



Charge Controller Guide

For Armada Portable Folding Solar Kits

FOR 2020/2021 MODELS WITH ARC-MC2420 and MC2420N10-HY CONTROLLERS

A note to our customers:

One of the most important things that we stress to customers regarding the portable folding solar kits and specifically the charge controller is that regardless of what you see, the controller is protecting your batteries. In days past, displays on controllers were extremely rare and they would just quietly do their thing without regard from the user. Nowadays, we have much more information at our fingertips which can be helpful and interesting. But this information can also be confusing and overwhelming, particularly for those that are new to solar. It is important to note that you don't need to do anything for this system to operate effectively and safely.

Understanding the controller without remote meter or the APP.

There are *3 indicator lights on the charge controller. This is a quick breakdown of the 3 lights:

The far left light is the solar indicator. The light will be steady on or flashing depending on what charge stage it is in. MPPT (bulk) charging is steady on, absorption or boost charging is a slow flash, and float charging is single flashing.

The middle indicator is for the battery. It will show green for full charge, yellow for medium charge and red for low charge.

The far right indicator is for battery type. The default is green for AGM (SLD). You can change it to whatever battery type you have following the directions in the manual. The AGM setting is safe for all battery types. It may not be optimal, so it is good to change it if you do not have AGM batteries.



*Three indicator lights on bottom right of the controller.



Understanding the controller with the AR-RM-6 remote meter.

There are 9 different pages to scroll through using the remote meter. Here is a brief explanation of each page:

Main interface: This page shows the live status, as well as the system voltage (lower left) and the battery type (lower right).

Solar Panel Voltage: This is the voltage coming into the charge controller from the solar panel.

Battery Voltage: This is the voltage reading at the battery. Be aware that this reading will show charging voltage (surface voltage), so it is often not an accurate representation of true resting battery voltage. This number should not be used to interpret “state of charge” based on voltage unless the battery has been resting for a minimum of 12 hours with no load or charge source. It is also incorrect to assume a higher number means a higher state of charge on the battery. In fact, it often means the opposite. If the batteries are low on charge and the controller is bulk charging, the voltage might read 14.4V. If the batteries are fully charged and the controller is float charging, the value might be 13.5V.

Battery Capacity: This is a percentage-based state of charge reading. Please be aware that this is a voltage-based reading and in the application that portable solar kits are most commonly used, this number will almost never be an accurate representation of true battery state of charge. If the battery is receiving charge, this number will read artificially high. If the battery is under load, this number will read artificially low. You could use this reading as an estimate if the battery has been resting and connected to the solar kit before the panel is exposed to light. In this case it may give an accurate representation of state of charge.

Charging current: This is the live charging amperage going to the battery from the charge controller. Be aware that this number will be affected by how much charge the battery needs. For example, if you have the panel out on a really sunny day and see a low value it is likely because the batteries are at or nearing full charge. The controller will reduce or eliminate the charge current to protect the batteries. This value is a great number to use to adjust the panel in the best sun possible. If you are able to monitor this value as you move the panel, the number will increase as it has better exposure so it can be a very useful tool to maximize your charge throughout the day!

Charging power: This is the live power in watts going from the panel to the charge controller. Be aware that this number will also be affected by how much charge the battery needs. As the batteries near full charge the controller will begin restricting the amount of power it is accepting from the panels, therefore reducing this number.

Charging AH: This is a cumulative total of charge delivered to the batteries for the day. For example, if you were charging at 8 amps for 5 hours, you would see a value of 40AH. Again, this total can be affected by how much power the batteries need. If your batteries are very low on charge to start a day, this number will likely be significantly higher than if you start the day with fully charged batteries even if the weather conditions seem better.

Controller temperature: The live temperature of the charge controller. The only time this may be of interest is if you get an error code E6 (controller over temperature). In this case you can use this reading to monitor the controller temperature.

Error Code: If there is an abnormality the controller will display an error code that will help direct you to the cause of the issue. Refer to the remote meter manual for the list of error codes and possible resolutions.



You can also make changes to the controller settings using the remote meter:

Battery Type: The Battery Type is pre-set to SLD (AGM). If you have Lithium, GEL or flooded batteries you should change this setting to the appropriate type. You can also do a custom battery type (USE). This will allow you to input your own custom charging voltages further in the system settings.

System Voltage: This should always be set to 12V.

If you have set your battery type to "USE" you can now adjust your charge settings in the following pages.

Understanding the controller using the AR-BT-2 receiver and APP.

With the AR-BT-2 connected to the controller download the APP using the following directions:

Search "solar app" in your app store and you should see an orange app titled "solar app" with either "lifestyle" or "srne" underneath. This is the app you want. Once downloaded, connect the Bluetooth receiver to the controller and go into "device info" on the bottom right of the app. Select "search device" and the controller info should appear. Select the device and hit confirm. You can now access all of the controllers information on your smart device!

Now that you are connected you have some pretty cool information at your fingertips. But it can also be overwhelming, particularly to new users. The next section will help you understand what you are looking at and what's important.

Monitoring:

This is a live look at what your system is doing. There are 3 sections; solar panel, battery, and load. The portable folding solar kits are not designed for direct load connection so you can ignore the load section.

The solar panel section shows what is being supplied to the controller from the solar panels in voltage, current and wattage. These values can be very helpful to position your panel in the best spot possible to maximize your battery charging! You can see the numbers change instantly as you move your panel. Be aware that the current and wattage values will be affected by how much charge the battery needs. As the batteries near full charge the controller will begin restricting the amount of power it is accepting from the panels, therefore reducing these numbers. So it can be normal to see low values even with good sun exposure.

The battery section shows voltage at the battery, current flowing from the controller to the batteries, battery capacity, temperature, and charge mode. Here is a brief explanation of what each value represents:

Battery Voltage: This is the voltage reading at the battery. Be aware that this reading will show charging voltage (surface voltage), so it is often not an accurate representation of true resting battery voltage. This number should not be used to interpret "state of charge" based on voltage unless the battery has been resting for a minimum of 12 hours with no load or charge source. A higher value does not mean greater state of charge. In fact, it often means the opposite. If the batteries are low on charge and the controller is bulk charging, the voltage might read 14.4V. If the batteries are fully charged and the controller is float charging, the value might be 13.5V.



Current: This is the live charging amperage going to the battery from the charge controller. Be aware that this number will be affected by how much charge the battery needs. For example, if you have the panel out on a really sunny day and see a low value it is likely because the batteries are at or nearing full charge. The controller will reduce or eliminate the charge current to protect the batteries.

*One thing worth noting is how this section can show users the advantage of MPPT charge controllers. When the controller is in MPPT charge mode you will see the current amps in the solar panel section panel is lower than the current amps in the battery section. For example, if the solar panel is providing 2 amps, you might see the battery charging at 2.6 amps. This is the boost that truly represents the advantage of the MPPT charge controller and why they are 25% more efficient. With a PWM controller this is not possible. The current (amps) going to the battery is never higher than the current (amps) from the solar panels.

Capacity: This is a percentage-based state of charge reading. Please be aware that this is a voltage-based reading and in the application that portable solar kits are most commonly used, this number will almost never be an accurate representation of true battery state of charge. If the battery is receiving charge, this number will read artificially high. If the battery is under load, this number will read artificially low. You could use this reading as an estimate if the battery has been resting and connected to the solar kit before the panel is exposed to light. In this case it may give an accurate representation of state of charge.

Controller temperature: The live temperature of the charge controller. The only time this may be of interest is if you get an error code E6 (controller over temperature). In this case you can use this reading to monitor the controller temperature.

Charge Mode: This will show what charge mode the charge controller is in. Bulk (MPPT), Boost (absorption), Float, or Equalize. This can be a better battery state of charge indicator than the actual capacity reading. If the controller is in Bulk (MPPT), the battery needs significant charge and is therefore lower state of charge. In Boost (absorption), the charge level has risen to about 80-95% and in float mode the battery is fully charged.

Record:

In this section you can reference historical data from previous days.

Settings:

In this section you can easily make changes to your charge controller settings. If you are prompted for a password when attempting to make changes, enter: 135790123.

The system voltage should always be 12V. The Battery Type is pre-set to SLD (AGM). If you have lithium, GEL or flooded batteries you should change the battery type to the appropriate type. You can also enter custom values by selecting "USER".

Please note that the default settings for the advanced settings are ideal for the majority of users. If you want to fine tune these numbers and you know the values that are ideal for your specific battery or situation, then by all means you can do so. **We would stress that if you are not sure, or are not comfortable with this section to just leave the factory settings as is.**



Device Info:

This is simply where you connect to the device and where you can reset the values to factory default if necessary.

Summary:

We hope that you have found all the information that you need in this guide! If you need more information, you can email us at info@armadasolar.ca and we will be happy to assist you. We thank you for supporting Canadian retailers and distributors by choosing Armada products!