



GENASUN **GV-4 Manual**

Solar Charge Controller with Maximum Power Point Tracking

For models:

GV-4-Pb-12V: 12 V Lead-Acid/AGM/Gel/Sealed/Flooded

GV-4P-Pb-12V: 12 V Lead-Acid/AGM/Gel/Sealed/Flooded

GV-4-Pb-CV: 12 V Custom Multi-Stage Lead-Acid/AGM/Gel/
Sealed/Flooded

4 A / 50 W

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GENASUN GV-4 (ALL MODELS) MANUAL, REVISION 4.1 | 2021

IMPORTANT SAFETY INSTRUCTIONS | SAVE THESE INSTRUCTIONS

Safety Instructions:

This manual contains important instructions for the GV-4-Pb-12V, GV-4P-Pb-12V, and GV-4-Pb-CV solar charge controller that shall be followed during installation and maintenance. Various models of the GV-4 are available as follows:

- GV-4-Pb-12V: 12 V Lead-Acid/AGM/Gel/Sealed/Flooded
- GV-4P-Pb-12V: 12 V Lead-Acid/AGM/Gel/Sealed/Flooded
- GV-4-Pb-CV: 12 V Custom Multi-Stage Lead-Acid/AGM/Gel/Sealed/Flooded
- GV-4-Pb-PCB: 12 V Multi-Stage Lead-Acid/AGM/Gel/Sealed/Flooded

The GV-4 is intended for charging 12 V Lead-Acid, AGM, Gel, Sealed, and Flooded batteries. Consult your battery charging specifications to ensure that the GV-4 is compatible with your chosen batteries.

The GV-4 does not include a fuse. Overcurrent protection suitable for the application must be provided by the user.

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 CONNECTER NI DÉCONNECTER PAS LORSQU'IL EST SOUS TENSION. NE PAS CONNECTER LE CIRCUIT ALORS QUE EST VIVANT OU A MOINS QUE LA ZONE EST LIBRE DE CONCENTRATIONS IGNITAIRES.

CAUTION: 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-4-Pb-12V and GV-4-Pb-CV.

To avoid stress on the GV-4 and possible damage, **DO NOT SHORT CIRCUIT** the solar array when plugged into the controller, and **DO NOT MEASURE SHORT CIRCUIT CURRENT** of the array while connected to the controller.

Use only 12 – 30 AWG (3.0 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: 3 – 5 in-lbs, 0.35 – 0.55 Nm.

Grounding is not necessary for operation and is at the user's discretion. If the GV-4 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.

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.

Product Certifications¹

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

(1) The GV-4-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.

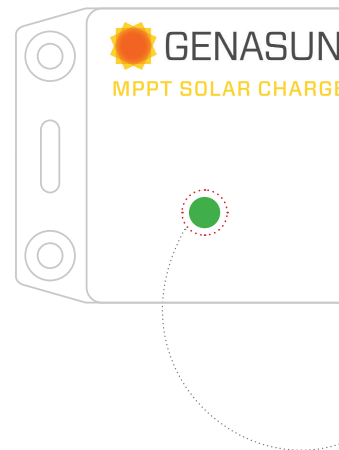
1 MOUNTING

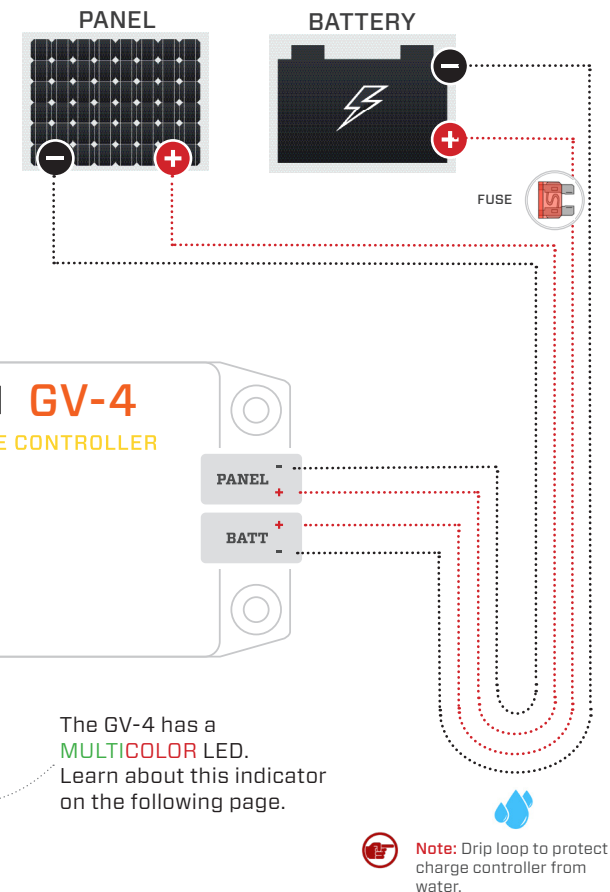
Mount the controller near your battery securely using the holes provided on the enclosure's flanges or with a means appropriate to the application.

- Mount near the battery (use within 1 ft (0.3 m) of batteries. *See Caution, p.2).*
- The GV-4 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 10 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.





2 CONNECTING THE SOLAR PANEL

Connect the solar panel to the PANEL+ and PANEL- terminals.

- In most applications, the panel should be connected only to the GV-4.
- Never connect the panel negative to the battery negative, as your batteries may be damaged.
- Do not use blocking diodes for single-panel installations. The GV-4 prevents reverse-current flow.
- If multiple panels are being used in parallel, blocking diodes are recommended in series with each panel, unless the panel manufacturer recommends otherwise.
- 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-4 at the coldest possible expected temperature.



Note: In the GV-4, the positive side of the battery is connected internally to the positive side of the solar panel.

3 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-4 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.

Status Indication:

The GV-4 has a **MULTICOLOR** LED.



LED RUN/CHARGE INDICATION

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

8 – 10 SEC. BETWEEN GREEN BLINKS



Charging (low current, less than 0.15 A):

4 – 5 SEC. BETWEEN GREEN BLINKS



Charging (between 0.15 – 1.5 A):

FAST GREEN BLINKS



Charging (high current, more than 1.5 A):

LONGER, SLOWER GREEN BLINKS



Charging at current limit:

The GV-4 is overloaded and limiting charging current.

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



SOLID RED



OR OTHER LED INDICATIONS NOT LISTED

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-4 battery terminal screws.
- Check the GV-4 terminal area for water or mechanical damage.

The GV-4 will not operate without a battery. If the system appears to be overcharging or the GV-4 will not begin charging, ensure that the solar panel is wired only to the GV-4, and in particular that the solar panel negative terminal is not connected to ground (battery negative). If the GV-4 does not appear to be charging, note that the GV-4 waits up to one minute before trying to restart if it has shut down due to lack of power from the solar panel. For more in-depth system troubleshooting, please visit the support area of our website: <https://sunforgellc.com/learning-center/>

Specifications:

GV-4-Pb-12V

Max Recommended Panel Power:	50 W
Max Input Voltage:	27 V
Recommended Max Panel Voc at STC:	22 V
Max Input Short Circuit Current: ²	4 A
Max Input Current: ³	7 A
Nominal Battery Voltage:	12 V
Min Battery Voltage for Operation:	7.2 V
Rated Charging Current:	4 A
Input Voltage Range:	0 – 27 V
Charging Output Voltage Range:	7.2 – 18 V

(2) Panel Isc. Max input power and maximum 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.

Specifications (cont.):

GV-4-Pb-12V

Charge Profile:	Multi-Stage with Temperature Compensation
Bulk Voltage:	14.4 V
Absorption Voltage:	14.2 V
Absorption Time:	2 Hours
Float Voltage:	13.8 V
Re-Absorb (Re-Bulk): ⁴	12.5 V
Battery Temperature Compensation:	-28 mV/°C (referred to 25 °C)
Operating Temperature:	-40 °C – 85 °C
Max Full Power Operating Ambient: ⁵	45 °C
Tracking Efficiency:	99% typical
MPPT Tracking Speed:	15 Hz
Electrical Efficiency:	96% – 99.85% typical
Operating Consumption:	0.125 mA (125 uA)
Standby Consumption:	0.09 mA (90 uA)
Connection:	4-position terminal block for 12 – 30 AWG wire
Weight: ⁵	2.8 oz (80 g)
Dimensions: ⁵	4.3" x 2.2" x 1.14" (11 cm x 5.6 cm x 2.9 cm)
Environmental Protection: ⁶	IP40, Nickel-Plated Brass & Stainless Hardware
Certifications:	cETLus, CE, FCC, RoHS
Warranty:	5 years

(4) 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.

(5) Max ambient temperature for full operating power. Test conditions: 16 V input, 13 V output, GV-4 vertically (wall) mounted.

(6) This specification does not apply to the GV-4-PCB. The GV-4-PCB specifications are as follows: Weight: 1.02 oz (29 g); Dimensions: 3.3" x 1.9" x 0.9" (8.3 cm x 4.8 cm x 2.3 cm); Environmental Protection: IP00.