



# GENASUN

## GV-10 Manual

Solar Charge Controllers with Maximum Power Point Tracking

### For models:

**GV-10-Pb-12V:**

12V Lead-Acid/AGM/Gel/Sealed/Flooded

**GV-10-Pb-CV:**

12V Custom Multi-Stage Lead-Acid/AGM/Gel/Sealed/Flooded

**GV-10-Li-12.5V:**

11.1V (3s) Lithium Cobalt/Magnesium/Nickel

**GV-10-Li-14.2V:**

12V (4s) Lithium Iron Phosphate

**GV-10-Li-16.7V:**

14.8V (4s) Lithium Cobalt/Magnesium/Nickel

**GV-10-Li-CV(\*\*.\*V):**

Custom CC/CV or Multi-Stage Lithium Variation

[www.genasun.com](http://www.genasun.com)

GENASUN

c/o BLUE SKY ENERGY

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10.5A / 140W (see specs p.7 for the max. power of Li-ion versions.)

GENASUN GV-10 (ALL MODELS) MANUAL, REVISION 4.0 | 2018

IMPORTANT SAFETY INSTRUCTIONS | SAVE THESE INSTRUCTIONS

# Safety Instructions:

This manual contains important instructions for the GV-10-Pb and GV-10-Li solar charge controllers that shall be followed during installation and maintenance. Various models of the GV-10 are available to charge different battery types as follows:

- **GV-10-Pb-12V:** 12V Lead-Acid/AGM/Gel/Sealed/Flooded
- **GV-10-Pb-CV:** 12V Custom Multi-Stage Lead-Acid/AGM/Gel/Sealed/Flooded
- **GV-10-Li-12.5V:** 11.1V (3s) Lithium Cobalt/Magnesium/Nikel
- **GV-10-Li-14.2V:** 12V (4s) Lithium Iron Phosphate
- **GV-10-Li-16.7V:** 14.8V (4s) Lithium Cobalt/Magnesium/Nikel
- **GV-10-Li-CV(\*\*.\*V):** Custom CC/CV or Multi-Stage Lithium Variation

Consult your battery charging specifications to ensure that the GV-10 is compatible with your chosen batteries.

The GV-10 includes a 20A fast-acting ATO fuse rated 32V.

**WARNING: EXPLOSION HAZARD. DO NOT SERVICE, CONNECT, DISCONNECT, OR CHANGE FUSES UNLESS THE AREA IS FREE OF IGNITABLE CONCENTRATIONS. ATTENTION: RISQUE D'EXPLOSION. NE PAS RÉPARER, CONNECTER, DÉCONNECTER, OU REMPLACER LES FUSIBLES À MOINS QUE LA ZONE SOIT EXEMPTÉ DE CONCENTRATIONS INFLAMMABLES.**

**WARNING: REPLACE ONLY WITH THE SAME RATINGS AND TYPE OF FUSE. DISCONNECT ALL SOURCES OF SUPPLY BEFORE SERVICING. NON-ISOLATED. ATTENTION: REMPLACER SEULEMENT AVEC LE MÊME TYPE ET VALEUR NOMINALE DE FUSIBLE. DÉBRANCHER TOUTES LES SOURCES D'ALIMENTATION AVANT L'ENTRETIEN. PAS ISOLÉ.**

**CAUTION** for the GV-10-Pb (Lead Acid Versions Only): **INTERNAL TEMPERATURE COMPENSATION. RISK OF FIRE, USE WITHIN 0.3 m (1 ft) of BATTERIES.** Lead-acid batteries can create explosive gases. Short circuits can draw thousands of amps from a battery. Carefully read and follow all instructions supplied with the battery. Use only 12V lead-acid batteries with the GV-10-Pb-12V and GV-10-Pb-CV.






**DO NOT SHORT CIRCUIT** the solar array when plugged into the controller. **DO NOT MEASURE SHORT CIRCUIT CURRENT** of the array while connected to the controller. This may damage the controller, and such damage will not be covered under warranty.

Grounding is not necessary for operation and is at the user's discretion. If the GV-10 is to be used with a solar array electrically connected to earth ground, please note the following: **WARNING: THIS UNIT IS NOT PROVIDED WITH A GFDI DEVICE.** Consult Article 690 of the National Electrical Code (or the standards in force at the installation location) to determine whether a GFDI is necessary

for your installation. **WARNING: THIS UNIT IS NOT PROVIDED WITH DISCONNECT DEVICES.** Consult Article 690 of the National Electrical Code (or the standards in force at the installation location) to determine whether disconnect devices are necessary for your installation. **LITHIUM WARNING:** Use caution when working with lithium systems. Genasun Li controllers use the CC/CV charging profile indicated on the controller. CHECK the specifications of the battery pack to ensure that the CV voltage is correct. Further check that the power supplied by the solar array and Genasun controller is within the battery specified design limits.

**LITHIUM BMS WARNING:** Genasun recommends using a lithium battery with a Battery Management System capable of disconnecting the solar charge controller in the event that any cell in the pack is outside of its rated temperature, current, or voltage range. Failure to do so may result in property damage, injury or death. Genasun highly recommends the use of a BMS with cell balancing. Cell balancing is mandatory for lithium iron phosphate. Use only 10-30 AWG (5.0 mm<sup>2</sup> max) copper conductors suitable for a minimum of 60 degrees C. If operation at high power or at high ambient temperatures is expected, wire with a higher temperature rating may be necessary. Recommended terminal block tightening torque: 7 in-lbs, 0.79 Nm.

## Product Certifications

	<p>RECOGNIZED COMPONENT</p> 			
<p><b>Safety</b> Conforms to: UL STD 1741 Certified to: CSA STD C22.2#107.1</p>	<p><b>HazLoc (C1D2)</b> Conforms to: UL STD 121201 Certified to: CSA STD C22.2#213</p>	<p><b>EMC</b> Conforms to: EN 61000-6-3:2007+A1:2011 EN 61000-6-2:2005 AS/NZS 61000-6-3:2012</p>	<p><b>EMC</b> Conforms to: FCC (CFR Title 47) Part 15 Radio frequency Devices, Subpart B - Unintentional Radiators. Tested for compliance.</p>	<p><b>Restriction Hazardous Substances</b> Conforms to: EN 50581:2012</p>

## Inspection & Maintenance

Inspect the controller at least once per year to ensure proper performance.

- Check for animal or insect damage.
- Inspect for corrosion / water damage.
- Inspect the security of all connections.
- Ensure the solar array does not exceed the maximum input voltage.
- Repair and clean as necessary.

# Installation & System Connections:

- Connections should be made according to Article 690 of the National Electrical Code (NFPA 70) or the standards in force at the installation location.
- Electrical connections may be made in any order; however the sequence below is recommended.

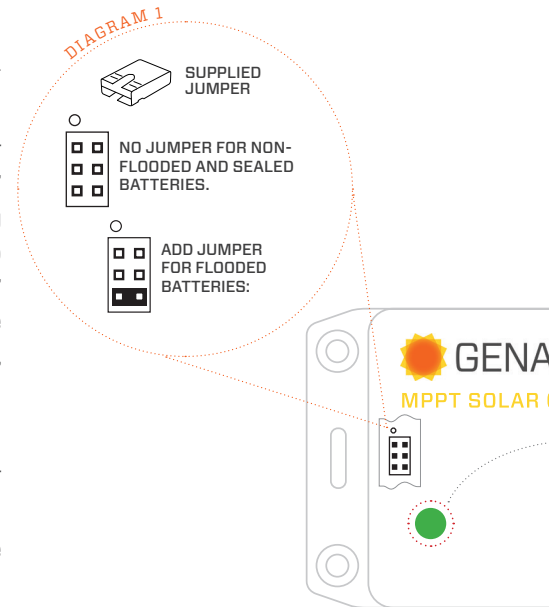
## 1 SELECTING THE BATTERY TYPE (LEAD-ACID / PB MODEL ONLY)

Your GV-10-Pb-12V controller is supplied set to the “SEALED” charging profile, which is appropriate for most types of sealed lead-acid and gel batteries, as well as some types of AGM batteries. A “FLOODED” setting is available for flooded batteries and other types of AGM batteries. The “FLOODED” setting includes equalization charging. Please consult the specification table at the end of this manual to determine the best setting for your battery type. To change your GV-10 controller to the “FLOODED” setting, unscrew the four screws on the bottom of the controller, remove the top, and install the supplied jumper on the 6-pin connector as shown in diagram 1. Use care when installing the jumper, as incorrect installation can damage the controller. **For sealed batteries, do not install the jumper.**

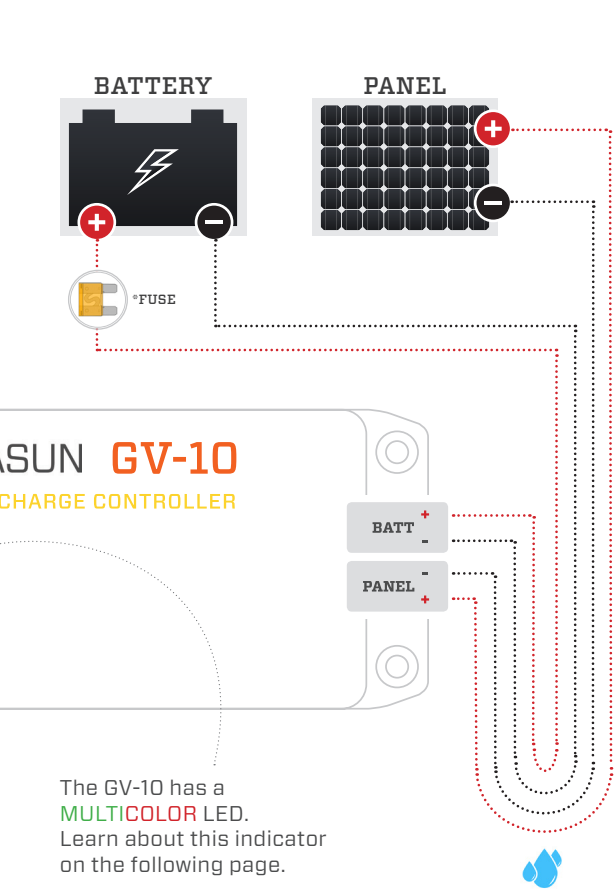
## 2 MOUNTING


Mount the controller near your battery securely using the holes provided on the enclosure’s flanges or with a means appropriate to the application.

- Mount near the battery (for lead-acid versions only, use within 0.3 m (1 ft) of batteries. See Caution, p.2).
- The GV-10 can be mounted in any orientation on the floor or wall. We recommend a position in which all labels are clearly visible.
- Do not expose to water.
- Do not mount in direct sunlight or near a source of heat.
- Allow adequate airflow around the controller to achieve maximum output capability.
- For outdoor use, the controller must be housed in an enclosure providing protection at least equivalent to NEMA Type 3.



**Note\***: The positive or negative battery cable must be protected by a fast-acting fuse or circuit breaker of 20A or less, rated for the maximum battery voltage and connected close to the battery terminal or power distribution block. This fuse will protect the wiring in the event of a short circuit or controller damage.



 **Note:** Drip loop to protect charge controller from water.

### 3 CONNECTING THE SOLAR PANEL

Connect the solar panel to the +PANEL and -PANEL terminals. While connecting the battery first will not damage the GV-10, we recommend connecting the panel first. This eliminates the risk of short-circuiting the panel while the GV-10 is operating, which can cause damage.

- In most applications, the panel should be connected only to the GV-10.
- Do not use blocking diodes for single-panel installations. The GV-10 prevents reverse-current flow.
- Multiple panels may be connected in parallel up to the maximum power limit of the controller, with a blocking diode used for each panel (unless otherwise recommended by the panel manufacturer). These panels should be the same model and facing the same direction, otherwise we recommend using a separate controller for each panel.
- Solar panel voltage rises in cold weather. Check that the solar panel open circuit voltage (Voc) will remain below the maximum input voltage of the GV-10 at the coldest possible expected temperature.



**Note:** In the GV-10, the negative side of the battery is connected internally to the negative side of the solar panel.

### 4 CONNECTING THE BATTERY

Connect the battery to the +BATT and -BATT terminals.

- A small spark while connecting the battery is ok.
- Any loads should be connected directly to the battery. The GV-10 does not provide protection against over-discharge.



**CAUTION, RISK OF FIRE OR EXPLOSION:** Do not make the final battery connection near lead-acid batteries that have recently been charging.



**Note:** Voltages above 25V applied to the battery terminals will immediately destroy the GV-10. We recommend wiring the controller directly to the battery through its own circuit, and not through any battery switch or selector. Do not share wiring between the GV-10 and an alternator.

# Status Indication:

The GV-10 has a **MULTICOLOR LED**



## LED RUN/CHARGE INDICATION

**Standby:** The battery is connected properly and ready to charge when solar panel power is available.

2 SEC. BETWEEN GREEN BLINKS 

**Charging (low current, less than ~3.7A):**

FAST & SHORT GREEN BLINKS 

**Charging (high current, more than ~3.7A):**

LONGER, SLOWER GREEN BLINKS 

**Charging (current limit):** charging at current limit (10.5A+).

LONG, THEN SHORT GREEN BLINKS 

**Battery Charged:** The battery is in the absorption or float charging stage.

SOLID GREEN LED 



## LED ERROR INDICATION


**Overheat:** The controller's internal temperature is too high.

SETS OF 2 RED BLINKS. 

**Overload:** This could be caused by changing the solar panel connections while the controller is operating.

SETS OF 3 RED BLINKS. 

**Battery voltage too low:** The controller cannot begin charging due to low battery voltage. If the nominal battery voltage is correct (12V), charge the battery by some other means before use.

SETS OF 4 RED BLINKS 

**Battery voltage too high:** If the nominal battery voltage is correct (12V), check the functioning of other chargers that may be connected to the system.

SETS OF 5 RED BLINKS. 

**Panel voltage too high:** Only 12V nominal solar panels may be used with this controller.

SETS OF 6 RED BLINKS. 

**Internal Error:** Contact your dealer for assistance.

2 LONG BLINKS, FOLLOWED BY ANY NUMBER OF SHORT BLINKS. 

## Troubleshooting

If the LED Indicator will not light, or displays an indication not listed in this manual:

- Verify correct battery polarity;
- Check that there is a solid electrical connection to the battery;
- Check that battery voltage appears on the GV-10 battery terminal screws;
- Check the GV-10 terminal area for evidence of water or mechanical damage.

The GV-10 will not operate without a battery. If the system appears to be overcharging or the GV-10 will not begin charging, ensure that the solar panel is wired only to the GV-10. If the GV-10 does not appear to be charging, note that the GV-10 waits up to one minute before trying to restart if it has shut down due to lack of power from the solar panel. If the LED indicator will not light with a battery connected, or blinks the over-battery-voltage error, or the controller does not charge, the internal fuse may be blown. Check the fuse inside the GV-10 by removing the four screws on the bottom of the enclosure. If the fuse is blown, replace it with a 20A fast-acting ATO or ATC fuse rated 32V or higher. For more in-depth system troubleshooting, please visit the support area of our website: [www.genasun.com/support/](http://www.genasun.com/support/)



**Note: The most common causes of blown fuses are:**

- Connecting the GV-10 to the battery backwards;
- Shorting the solar panel input while the GV-10 is charging;
- Disconnecting the vehicle's battery while an alternator is running;
- Connecting the GV-10 battery terminals to a 24V battery.

In the latter three cases, there may be other internal damage to the controller.

## Specifications:

GV-10-Pb-12V

GV-10-Li-\*\*. \*V

	GV-10-Pb-12V	GV-10-Li-12.5V	120W
Maximum Recommended Panel Power:	140W	GV-10-Li-14.2V	140W
		GV-10-Li-16.7V	160W
Rated Battery (Output) Current:		10.5A	
Nominal Battery Voltage:		12V	
Maximum Input Voltage:		34V	
Recommended Max Panel Voc at STC:		27V	
Minimum Battery Voltage for Operation:		8.5V	
Input Voltage Range:		0-34V	
Maximum Input Short Circuit Current*:		10.5A	
Maximum Input Current**:		19A	
Operating Temperature:		-40°C - 85°C	

\*Panel Isc. Maximum input power and maximum input voltage requirements must also be respected. \*\*Maximum current that the controller could draw from an unlimited source. This specification is not intended for determining PV input.

# Specifications (cont.):

GV-10-Pb-12V

GV-10-Li-\*\*, \*V

Maximum Full Power Ambient:	70°C			
Battery Temperature Compensation:	-28mV/°C (referred to 25°C)		Disabled	
Charge Profile:	Multi-Stage with Temperature Compensation		CC-CV	
Charging Voltages:	FLOODED Setting	SEALED Setting		
Equalization Voltage:	15.0V	-	-	
Equalization Time:	2 Hours	-	-	
Equalization Interval:	30 Days	-	-	
Bulk Voltage:	14.6V	14.3V	-	
Absorption Voltage:	14.4V	14.1V	-	
Absorption Time:	2.5 Hours		-	
Float Voltage (Pb models) or CV Voltage (Li models):	13.5V	13.7V	GV-10-Li-12.5V	12.5V
			GV-10-Li-14.2V	14.2V
			GV-10-Li-16.7V	16.7V
Electrical Efficiency:	96% - 98% typical			
Tracking Efficiency:	99+% typical			
MPPT Tracking Speed:	15Hz			
Night Consumption:	0.9mA (900uA)			
Environmental Protection:	IP40, Nickel-Plated Brass & Stainless Hardware			
Connection:	4-position terminal block for 10-30AWG wire			
Certifications:	cETLus Safety (UL1741), Recognized Component cETLus HazLoc (C1D2), CE, FCC, RoHS			
Weight:	6.5 oz. , 185 g			
Dimensions:	5.5 x 2.5 x 1.2" , 14 x 6.5 x 3.1 cm			
Warranty:	5 years			