

Specifications

Features

- 5 year warranty
- Unique - Night time shutdown
- Extreme design -40° to $+50^{\circ}\text{C}$ (-40° to $+120^{\circ}\text{F}$)
- Fully encapsulated in epoxy potting
- Manufactured with solar power
- Designed and built in North America

Model AR-S3

Electrical Specifications

Voltage configuration 24 volts (2 x 12V batteries)

Max. PV open circuit voltage 25V

Max. Charging current at 50°C ($+120^{\circ}\text{F}$) 3 amps DC

Consumption 0.2 mA at night, 0.6 mA daytime standby, 2.5 mA when charging

Typical set points: Bulk: **13.7 Volts, Float: 13.4 Volts,**

temperature compensated per battery for bulk

27.4 V, and float 26.8 V at 20°C (68°F)

temperature compensated.

General Specifications

Temperature range: -40° to $+50^{\circ}\text{C}$ / -40° to $+122^{\circ}\text{F}$

Case: Solid aluminium case, completely sealed in epoxy

Weight: 330 grams (approx. 11.6 oz)

Size: 5.8 x 9.5 x 3.5 cm (2.3 x 3.75 x 1.4 in.)

Wire: 18 gauge leads, solar 10 in., battery 32 in.

Features & Options

Custom voltage setpoints

Custom wire lead lengths

Full 5-Year Warranty

Warranted in entirety, except abuse, within a period of 5 years following the date of purchase. In the event a defect develops during the warranty period, return the unit to eco energy, postage paid. Eco energy will repair or replace the product with a new or reconditioned unit of equivalent quality.

Eco Energy

Since 1992, Eco Energy has been in the business of designing and manufacturing solar charge controllers, battery chargers, voltage switches, and solar lighting controls.

Eco Energy controls are currently used in power systems for remote homes and cottages, recreational vehicles, boats, telecommunication and navigational systems, natural gas pipeline operations and other solar battery charging applications around the world.

Eco Energy has a 6.5 KW array which is used to manufacture our controls.

Installation Guide

AR-S3 3 Amp PWM Advanced Solar Controller

**For charging two 12V
batteries in series using a
single 12V solar module**



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Advanced Control Solutions

AR-S3

The control also prevents power loss back into the solar modules at night, so an external blocking diode is not required.

Unique no battery drain - Battery standby power consumption is zero! In the dark they use absolutely zero power, ideal for PV systems where efficiency is important. Boaters can leave it connected all winter without draining the batteries. Some other controls which have a standby current draw will drain the battery over the winter with no solar input, reducing the freeze protection of the battery.

Efficient Design – our latest innovation; automatic nighttime shutdown with an intelligent design results in the controller using < 1/10th the power of the industry average. Other controls stay on all night, wasting precious power. Save up to 10% more power from a 5 Watt module.

Installation

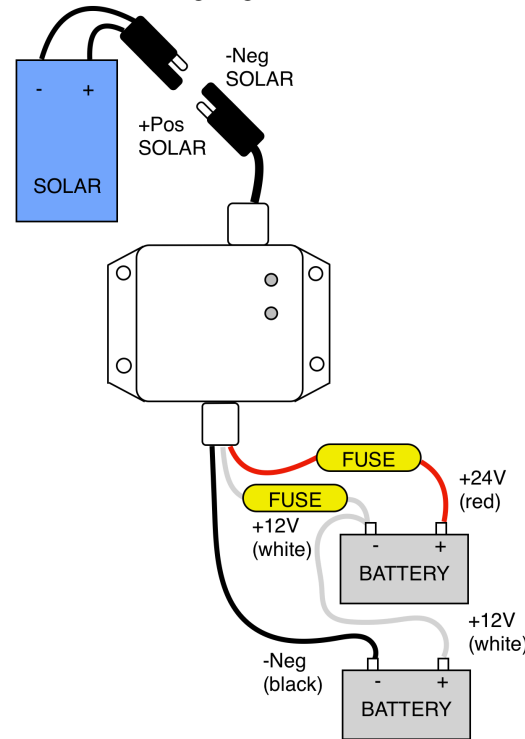
Location

The controller needs to be in a cool location in order to function properly. It should not be in direct sunlight, or mounted in a hot location such as the back of a solar module. The controller should be installed near the batteries, to ensure an accurate battery voltage measurement. The distance from the solar panels to the controller should not exceed 60 feet.

Wiring

#Min. #18 AWG wire should be used. Min. 10 Amp fuses should be used.

Wiring Diagram



Operation

The controller uses a single 12V module to charge two 12V batteries in series for 24V systems. This keeps the batteries charged and equalized to the same voltage when the system is in standby. The 12V battery charges first for one hour, then switches to the battery with the 24V terminal for the second hour. The control will switch batteries every hour so that both batteries charge equally.

However, if one battery is lower than the other the control will remain on the lower battery for 2 hours. (this only occurs if one battery is in float mode and the other battery has not yet reached float mode).

The control requires two 12V batteries to operate normally. The control may not operate properly if only one battery is installed. (a future software update may allow single battery operation).

If a battery voltage is lower than approximately 9 volts the control will assume a short circuit and will turn off charging.

Operation

Operation

The controller protects batteries from overcharging. It allows solar power to charge the batteries until the batteries rise to the full voltage set point. It then maintains the battery voltage at this setpoint. When full charge is achieved the charging light will go out completely.

Charging Flashes

Three Flashes - Charging below charging setpoint
Two Flashes - Charging at charging setpoint
One Flash - In float charging mode
No Flash - Charging on hold

The control will switch to float mode after the battery has been at the charging setpoint for a minimum of 10 minutes and a maximum of 4 hours. The amount of time the battery takes to reach the charging setpoint determines the amount of time that is required before switching to float mode. The control will stay in float mode for a minimum of 5 minutes. If the battery voltage drops below the float setpoint a new charging cycle will begin.

At night the control shuts down to save power.

Fault Conditions

The charging light is off to indicate a fault during solar short circuit, solar or reversed battery, over-temperature and battery short circuit conditions. Remove solar power to reset the control.

No damage will occur if the battery is removed, or if the control is directly connected to the solar module without a battery.

Testing

To test the operation of the control measure the current from the solar module or to the battery. Do not measure the output voltage without the control connected to a battery as the control shuts off if the battery voltage is too low for safety in the event of a short circuit.