



# GENASUN

## AR-2 Manual

Alternator Regulator

**For models:** .....

**AR-2:** Alternator Regulator

Genasun's AR-2 Alternator Regulator has been designed specifically for charging lithium batteries. Dedicated differential battery voltage sense lines ensure fast and accurate charging. A lithium-specific charge algorithm and highly accurate charge setpoints ensure long battery life.

<http://genasun.com> .....

GENASUN INC.  
1035 CAMBRIDGE ST. • SUITE 16B  
CAMBRIDGE, MA 02141 • USA

GENASUN AR-2(ALL MODELS) MANUAL, REVISION 1.0 | 10.2012

IMPORTANT SAFETY INSTRUCTIONS | SAVE THESE INSTRUCTIONS

# Safety Instructions:

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This manual contains important instructions for the AR-2 Alternator Regulator that shall be followed during installation and maintenance.

Carefully follow these instructions.

## **CAUTION FOR LEAD-ACID BATTERIES:**

**NO TEMPERATURE COMPENSATION. RISK OF FIRE.** 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.

**LITHIUM WARNING:** Take caution when working with lithium systems. 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 charge source 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 systems.

## 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:

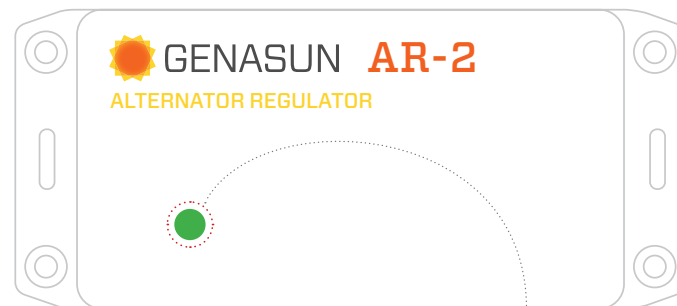
Lithium batteries are sensitive to overvoltage, so in addition to the normal regulator connections, Genasun's alternator regulator has been provided with dedicated positive and negative battery sense lines. These sense wires not only ensure accurate charging, but also faster charging, because they allow the regulator to compensate for voltage drops along the alternator cables. Below is an overview of each of the six connections needed to operate the alternator regulator.

## 1 MOUNTING

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

- Mount near alternator
- The AR-2 can be mounted in any orientation
- Do not expose to water
- Do not mount in direct sunlight or near a source of heat.
- For outdoor use, the controller must be housed in an enclosure providing protection at least equivalent to NEMA Type 3.

**Note:** Make sure to inspect the controller at least once per year to ensure proper performance. Please see the Inspection & Maintenance section in this guide.



The AR-2 has a **MULTICOLOR** LED. Learn about this indicator on the following page.

- Connections should be made according to Article 690 of the National Electrical Code (NFPA 70) or the standards in force at the installation location.

## 2 UNPLUG THE TERMINAL BLOCK

Making connections with the pluggable terminal block removed from the regulator helps avoid short-circuits and other damage.

## 3 CONNECTING THE BATTERY

+BATT and -BATT battery voltage sense lines, should be connected very close to batteries for best charging.

## 4 CONNECTING THE ALTERNATOR

+ALTERNATOR and -ALTERNATOR lines supply current to the alternator field. Connect near alternator output.

## 5 CONNECTING THE FIELD

FIELD: FIELD OUTPUT; other end of alternator field should be grounded.

## 6 CONNECTING THE POWER (IGN)

IGNITION (SWITCHED) Internal power supply / enable for regulator.

## 7 PLUG IN THE TERMINAL BLOCK

# Status Indication:

The AR-2 has a **MULTICOLOR** LED. The regulator has three stages of operation, each of which are indicated by green blinks of the indicator LED.



## LED RUN/CHARGE INDICATION

**Startup Delay:** Once powered on, the alternator regulator waits for approximately one minute before beginning to charge, in order to allow the engine to warm up.

**QUICK GREEN BLINKS** 

**Bulk Charge:** The alternator is run at full power to quickly charge the batteries.

**SLOW GREEN BLINKS** 

**CV / Float Charge:** The regulator adjusts the power output from the alternator as necessary to keep the batteries at their specified CV/Float voltage.

**SOLID GREEN LED** 



## LED ERROR INDICATION

Repeating red blinks of the LED indicate that the regulator has shut down. The number of blinks indicate the error condition as follows:

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

**SETS OF 2 RED BLINKS.** 

**Wiring Error:** The Field is connected with positive common, or +/-Batt are connected incorrectly.

**SETS OF 3 RED BLINKS.** 

**Battery voltage too high:**

**SETS OF 5 RED BLINKS.** 

**IGN voltage too low:** The regulator requires at least 9V on the IGN line to begin charging.

**SETS OF 6 RED BLINKS.** 

**IGN voltage too high:**

**SETS OF 7 RED BLINKS.** 

## Troubleshooting

If the LED indicator blinks green, but no voltage is present on the field output, the internal fuse may be blown. Check the fuse inside the regulator by removing the four screws on the bottom of the enclosure. If the fuse is blown, replace it with a 10A fast-acting ATO or ATC fuse rated for the maximum battery voltage. Automotive-style fuses are typically rated to 32V, and are suitable for systems with a CV / float voltage of 31V or less. For systems with a CV / float voltage higher than 31V, a fuse with a higher voltage rating is required. We recommend Littelfuse part number 142.6185.5102, rated to 58V.

The most common causes of blown fuses are:

- Connecting the regulator to the battery backwards
- Shorting the Field output while the regulator is charging

# Specifications:

## AR-2

Charge Profile:	CC/CV
CV / Float Voltage(model dependent)*:	14.2V 28.4V 56.8V
Operating System Voltage (Alt+ to Alt-):	0-58V
IGN Voltage (IGN to Alt-):	9-60V
IGN Operating Current:	<30mA Typical
Maximum Field Current:	8A
CV / Float Voltage Accuracy:	<1% Typical
Internal Fuse:	10A, 58V Blade Style
Marine Grade:	Yes
Connection:	6-position terminal block for 12-30AWG wire
Weight:	4.5oz., 130g
Dimensions:	5.5x2.5x1.2", 14x6.5x3.1cm
Warranty:	5 Years

\*Other voltages by special order.