

AIRGEAR

How to Connect and Use the **Portable Solar Panel Kit**



ATTENTION

**If your Airstream trailer was built before 2017,
it may not have a Solar Charge Port.**

In this case, you'll need a "7-way Adapter", which connects the charge controller in this system to the 7-way cord on your trailer. If you did not purchase the GoPower "7-way Adapter" when you bought this kit, you'll need to purchase one before you can set up the kit. This product is available from various sources such as etrailer.com. (AIR GEAR does not sell the adapter separately.)



AIRGEAR

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SEE OUR SETUP VIDEO

Scan this QR code with your phone to watch our setup video, or visit <https://tinyurl.com/AirGearSetup>

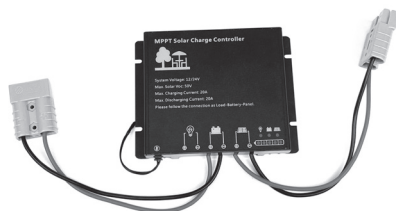


SYSTEM SET UP GUIDE

REMOVE ALL THE PARTS IN THE KIT

These include:

- **Folding solar panels** with collapsible legs
- **Solar charge controller**, compatible with all types of batteries
- **Charge port adapter** for connecting to the Solar Charge Port on Airstream trailers model year 2017 and later
- **25-foot extension cable** that provides greater flexibility for moving the panels into a sunny area



SET UP AND ORIENT THE SOLAR PANEL

1. *Unfold the solar panel* and set it up on its three legs.
2. *Orient the panels* so they are fully in the sun.

CONNECT THE SYSTEM TO YOUR AIRSTREAM

IMPORTANT: Always connect to the battery first, then the solar panels, as described below. If you don't, the system may not work properly.

1. Connect the Adapter cable



If your trailer was manufactured in 2017 or later:

Connect the Charge Port Adapter to the Solar Charge Port on your Airstream's front A-frame, next to the battery box. Pull off the rubber cap on the port and plug in the cable.



You may see a label that says, "Connect only ZAMP panels," but you can safely ignore it. This solar panel kit is completely compatible with all Airstream trailers that have a Solar Charge Port.

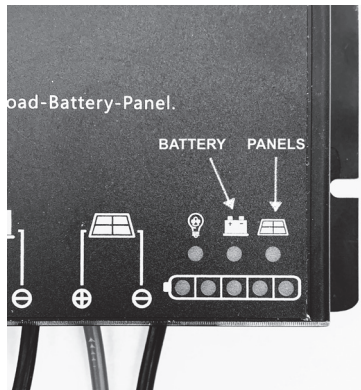
If your trailer was manufactured prior to 2017 or lacks a Solar Charge Port:

Connect a 7-way Adapter, sold separately, into the trailer's 7-way cable.

2. Locate the gray plug that is wired to the picture of a battery (indicated by an arrow in the photo) on the black charge controller box. Connect this to the end of the Charge Port Adapter (or to the 7-way Adapter if you're using that).



On the charge controller, you should see the middle indicator light turn green. This means the battery is connected. Steady green is normal. If it's flashing, see the TROUBLESHOOTING table on page 6.



The series of five green lights below that indicate the approximate voltage being produced by the battery.

3. Connect the other plug from the black Charge Controller box to one end of the 25-foot extension cable.
4. Connect the other end of the extension cable to the connector coming from the back of the solar panels.

You should see the rightmost indicator light on the controller box (see arrow in photo) turn blue. This means that the solar panels are providing power to your Airstream batteries. If the light is off or blinking, see the TROUBLESHOOTING table on page 6.

THAT'S IT! YOUR PORTABLE SOLAR PANELS ARE CONNECTED

Leave the system connected as long as you like. Charging automatically stops when the batteries are full, or when the sunlight gets dim. Charge time is dependent on many factors, such as clouds, sun angle (time of year), temperature, and the size and type of batteries installed in your Airstream.

DISCONNECTING THE PANELS

When you're done charging, be sure to disconnect the panels first, then unplug the Charge Port Adapter (or 7-way Adapter) from the Airstream. (This is the reverse of the way you set it up.)

MONITORING YOUR PANELS WITH THE PHONE APP

You can connect to the charge controller through a free phone app. Search your app store for "ETA Solar". This app will show you how much charge is going into your batteries at any moment.

The charge controller comes pre-programmed with settings that are suitable for commonly-used lead-acid and lithium batteries. If you require different values, the app offers the option of re-programming charge parameters to suit your particular battery.

IMPORTANT: Changing settings is for advanced users only! We do not provide technical support for the app. We recommend following the charge parameters indicated by the manufacturer of the batteries you have installed. AIR GEAR accepts no liability for damage, injury, or consequential damages resulting from your use of the ETA Solar app.

CARE AND MAINTENANCE

Minimize panel damage and optimize power generation by following these guidelines:

DO keep the panels folded in their carrying case when not in use, to protect against scratches.

DO keep your panels clean. Even a thin layer of dust can impact power generation. Optimize power generation by wiping the panels periodically with a soft cloth, dampened with water only.

DON'T place the panels where they might be run over by a truck or bicycle.

DON'T pack them with heavy objects on top, or lean things against them.

Both of the preceding actions could break internal connections and cause the panels to fail, which isn't covered by warranty.

DON'T leave the panels, charge controller, or cable connectors in standing water. They're weatherproof, so they won't be affected by light rain or snow, but they're not waterproof. **DON'T** let the charge controller sit where contact with water might cause a short circuit in the electrical connections.

DON'T set up the system by laying the panels directly onto hot asphalt or concrete. The system performs better when the panels are not terribly hot.

TROUBLESHOOTING

INDICATOR COLOR STATUS MEANING

LED	STATUS	MEANING
Solar panel (rightmost, blue light)	ON	Panels are connected and charging
	OFF	Not charging (no sunshine) or solar panels are not connected.
	Fast Blink	Connected to Bluetooth (phone app)
	Slow Blink	Error. Solar panels over normal voltage, reversed wiring, short circuit, etc. The battery connection must be made first, each time you use the kit. Use only the panels supplied with this kit.
Battery (middle light, green)	ON	Battery is connected
	Fast Blink	Error. Batteries are too low or overcharged. Have the batteries checked.
	Slow Blink	Battery or charge controller overheating.
Light bulb (leftmost, blue light)	ON or OFF	(Can be disregarded, no meaning in this situation)
	Flashing	Error. Over current or short circuit. Disconnect from panels and battery, and make sure the connections are dry.

Tips for Using Solar Power

UNDERSTANDING SOLAR POWER BASICS

Your Airstream has two electrical systems:

120-volt AC power	Provided by power from a campground hookup, AC power drives the power to the outlets in your Airstream. 120-volt AC power is just like your household power.
12-volt DC power	Provided by the Airstream batteries, 12-volt DC power drives the power to most appliances in your Airstream: lights, water pump, furnace, inverter, 12-volt outlets, fans, refrigerator (when running in gas or 12v mode), propane leak detector, stereo/DVD player, USB outlets, breakaway switch, etc.

Solar panels don't power your Airstream directly. They charge the 12-volt batteries, which in turn power the appliances and other features in your Airstream.

Using your solar panels daily will extend your camping time by adding power to the batteries whenever there's sunshine.

OPTIMIZING THE CHARGE

A big advantage of Portable Solar Panels is that you can move and tilt them to get the best exposure to the sun.

The angle of the panels is not that critical. Most of the time you can leave them set at about 45 degrees, or lay them flat on the ground. Just be sure they are pointed in the direction of the sun if the sun is not directly overhead, and that nothing is casting shade on the panels. As the day goes on, you can move the panels once or twice to re-point them at the sun.

Moving the panels is more important in the winter because the sun is lower to the horizon and there are fewer hours of daylight. In the summer, when the sun is high, you can just lay the panels on the ground facing up and they'll do pretty well all day without being moved.

Solar panels perform better when they are not terribly hot, so if you lay them flat on the ground, avoid putting them on hot asphalt or concrete surfaces.

Each morning your batteries will probably be at their lowest level, so make sure the portable solar panels are oriented toward the morning sun as early as possible. You can do this at sunset the day before.

Batteries accept a charge fastest when they are low. The rate at which they will charge declines as they get fuller, so getting the last 10% of the battery full might take hours. For this reason, don't worry if the battery doesn't recharge to "full" each day. The goal is to keep the batteries full enough that you can keep camping. Getting to 90% of full charge is a win.

GETTING THE MOST OUT OF YOUR BATTERIES

There are two types of batteries commonly used by Airstream: Lead-acid, which includes "AGM" batteries, and Lithium Iron Phosphate (or LiFePO4) which are commonly just called "lithium batteries". Discharging **lead-acid** Airstream batteries more than 50% will shorten their overall lifespan. (This is not a problem for lithium batteries.) It's a good practice to check the batteries every day when you are camping without an electrical hookup, to ensure they are not over-discharged.

A *voltmeter* measures how much voltage the batteries can put out, and is installed in all late model Airstreams. It's part of the "SeeLevel II Monitor Panel" that also shows the holding tank levels. You can use the voltmeter to estimate the amount of battery charge left for lead-acid batteries using the chart below, but not for lithium batteries.

To get the most accurate reading of battery voltage, press the BATT button on the SeeLevel panel in the early morning before you've started to use lights, fans, inverter or other electrical devices, and before you've connected the solar panels.

This chart shows the approximate state of charge ("fullness") of the batteries based on your morning voltage reading.

State of Charge	Sealed or Flooded Lead Acid Battery Voltage	AGM Battery Voltage
100%	12.70+	12.80+
75%	12.40	12.60
50%	12.20	12.30

REMEMBER: To prolong their life, don't let lead-acid batteries go below 50%. While camping, charge the battery every day that the trailer isn't plugged into shore power.

If you want an accurate view of the batteries' start of charge, consider adding an amp-hour monitor as described later. If you have lithium batteries, this is essential equipment to know the batteries' level of charge.

TIPS FOR CONSERVING POWER

When you're camped without an electrical hookup, it's important to conserve battery power in every way you can. At the very least, be mindful of how much you use these big power consumers:

- Furnace
- Water pump
- Inverter
- Incandescent lights (only in older Airstreams)

1. Set the furnace between 55-65 degrees at night.

The biggest power hog in your Airstream is the furnace. A typical 30,000 BTU furnace will pull a whopping 7.5 amps while running. The simplest way to reduce the use of the furnace power is to turn down the furnace and throw another blanket on the bed. Many people find they can sleep comfortably with the furnace set between 55 and 65 degrees F.

2. Limit use of the water pump.

The water pump is another big power user, pulling even more amps than the furnace. Since it runs for less time, however, it tends to have less overall impact. Still, limiting water use will save some battery power. So, conserving water usage conserves power too.

3. Limit use of the inverter, and turn it off when not in use.

The convenience of the inverter that's built into late model Airstreams can also cause you to use a lot of power. Here's how that happens: When using your Airstream on batteries only, there is no power flowing to the outlets. That's because the outlets are 120-volt power and the batteries are 12-volt power. But with a flip of a switch, the inverter turns the 12-volt battery power into 120-volt outlet power, enabling you to plug in electrical devices to the outlets.

Some of the common devices you use at home draw so much power they should never be plugged in when you are using your Airstream batteries only. That includes anything that draws over 1,000 watts. Generally, that includes anything that has a motor or a heating element, such as:

- Hair dryer
- Coffee maker
- Toaster
- Vacuum cleaner

All of these things are likely to draw too much power and overload the inverter, which will automatically switch off. And if it is overloaded too many times, the inverter will eventually fail.

If you use the inverter to power a laptop, CPAP machine, or TV for hours, you're using quite a bit of power. Limit the time you run the inverter, and be sure to switch it off when not in use because the inverter itself uses some power even when nothing is plugged into it. Using a tablet (like an iPad) instead of a laptop computer will save a bit of power since tablets are far more energy-efficient.

4. Charge your laptop and other devices before your trip. Don't plug them in unless you have to recharge the battery.

This is another way to limit the use of the inverter, because the inverter must be turned on in order for the plugs that charge these devices to be charged.

Plan ahead and charge laptops, mobile devices, wireless ear phones, digital camera, and smart watches before a trip. Plug them in for a recharge only if needed.

5. Replace incandescent bulbs with LED lights.

If you haven't switched from incandescent bulbs to LED lights (in older Airstreams) you're using significantly more power than you need to be. Upgrade those standard incandescent bulbs to LED and you'll cut power usage by about 80-90%.

CHARGING STRATEGIES WITH A GENERATOR

Solar is much better for battery recharging than a generator. Rather than pumping out large amounts of power in short time periods, solar provides a steady all-day charge and has a much better chance of getting your batteries up to 100%. It's like the turtle and the hare. With batteries, slow and steady wins the race.

Generators are not very efficient at charging the batteries. They put out far more power than the batteries can accept most of the time, so generators are best used for heavy loads like running the microwave or other 120 volt AC-powered appliances (toaster, coffee maker, hair dryer, etc).

If you have both a generator and solar panels, use the generator when the batteries are heavily discharged (for an hour or so in the morning, for example) to get the bulk charge done quickly, and then let solar finish the job over the course of the day.

If you only have solar, keep in mind that during the morning and mid-day, moderately or heavily discharged batteries will probably accept every amp the panels can generate. When the batteries begin to approach full, the charging rate naturally slows down.

If the sun is still shining at that point, you will probably have surplus power, and so that's the time of day to plug in all of your rechargeable accessories like phones, cameras, laptops, etc. This strategy takes maximum advantage of the power being generated.

ADVANCED TIPS

If you're finding you run out of power even with solar, you've got three good options.

1. Add battery capacity.

Usually this is the least expensive thing you can do to extend your boondocking time. There are several ways to do this, and the best solution depends on the layout of your Airstream.

Usually, people find a spot toward the front of the trailer (such as under a couch or in an external storage compartment) to install a bigger battery bank.

2. Switch to LiFePO4 ("lithium") batteries.

This is an expensive upgrade but typically will give you 3 times as much usable power in the same space. We've written a guide called *Diary of a Lithium Battery Upgrade*, which you'll find here: <https://www.airgear.store/pages/diary-of-a-lithium-battery-upgrade-a-planning-guide-for-airstreamers>.

3. Use an amp-hour battery meter to understand where your power is going.

Install an amp-hour meter with a digital readout or phone app, like those from Victron, Bogart Engineering, or Xantrex.

If it doesn't have a "shunt" to be wired next to the battery, it's not an amp-hour meter; it's probably a cheaper voltage meter that can only offer an approximation of the battery's state of charge. You already have that, so you don't need another. Similarly, if your Airstream came with an "amp-hour" display on the control panel for the factory-installed solar panels, it's not capable of telling you the status of the batteries.

With a true amp-hour meter installed on the batteries, you can see what each light and appliance is consuming, and identify the big users so that you can avoid them or upgrade them. You'll also have the benefit of understanding exactly how much power is left in your batteries so you don't accidentally drain them too much.

FAQS

Do I need to use the phone app?

No, the panels will automatically charge your batteries whether you use the app or not.

What's the black wire coming from the charge controller?

It's a temperature sensor, which helps the controller provide the best possible charge to the batteries.

Can this kit be used with Airstream Interstate motorhomes that have factory-installed rooftop solar and solar charge port?

No, those motorhomes have built-in charge controllers. Any portable solar panels you use must match the rooftop panels, because the solar port connects to the same charge controller as the rooftop panels.

How do you know the amp-hour capacity of the batteries?

The amp-hour rating is typically printed on the battery case with a number and the letters "Ah." If not, search online for the rating, using the make and model of batteries you have. A typical Airstream trailer with two lead-acid batteries will have 60-85 amp-hours of usable capacity. Two lithium batteries usually offer 200 amp-hours of usable capacity.

**If you have any questions about using this kit,
feel free to contact us at help@airgear.store for assistance.**

HAPPY CAMPING!