



**GENASUN**

# GVB-8 (Boost) Manual

Solar Charge Controllers with Maximum Power Point Tracking

**For models:**

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<b>GVB-8-Pb-12V:</b>	12 V Lead-Acid/AGM/Gel/Sealed/Flooded
<b>GVB-8-Pb-24V:</b>	24 V Lead-Acid/AGM/Gel/Sealed/Flooded
<b>GVB-8-Pb-36V:</b>	36 V Lead-Acid/AGM/Gel/Sealed/Flooded
<b>GVB-8-Pb-48V:</b>	48 V Lead-Acid/AGM/Gel/Sealed/Flooded
<b>GVB-8-Pb-CV:</b>	Custom Multi-Stage Lead-Acid/AGM/Gel/ Sealed/Flooded
<b>GVB-8-Li-14.2V:</b>	12 V (4S) Lithium Iron Phosphate
<b>GVB-8-Li-25.0V:</b>	24 V (6S) Lithium Cobalt/Manganese/Nickel
<b>GVB-8-Li-28.4V:</b>	24 V (8S) Lithium Iron Phosphate
<b>GVB-8-Li-41.7V:</b>	36 V (10S) Lithium Cobalt/Manganese/Nickel
<b>GVB-8-Li-56.8V:</b>	48 V (16S) Lithium Iron Phosphate
<b>GVB-8-Li-CV:</b>	Custom CC/CV or Multi-Stage Lithium Variation

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**8 A Input - 105 W / 210 W / 325 W / 350 W**

GENASUN GVB-8 BOOST (ALL MODELS) MANUAL, REVISION 4.1 | 2021

**IMPORTANT SAFETY INSTRUCTIONS | SAVE THESE INSTRUCTIONS**

# Safety Instructions:

This manual contains important instructions for the GVB-8 Boost (GVB-8-Pb and GVB-8-Li) solar charge controllers that shall be followed during installation and maintenance. Various models of the GVB-8 are available to charge different battery types as follows:

- |                 |  |                   |  |
|-----------------|--|-------------------|--|
| • GVB-8-Pb-12V: | 12 V Lead-Acid/AGM/Gel/Sealed/Flooded        | • GVB-8-Li-14.2V: | 12 V (4S) Lithium Iron Phosphate           |
| • GVB-8-Pb-24V: | 24 V Lead-Acid/AGM/Gel/Sealed/Flooded        | • GVB-8-Li-25.0V: | 24 V (6S) Lithium Cobalt/Manganese/Nickel  |
| • GVB-8-Pb-36V: | 36 V Lead-Acid/AGM/Gel/Sealed/Flooded        | • GVB-8-Li-28.4V: | 24 V (8S) Lithium Iron Phosphate           |
| • GVB-8-Pb-48V: | 48 V Lead-Acid/AGM/Gel/Sealed/Flooded        | • GVB-8-Li-41.7V: | 36 V (10S) Lithium Cobalt/Manganese/Nickel |
| • GVB-8-Pb-CV:  | Custom Lead-Acid/AGM/Gel/Sealed/Flooded      | • GVB-8-Li-56.8V: | 48 V (16S) Lithium Iron Phosphate          |
| • GVB-8-Pb-PCB: | Multi-Stage Lead-Acid/AGM/Gel/Sealed/Flooded | • GVB-8-Li-CV:    | Custom CC/CV or Multi-Stage Lithium        |
|                 |  | • GVB-8-Li-PCB:   | CC/CV or Multi-Stage Lithium               |

Consult your battery charging specifications to ensure that the GVB-8 is compatible with your chosen batteries.

The GVB-8 includes a 10 A fast-acting ATO fuse rated for the maximum battery voltage.

**UL SAFETY AND HAZLOC 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. ONLY VERSIONS WITH VOLTAGE ABOVE 42.4 V - WHEN A GROUND FAULT IS INDICATED, BATTERY TERMINALS AND CONNECTED CIRCUITS MAY BE UNGROUNDED AND HAZARDOUS. ATTENTION: REMPLACER SEULEMENT AVEC LE MÊME TYPE ET VALEUR NOMINALE DE FUSIBLE. DÉBRANCHER TOUTES LES SOURCES D'ALIMENTATION AVANT L'ENTRETIEN. PAS ISOLÉ. SEULES LES VERSIONS DE TENSION SUPÉRIEURES À 42,4 V - LORSQU'UN DÉFAUT À LA TERRE EST INDIQUÉ, LES BORNES DE BATTERIE ET LES CIRCUITS CONNECTÉS PEUVENT ÊTRE N'EST PAS RELIÉE À LA TERRE ET DANGEREUX.**

**CAUTION for the GVB-8-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.**

**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 GVB-8 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.

Use only 10 – 30 AWG (5.0 mm<sup>2</sup> 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.

**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.

## 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 Certifications<sup>1</sup>

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

(1) The GVB-8-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

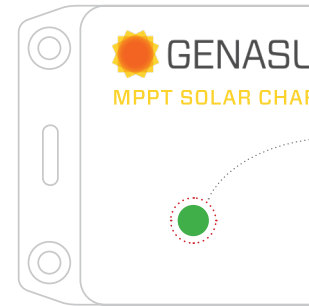
Mount the controller near your battery securely using the holes provided on the enclosure's flanges or with a means appropriate to the application.

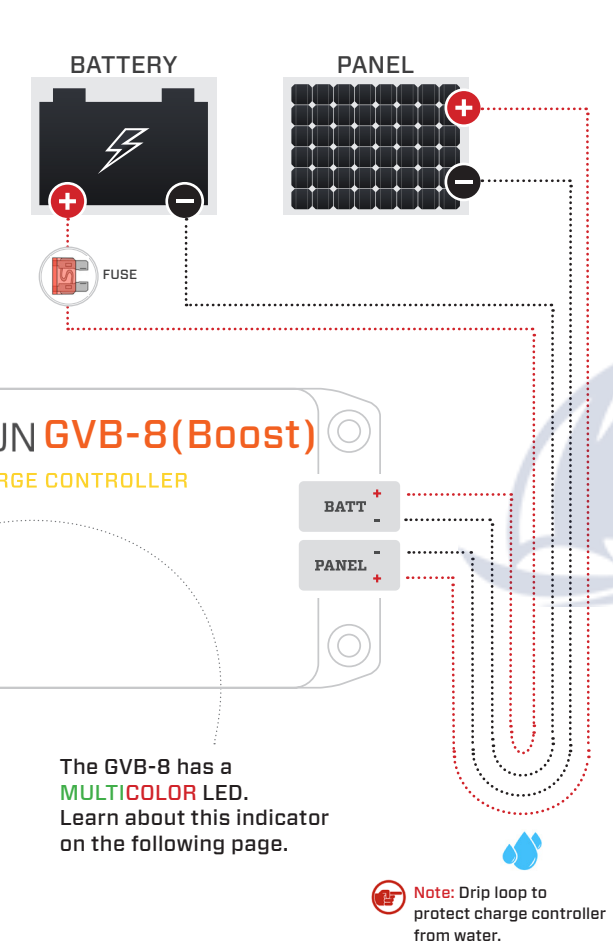
- Mount near the battery (for lead-acid versions only, use within 1 ft (0.3 m) of batteries. See *Caution*, p.2).
- The GVB-8 can be mounted in any orientation on the floor or wall. We recommend a position in which all labels are clearly visible.
- Do not expose to water (PLEASE SEE MODEL GVB-8-WP FOR WATERPROOF VERSION).
- Do not mount in direct sunlight or near a source of heat.
- Allow adequate airflow around the controller.
- For versions above 42.4 V, apply the sticker provided in the box on or adjacent to the battery.
- For outdoor use, the controller must be housed in an enclosure providing protection at least equivalent to NEMA Type 3.



**Note:** Do not install this controller in a Golf Cart. Genasun offers the GVB-8-WP for Golf Carts and other applications where water resistance is needed.

**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.





The GVB-8 has a **MULTICOLOR LED**. Learn about this indicator on the following page.

## 2 CONNECTING THE SOLAR PANEL

Connect the solar panel to the PANEL+ and PANEL- terminals. While connecting the battery first will not damage the GVB-8, we recommend connecting the panel first. This eliminates the risk of short-circuiting the panel while the GVB-8 is operating, which can cause damage.

- In most applications, the panel should be connected only to the GVB-8.
- The LED may blink red until a battery is connected.
- Do not use blocking diodes for single-panel installations. The GVB-8 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 GVB-8 at the coldest possible expected temperature.



**Note:** In the GVB-8, the negative side of the battery is connected internally to the negative 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 GVB-8 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 GVB-8 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 BLINKS 

**Charging (low current, input current less than ~3.5 A):**

FAST & SHORT BLINKS 

**Charging (high current, input current more than ~3.5 A):**

LONGER, SLOWER BLINKS 

**Charging at current limit:**

The GVB-8 is overloaded and limiting input current. Check that the solar panel rating is within the GVB-8's input specifications.

LONG, THEN SHORT BLINKS 

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

SOLID LED 



## LED ERROR INDICATION

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

SETS OF 2 RED BLINKS 

**Overload:** The GVB-8 has been overloaded.

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. Charge the battery by some other means before use.

SETS OF 4 RED BLINKS 

**Battery voltage too high:** Check that the correct GVB-8 has been selected for the nominal system battery voltage. If the nominal battery voltage is correct, check the functioning of other chargers that may be connected to the system. This error can also be caused by a disconnected battery or blown fuse.

SETS OF 5 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 GVB-8 battery terminal screws.
- Check the 10 A fuse inside the GVB-8.
- Check the GVB-8 terminal area for water or mechanical damage.

The GVB-8 will not operate without a battery. If the system appears to be overcharging or the GVB-8 will not begin charging, ensure that the solar panel is wired only to the GVB-8. If the GVB-8 does not appear to be charging, note that the GVB-8 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 GVB-8 by removing the four screws on the bottom of the enclosure. If the fuse is blown, replace it with a 10 A fast-acting ATO or ATC fuse rated for the maximum battery voltage. Automotive-style fuses are typically rated to 32 V, and are suitable for the GVB-8-Pb-12V, GVB-8-Pb-24V, and lithium models with a CV voltage up to 31 V (i.e., GVB-8-Li-CV at 31.0 V). For the GVB-8-Pb-36V, GVB-8-Pb-48V, and higher-voltage lithium models, a fuse with a higher voltage rating is required. We recommend Optifuse part number APR58-UL, rated to 58 V. For more in-depth system troubleshooting, please visit the support area of our website: <https://sunforgellc.com/learning-center/>



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

- Connecting the GVB-8 to the battery backwards.
- Shorting the solar panel input while the GVB-8 is charging. In this case, there may be internal damage to the controller.

## Specifications:

### GVB-8, All Models

Rated Panel (Input) Current: <sup>2</sup>	8 A
Min Panel Voltage for Charging:	5 V
Min Battery Voltage for Operation:	9.5 V
Trickle Charge to Recover Dead (0V) Battery	Yes
Max Input (Panel) Voltage:	60 V
Recommended Max Panel Voc at STC:	50 V
Input Voltage Range:	0 – 60 V
Max Input Short Circuit Current: <sup>2,3</sup>	8 A
Max Input Current: <sup>4</sup>	15 A
MPPT Tracking Speed:	15 Hz
Operating Temperature:	-40 °C – 85 °C
Max Full Power Operating Ambient: <sup>5</sup>	70 °C
Warranty:	5 years
Connection:	4-position terminal block for 10 – 30 AWG wire
Certifications:	cETLus, CE, FCC, RoHS

(2) Panel ratings have increased since we designed the GVB-8. Although we don't believe in changing specifications without a corresponding engineering change, based on both our customers' experiences over the years as well as the headroom we designed into the GVB-8, we feel comfortable recommending the GVB-8 for panels with Imp up to 9 A. (3) Panel Isc, Max input power and maximum input voltage requirements must also be respected. (4) Max current that the controller could draw from an unlimited source. This specification is not intended for determining PV input. (5) Max ambient temperature for full operating power.

# Specifications (cont.):

## GVB-8, All Models

Weight: <sup>6</sup>	6.5 oz (185 g)					
Dimensions: <sup>6</sup>	5.5" x 2.5" x 1.2" (14 cm x 6.5 cm x 3.1 cm)					
Environmental Protection: <sup>6</sup>	IP40, Nickel-Plated Brass & Stainless Hardware					

	GVB-8-Pb-12V	GVB-8-Pb-24V	GVB-8-Pb-36V	GVB-8-Pb-48V	GVB-8-Pb-CV
Max Recommended Panel Power (8 A Panel w/~155 mm cells):	105 W	210 W	325 W	350 W	(See specs for closest Pb equivalent.)
Max Recommended Panel Vmp:	13 V	26 V	41 V	43 V	
Nominal Battery Voltage:	12 V	24 V	36 V	48 V	
Charge Profile:	Multi-Stage with Temperature Compensation				
Bulk Voltage:	14.4 V	28.8 V	43.2 V	57.6 V	
Absorption Voltage:	14.2 V	28.4 V	42.6 V	56.8 V	
Absorption Time:	2 Hours				
Float Voltage:	13.8 V	27.6 V	41.4 V	55.2 V	
Re-Absorb (Re-Bulk): <sup>7</sup>	12.5 V	25 V	37.5 V	50 V	
Battery Temperature Compensation (referred to 25 °C):	-28 mV/°C	-56 mV/°C	-84 mV/°C	-112 mV/°C	
Electrical Efficiency:	95% - 97% typical	96% - 98% typical	96% - 98% typical	96% - 99% typical	
Standby Consumption:	7 mA	6 mA	6 mA	5 mA	

	GVB-8-Li-14.2V	GVB-8-Li-25.0V	GVB-8-Li-28.4V	GVB-8-Li-41.7V	GVB-8-Li-56.8V	GVB-8-Li-CV
Battery type:	4S LiFePO <sub>4</sub>	6S Li-ion	8S LiFePO <sub>4</sub>	10S Li-ion	16S LiFePO <sub>4</sub>	Lithium
Max Recommended Panel Vmp:	13 V	20 V	26 V	39 V	43 V	(See specs for closest CC/CV voltage.)
Max Recommended Panel Power:	105 W	210 W	210 W	325 W	350 W	
Electrical Efficiency:	95% - 97% typical	95% - 97% typical	96% - 98% typical	96% - 98% typical	96% - 99% typical	
Standby Consumption:	7 mA	6 mA	6 mA	6 mA	5 mA	
Charge Profile:	CC/CV				CC/CV or Multi-Stage	
CV Voltage:	14.2 V	25.0 V	28.4 V	41.7 V	56.8 V	Custom Voltage
Battery Temperature Compensation:	Disabled					

(6) This specification does not apply to the GVB-8-PCB. The specifications for the GVB-8-PCB are as follows: Weight: 3.8 oz (108 g); Dimensions: 4.8" x 2.2" x 1.1" (12 cm x 5.5 cm x 2.7 cm); Environmental Protection: IP00.

(7) 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.