Charge controllers for solar panels

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Authors Note: This has been updated on Feb 23, 2022 with updated information, links, and resources.

Solar charge controllers are a critical component in every solar installation. They protect your battery storage components, and they ensure everything runs efficiently and safely throughout the lifespan of your system.

The charge controller in your solar installation sits between the energy source (solar panels) and storage (batteries). Charge controllers prevent your batteries from being overcharged by limiting the amount and rate of charge to your batteries. They also prevent battery drainage by shutting down the system if stored power falls below 50 percent capacity and charge the batteries at the correct voltage level. This helps preserve the life and health of the batteries.

Regarding "what does a solar charge controller do", most charge controllers has a charge current passing through a semiconductor which acts like a valve a to control the current arge controllers also prevent your batteries from being overcharged by reducing the flow of energy to the battery once it reaches a specific voltage. Overcharging batteries can be particularly damaging to the battery itself so charge controllers are especially crucial.

Charge controllers also offer some other important functions, including overload protection, low voltage disconnects, and blockage of reverse currents.

Typically, yes. You don"t need a charge controller with small 1 to 5 watt panels that you might use to charge a mobile device or to power a single light. If a panel puts out 2 watts or less for each 50 battery amp-hours, you probably don"t need a charge controller. Anything beyond that, and you do.

Solar charge controllers play an integral role in solar power systems, making them safe and effective. You can"t simply connect your solar panels to a battery directly and expect it to work. Solar panels output more than their nominal voltage. For example, a 12v solar panel might put out up to 19 volts.

While a 12v battery can take up to 14 or 15 volts when charging, 19 volts is simply too much and could lead to damage from overcharging. Solar charge controllers aren"t an optional component that delivers increased efficiency. They"re an absolute necessity that makes solar power battery charging possible.

What will affect my decision-making when selecting a charge controller?

The following factors should be considered when buying a charge controller:

These factors all interact in complex ways that can be challenging to implement effectively. However, there is

a clear process for determining which charge controller is right for your application.

There are two main types of charge controllers to consider: the cheaper, but less efficient Pulse Width Modulation (PWM) charge controllers and the highly efficient Maximum Power Point Tracking (MPPT) charge controllers. Both technologies are used widely, protect the battery, and typically have a lifespan of around 15 years, although that may vary from product to product.

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