

**QUICK START GUIDES** 

DRAGONFLY LITHIUM BATTERY SET-UP





# WELCOME TO SOLARFLEX™

GET STARTED BY ENSURING YOU HAVE PROPERLY INSTALLED BATTERIES.

Note: Do not operate the SolarFlex system without a battery installed. Operating SolarFlex without a battery may cause a variance in voltage that may cause damage to Photovoltaic (PV) components which is not warrantable.

# NOW SUPPLY POWER TO THE RV



- 1. The Photovoltaic (PV) Solar Panel Disconnect (IF EQUIPPED) should be turned to ON and allows panel voltage thru to the Smart Solar Charge Controller. This switch will be located near the Smart Solar Charge Controller for all SolarFlex packages.
- **2.** The 12V Battery Disconnect (IF EQUIPPED) should be turned to ON. This switch turns ON and OFF 12V battery power to the RV.





#### SF200 and SF400i

This switch is typically located on the Giggy Box\* (12 Volt Distribution Box)

# \*SF200 Skip to page 4 to download the Victron Connect App



**INSIDE** 



**OUTSIDE** 

# SF600i-L and SF1200i-L

This switch will be located on the black cover plate of the SolarFlex system or on an interior wall at the entry door.

**NOTE:** YOUR 12 VOLT BATTERY DISCONNECT (IF EQUIPPED) CAN BE TURNED OFF ANYTIME YOU WISH TO SHUT OFF ALL 12V POWER INSIDE OF COACH.

**3.** The **Inverter Disconnect** (IF EQUIPPED) should be turned ON. This switch turns ON and OFF 12V power from the Batteries to the Inverter.



SF200 is not equipped from the factory.\*

\*If unit is equipped with a residential refrigerator it will have an inverter and disconnect located in a storage compartment.

**SF400i Travel Trailer** – This switch is located on the Battery Monitor Inverter Disconnect Box (BMI) box on the A-Frame outside front of unit.



# SF400i Fifth Wheel

This switch is located inside the front bulkhead compartment.



# SF600i-L and SF1200i-L

This switch is located on or near the SolarFlex cover plate.

**NOTE:** THE INVERTER DISCONNECT SHOULD ONLY BE TURNED OFF WHEN PLACING THE COACH INTO STORAGE OR SERVICING THE INVERTED CIRCUIT OUTLETS.

- 4. The Inverter (IF EQUIPPED) should be turned ON.
  - » SF200 Not equipped from the factory.\*
    \*If unit is equipped with a residential refrigerator it will have an inverter and disconnect located in a storage compartment.
  - » SF400i Typically located in the front pass-thru compartment on the driver side.
  - » If equipped with the Magnum Inverter turn on w/the remote. (see (A))
  - » If equipped with the Xantrex Inverter push the Power button on the display. (see 13)







# SF600i-L Travel Trailer

The Victron MultiPlus Inverter will be located in the front pass-thru compartment.

#### SF600i-L Fifth Wheels

The Victron MultiPlus inverter will be in the front Bulkhead Compartment.



USER MANUAL

# SF1200i-L

The Magnum Hybrid Inverter is located in the front bulkhead compartment. Go inside the RV, locate the Magnum Energy Remote Control (MERC) and turn the power ON at the Charger and the Inverter.





USER MANUAL



# TO CONNECT - VICTRON PRODUCTS: SF200 - SF400i - SF600i-L - SF1200i-L

START BY DOWNLOADING THE VICTRONCONNECT APP AND FOLLOW THE STEPS BELOW.







APP STORE

GOOGLE PLAT

**USER MANUA** 

- 1. Enable Bluetooth on your phone.
- 2. Open VictronConnect and your Victron products will appear. Tap on the Smart Solar Charge Controller. (SF200 has 1 Smart Solar Charge Controller, SF400i and SF600i-L have 1 Smart Solar Charge Controller and 1 Smart Shunt, SF1200i-L has 2 Smart Solar Charge Controllers and 1 Smart Shunt)
- **3.** The first time you connect, the app will ask to pair with a Victron product. Enter your PIN code or enter the default PIN code: 000000.
- **4.** If prompted to update, install the update. This is normal and updates to the app or firmware should always be done.
- **5.** Once paired to your Maximum Power Point Tracking (MPPT) Smart Solar Charge Controller or Smart Shunt, you will be taken to the home screen.

The settings page is accessed by clicking on the ( ) icon in the top right. This page provides access to view or change the Smart Solar Charge Controller settings and other features.

If your unit was built with SF600i-L or SF1200-i-L it was programmed at the factory.

Scan the appropriate QR code for a detailed Basic User Guide.

You can also find these Guides at www.keystonerv.com,
Owner's page or SolarFlex page or download the My Keystone App.
The rest of this Quick Start Guide will cover programming for SF200 and SF400i.



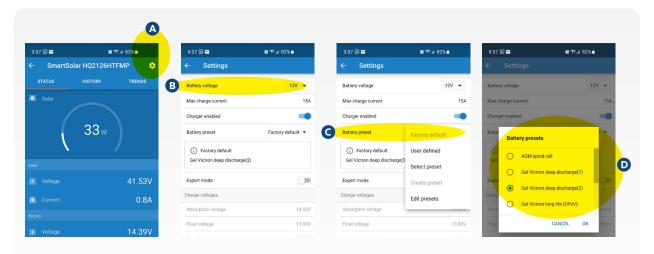
SF600i-L



SF1200i-L

# SF200 AND SF400I - PROGRAM THE SMART SOLAR CHARGE CONTROLLER WITH DEALER INSTALLED BATTERIES

- 1. At the home screen tap on settings **and** then battery.
- 2. Select Battery voltage Be sure the voltage is set to 12V, if it is set to 24V it will need to be changed by clicking the down arrow next to 24V and select 12V.
- 3. Select the down arrow to the right of Battery preset, Select preset and set the appropriate battery setting. For Lead Acid select Gel Victron Deep Discharge 2. For Lithium select Lithium Iron Phosphate (LiFePo4).



**NOTE:** (Gel Victron Deep Discharge 2) battery type is the default setting and preferred for Lead Acid Batteries. Please refer to the Smart Solar Charge Controller Manual to learn more.

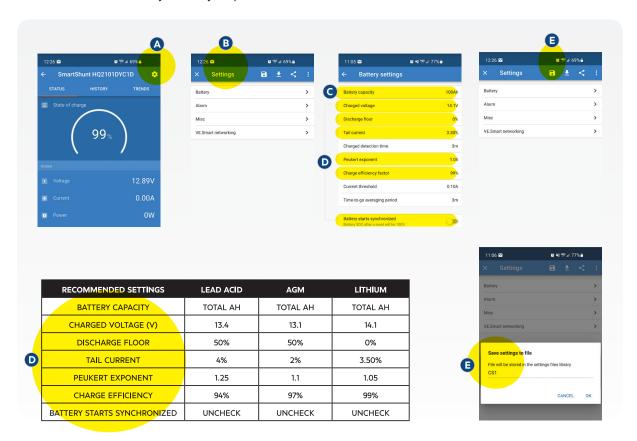


# SF400I SMART SHUNT BATTERY MONITORING WITH DEALER INSTALLED BATTERIES:

# FOLLOW THE STEPS BELOW TO ENSURE THAT YOUR SMART SHUNT IS SET UP PROPERLY:

**NOTE:** SF600i-L and SF1200i-L come pre-programmed from the factory. See page 4 for the Basic User Guide.

- 1. Open your VictronConnect App. On your device list, click on the smart shunt.
- **2.** If prompted to update, install the update. This is normal and updates to the app or firmware should always be done.
- **3.** Once paired to your Smart Shunt, you will be taken to the home screen. The settings page is accessed by clicking on the top icon in the top right. The settings page provides access to view or change the settings of the Battery Monitor.
- **4.** Click on settings icon in top right corner.
- 5. Select Battery. <sup>3</sup>
- **6.** Add up total Amp hours (Ah) for the batteries installed and insert value into Battery Capacity Total Ah column. To convert RC (Reserve Capacity) to Ah: divide the total RC by 2.4 (Ah=RC/2.4).
- 7. Use the following chart by inputting each variable for the type of batteries installed on your unit.
- **8.** After confirming or changing the values click the save disk icon on the main settings page and save under "CS1" or any name you prefer. YOU'RE ALL SET!

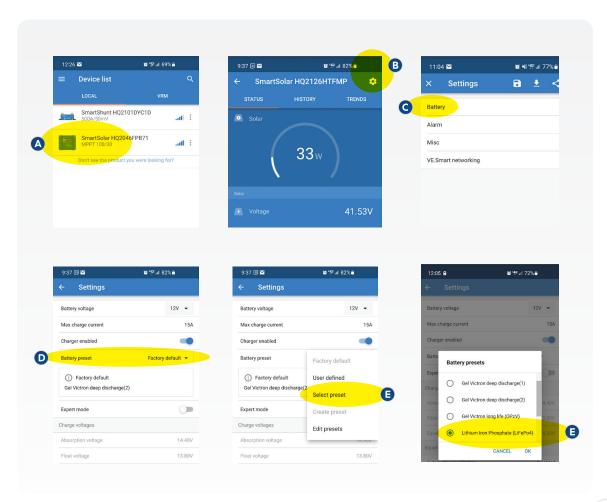


# SF200 AND SF400I WITH FACTORY INSTALLED DRAGONFLY LITHIUM-ION BATTERY OPTION

# PROGRAMMING YOUR SMART SOLAR CHARGE CONTROLLER

# MAKE SURE YOUR SYSTEM IS LITHIUM READY:

- 1. Open your VictronConnect App.
- 2. On your device list, tap on your Smart Solar Charge Controller. A
- **3.** If prompted to update, install the update. This is normal and updates to the app or firmware should always be done.
- **4.** Tap on settings icon in top right corner. **☼** <sup>1</sup>
- 5. Tap on the battery tab.
- **6.** Tap the arrow to the right of Battery Preset, tap Select preset and make sure it's set to Lithium Iron Phosphate (LiFePo4). Tap ok and you're set.

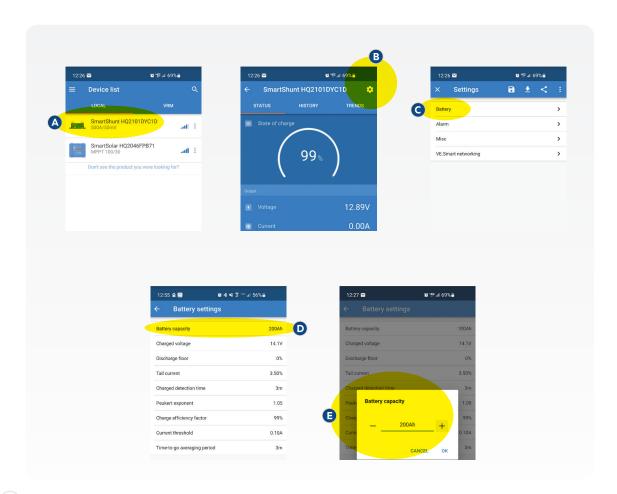


# SF400I WITH FACTORY INSTALLED DRAGONFLY LITHIUM-ION BATTERY OPTION

# PROGRAMMING YOUR SMARTSHUNT

FOLLOW THE STEPS BELOW TO ENSURE THAT YOUR SMART SHUNT IS SET UP PROPERLY:

- 1. Open your VictronConnect App.
- 2. On your device list, tap on SmartShunt.
- **3.** If prompted to update, install the update. This is normal and updates to the app or firmware should always be done.
- 5. Tap on the battery tab.
- **6.** If your RV came with 1-100Ah battery the battery capacity should be set to 100. If your RV came with 2-100Ah batteries the battery capacity should be set to 200 Ah. If this setting is correct proceed to Step 8.
- **8.** See page 6 steps 4 thru 7 to confirm or change and save the recommended battery settings.



# BATTERY HEAT FOR OPTIONAL FACTORY INSTALLED DRAGONFLY LITHIUM BATTERIES.

# 1. WHEN TO TURN THE HEAT ON AND WHY:

The batteries will not accept a charge below an internal temperature of 25°F, so the heat should be activated when you plan to charge the batteries in a cold environment.

# BATTERY

\*Heat is enabled when light on switch is on.

#### 2. HEATING PARAMETERS:

If the heat circuit is activated, it will maintain an internal temperature between 35°F and 45°F. The heat circuit will trigger on at 35°F and heat up to 45°F before it shuts off.

# **3.** WHEN TO TURN THE HEAT OFF TO CONSERVE ENERGY OR WHEN IT IS NOT NEEDED:

Disable the heat circuit for times when you will not be charging the batteries, or for storage. If you are not going to actively charge the batteries, there is no need for the batteries to heat themselves.

# 4. DISCONNECTING HEATED BATTERIES IN WINTER

During cold weather months when the RV is not in use, it's best to disconnect the batteries from all energy sources to prevent the battery from continuing to heat itself. Use the charts as a guide for turning on and off your disconnect switches.

Application	Battery Heat Switch		Battery Disconnect	Solar Disconnect	Inverter Disconnect
	Daytime	Night	Switch	Switch	(if equipped)
Using Power	OFF	OFF	ON	ON	ОИ
In Storage	OFF	OFF	OFF	OFF	OFF

Application	Battery Heat Switch		Battery Disconnect	Solar Disconnect	Inverter Disconnect
	Daytime	Night	Switch	Switch	(if equipped)
Using Power	ON	ON	ON	ON	ON
In Storage	OFF	OFF	OFF	OFF	OFF

# DRAGONFLY BATTERY ADVANTAGES

# FACTORY-INSTALLED LITHIUM-ION BATTERIES

- » 10-Year Warranty. Peace of mind for your investment.
- » **Heated Batteries.** Ability to charge in low temperature environments when inexpensive alternatives will not.
- » 100% Depth of Discharge. Greater performance by getting the full use of stored energy.
- » Lightweight. Only 29 lb per battery as compared to 70 lbs for comparably sized Lead Acid battery.
- » **Internal Battery Management System.** Never worry about damage to battery due to faulty charging or discharge.
- » Enhances Keystone's Exclusive SolarFlex Experience. Take full advantage of the solar capabilities of your Keystone RV.
- » End of Life/Warranty Recycling Program. Dragonfly batteries can be returned to Dragonfly to be recycled at the end of their life and in warranty situations.
- » Quality-assured Performance. Fully tested and UL listed, approved for use by RVIA.

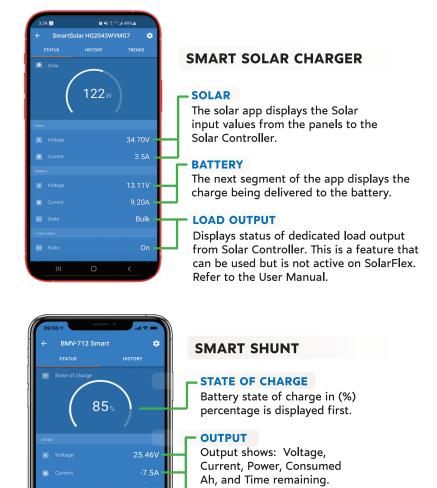


# **COMMON USES**

SOLAR PANELS CONVERT THE ENERGY FROM SUNLIGHT INTO DC POWER, WHICH IS SENT TO THE SMART SOLAR CHARGE CONTROLLER WHERE IT IS REGULATED TO CHARGE A BANK OF BATTERIES.

**SF200** - A common use is to maintain and refill the battery to operate onboard 12 volt systems. **SF400i** - The inverter draws 12 volt power from the battery bank, converts it to 120 volts and supplies power to the inverted labeled outlets.

Performance will vary based on available sunlight, battery size/type, and power usage.



For Expansion Possibilities, Troubleshooting and Frequently Asked Questions (FAQ's) please visit our SolarFlex page at **www.keystonerv.com** 

N/A

This is a feature that can be used on motorized units but is not active on this system.

# FREQUENTLY ASKED QUESTIONS

# **SOLAR POWER BASICS**

#### WHAT IS SOLAR POWER?

The term "solar power" or "solar energy" is referring to the process of using photovoltaic cells to convert energy from the sun into electric power.

# WHAT IS NEEDED FOR SOLAR POWER?

This requires a minimum of a solar panel, solar controller, batteries as well as properly sized wires/cables and circuit protection (fusing).

#### WHY DO I NEED SOLAR POWER?

Solar power is used to replenish (or charge) batteries without using the shore cord/converter or another AC power source such as a generator.

# DOES SOLAR POWER WORK AT NIGHT?

While electricity from your battery can be used at night, no, a solar power system does not produce more electricity when it's dark.

# CAN I EXPAND MY SOLAR POWER CAPABILITY?

All SolarFlex systems were designed to be expandable (providing you have open roof space). We recommend using a solar power calculator (Google it) to determine how much energy you will typically use/need for your type/style of camping. Once that is determined, your Keystone dealer can outline the different expansion options available. More information is also available at KeystoneRV.com under SolarFlex.

# HOW DO I ADD SOLAR POWER TO MY RV?

Starting with the 2022 model year, all Keystone Travel Trailers and Fifth wheels come standard with a 200 SF SolarFlex package which includes a 200 Watt Solar panel, 15 Amp MPPT Smart Solar Controller, 30 Amp Solar Roof Ports, and pre-wired to add an inverter. Depending on the brand and model, SF 400i, SF 600i-L, and a SF 1200i-L (Montana only) could be optioned. Regardless of the SolarFlex package that is on your Keystone RV when built, we designed SolarFlex to be customized and expanded by your Keystone dealer to fit a wide variety of camping needs. For more information, visit SolarFlex at KeystoneRV.com or contact your local Keystone dealer to get started.

# DO I NEED TO DO ANYTHING TO MY CAMPER BEFORE PLUGGING INTO THE CAMPSITE WITH SOLAR POWER?

No, solar power charging is completely independent of the shoreline cord/converter. The solar charge controller reads the level of the battery, then only allows through the charge actually needed by the battery so you never have to worry about overcharging or damaging your battery.

# WHAT DO I DO IF IT IS RAINING CLOUDY OR NO SUN?

In this situation, there are only 2 options: 1) Practice energy management to reserve your battery capacity until which time the sun becomes available again, and 2) Recharge the batteries by shore cord/converter, generator, or running the tow vehicle while the pigtail (7-Way) is plugged into the RV.

**Note:** Using the tow vehicle may not work with Lithium, see FAQ regarding charging the battery while driving down the road.

# **SOLAR PANELS**

# HOW MUCH WATTAGE SHOULD I SEE FROM MY PANELS? (200W OR 300W PANELS ONLY)

Best case/perfect conditions: 180 watts (200 Watt panel) and 270 Watts (300 Watt panel). That said, there are many variables that can impact the wattage delivered from your panels, including:

- 1. Batteries State of Charge (SOC)—The higher the SOC, the less charge being sent by the solar controller because the battery doesn't need it, the lower the SOC, the more the charge that is sent
- 2. How much sun is actually reaching the solar panel which is impacted by the time of day (sun low), time of year (fewer hours of total sun), angle of the panel to the sun, and if trees, leaves or other things are blocking the sun, and
- 3. If you solar panels are clean or dirty.

# WHAT MAINTENANCE IS NEEDED FOR MY SOLAR POWER SYSTEM?

Your solar power system is relatively easy to maintain: 1) Keep your panels clean so they can absorb as much sunlight as available 2) follow Keystone's requirements to inspect/maintain roof seams/joints/attachments as outlined in the Owner's Manual.

#### HOW DO I CLEAN MY PANELS?

It is best to clean the panels with only a wet rag, then wipe them dry with a soft cloth.

# **BATTERIES**

# WHAT BATTERIES ARE RECOMMENDED FOR SOLAR POWER APPLICATIONS?

Lead Acid, Absorbed Glass Mat (AGM), or Lithium-ion can be used for solar power applications.

# WHAT IS THE DIFFERENCE BETWEEN LEAD ACID, AGM, AND LITHIUM?

**Lead Acid (oldest technology invented in 1859):** a rechargeable battery with dilute sulphuric acid as the electrolyte that allows for discharge and recharge.

**AGM (newer technology):** an advanced lead-acid battery that has a longer life span, higher electrical loads, and quicker recharge time than the standard Lead Acid Battery.

**Lithium (newest technology):** a rechargeable battery that uses lithium ions as the primary component of its electrolyte.

# HOW ARE LITHIUM BATTERIES DIFFERENT FROM TRADITIONAL LEAD-ACID BATTERIES?

Lead-acid is a tried-and-true technology that is economical, but requires regular maintenance and doesn't last as long. Lithium is a premium battery technology with a longer lifespan, higher efficiency, and better performance and is lighter weight. Properly used and maintained, they can last as much as 7-10 years.

# WHICH BATTERY TYPE IS BETTER, LEAD-ACID, LITHIUM, OR AGM?

When using multiple 120-volt components or those that consume more energy (higher load such as a microwave, coffee maker, or hairdryer) for longer periods, lithium wins hands down. Lithium not only allows you to pull more energy at a faster rate but also recharges faster. However, we know that Lithium may not be practical for everyone, so if you are someone who typically uses their RV for a weekend at a park or unplugged for short periods, not using higher load 120-volt components much, then a couple of AGM batteries will most likely serve you well. If traveling often, longer trips, using multiple or higher load 120-volt components with no access to plug in a shore cord or run a generator, Lithium is well worth the additional cost.

**Important Note:** Not all "Lithium" batteries are equal. There are several different chemical combinations that all fall into the lithium-ion category. The lithium solution we offer is LiFePo4. This is a category where cheaper is not necessarily better.

# CAN I ADD MORE BATTERIES LATER?

Yes, as long as they are the same type and size as what is currently installed and wired in parallel.

# WILL MY RV BATTERY CHARGE FROM MY TOW VEHICLE WHILE I AM DRIVING DOWN THE ROAD?

Tow vehicles may be equipped with a "smart alternator" which is designed to read the battery voltage and only send a charge if necessary. Because Lithium batteries maintain high voltage even while being depleted of energy, the "smart alternator" can misread the need and not recharge the RV batteries while driving. There are aftermarket products that can help overcome this if charging while driving is important for your application.

For more information, check out these YouTube videos from Battle Born:

- » FAQ: Can I charge my batteries using the alternator?
- » FAQ: Comparing DC to DC Chargers

# WHY DO MY LITHIUM BATTERIES ONLY CHARGE TO 80%?

The Smart Solar Controller battery preset is incorrect and should be set to Lithium Iron Phosphate (LiFePo4). Use the Victron Connect app to change this setting. Instructions can be found in your SolarFlex Quick Start Guide.

# INVERTER WHAT IS THE DIFFERENCE BETWEEN A CONVERTER AND AN INVERTER?

A converter takes 120-volt Alternating Current (AC) and converts it to 12-volt Direct Current (DC) which allows you to run your 12-volt components in your RV. An Inverter takes 12-volt Direct Current (DC) from your properly charged RV batteries to create 120-volt Alternating Current (AC) to run 120-volt components in your unit.

# ARE THERE DIFFERENT TYPES OF INVERTERS?

We use two types of inverters: 1) Stand-alone inverters converts DC power from the batteries to AC power for the outlets or other 120-volt appliances, and 2) an inverter charger does the same but also converts outside AC power (shore power or from a generator) to DC power to charge the RV batteries.

# DOES MY INVERTER NEED TO BE TURNED ON IF NOT IN USE?

The inverter disconnect and inverter can be left on during normal use which will allow it to automatically engage in the event you are disconnected from shore cord power. Both should be turned off while servicing the 120-volt system and during storage.

# WHY DO I SEE VOLTAGE, BUT NO AMPS FROM MY SOLAR CONTROLLER?

If the RV batteries are fully charged and there are no large load demands on the system, the solar smart controller limits the amount of amperage sent to the battery to avoid overcharging and damaging it.

MY RV HAS SF200, IT ALSO CAME WITH THE OPTION FOR A RESIDENTIAL REFRIGERATOR POWERED BY A 2000W INVERTER, ARE MY INVERTED OUTLETS POWERED BY THE SAME INVERTER?

The inverter that comes with your residential refrigerator will be hooked up to the SolarFlex 200's inverted loop in the factory, so up to seven 110v outlets in these coaches will be able to operate using power from the battery.

# INVERTER DISCONIECT

#### WHAT IS THE BIG RED DISCONNECT SWITCH?

This disconnects the power between the batteries and the inverter ONLY. This does not disconnect the battery power from the rest of the 12-volt components in the unit.

#### WHEN DO I USE IT?

Inverter disconnect should only be turned off along with the inverter (if equipped) when the 120-volt system is being serviced or the unit is being put in storage.

# SOLAR CHARGE CONTROLLER

# WHAT IS A SOLAR CHARGE CONTROLLER?

The Smart MPPT controller is what is used to regulate the energy the solar panel collects that is passed through to the battery. When the batteries are in a discharged state, the controller will allow maximum power through to recharge the batteries as fast as possible. When it senses the batteries are fully charged, it will significantly reduce/stop what power is allowed through to avoid overcharging or damaging the batteries.

#### DO I NEED TO SHUT OFF MY SOLAR CONTROLLERS IF I AM PLUGGED INTO SHORE POWER?

No, the solar power system and shore power system are separate. The MPPT solar controller(s) offered all work in conjunction with all other charging sources. Since the controller senses the battery needs, they will avoid overcharging and damaging the batteries.

# WHY DO YOU USE MULTIPLE, SMALLER CONTROLLERS INSTEAD OF A SINGLE LARGER CONTROLLER?

There are a couple of reasons we set our solar power installs up with multiple smaller controllers in place of a single larger controller:

- 1. Breaking up large arrays allows us to use smaller gauge wire reducing the weight being added to the coach , and
- 2. Using two 50 amp controllers allows for the array to be on two completely independent circuits giving you added peace of mind that whether due to shade or damage occurring to one of the circuits, the other is working!

# HOW TO RESET THE SOLAR CHARGE CONTROLLER?

This applies to the Jaboni Power product only. There is a reset button on the side of the solar controller. Press and hold for 3 seconds, then release. To reset the remote display, simultaneously press the up and down arrows with the power button.

# **SMARTSHUNT**

# WHAT IS A BATTERY SHUNT (SMARTSHUNT) AND WHAT DOES IT DO?

A shunt is a precision resistor that allows you to monitor your batteries. It measures battery voltage and current (amperage). The Victron SmartShunt we use records the batteries recharging rate and energy consumption at that moment in time to calculate the % of battery charge and the time remaining before the batteries are discharged. It also keeps track of historical data, such as deepest discharge, average discharge, and the number of charge/discharge cycles.

# HOW DO I VIEW INFORMATION?

Using the built-in Bluetooth broadcasting to link a smartphone or tablet to the Victron Connect app.

#### WHAT DOES THIS INFORMATION ON THE APP MEAN?

SOLAR: What is being sent to recharge the batteries

- » State of Charge the batteries "state of charge" % (out of 100%)
- » Voltage Volts going to recharge the batteries
- » Current Amps going to recharge the batteries

OUTPUT: How much is being consumed or taken out of the batteries

- » Voltage -Volts being consumed
- » Current Amps being consumed
- » Power Watts being consumed
- » Consumed AH (Amp Hours) Total Amp Hours (AH) consumed for that day
- » Time Remaining Estimated time remaining before the batteries are discharged

#### INPUT:

» This feature is not used in this application

# QUESTIONS ABOUT YOUR SOLARFLEX PACKAGES

# WHY CAN'T I BUILD OUT MY SOLARFLEX 200 TO BE LIKE THE SOLARFLEX 400I?

Keystone RVs with the SolarFlex 400i package have a second inverted loop, 120 Volt pre-wire to the primary roof A/C and a dedicated circuit breaker that isn't included in the SolarFlex 200 package. While owners could technically add these items to the RV after purchase, it would be a rather large and expensive installation. While one can't completely turn SolarFlex 200 into SolarFlex 400i, you can easily match the solar power collection by adding a second 200w panel, increase charging speed by upgrading to a 30 amp solar controller, and power your 110v outlets by adding a 2000 watt inverter. The only thing that is really missing are the components necessary to run the RV's air conditioner. Please see the "expand your system" section of the SolarFlex 200 page for a full list of upgrade options.

# WHY CAN'T I BUILD OUT MY SOLARFLEX 400I TO BE LIKE THE SOLARFLEX 600I-L?

SolarFlex 600i-L features a different distribution panel with built-in sub-panel, additional 10/2 wiring, and a Lithium-ion battery that aren't included in the SolarFlex 400i package. These components are easy to include during the build process, but much more difficult and expensive to add after delivery. However, the SolarFlex 400i package can be easily expanded to provide much of the functionality of SolarFlex 600i-L by upgrading the solar charge controller, adding additional solar panel(s), adding another inverter, or upgrading the inverter, adding battery capacity, and upgrading to a soft start air conditioner. For a complete list of expansion options and parts recommendations, please see the "expand your system" section of the SolarFlex 400i page.



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