



GENASUN **GV-10 Manual**

Solar Charge Controllers with Maximum Power Point Tracking

For models:

GV-10-Pb-12V: 12 V Lead-Acid/AGM/Gel/Sealed/Flooded

GV-10-Pb-CV: 12 V Custom Multi-Stage Lead-Acid/AGM/Gel/
Sealed/Flooded

GV-10-Li-12.5V: 11.1 V (3S) Lithium Cobalt/Manganese/Nickel

GV-10-Li-14.2V: 12 V (4S) Lithium Iron Phosphate

GV-10-Li-16.7V: 14.8 V (4S) Lithium Cobalt/Manganese/Nickel

GV-10-Li-CV: Custom CC/CV or Multi-Stage Lithium

10.5 A / 140 W

SUNFORGE LLC

2598 FORTUNE WAY • SUITE K

VISTA, CA 92081 • USA

<https://sunforgellc.com>

GENASUN GV-10 (ALL MODELS) MANUAL, REVISION 4.1 | 2021

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: 12 V Lead-Acid/AGM/Gel/Sealed/Flooded
- GV-10-Pb-CV: 12 V Custom Multi-Stage Lead-Acid/AGM/Gel/Sealed/Flooded
- GV-10-Li-12.5V: 11.1 V (3S) Lithium Cobalt/Manganese/Nickel
- GV-10-Li-14.2V: 12 V (4S) Lithium Iron Phosphate
- GV-10-Li-16.7V: 14.8 V (4S) Lithium Cobalt/Manganese/Nickel
- GV-10-Li-CV: Custom CC/CV or Multi-Stage Lithium
- GV-10-Li-PCB: CC/CV or Multi-Stage Lithium
- GV-10-Pb-PCB: 12 V Multi-Stage Lead-Acid/AGM/Gel/Sealed/Flooded

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

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

UL SAFETY AND HAZLOC WARNING: EXPLOSION HAZARD. DO NOT CONNECT OR DISCONNECT WHEN ENERGIZED. DO NOT DISCONNECT WHILE THE CIRCUIT IS LIVE OR 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 1 ft (0.3 m) 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 12 V 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 (BMS) 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 mm² max) copper conductors suitable for a minimum of 60°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.

Inspection & Maintenance

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

Product Certifications¹

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

(1) The GV-10-PCB models are ETL Recognized Components for safety (UL1741).

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.

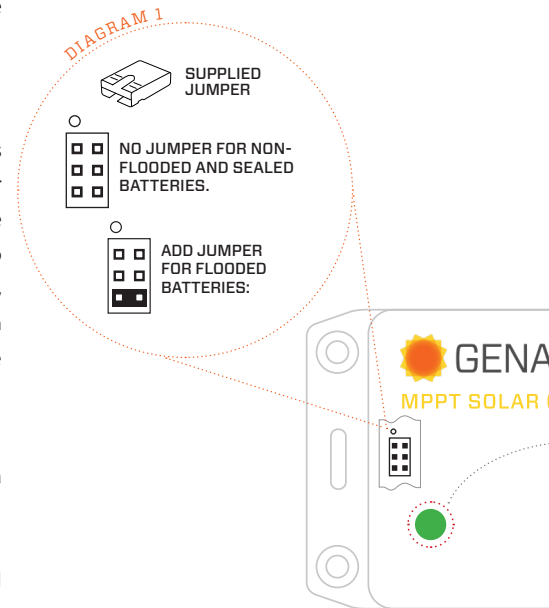
1 SELECTING THE BATTERY TYPE (LEAD-ACID / PB MODEL ONLY)

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.

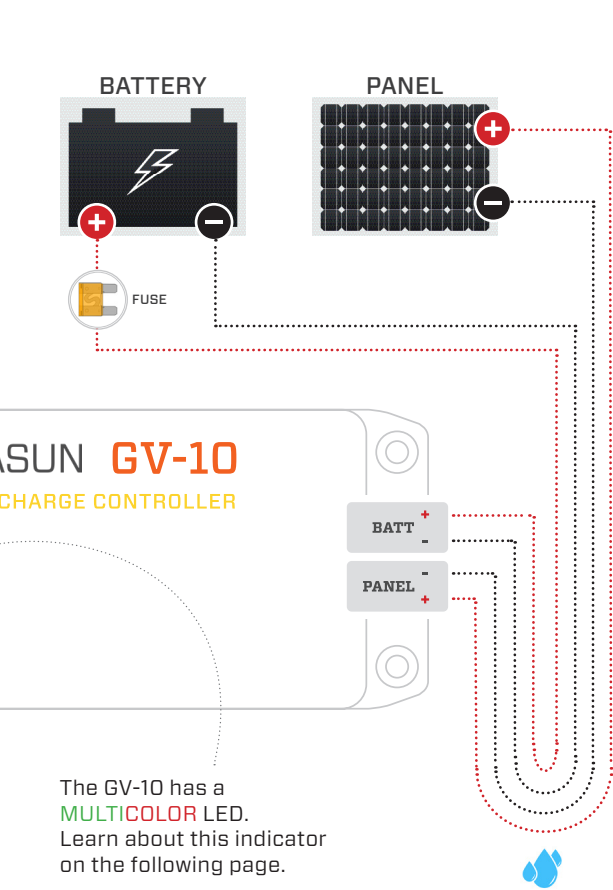
2 MOUNTING

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 1 ft (0.3 m) 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. Although the GV can be used in any orientation, for marine or other applications where liquid water may be nearby, the GV should be mounted with the terminal block down (or where not possible, to the side). This orientation facilitates the use of drip loops to prevent liquid water from running along the wiring into the controller.
- Do not expose to water. Do not mount in direct sunlight or near a source of heat.
- Allow adequate airflow around the controller.
- 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 20 A 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.



The GV-10 has a **MULTICOLOR LED**. Learn about this indicator on the following page.

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 25 V 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 ~3.7 A):

FAST & SHORT GREEN BLINKS 

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

LONGER, SLOWER GREEN BLINKS 

Charging at current limit (10.5 A):

LONG, THEN SHORT GREEN BLINKS 

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

SOLID GREEN LED 



LED ERROR INDICATION

Over-temperature: 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 (12 V), 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 (12 V), check the functioning of other chargers that may be connected to the system.

SETS OF 5 RED BLINKS 

Panel voltage too high: Only 12 V 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 screw.
- Check the GV-10 terminal area for water or mechanical damage.
- Check the 20 A fuse inside the GV-10.



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 24 V battery.
- In the latter three cases, there may be other internal damage to the controller.

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. 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 20 A fast-acting ATO or ATC fuse rated 32 V or higher. For more in-depth system troubleshooting, please visit the support area of our website: <https://sunforgellc.com/learning-center/>

Specifications:

	GV-10-Pb-12V	GV-10-Li-12.5V	GV-10-Li-14.2V	GV-10-Li-16.7V	GV-10-Li-CV
Max Recommended Panel Power:	140 W	120 W	140 W	160 W	(See specs for closest CC/CV voltage.)
Max Input Voltage:			34 V		
Recommended Max Panel Voc at STC:			27 V		
Max Input Short Circuit Current: ²			10.5 A		
Max Input Current: ³			19 A		
Nominal Battery Voltage:			12 V		
Min Battery Voltage for Operation:			8.5 V		
Rated Charging Current:			10.5 A		
Input Voltage Range:			0 – 34 V		
Operating Temperature:			-40 °C – 85 °C		
Max Full Power Operating Ambient: ⁴			70 °C		

(2) Panel Isc. Max input power and max input voltage requirements must also be respected.

(3) Max current that the controller could draw from an unlimited source. This specification is not intended for determining PV input.

(4) Max ambient temperature for full operating power.

Specifications (cont.):

GV-10-Pb-12V

GV-10-Li-12.5V

GV-10-Li-14.2V

GV-10-Li-16.7V

GV-10-Li-CV

Charge Profile:	Multi-Stage with Temperature Compensation		CC/CV			CC/CV or Multi-Stage
	Lead-Acid FLOODED (jumper in place)	Lead-Acid SEALED (no jumper)	3S Li-ion	4S LiFePO ₄	4S Li-ion	Lithium
Equalization Voltage:	15.0 V	–			–	
Equalization Time:	2 Hours	–			–	
Equalization Interval:	30 Days	–			–	
Bulk Voltage:	14.6 V	14.3 V			–	
Absorption Voltage:	14.4 V	14.1 V			–	
Absorption Time:	2.5 Hours				–	
Float Voltage (Pb models) or CV Voltage (Li models):	13.5 V	13.7 V	12.5 V	14.2 V	16.7 V	Custom Voltage
Re-Absorb (Re-Bulk): ⁵	12.5 V				–	
Battery Temperature Compensation:	-28 mV/°C (referred to 25 °C)				Disabled	
Electrical Efficiency:	96% – 98% typical					
Standby Consumption:	0.9 mA (900 uA)					
MPPT Tracking Speed:	15 Hz					
Connection:	4-position terminal block for 10 – 30 AWG wire					
Weight: ⁶	6.5 oz (185 g)					
Dimensions: ⁶	5.4" x 2.4" x 1.3" (13.7 cm x 6.2 cm x 3.3 cm)					
Environmental Protection: ⁶	IP40, Nickel-Plated Brass & Stainless Hardware					
Certifications:	cETLus, CE, FCC, RoHS					
Warranty:	5 years					

(5) If the battery voltage drops below this point, the controller will attempt to run an absorption cycle. Otherwise, it will charge to the float voltage.

(6) This specification does not apply to the GV-10-PCB. Specifications for the GV-10-PCB are as follows: Weight: 3.4 oz (96 g); Dimensions: 4.8" x 2.2" x 1.0" (12 cm x 5.5 cm x 2.5 cm); Environmental Protection: IP00.

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