Manual

SOLAR CHARGER CONTROLLER INSTALLATION CONNECTIONS AND OPERATION

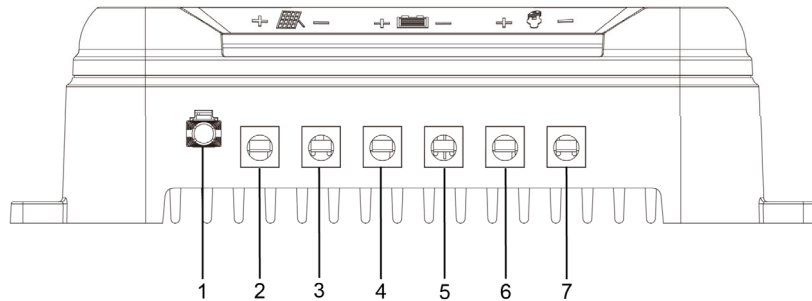
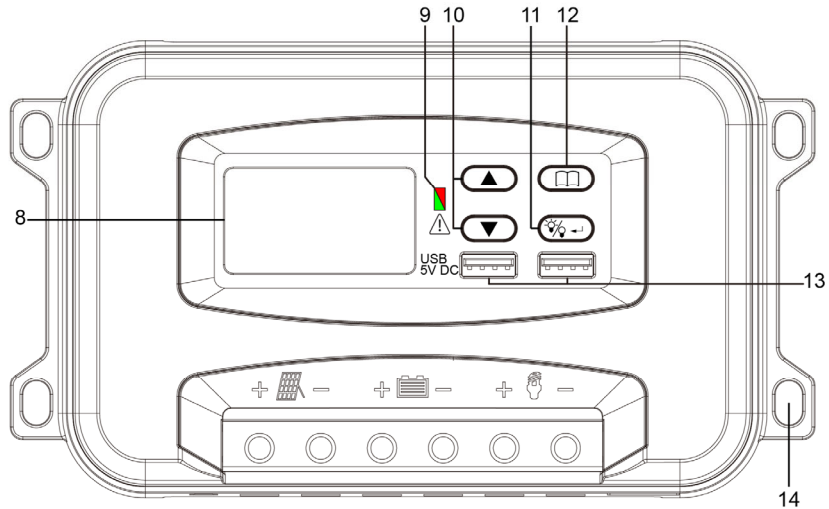


SOLAR PANEL
Max Input Voltage: 50V
Max Input Power:
12V: 450W
24V: 900W

NOTE:
USE ONLY A MINIMUM OF
10 AWG WIRE FOR
OUTPUT CONNECTIONS

12V/24V LEAD ACID/AGM
12V ONLY LITHIUM
BATTERY

FRONT PANEL

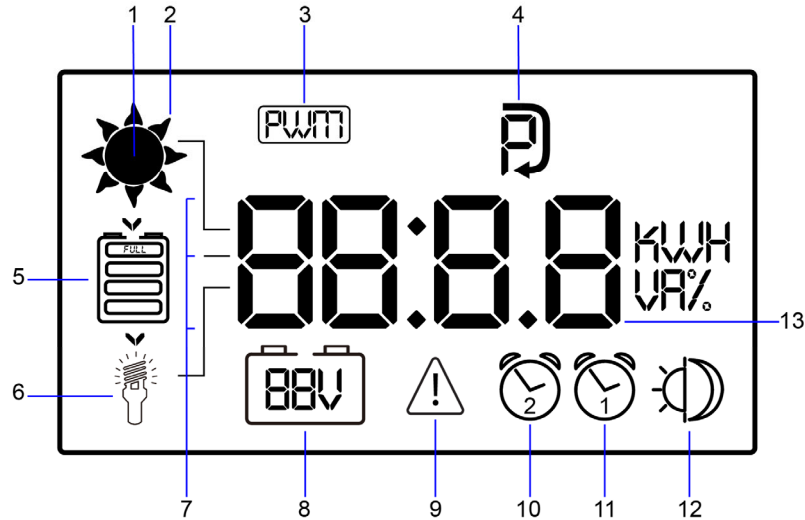


SEE NEXT PAGE FOR EXPLANATIONS

FRONT PANEL DESCRIPTIONS

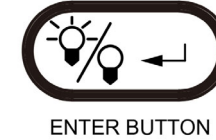
1. Temperature Sensor
2. Solar panel + positive input
3. Solar panel - negative input
4. Battery + positive output
5. Battery - negative output
6. Load + positive output
7. Load - negative output
8. LCD Screen (see next page for descriptions)
9. Solar panel Charging Green LED – Flashes during charging, turns solid when fully charged. If insufficient sun light the LED will not illuminate. Error warning Red LED – Red indicates a fault (see fault section for details).
10. Scroll up and down Menu buttons.
11. Enter/OK button
12. Menu button.
13. USB output – 5VDC, 3.4 Amp Max, 2X.
14. One of four mounting slots.

LCD DESCRIPTIONS



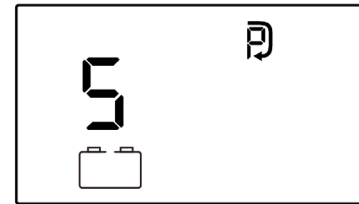
1. Sun icon displayed when solar panel is connected.
2. Sunlight rays, 8 in total, shows the charging current rate. (1-8).
3. PWM indication. **P**ulse **W**idth **M**odulation.
4. Settings icon: turn on when entering the setting parameters and turn off when exiting.
5. Battery level icon; displays icons according to the battery voltage.
6. Load icon: turns on when the load is turned on, synchronized with the load switch ON.
7. Connections: Three segments. Top corresponds to PV, middle corresponds to battery, bottom corresponds to load.
8. Currently identified battery type (12/24V).
9. Protection icon. When this icon appears, it indicates that the controller has some protection such as load overcurrent, short circuit protection, under-voltage protection, etc. (Refer to the fault code).
10. Load timing clock 2.
11. Load timing clock 1.
12. Daytime and Nighttime Icons. When PV is > 12V the half sun icon will appear. When PV is <12V the half-moon icon will appear.
13. Numerical Display (8888 characters). Can be switched by the menu button to display Battery Voltage/Load Voltage/PV voltage/time.

LCD MENU SETTINGS



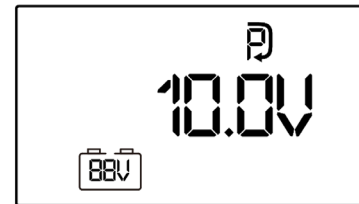
1. To enter the menu screen press the menu button once, then press again and hold for two (2) seconds. The settings icon will then appear and the first LCD settings screen will also appear. To move to the next LCD settings screen press the menu button.

2. Battery Type Selection



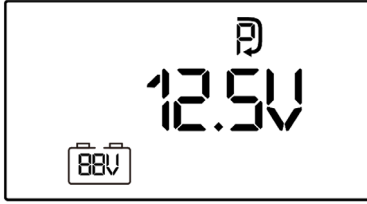
There are three (3) battery chemistry types to choose from. S=Standard lead acid. L=Lithium. A=AGM. Press the enter button and the battery type will flash. Then use the up/down scroll button to change the battery type. Press enter button to set. Press menu button to move to the next LCD screen.

3. Low Voltage Protection Cut Off Value



When your battery reaches this voltage the output load will be turned off. Press the enter button and the voltage# will flash. Then use the up/down scroll button to change the voltage. Press enter button to set. Default is set at 10.0V. Press menu button to move to the next LCD screen.

4. Low Voltage Recovery Re-engage



When your battery voltage has charged back up to this voltage the outload will reactivate. Press the enter button and the voltage# will flash. Then use the up/down scroll button to change the voltage. Press enter button to set. Default is set at 12.5V. Press menu button to move to the next LCD screen.

5. Time Setting (24hr Military time)



Set the time in military 24hr format. Press the enter button and the hour# will flash. Then use the up/down scroll button to change the hour. Press enter button to set. The minute# will then flash. Then use the up/down scroll button to change the minutes. Press enter button to set. Press menu button to move to the next screen.

LOAD TIMING SETTEINGS

1. LdU MODE: Load on/off based on the PV input voltage (Day and night)



When the PV input voltage drops below 10V (during the night hours or cloud cover) you can set the regulator to activate the output load automatically. Press the enter button and the OFF/ON will flash. Then use the up/down scroll button to change to ON. Press enter button to set. The clock 1 screen will then appear.

Clock 1 Screen



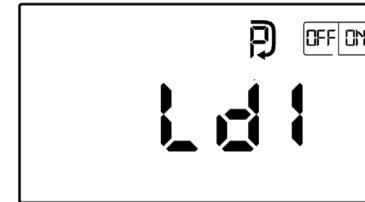
Clock 1 symbol is on. The default is sixty (60) minutes. This means when the PV input voltage drops below 10V, sixty (60) minutes later the load output will be activated. Clock 1 is a power on timer and can be set from 0 to 120 minutes. Use the up/down scroll button to change the minutes. Press enter button to set. The clock 2 screen will then appear.

Clock 2 Screen



Clock 2 symbol is on. The default is thirty (30) minutes. This means when the PV input voltage rises to 12.5V (morning time) after thirty (30) minutes the output load will be shut off. Clock 2 is a power off timer and can be set from 0 to 120 minutes. Use the up/down scroll button to change the minutes. Press enter button to set. This will then take you back to the LdU screen, Press enter to move to the next screen.

Ld1 MODE: Load On/Off based on a set length of time



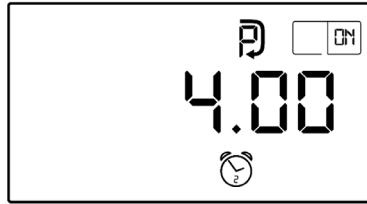
This allows you to set the load output to be active for a set length of time. Press the enter button and the OFF/ON will flash. Then use the up/down scroll button to change to ON. Press enter button to set. The clock 1 screen will then appear

Clock 1 Screen



Clock 1 symbol is on. The default is three (3) hours. This means when the PV input voltage drops below 10V, the output load will be active for 3 hours. This can be set from 0 to 12 hours. Use the up/down scroll button to change the minutes. Press enter button to set. The clock 2 screen will then appear

Clock 2 Screen



Clock 2 symbol is on. This timer will begin after the clock 1 counting has finished. In this case, after the PV input voltage has dropped to 10V (night hours), the output load will power on for 3 hours, then switch off for 4 hours, then back on again until the PV input voltage has risen to 12.5V at witch time the load will be cut off. This can be set from 0 to 12 hours. Use the up/down scroll button to change the minutes. Press enter button to set. This will then take you back to the Ld1 screen, Press enter to move to the next screen.

Clock 1 Screen



Clock 1 symbol is on. This is a power on timer, and means the output load will be activated at 5.00. This can be set from 0 to 24 hours. Use the up/down scroll button to change the hours minutes. Press enter button to set. The clock 2 screen will then appear.

Clock 2 Screen



Clock 2 symbol is on. This is a power off timer, and means the output load will shut off at 6.00. This can be set from 0 to 24 hours. Use the up/down scroll button to change the hours minutes. Press enter button to set. This will then take you back to the LDs screen.

LdS MODE: Load On/Off based on the real time



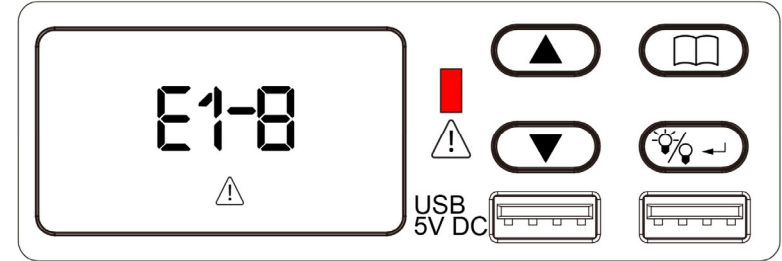
This allows you to set the output load based on 24 hour time (military time). Press the enter button and the OFF/ON will flash. Then use the up/down scroll button to change to ON. Press enter button to set. The clock 1 screen will then appear

ADDITIONAL SOLAR CHARGER CONTROLLER INFORMATION/WARNINGS

1. Wire the solar panels cables into the connector on the controller; make sure the solar panel input voltage DOES NOT exceed the max limit of the controller. Wire up the battery's positive and negative terminals to the correct connector on the controller (marked by the battery image). The controller will automatically detect the battery voltage scale it is connected to and charge. The switchable output is marked with a bulb. This output is designed to run a modest load(s), such as lights. Read the manual for the full workings of the controller as you can adjust time as to when the output switches on and off - ideal for something like security lighting.
2. **Maximum 450W solar panel at 12V.**
3. **Maximum 900W solar panel at 24V.**
4. The solar charger controller will automatically detect if you have connected up to a 12V or 24V battery. It will then charge appropriately.

FAULTS

THE RED ERROR LED ON THE FRONT PANEL WILL BE RED IF THERE IS A FAULT WITH THE OUTPUT REGULATOR.



- E1** Battery reverse connection / reverse polarity (please correct).
 - E2** Battery open circuit protection / low DC voltage (battery not connected / or battery voltage too low).
 - E3** Battery over current protection (circuit has constant current function; the controller may be damaged if there is a problem).
 - E4** Load over current / short circuit protection (Turn on the load after eliminating the error).
 - E5** Battery over voltage (battery damaged or battery voltage too high).
 - E6** PV (solar) input over voltage protection. (PV voltage has exceeded the limit).
 - E7** Over temperature protection, controller will automatically stop charging when the heat sink temperature is $\geq 90^{\circ}\text{C}$; and will resume when the temperature is $\leq 60^{\circ}\text{C}$.
 - E8** PV reverse connection (check the voltage and correct) - please ensure polarity is correct.
- NOTE:** Please eliminate the fault according to the error code. If the controller does not respond after the error is eliminated remove the power source (battery). If the error persists the controller may be damaged and may need servicing.

TEMPERATURE COMPENSATION/ TEMPERATURE SENSOR (Only for Lead Acid/AGM Batteries)

1. The system will automatically adjust the float voltage according to the ambient temperature. If the external temperature probe is not connected (or the external temperature is $<40^{\circ}\text{C}$), it uses (temperature $\geq 20^{\circ}\text{C} - 5^{\circ}\text{C}$) by default.
2. The voltage may vary when the input energy is insufficient to stabilize the energy required for the float charging.
3. For 12/24V batteries, when the external probe temperature $\leq 0^{\circ}\text{C}$, the float charging voltage is 14.1/28.2V.
4. For 12/24V batteries, when the external probe temperature is $0^{\circ}\text{C}\sim 20^{\circ}\text{C}$, the float charging voltage is 13.8/27.6V.
5. For 12/24V batteries, when the external probe temperature $\geq 20^{\circ}\text{C}$, the float charging voltage is 13.5/27V.

NOTE: If internal head sink temperature exceeds 80 Deg C, the device shall go into approximately half power mode. Shall resume normal operation when internal head sink drops below 75 Deg C.

If internal head sink exceeds 90 Deg C, the device shall turn off. It will resume charging again when temperature drops below 60 Deg C.

CUSTOMER SERVICE

For customer support please visit batterytender.com. You can also call our customer service hotline 877-456-7901. You may also email us Service@batterytender.com or use Chat from our website.

WARRANTY

The Battery Tender® Solar Charger Controller comes with a two (2) year limited warranty against defects or failure (within two (2) years of purchase).

THIS LIMITED WARRANTY IS VOID under the following conditions:

- 1) The product is misused, subjected to careless handling, or operated under conditions of extreme temperature, shock, weather, or vibration beyond our recommendations for safe and effective use.
- 2) The product is disassembled or repaired by anyone who is not an authorized service representative.
- 3) The product was purchased from an unauthorized source. Warranty is not transferable from the original purchaser.
- 4) Any physical damage to any of components or any accessory after purchase.
- 5) Any modifications to any of the components.