315EX/EX+

315 AH | 4.1 kWh | 12.8v Deep Cycle Lithium Iron Phosphate Battery

User Manual

REVISION 1.5

ASSEMBLED IN THE USA

Engineered & Designed in the USA

sunfunkits.com

Table of Contents

Table of Contents

Introduction

Thank you for purchasing your Sun Fun Kits battery, your battery has been hand built by Sun Fun Kits technicians in our Baton Rouge (Louisiana, USA) facility using components from China, The United States, and India. We have tested your battery by performing a complete balance, capacity, and load test to ensure it is built to industry standards. Your battery comes ready to use and we recommend you review this manual on how to get the optimum performance and longevity of your unit.

We have built the SFK315EX/EX+ battery to be serviceable and upgradeable, this allows for efficient service and repairs and ensures product longevity. The nature of kit built products comes with some considerations; they are not as rugged as non serviceable products so care needs to be given when handling battery kits. However non serviceable products generally have to be disposed of in case of issues (regardless of how insignificant) this contributes to e-waste and is against many right to repair laws; because of this we feel our kit approach offers the best in reliability and longevity for our customers.

Please review this usage manual before using your battery/kit to ensure many years of reliable use. **NOTE:** The battery will arrive with approximately 35% SOC (necessary to comply with shipping regulations) when it arrives to you and should be charged to 100% and 14.2-14.6 volts. The SOC guage will recalibrate itself once fully charged.

Overview

The SFK-315EX/EX+ is a high performance battery made with REPT 320 or EVE MB31 UL1973 & UL9540A certified cells. Under optimal conditions, it can provide up to 8,000 cycles at a depth of discharge of 80% and has an expected life cycle of about 12-15 years. Below we highlight some of the core features of this battery:

Construction

- Assembled, designed and tested in the USA with domestic and globally sourced components in our facility in Baton Rouge, Louisiana.
- Made with **CERTIFIED ESS** cells. Every cell in our battery has its manufacturer testing report on its label and this can also be viewed on our website by logging into your account or scanning the qr code on the battery. Sun Fun Kits batteries **DO NOT** use reject / failed / grade B cells which do not have test reports or valid manufacturing QR codes..
- Upgradeable and serviceable, features a tongue & groove construction with a rubber seal strip to prevent moisture from entering the battery.
- USA 8 year warranty including all support, service, and repair in the USA; 10 year warranty if installed by a Sun Fun Kits authorized dealer.

Performance

- 4.1 kilo Watt-hours of reliable lithium power, replaces up to 6 lead acid / agm batteries (100ah) and is designed to be fully utilized 0-100%
- 2.4 kilo Watts of peak power, and 1500 watts of continuous power. Using Amp Boost, max output increases to 200 amp discharge.
- Expected cycle life of 8,000 cycles at 80% depth of discharge, and up to 10,000 cycles at 70% depth of discharge, 12-15 year usage life.

- Fully compatible with existing 12v infrastructure including standard 12v lead acid/ agm battery chargers, trickle chargers and high voltage DC systems up to 48v (when in 4s series configuration).
- High and low temperature protection including built in heating pads to allow for low temperature charging or standby heating.
- Automatic low/high voltage cut-off to stop battery damage from occurring.
- Automatic short circuit prevention as well as overcharge and over discharge prevention.
- Only 60.05 lbs, one of the lightest watt / pound batteries on the market.

Smart Features

- The battery can be monitored via Bluetooth and has apps for Apple IOS & Google Android; view the status of charge, the health of your cells, power output, temperature readings and more. Native apps for Windows, & Mac OS coming soon.
- Users can adjust battery parameters such as setting up power output limits, max/ min soc, turn the battery on or off via a software switch and also set up pin code protected access to the battery.
- View the combined output of multiple batteries using multi-view; supports up to 6 batteries at the same time.
- Optional Hardware RS-485 connection to allow for inverter integration with: Victron, Voltronix (MMPT Solar, EG4, PowMR, Growatt, Renogy), Magnum energy and more when used with the SFK Data Hub.

Weight & Dimensions

HEIGHT: 10.6” Physical, terminal studs will add 1”, total height combined is 11.6”

WIDTH: 7.5”

LENGTH: 14.6” (including handles)

Physical Attribute	Value	Notes
Width	190 MM , 7.5 Inch	The width will tapper out 6mm from the bottom to top.
Length	345 MM , 13.6 Inch	14.6 Inch / 371 MM Including handles
Height	265 MM , 10.65 Inch	11.6”/ 285 MM including terminal bolt
Weight	27 KG, 60.05 Lbs	Total weight including terminal bolt, handles & securing nuts.

Safety

Sun Fun Kits recommends an experienced electrician setup your battery bank system, or you have extensive knowledge and experience in setting up high power DC systems. Setting up batteries improperly can result in severe injury and even death. Please take caution when working with our batteries and ensure you have proper safety equipment and tools, please follow these safety tips:

- Wear safety equipment and tools including eye protection, insulating gloves, and use electrically safe tools.
- The use of proper circuit breakers, fuses and DC disconnects is recommended. Please ensure installs and setups are done by certified electricians, or licensed installers/dealers.
- Sun Fun Kits SFK-315EX/EX+ battery contains a battery management system (BMS) that protects the battery from overcharging, discharging and temperature extremes. Users must ensure their electrical setup works within these parameters and assume that the BMS protection is **Secondary Protection Only**.
- Reverse Polarity can cause damage to your battery, **Ensure** you have properly set up your electrical wiring.
- Battery short-circuits can damage your bms and battery, ensure you are using insulated tools when installing the battery and that you have planned your install carefully before beginning.

- Ensure bolts are tightened and installed correctly on all cables and power disconnects/bridges, loose terminals can cause permanent damage and lead to electrical fires as it increases resistance in an electrical circuit.

- ALWAYS ensure the battery is oriented properly and has the terminals facing up. **Do Not** place the battery upside down or on its sides. This will cause long term damage to your battery.

- Keep away from direct sunlight and water, these battery units are not water sealed in order to make them serviceable. If you are using them in a situation where they are exposed to the elements, you must take appropriate measures to ensure they are isolated from these environmental factors.

General Usage

LFP or Lithium Iron Phosphate is one of the safest lithium based chemistries in the market. Unlike other chemistries such as Li-Ion or Li-polymer these batteries do not have thermal run-away, and will not ignite or burst into flames (in rare circumstances, if the cell is punctured; the electrolyte is flammable and may ignite if exposed to an ignition source). It is the only chemistry recommended for recreational use and has been confirmed to be the safest lithium option by independent labs and government agencies (FAA transportation study https://www.fire.tc.faa.gov/pdf/TC-16-17.pdf).

Sun Fun Kits LifePo4 batteries may be used anywhere typical deep cycle lead acid/agm/ flooded batteries are used and do not require special charging equipment as they have built in circuitry that ensures proper charging and discharging. It is recommended that you use lithium LifePo4 chargers whenever possible or set your charging apparatus to the AGM charging profile to ensure that your batteries can get fully charged.

Sun Fun Kits offers the SFK-PS-400 (https://www.sunfunkits.com/product/21/sun-fun-kits-136v-400-watt-30-amp-lithium-charger-lifepo4) charger that can be used to fully charge your LifePo4 batteries for customers looking for a stand-alone wall outlet charger.

Here are some acceptable uses for the SFK-315EX/EX+ battery:

- Use in RVs as a 12-48 volt power source, or as part of an inverter bank to provide standby power
- Use in solar panel installs as a power source for storing power
- Use in trolling motor applications for boats (requires ensuring that the battery is isolated and protected from water intrusion)
- Use in Golf Carts or other small electric vehicles that have amperage governors (care must be taken to ensure that the batters are protected from water intrusion)
- As a DC power source for power supplies and other items needing DC power
- Use in DC to AC inverters where standby / backup power is needed such as data centers, or residential power sources.

Safe Mode

Lithium Iron Phosphate batteries are not recommended for applications that require high amperage bursts such as starting engines (generators are ok) or use in DC arc welding. This will trigger the maximum amp cut-off in the battery's built in BMS and will engage a 30 second shut down.

If you exceed the amp limit of your battery or have gone to below 0% SOC and find that the battery is not outputting power, it may be because the battery has gone into safe mode. Safe mode protects the battery from damage and requires a cool down period of up to 5 minutes before it can be available for use again. In order to take out the battery of safe mode, you will need to apply an external power source of 13 volts or higher to "wake up" the battery, this can be done using any standard 12v charger.

Max Amps & Voltage

Sun Fun Kits SFK315EX/EX+ batteries can be connected in parallel or in series. You can connect up to 4 batteries in series to achieve a maximum voltage of 58 volts (this is generally shown as 48v, the nominal reading) and you can parallel these batteries up to 4 units. Regardless of how you configure your batteries, we recommend you keep your combined power output to under 4,000 watts for sustained use with a max peak of 6 kw (30 seconds) and a maximum amp discharge of 125 amps per battery. The SFK315EX/EX+ is capable of up to a burst output of 300 Amps and 3,840 watts for 6 seconds, sufficient to start most 4,000-,5,000 watt generators.

To ensure safe usage, make sure you have selected the proper wire gauge and wire materials to handle the desired output of your batteries, a brief chart lists power usage and wire / gauge requirements below:

Guage	Volts	Amps	Power
4 AWG	13.6	75	1,020 Watts
4 AWG	27.2	75	2,040 Watts
4 AWG	54.4	75	4,080 Watts
2 AWG	13.6	125	1,700 Watts
2 AWG	27.2	125	3,400 Watts
2 AWG	54.4	125	6,800 Watts

*For power requirements greater than 4 kw continuous, you will need to have multiple banks of batteries connected to different inverters / dc banks.

Sun Fun kits recommends using the highest possible voltage available in your power system for multi battery setups, and limiting the total output to below 125 amps for continuous use, we also recommend using 2 awg or lower pure copper wire.

Charging & Discharging

LFP batteries do not require special charging equipment as they have built in circuitry that ensures proper charging and discharging. This means you can use “any standard 12v based battery charger”. We do recommend you use lithium LifePo4 chargers whenever possible, or set your charging apparatus to the AGM charging profile to ensure a good charge. Sun Fun Kits offers the SFK-PS-400 (https://www.sunfunkits.com/product/21/sun-fun-kits-136v-400-watt-30-amp-lithium-charger-lifepo4) charger that can be used to fully charge your LifePo4 batteries for customers looking for a stand-alone wall outlet charger.
NOTE: For smart lead acid chargers, you may need to force bulk/absorption mode to ensure a full charge.

The charging and discharging parameters for the SFK-315EX/EX+ are listed below:

Parameter	Value	Notes
Low voltage cut-off	10.0-12.0 volts / 2.5 - 3.0 volts (cell)	Battery will go into Safe Mode at this voltage, may be adjusted in the Sun Fun Kits BMS App.
Full Charge	14.6 volts / 3.65 volts (cell)	Maximum charge voltage.
Nominal Voltage	13.0 Volts / 3.25 volts (cell)	Nominal voltage range is between 13.2-13.6 volts.
BMS Self Discharge	0.61 ah / day	A fully charged battery will discharge to low SOC in about **500** days
BMS Balance	5 amp active balancer.	Balancing will happen between 2.9v-3.65v **ONLY**.
Recommended Discharge	800 Watts	Discharge rates of 800 watts and below will yield the longest battery life.
Max Continuous Discharge	1500 watts	This is the highest suggested discharge for an extended period of use.
Peak Discharge	2.4 kW (120 seconds)	Must not exceed **200 amps**.
Recommended Charge Rate	400 Watts (30 amps)	Slower charging will result in a complete charge and also extend battery life.
Max Charge Rate	1500 Watts (150 amps)	//
Surcharge Disconnect	210 amps	The battery will stop charging if it detects a surge of more than 210 amps.
Recommended Usage Temp.	70° Fahrenheit	Batteries are happiest in the same temperature range we like to be.
Maximum Discharge Temp.	140° Fahrenheit	Battery will go into Safe Mode at this temperature.

Parameter	Value	Notes
Minimum Discharge Temp.	34° Fahrenheit	Battery will go into Safe Mode at this temperature (can be lowered to 0° in app)
Maximum Charge Temp.	140° Fahrenheit	//
Minimum Charge Temp.	35° Fahrenheit	Built in heating pads will turn on to warm up the battery.
Short Circuit Protection	210 amps	The BMS will turn the battery off if more than 210 amps are drawn from the battery.
Usable Battery Capacity	316 ah	This is regulated by the BMS to ensure battery integrity.
Total Cell Capacity	325 - 335 ah	This is the actual cell capacity of the individual cells.

New batteries may require a SOC meter calibration during the first charge, this process is automatic and will perform an auto re-calibrate operation when the battery cells and overall voltage reach the Full Charge voltage during the charging process. **NOTE:** it is normal for the battery to show a 100% SOC even though it is accepting amps, once the battery reaches full voltage the incoming amps will decrease and the battery will stop accepting current. It is recommended to charge the battery to full once every 30 days to keep the SOC meter properly calibrated.

Maintenance

Sun Fun Kits Lithium Iron Phosphate batteries require minimal maintenance and do not need to have any liquid added to them such as water (as is the case with flooded lead acid) in order to keep charge. The only maintenance required is to ensure that the state of charge of the battery is in a reasonable state depending on how it is being used. Please see the chart below:

State of Charge	Recommended Use	Notes
80-100%	Normal Use	For normal everyday use, keep your battery in this range if you are using it at least once a month.
50%	Long term storage	Keep your battery in this state when you will not be using it (for more than a month).
25-35%	Transport	For use in transport / maintenance, when your battery is shipped to you, or if you need to return it, it should be in this SOC.
15% or lower	**Low charge!** Charge battery ASAP.	This is a low SOC, do not keep your battery in this state for a long period of time or it will cause permanent damage to it.

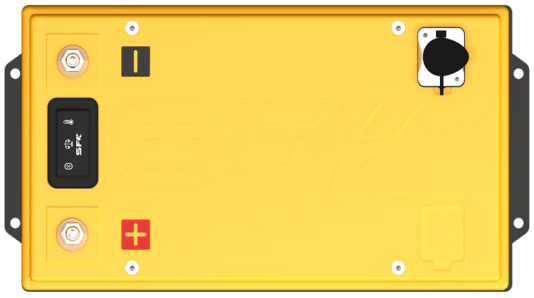
In cases where the SOC falls below the minimum SOC (see page 35) or falls below LVC cut off the battery will go into protection mode and the discharge mosfets will be disabled. In this condition the output voltage of the terminals will show a very low voltage (about 6-7v) and you may find it difficult to charge the battery. This is due to safety mechanisms in most modern chargers where they will not charge a battery if it falls below a minimum voltage threshold (usually 9 volts).

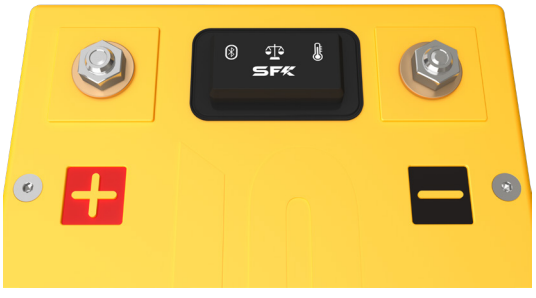
In order to get the battery out of protection mode, you will need to apply power from a 12-14v dc source (such as a 12v battery) and apply current to the positive and negative terminals while keeping your charger connected. This should provide the voltage needed by the charger to begin charging. If you don't have access to a 12-14v dc power source, you can lower the minimum SOC to 0% or LVC to 10 volts inside the tools tab (see page 35), doing this will enable the discharge mosfets there by showing a viable voltage on the battery terminals. **NOTE:** If your LVC and minimum SOC is already set to their lowest level, then you will require a 12-14v dc source as the battery is not able to enable the discharge mosfets without external power.

Low Temp Charging

The SFK315EX/EX+ is equipped with internal heating elements (silicone rubber heater pads) that are designed to turn on and warm up the battery during cold environments while the battery is being charged or can be used to keep the battery warm when its is standby. The settings for this are available in the tools tab within the official Sun Fun Kits management app can be configured to be turned on at 35° , 40° , 45° , degrees Fahrenheit. In cold temperatures, depending on the setting selected, charging will be disabled and any current sent to the battery will be sent to the heating elements to raise the internal temperature until it is at least 5 degrees above the setting specified in the tools tab. If the setting is set to 40 degrees, then the battery will continue to warm up until the internal temperature is at least 45 degrees at which point normal charging will resume. We recommend keeping maximum charging to 30 amps in temperatures below 50 degrees Fahrenheit.

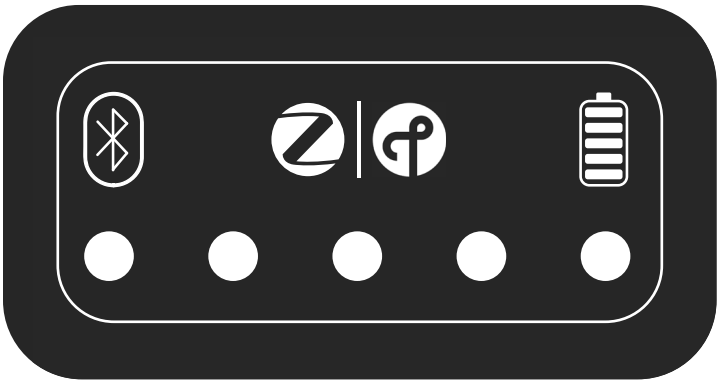
NOTE: The latest version of the SFK315EX/EX+ battery uses the GEN 2 B / GEN 3 A switch, this revision allows users to select the heating mode form with in the app. Should customers select the GEN 2 A switch, they can manually turn on heating by pressing the heating icon. This will maintain 60° Fahrenheit internal battery temperature.





Gen 3 Switch

The SFK GEN 3 A switch is standard on the 315EX+ battery and allows users to select the wireless communication mode of the battery. It also features a SOC gauge that can show the charge level of the battery.



The Bluetooth button turns on BLE communications.

The Zigbee button turns on Zigbee communications.

The Thread button turns on Thread communications.

The SOC button will display the SOC of the battery via the 5 SOC status leds.

The GEN 3 A Switch only allows a single wireless mode to be active at a time, you can switch protocols by clicking a different button or you can click the same button to deactivate that protocol. Zigbee and Thread protocols share the same button, pressing the button will allow you to switch from the Zigbee protocol to the Thread protocol, this will be indicated with a change in the illuminated LED. **NOTE:** there is no way to turn on or off wireless communications or switch to a different protocol except from the GEN 3 A switch, or from a command via the data port.

Pressing the SOC button will show the remaining capacity of the battery, this will automatically dim after 5 seconds. During charging, the buttons will illuminate and blink to show the status of the charging process. If there is a charging error the SOC button itself will illuminate and blink red.

Gen 2 Switch

The SFK GEN 2 B (315EX) switch expands the functionality of the battery by allowing the users to monitor and control various functions such as enabling / disabling Bluetooth connectivity, setting up active balancer behavior, and having a way to monitor internal battery temperature while the battery is in use or at idle.

- Temp **below 41° F**
- Temp **between 42° - 58° F**
- Temp **between 59° - 86° F**
- Temp **between 87° - 104° F**
- Temp **over 105° F**

Bluetooth: Bluetooth functionality can be enabled by pressing the Bluetooth icon for 1 second and it will illuminate the Bluetooth icon. Pressing the button again will disable Bluetooth connectivity. **NOTE:** The monitoring app will not work unless Bluetooth is enabled, alternatively you can connect to the via the SFK data cable on Android based devices or via the SFK HUB.

Temperature Monitoring: Pressing the thermometer button will turn temperature monitoring and the color of the temperature icon will change based on the values shown above. To turn off monitoring, press and hold the temperature icon for one second.

Active Balancer: The GEN 2B switch allows users to manually adjust the active balancer's behavior; users can select between **Normal Mode** (where the balancer runs continuously), **Hi Balance Mode** (where the balancer will turn on when the battery is near full: 3.37v / cell, or about 13.5v pack voltage) or can disable active balancing and rely solely on passive BMS balancing (150 mah). Sun Fun Kits recommends leaving the balancing mode to Hi Balance Mode (**green led**) for users that are able to charge there batteries up to 100% or Normal Mode (**blue led**) if their charging system can charge them to between 75% to 99% SOC. If you find at any time your cells are not evenly balanced, set the balancer to Normal Mode as it should fully balance your battery in a few hours while being charged.

Data Port

The SFK315EX/EX+ now supports an RS485 half duplex data connection via a water resistant RJ45 jack. This can be utilized to get BMS data from the battery. The official SFK data cable is recommended for best results.

The data port is optional on the 315EX but is standard on the 315EX+

Sun Fun Kits will be releasing the SFK HUB soon that will allow the SFK315EX/EX+ to communicate with lithium compatible inverters & chargers via a hard link, the data port option is highly recommended for customers looking for hardware integrations such as the Victron Multipluss and Cerbo Gx family or products.

Inverter Settings

The SFK315EX/EX+ is able to work with almost any 12v based inverter or charge converter as LFP chemistry by its nature allows it to be a drop-in replacement battery. If your device has a lithium mode, you can select this setting for optimal lithium settings. You can also use the guide below to configure your charging/inverter settings if you have a user defined settings or want to set custom settings for best compatibility with your device:

Parameter	Value	Notes
Absorption Voltage	14.4v - 14.6v	Voltage measured on the battery terminal posts, it may need to be increased to as high as 16.0v to compensate for voltage drop in battery cables
Bulk Voltage	14.4v - 14.6v	//
Float Voltage	13.2v - 13.4v	Voltage measured on the battery terminal posts, float voltage is not as critical and may be adjusted as needed to keep cells at around 3.33v
Absorption Time	90 minutes per battery in parallel.	If you have 2 batteries in parallel the time will be 180 mins, if 3 the time would be 270 mins. Absorption time helps the balancer top balance your cells.
Equalization	N/A	Equalization is not needed on the SFK315EX/EX+ and can be disabled. If this setting can not be turned off, set it to the same as the absorption voltage of 14.4v
Equalization Time	N/A	This setting can be disabled or be set to 0-10 minutes if it can not be disabled.

The settings above may be changed to suit the requirements of your charging and inverter system, you can consult with your vendor on the settings they recommend best. In some situations you may need to add additional charging support hardware such as a dc-to-dc buck booster, or lithium compatible alternator to ensure lithium battery compatibility.

Victron Settings

When equipped with the RS-485 data port and the SFK-V2 Data Cable (https://www.sunfunkits.com/product/150/sun-fun-kits-rs-485-rj45-to-usb-a-data-cable-ftdi-chip) the SFK315EX/EX+ is able to communicate with Victron Venus OS devices such as the Cerbo GX and Raspberri Pi devices running Venus OS.

This process involves installing a driver on to the Venus OS device and the process is described on our website at: https://www.sunfunkits.com/content/3081/victron-cerbo-gx-venus-os-driver. Once installed the Venus OS device will become “SFK Aware” and will allow you to configure your battery or multiple batteries for us within the Victron eco system, this includes VRM usage, setting up virtual batteries, setting float and absorption limits as well as DVCC for optimal charging and discharging operations.

The current driver supports up to 8 devices and will require the use of a USB hub in order to connect multiple batteries. Only genuine SFK data cables are supported by the driver.

The Cerbo Gx is a popular device that is used in many Victron Energy setups. The SFK-315EX/EX+ when equipped with the data port and the SFK RS-485 data cable is Victron Communications ready with the installation of the SFK Venus OS driver.

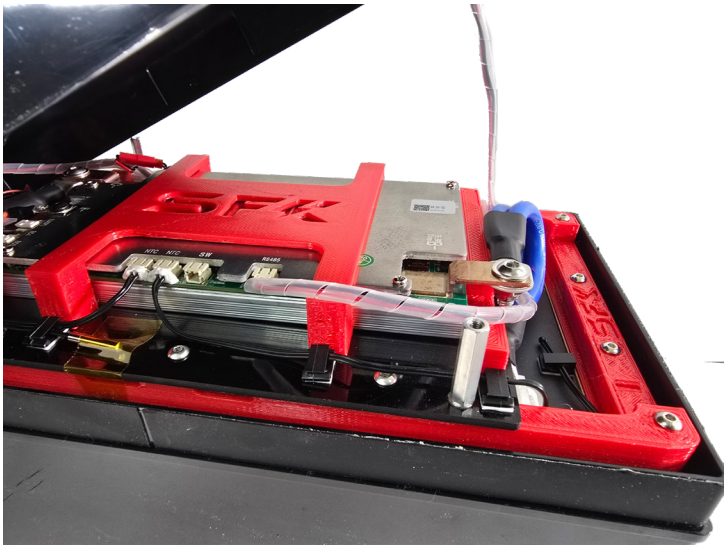
Maintenance

It is recommended to periodically inspect your wiring schematic and ensure all bolts and terminals are properly installed and tight. Depending on the discharge/charge rate you may experience loosening of terminals due to thermal expansion. If this occurs you will need to re-tighten your bolts.

The main terminal bolts on the SFK315EX/EX+ are under the battery case, to access this you will need to remove the 4 top M4 countersunk screws. Once the case is removed, you can use a M8 ball-end hex driver or L-wrench to ensure that they are snug and making proper contact with the brass conductor ring. If they are loose, you will need to tighten them. **NOTE:** loose bolts will cause the battery terminals to heat up as they become a source of resistance, this must be addressed or it will cause permanent damage to your battery and can lead to a fire hazard.

You should also check that the battery is kept away from water & moisture and that there is proper ventilation to maintain temperature & humidity. These issues can lead to battery performance and degradation if not resolved; they may not be apparent immediately, but will have a cumulative effect in the long term.

There are 4 countersunk M4-15mm Screws that hold the top lid in place. In order to access the inside of the battery, you will need to unscrew them with an appropriate Allen key.



We only recommend opening the lid of your battery with hand tools and not with powered screwdrivers or impact drivers.

Only use insulated tools when working with the battery with its lid open.

Ensure the wires are tight and make good contact with components, tighten if needed.

Multi-battery Setups

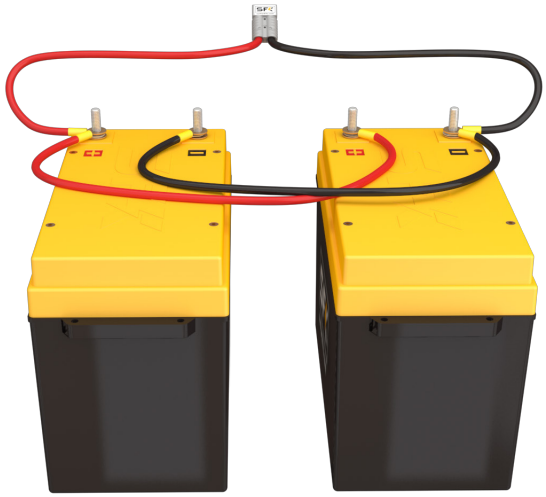
The SFK315EX/EX+ offers various multi-battery setups, these allow you to increase your total available amperage as well as voltage. The flexibility of this allows batteries to be used in 12v, 24v, 36v, as well as 48v setups. We will detail these options below.

NOTE: for many parallel setups we recommend the use of a common DC bus bar with equal wire lengths to ensure proper load splitting. The Sun Fun Kits DC Bus Bar works great for most parallel setups: https://www.sunfunkits.com/product/35/heavy-duty-bus-bars-250a-600v . We always recommend you consult an electrician before proceeding to ensure your loads are adequately spread among your batteries.

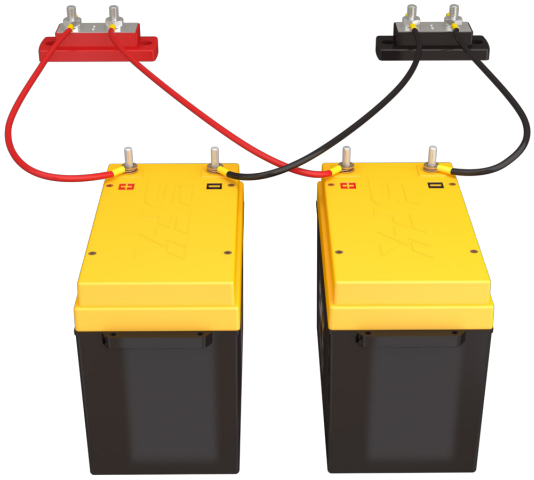
The SFK315EX/EX+ should only be used with batteries of the same type. You should avoid mixing and matching the: SFK-260, SFK-260HP, SFK-275HP, or SFK-275EX, SFK315EX, batteries or batteries of other brands in the same bank. Doing so may overload or cause unequal loads in your bank. Regardless of which setup you decide to use, the total number of batteries in a bank should not exceed 4/bank. If you need more than 4 batteries, you should consider making another bank and then connecting them with appropriate load balancers.

Parallel Operation

The most common parallel setup is the 2P setup, where two batteries are connected in parallel thereby increasing battery capacity to 630 AH while keeping the voltage at 13.6 volts. These setups can be used with piggyback cables, or can be set up using DC bus bars.

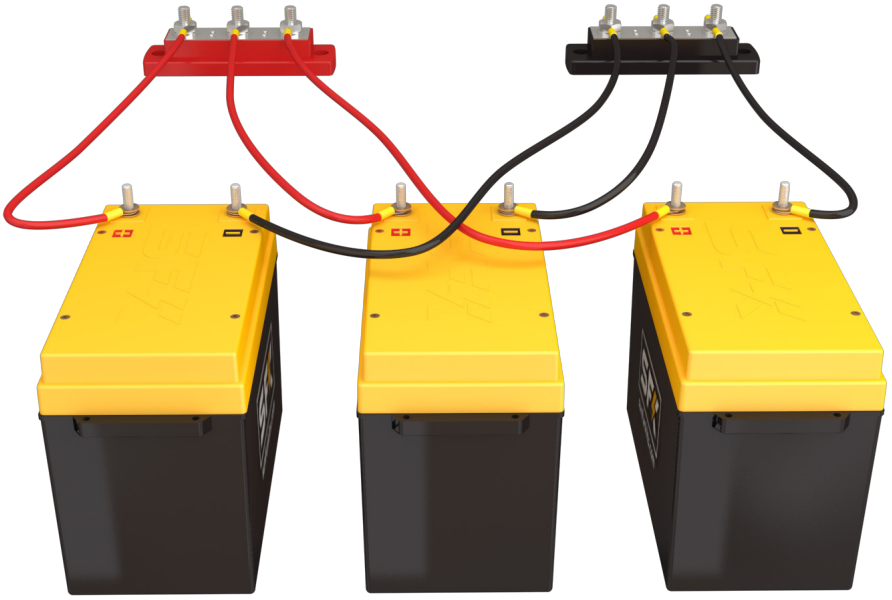


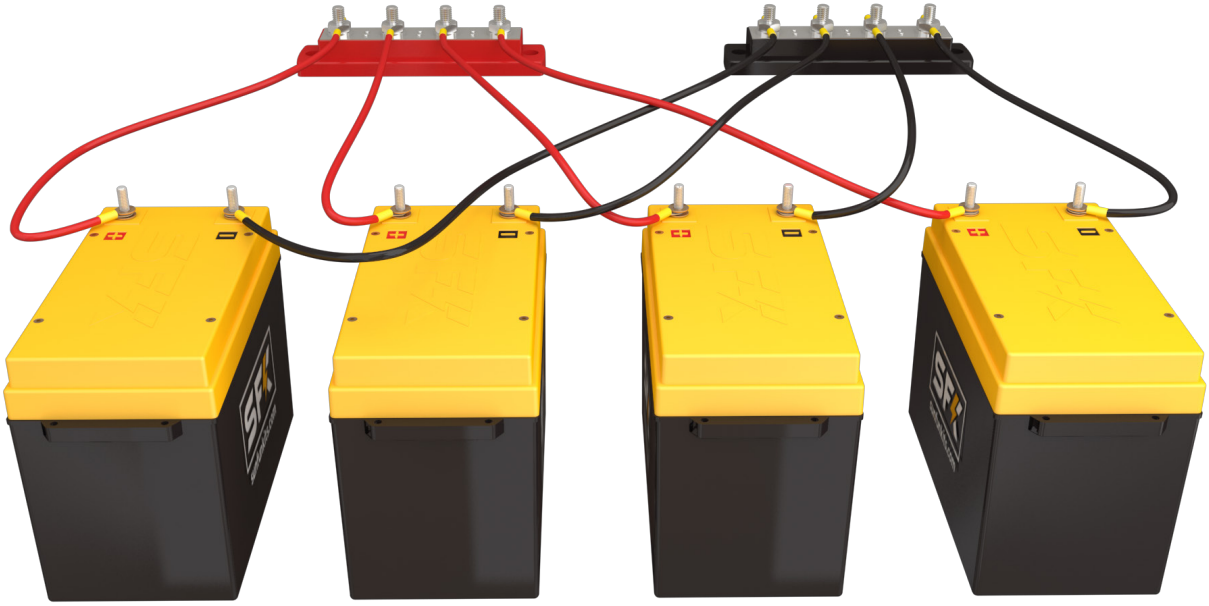
In all parallel setups, you must ensure your cables are of equal length, we recommend using 2 AWG or lower gauge for best performance.



For optimal performance, consider the use of dedicated bus bars.

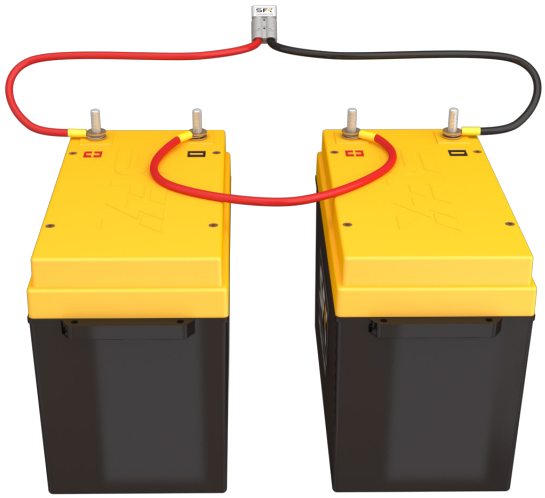
For even greater capacity, the SFK315EX/EX+ can be wired in 3P and 4P configurations, this will increase overall battery capacity to 945AH and 1260AH respectively. **NOTE: dedicated bus bars are required for 3P and 4P setups**. Sun Fun Kits does not support more than 4P connections due to the very high amp loads it can generate.



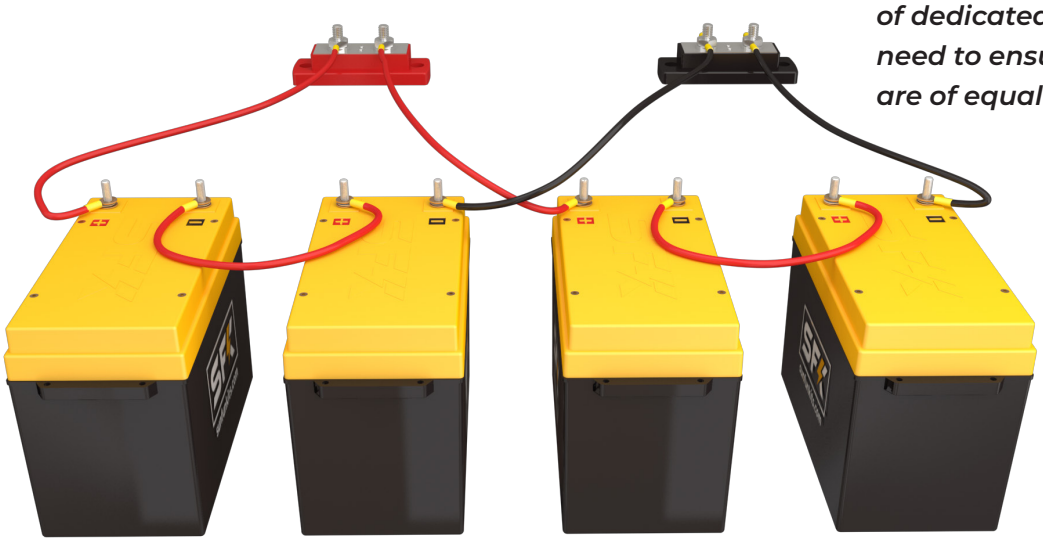


Series Operation

With series configurations, you can increase your overall pack voltage while keeping the capacity the same. Below we show a 2S and a 2S2P setup (where two sets of 24v batteries are connected in parallel to increase voltage and capacity) this provides 24V - 315AH and 24v - 660AH respectively.

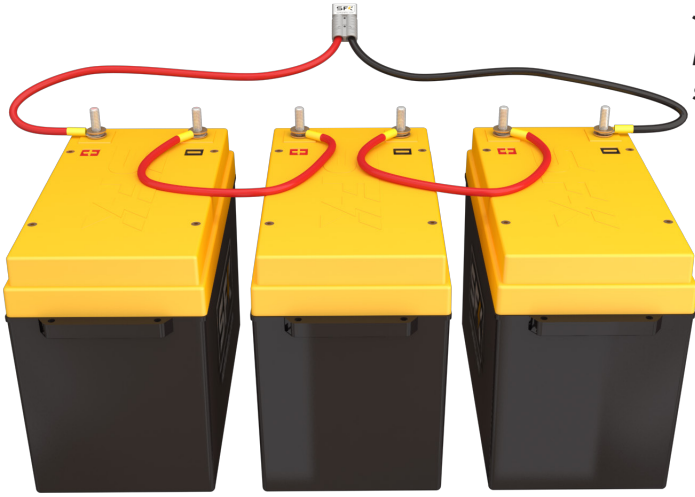


Cables of equal length are recommended but not critical in series setups. We recommend using 2 awg or lower gauge for best performance.



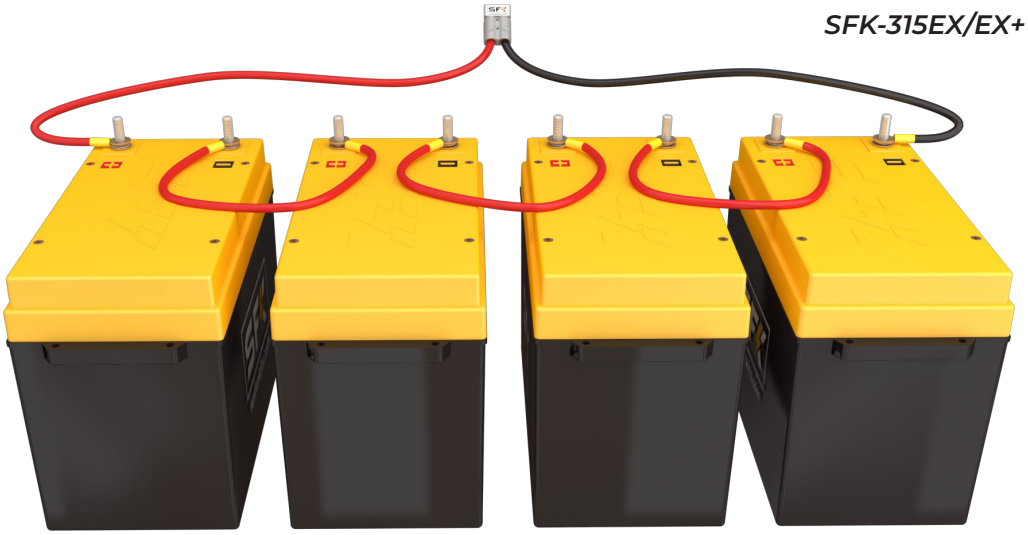
For 2S2P setups, consider the use of dedicated bus bars, you will also need to ensure your parallel cables are of equal length and wire gauge.

For even higher voltage setups, the SFK315EX/EX+ can be connected in 3S as well as 4S (36v, and 48v respectively) setups. These sets can not be paralleled in the same bank, if you require additional capacity you will need to create a separate bank. 4S or 48v is the maximum series connection supported by the SFK315EX/EX+, anything greater than this will permanently damage your battery.



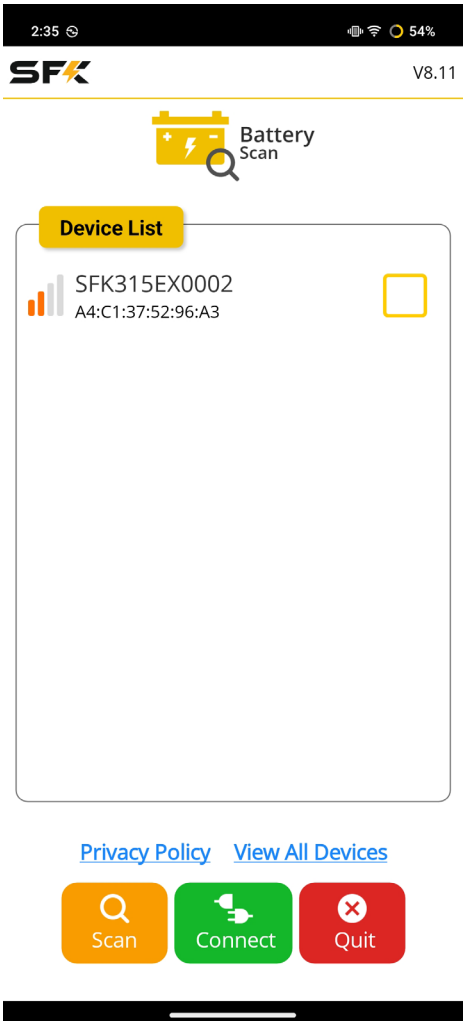
3S setups are not as common but provide 36 volts which is used by some marine troller motors.

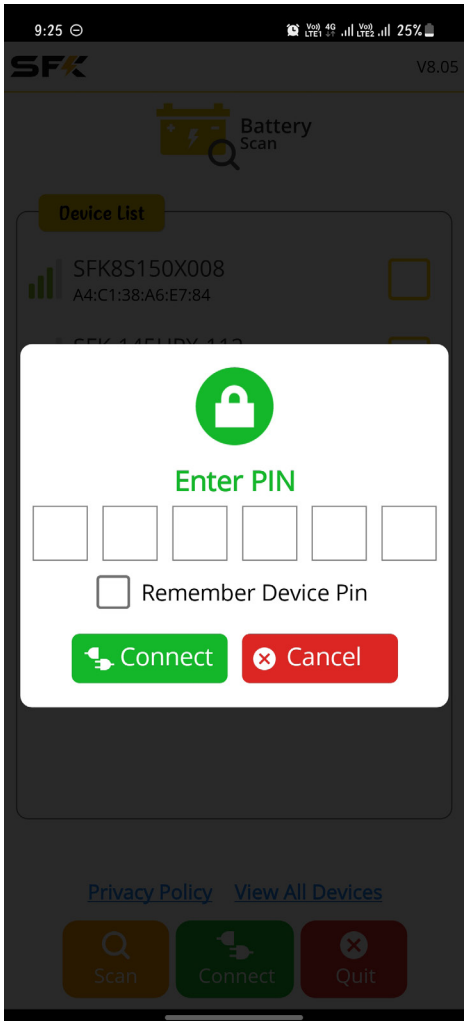
4S (48v) is the highest series configuration supported by the SFK-315EX/EX+ battery.



IOS & Android Apps

To manage your SFK-315EX/EX+, Sun Fun Kits has created easy to use management apps. These are available on the Google Play Store and Apple IOS App Store. In order to use these apps you must have a device that is compatible with the BLE Bluetooth protocol (or usb port for Android devices), these apps are available at no charge and can work with all Sun Fun Kits products. Below we provide a basic overview of the app's features (images in this manual are from the android version of the app):





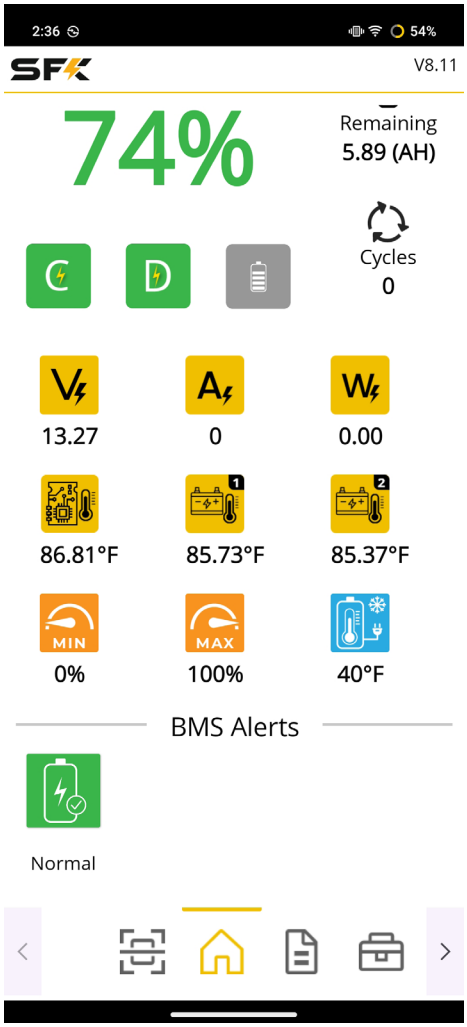
After you have downloaded the app, you will need to enable location services to allow a connection to your SKF-315EX/EX+ battery. Once enabled you can scan for available devices and connect to the battery you wish. With version 4.X and higher; the SFK BMS app supports up to 6 simultaneous device connections, this is explained on page: 53.

You can return to the scan page at any time by clicking the **Scan** tab, you can also quit the app by clicking on the **Quit** button.

NOTE: Quitting the app will not close the app as it will continue to run in the background, use your device's close app feature to permanently close the app.

PIN CODE: If you have setup an access pin the device will ask you for the 6 digit pin

MAIN TAB



After downloading and connecting to your battery you can view information in 5 tabs. The Main tab will display general battery information like the state of charge of the battery, the temperature, remaining capacity, as well as the current and watt output.

NOTE: When you first setup your battery, you may need to charge it overnight on a slow charger (around 20 amps) to allow the battery to fully charge and calibrate its capacity meter (SOC gauge).

Lithium iron phosphate batteries have a very shallow discharge curve; this means that voltage alone is not a good indication of the state of charge (SOC), for this reason a 3.3 / cell or 13.2 volt reading may be as high as 80% SOC or as low as 30%, hence, the SFK315EX/EX+ uses coulomb readings to determine the soc of the battery. However, this should only be used as a rough estimate; if you require a highly accurate state of charge reading, an external calibrated shunt would be required. You'll also need to fully charge your battery to recalibrate the SOC meter roughly every 5-10 cycles.

We explain what the icons represent in the list below and are starting with the newest options that are available in the latest firmware for the SFK315EX/EX+ battery:

SOC Lower Limit

This shows the lower SOC limit of the battery, once the soc meter reaches a value set by the user in the tools tab, the battery will disable discharging. Values can be set from 0% (disabled) to 20%.

SOC Upper Limit

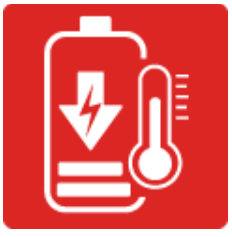
This shows the upper SOC limit of the battery, once the soc meter reaches a value set by the user in the tools tab, the battery will disable charging. Values can be set from 100% (disabled) to 80%. **NOTE:** Charging to 100% once a month is recommended.

Standby Heating Mode

The SFK315EX/EX+ allows users to set how the heating system will operate, if it the battery is set to stand by heating, this icon will appear and let users know what the activation temperature is.

Low Temp Charging

If it the battery is set to low temperature charging, this icon will appear and let users know what the activation temperature is.



Low Temp Protection only

In cases where you wish to disable the heating pads, you can set it to Low Temperature Protection Only where the battery will disable charging if battery temps fall below the temperature set by the user in the tools tab.

Charging Discharging Status

Charging Enabled

This symbol indicates that charging for the battery is enabled.

Charging Disabled

This symbol indicates that charging for the battery is disabled.

Discharging Enabled

This symbol indicates that discharging for the battery is enabled.

Discharging Disabled

This symbol indicates that discharging for the battery is disabled.

Warning

Uneven amp draw detected, check wiring to ensure equal amps are being drawn (Multi-view only).

Balancing

Voltage imbalance among batteries detected (Multi-view only).

Battery Charging

Battery is being charged

Battery Discharging

Battery is currently being discharged.

Battery Standby

Battery is currently in stand by (idle)

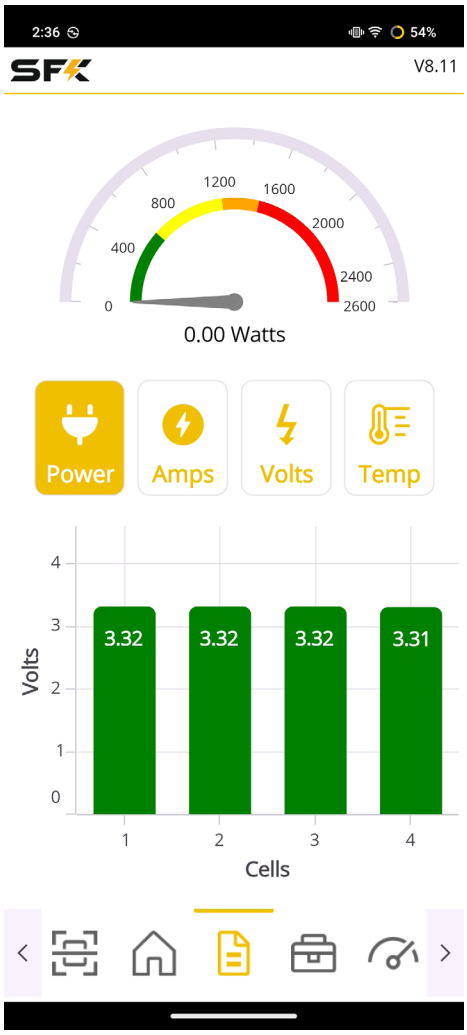
Update Data

Informs user that BMS data was refreshed (based on the poll rate set in the tools tab).

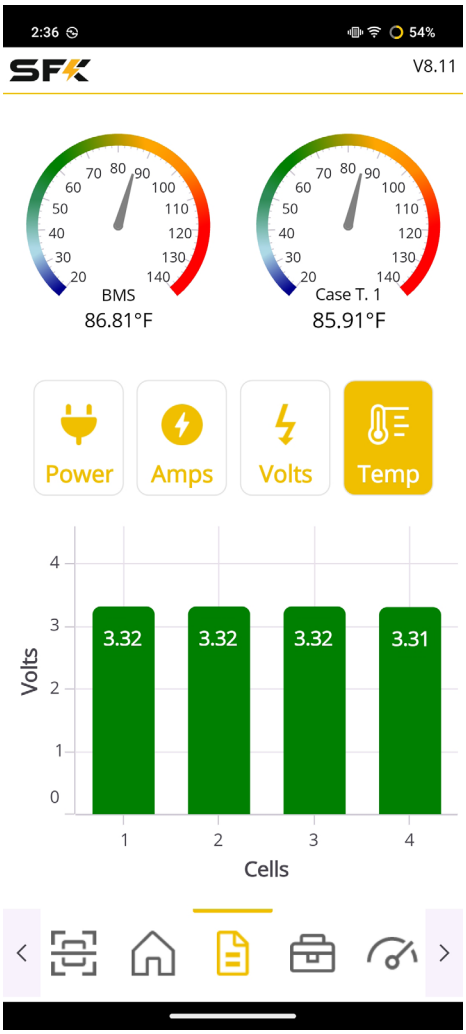
Failed Data Update

Indicates an issue with the BMS connection, after 3 failed attempts the app will attempt to re-connect with the BMS.

Details & Tools Tab

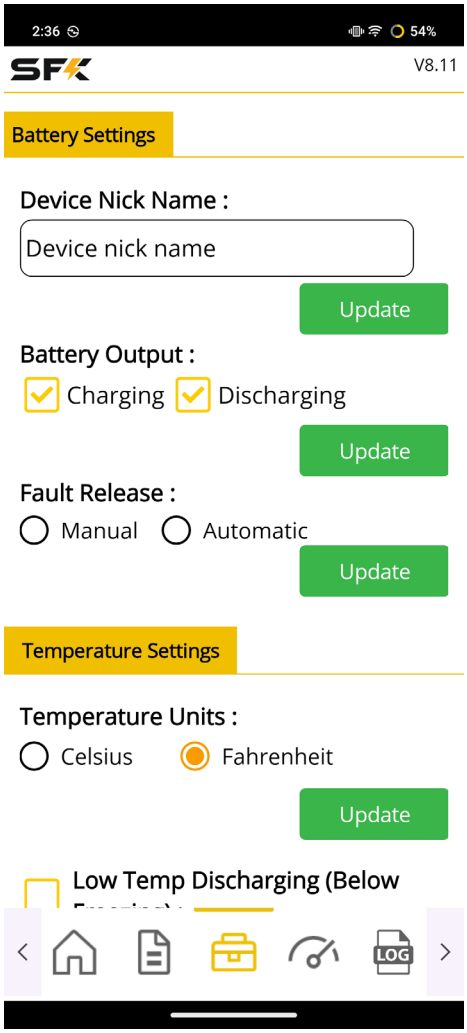


The details tab includes many sub-tabs which can allow you to drill down and view detailed battery information.



The details tab provides additional information for your battery, this can be useful in finding out issues you may be experiencing such as HVC or LVC (high/low voltage cut-off). If you are finding your cells are being stressed under loads you can use the information to make changes to the load accordingly. NOTE: The SFK315EX/EX+ has 3 temperature probes but at any given time only 2 are shown on the details tab, to switch between case temp 1 or 2, simply click the Case T 1/2 reading and it will show the other case temperature reading.

The tools tab is a powerful device management system that allows you to set parameters for the SFK315EX/EX+ battery, these options are discussed below:



Battery Output:

You can set options on your unit to enable or disable charging and discharging. This acts like a soft-switch for your battery. **NOTE:** these options may change if the battery is at full charge, whereby the charging enabled will be turned off. On the same token, if the battery is at a low state of charge, the status may show discharging disabled.

Fault Release:

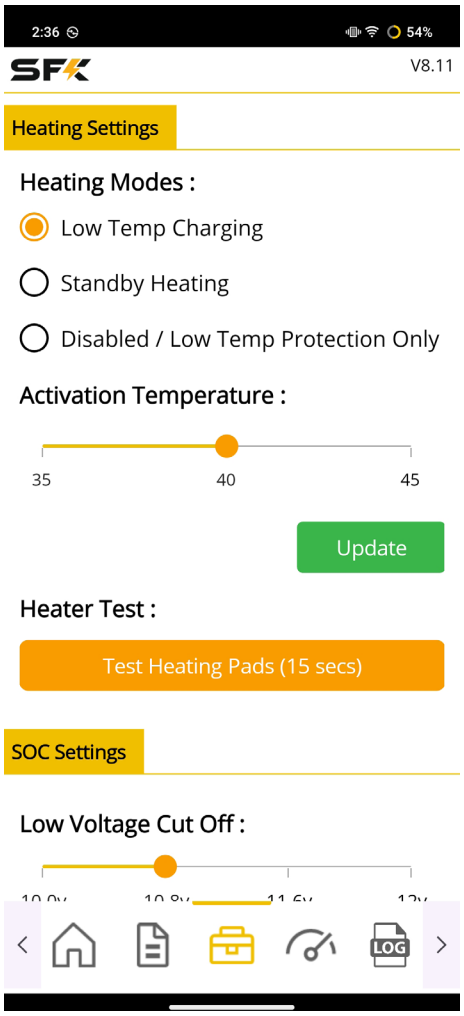
During a fault such as a short circuit the battery will go into a protected / locked state. The user will need to go into the tools tab and manually re-enable charging and or discharging to regain normal function. The battery can be setup to automatically release this fault condition after 20 seconds by selecting the Automatic option.

Low Temp Discharging:

Allows battery discharging below freezing, up to -10° F.

Low Voltage Cut Off:

Setting the LVC (low voltage cut-off) of your battery can be useful if you wish to limit the lowest voltage levels of your battery. For normal use we recommend keeping it at the **10.8v**; however, you can set a higher limit to keep some power in reserve with the **11.6v or 12.0v** setting. The **10.0v** setting should only be used when you are benchmarking your battery.



Heating Mode:

The SFK315EX/EX+ supports user selectable heating modes from 3 available settings:

Low Temp Charging: mode will only turn on the heating pads if the battery is charged during low temperatures, in this case the battery will only use incoming power to warm up the heating pads. The heating pads will not be available during standby or discharging.

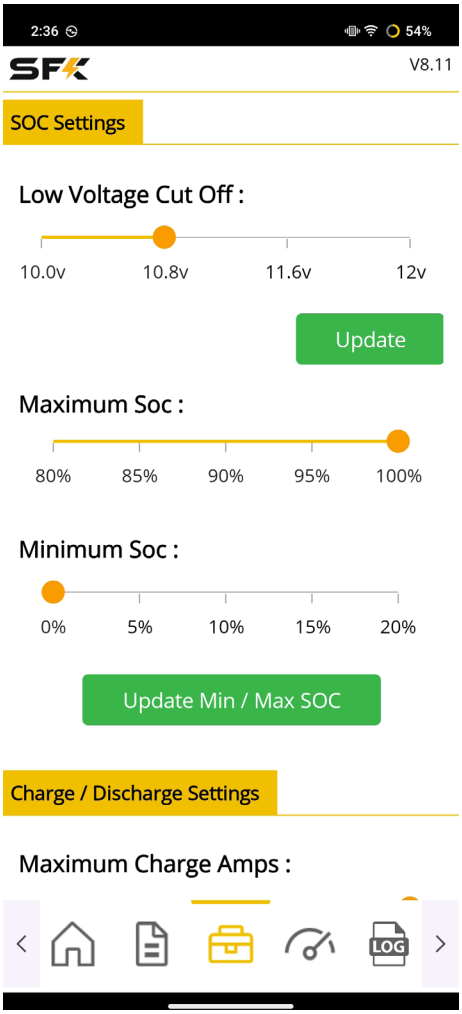
Standby Heating: mode will use the battery's own power to turn on the heating pads and maintain battery temperature.

Disabled: mode will turn off the heating functionality of the battery and the heating function will not work; however, low temperature protection will remain active and the battery will not allow charging during freezing temperatures.

Activation Temperature: This is the temperature that will activate the heating mode, based on the mode selected, it may turn on/off the heating to maintain this value.

Heating Pad Test:

The heating pad test function allows users to verify the heating pads are working properly; this is normally used by Sun Fun Kits technicians to verify heating pad functionality but it is now available to all users. To test heating pads, click the orange button and the app and will send a command to run the heating pads for about 15 seconds (you can view the amps being used on the main tab).



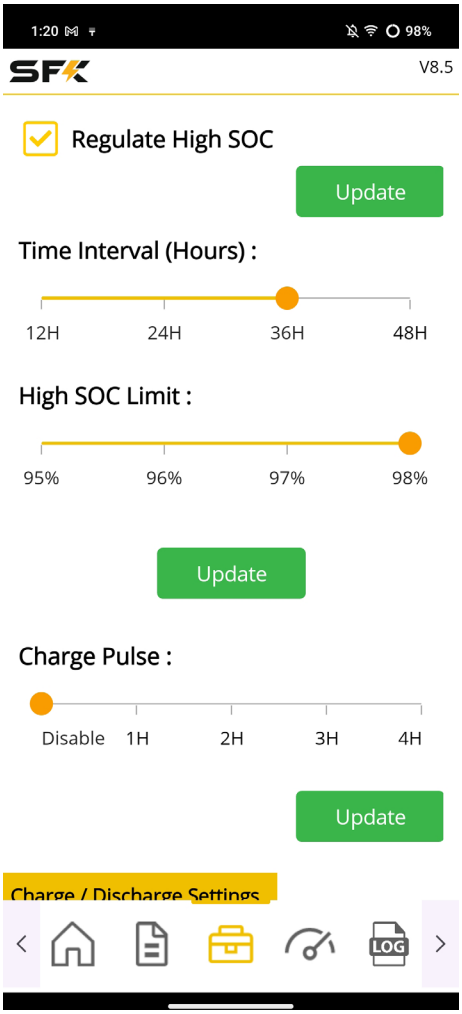
Min and Max State of Charge:

Users are able to set the upper and lower state of charge limits for their battery, when either limit is reached an alert is shown on the main tab (see page 46 for more details)

Lithium Iron Phosphate's ideal normal operating range is 100% for the upper limit and between 15-20% for the lower range. This allows the battery to fully balance during charging but also prevents damage that may happen from a fully depleted battery.

If you are planning on not using your battery for an extended period of time we recommend setting the upper limit to 80%; with this limit set even if you leave your RV or charging apparatus connected the battery will not charge if the SOC is above the selected limit.

NOTE: if you are using smart inverters/chargers such as the Multiplus series from Victron along with a Venus OS device (cerbo gx) it is recommended the settings be set to 100% for the maximum and 0% for the minimum soc. The reason for this is that the inverter can be programmed to turn on charging / discharging at set state of charge in the inverter settings and this may conflict with the SFK-315EX/EX+ if it also has its own state of charge limits that differ from the inverter/charger settings.



Regulate High SOC:

LFP batteries should avoid very high and very low states of charge, while it is recommended to fully charge the battery to 100% (cells reach 3.5v) to ensure popper balancing, it is not recommended to keep the battery at this state of charge for long periods of time. In other words once the battery has been fully charged it should be discharged to bring the voltages and state of charge to around 3.33v/per cell and lower the SOC below 100%.

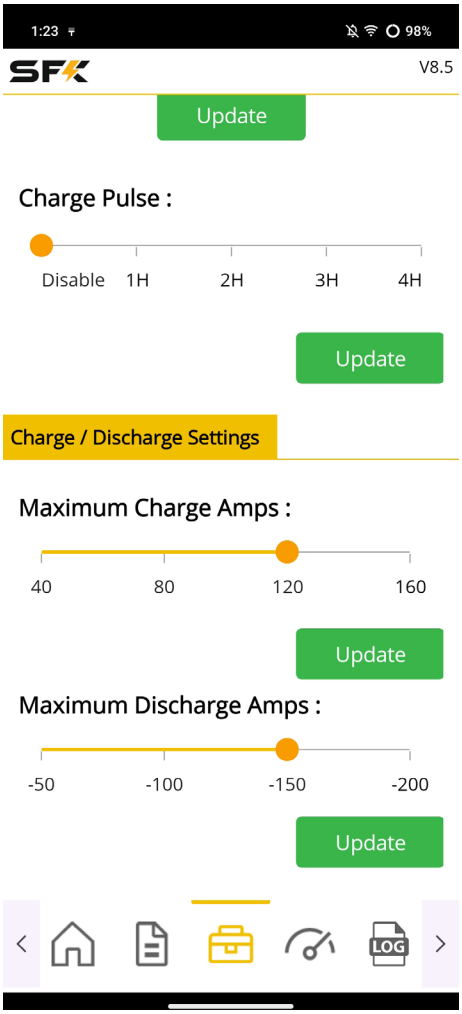
The 315EX+ includes an option to regulate high SOC which allows the battery to use its internal heating pads to reduce its SOC and voltage. This can be configured in the regulate SOC option in the tools tab.

The first option specifies the time interval, this setting determines how long the battery must be in a high SOC before the battery takes steps to lower it SOC. E.g. If you set it to 24 hours, then the battery must be at a high SOC for at least 24 hours before the regulate SOC process begins to lower its SOC and voltage.

NOTE: the battery must be in standby during the interval period, if the battery is being charged or discharged the regulate SOC function will not initiate.

The SOC limit option tells the battery how low it should reduce its SOC level to, e.g. if set to 95% the system will begin using its internal heating pads to lower its SOC value. Once the desired SOC level is reached the heating will be turned off.

NOTE: the system will limit the heating to a maximum of 113° Fahrenheit or 40° Celsius to ensure the battery does not over heat.

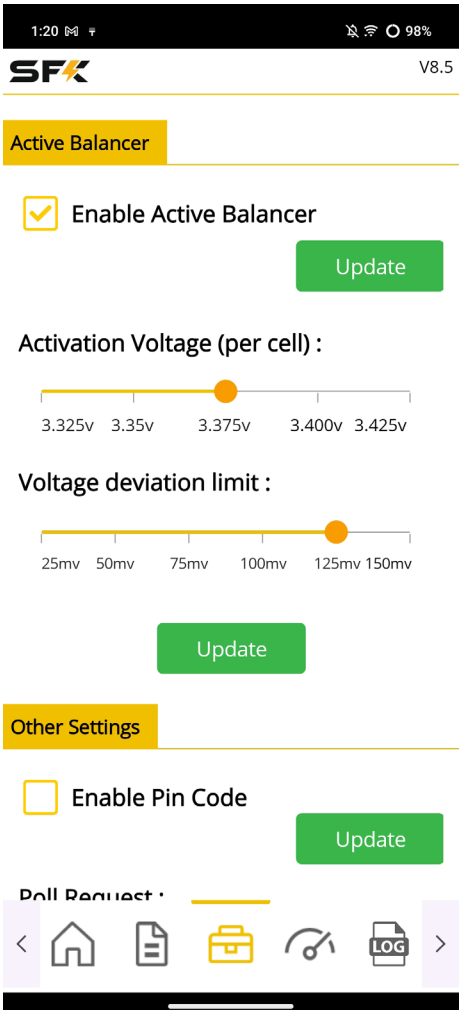


Charge Pulse:

As explained on page 14 in cases where low SOC or low voltage cut-off has disabled the discharging mosfets you may find it difficult to charge the battery. On the 315EX+ a feature called Charge Pulse is available where it will temporarily enable the discharge mosfets by lowering the LVC and SOC limit to its lowest setting there by showing a viable voltage at the battery terminals; this should meet the minimum viable voltage for most chargers so they will begin charging the battery.

The charge pulse can be configured to turn on at the interval specified by the user, e.g. if a 1 hour interval is set than every hour the battery will enable the discharge mosfets and lower the LVC to its minimum value so that the battery shows a viable voltage for the charger, however, if no available charging apparatus is available than after 30 seconds the battery will disable the discharging mosfets and restore the minimum SOC and LVC settings. It will then try again the next hour to see if a charging source is available.

NOTE: Charge Pulse is only available if the minimum SOC is set to at least 10% and the LVC voltage is at least 10.8v, if these settings are lower than this then charge pulse will not be available. Changing the LVC or minimum values below the minimum required will disable the Charge Pulse feature.



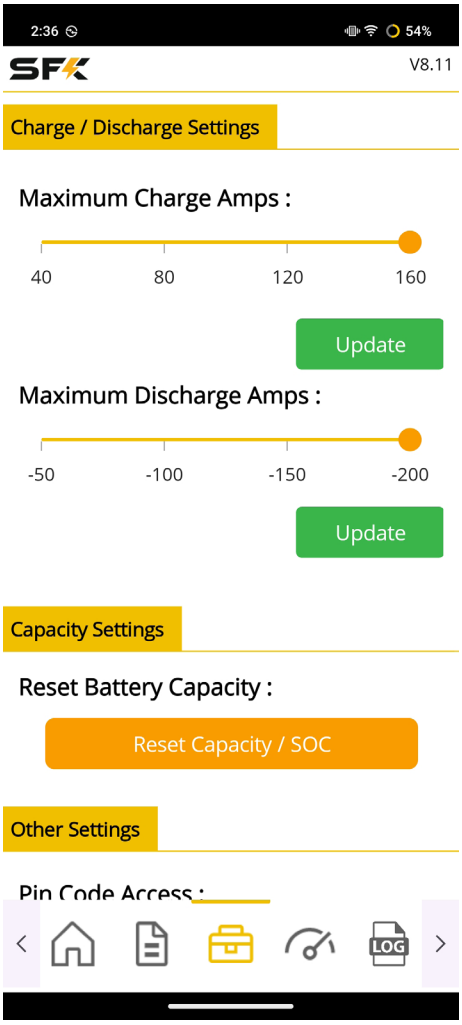
Active Balancer:

The 315EX and 315EX+ feature active balancing which is crucial for maintaining balanced cells in your battery. On page 18 we explain the 3 modes of Active Balancing on the 315EX battery, the 315EX+ uses an enhanced balancing mechanism which gives users greater control over how the Active Balancing system works. The 315EX+ also has the ability to change these options in the SFK BMS app instead of having to interact with the onboard Gen 2 B switch as is the case with the 315EX.

The active balancing system can be turned on or disabled; if it is turned off, only passive balancing is used and balances the cells at 150 mah of current. If active balancing is enabled, the Activation Voltage setting sets the voltage at which the system will turn on balancing; when all cells in the battery fall below this value then the system is deactivated.

The Voltage Deviation Limit works in a similar manner, it sets the maximum voltage deviation among the cells in the battery, as long as the voltage deviation is within limits the active balancing system will remain off, however, once the voltage deviation exceeds this limit the active balancing system engages balancing.

NOTE: For active balancing to work both conditions must be true, e.g. if the activation voltage matches the cell's voltage, however, the deviation among the cells is within limits then active balancing will remain off. In other words, the active balancing system will not turn on unless it really needs to. Users can adjust these thresholds as needed to optimize their balancing strategy.



Maximum Charge Amps:

This setting allows you to adjust the maximum amperage going into your battery during charging. This setting can be useful if your setup is using higher gauge wiring or you do not want to overload your charging apparatus. **NOTE:** This will not "throttle" the charge speed, instead if the battery detects incoming amps exceeding the setting; it will turn off charging for about 30 seconds.

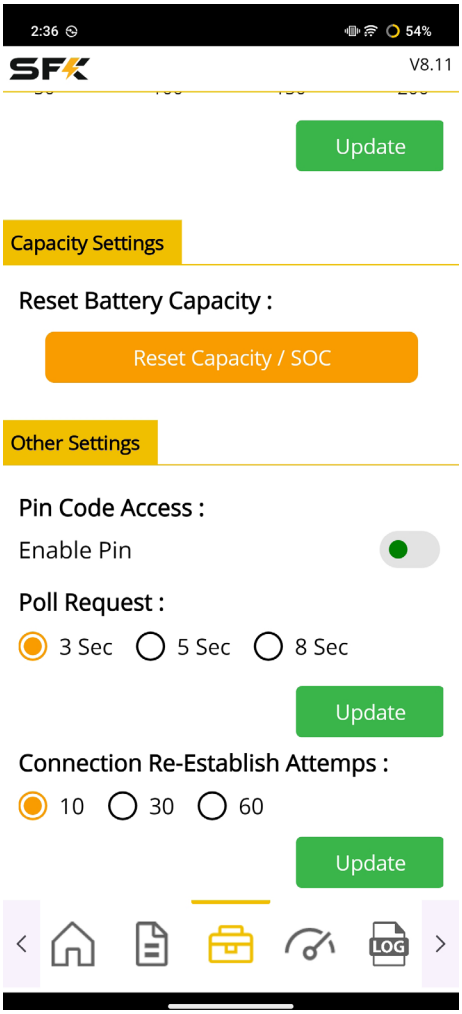
Maximum Discharge Amps:

This setting can be very useful in ensuring you do not overload your battery setup or devices. The range for the SFK315EX/EX+ is between 40 to 200 amps, you can set a lower setting if you want to limit the output power of your battery. **NOTE:** This will not "throttle" the battery output, instead it will disable battery output if you exceed the setting selected for about 30 seconds.

Reset Capacity:

If you notice that the state of charge of your battery seems to be off (e.g. it is reporting a higher percentage than it should or perhaps a lower percentage), you can use the reset capacity button to re-calibrate the SFK315EX/EX+ SOC meter. **NOTE:** This should only be done on a fully charged battery where each cell is reading 3.50 volts or higher (3.6V or higher is the ideal setting) and the battery is in standby (i.e. not being charged or discharged) mode.

NOTE: When performing a reset capacity, you will automatically reset the LVC to **10.8v** and Maximum SOC values to **Normal**.



Pin Code Access:

The SFK315EX/EX+ battery has Bluetooth functionality that is great for monitoring and making adjustments to your batteries operation, however, this information is freely available to anyone that downloads the Sun Fun Kits BMS management app. In order to secure this information and access, we recommend setting up a PIN code for your battery. The pin code is a 6 digit numerical code that is user definable and is required to make a connection to the battery once enabled. To set up the pin, enable the option in the app and confirm it, then select update.

EXTREMELY IMPORTANT do not forget your pin, if you lose your pin you will may need to send your battery back to Sun Fun Kits to unlock your battery.

You also have the option to disable the pin code; once updated, the app will no longer request a pin code to grant access to battery information.

Connection Re-Establish:

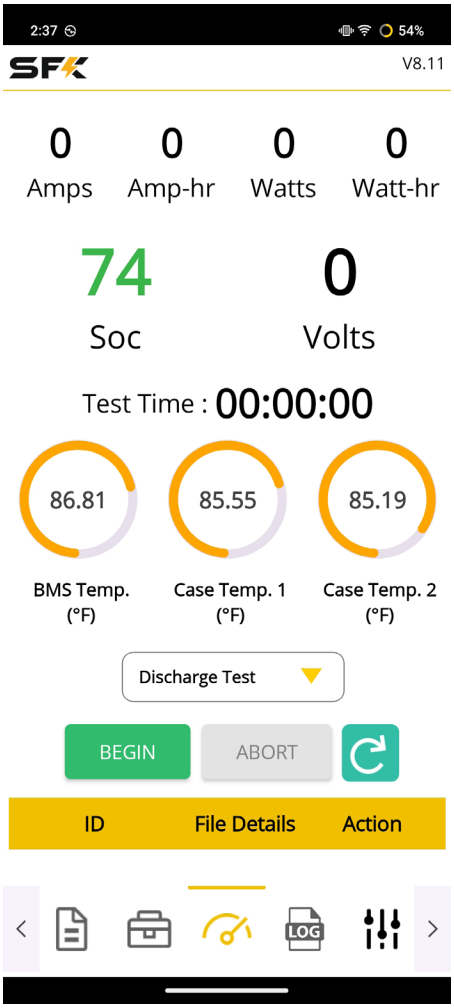
BLE or Bluetooth Low Energy is a very energy efficient technology, however, it comes with some downsides such as limited range and signal quality. Because of this, it is possible that connection to your battery may get interrupted. If this were to happen the app will attempt to automatically reconnect to the battery.

Connection Re-Establish Attempts: menu option specifies the maximum number of attempts the app will use to reconnect to your battery in case of a lost connection. Once the maximum number of attempts expires it will no longer try to connect to your battery and you will need to close the app and re-launch it to connect.

Poll Request:

The poll request option specifies the number of times the app will contact your battery for updates. The lower the number, the more frequent the updates; the higher the number the less frequent. If you are experiencing connectivity issues you can adjust the poll rate request as needed to establish a stable connection.

Benchmark Tab

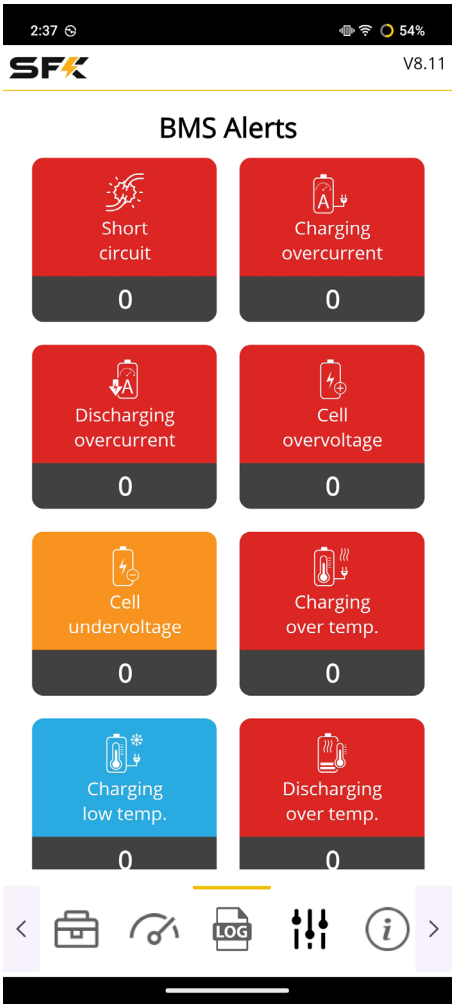


Discharge & Charge Test:

The benchmark tab includes various self diagnostic tests for your battery. Initially a Discharge and Charge test are available which will allow you to perform a capacity test on your battery and find out the available kWh and AH of your battery pack. Each test will inform you of the requirements needed to complete the test, however, the device running the benchmark will require a power supply to run as most of these will need 5-9 hours to complete. An Android based tablet is the recommended device for most tests.

You can view the results on your device, or upload them to the Sun Fun Kits' website to share with SFK technicians or your friends.

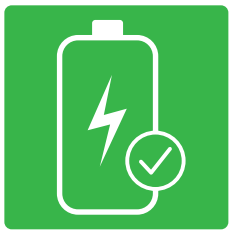
Bms Alert & Error Log



The logs tab will show you a summary of alerts & errors generated by the BMS inside your battery. This tab can help diagnose recurring issues you may be experiencing. **NOTE:** not all alerts are considered to be issues, it is common to see **Cell & Pack overvolt** alerts as this happens every time your battery is charged, however, serious errors such as **Short Circuit or IC Error** can lead to issues that would need to be addressed to avoid damage to your battery.

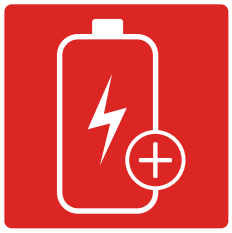
Please see page 43-46 for details on what each alert or error represents.

Bms Alerts



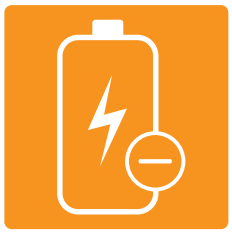
Cell Condition Normal

This symbol indicates that the battery is in normal condition and is operating optimally.



Cell Overvolt

Disables charging if the voltage of any cell exceeds 3.65. Charging is re-enabled when the cell's voltage falls to 3.5.



Cell Undervolt

Disables discharging if any cell's voltage drops below 2.5 - 2.9 volts (depending on the settings in tools). Discharging is re-enabled when the cells voltage rises to 3.0 volts.

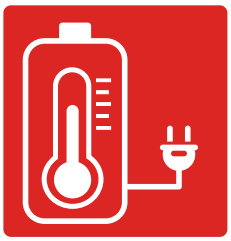
Pack Overvolt

Disables charging when the battery reaches 14.6 volts (based on the setting in tools). Charging is re-enabled once battery voltage drops to 14.0 volts.

Pack Undervolt

Disables discharging if the battery's voltage drops below 11.6 - 10.0 volts (configurable in tools). Discharging is re-enabled when battery voltage reaches 12.0 volts.

Bms Alerts

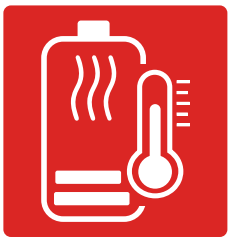


Charge Over Temp

Battery temperature exceeded the high temp threshold (130° F) during charging. Charging will be enabled once internal temperature falls below 115° F.

Charge Under Temp

Battery temperature is below the threshold (34° - 55° F) while charging. Heating pads will turn on and charging will be re-enabled once internal temperature rises above 40° - 60° F.

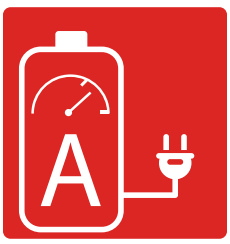


Discharge Over Temp

Discharging is disabled as internal temperature exceeded the high temp threshold of 130° F. Discharging is re-enabled once internal temperature falls to 115° F.

Discharge Under Temp

Discharging disabled as internal temperature is below freezing, discharging will be re-enabled once internal temperature is above freezing. This can be overridden in tools which will lower the discharging temp threshold to -10° F.



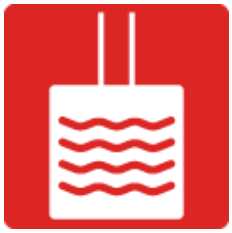
Charge Over Current

Charging will become temporarily disabled as charging amps exceed the threshold set in the tool settings.

Bms Alerts

SOC Limit

If you have set an upper soc limit of less than 100% or a lower soc limit above 0%, you will see a SOC Limit alert to you that either the upper or lower limit has been reached.



Heating Pad

Any time the heating pad mosfets are enabled, the bms will inform you that they are running with the heating pad alert. This includes situations where the battery is warming the cells or if you are running a heating pad test.

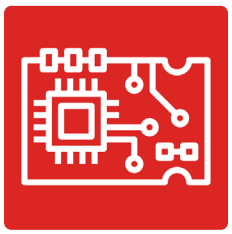
Bms Error Alerts

Discharge Over Current

Discharging will become temporarily disabled as discharging amps exceed the threshold set in the tool settings.

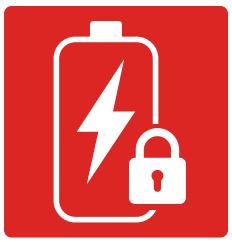
Short Circuit Error

The SFK BMS has detected a short circuit. Check wires and correct immediately to prevent BMS damage. Charging / Discharging functions will be disabled until the short circuit has been corrected.



Front-end IC Error

This is a hardware error, please contact Sun Fun Kits Techs to request repair service for your battery. You can also submit a ticket online: https://www.sunfunkits.com/app/support



Charge / Discharge Lock Error

This error may happen due to connection problems or repeated charge / discharge errors. Generally this error will happen due to inverter compatibility / configuration problems. To correct this error, you will need to go to the tools tab and manually enable discharging & charging (**NOTE:** if the SOC of the battery is full or depleted then you may not be able to enable both until the SOC is between 10-90%).

Please contact the manufacturer of your equipment to find the best settings for SFK / Lithium batteries.

315EX+ Enhanced Alerts & Log

The SFK315EX+ enhances the logging system has been expanded to record the battery's condition and usage to provide users with a long term view on it's health and performance. Below are a list of parameters that are stored by the EX+ battery exclusively:

No. of days since full charge calibration:
Stores the number of days since the battery was fully charged, in order to set this value the battery must be charged to 100% and each cell in the battery must have reached 3.5v at idle. Users should make sure their batteries are charged to 100% at least 4-6 times a year and preferably every 30 days to keep the battery's SOC gauge as accurate as possible.

No. of hours at high SOC:
Shows the number of hours the battery has been kept at a high state of charge (99% or more). Lithium batteries based on the LFP chemistry should not be kept at a high state of charge for an extended period of time as it can shorten the expected usage life.

No. of hours at low SOC:
Shows the number of hours the battery has been kept at a low state of charge (15% or lower). Lithium batteries based on the LFP chemistry should not be kept at a low state of charge for an extended period of time as it can shorten the expected usage life.

No. of hours at critically low SOC:
Shows the number of hours the battery has been kept at a critically low state of charge (3% or less). Batteries that are kept at this low state of charge may be permanently damaged, this condition should be avoided and batteries should be charged back up as soon as possible.

No. of hours at high temperature:

Shows the number of hours the battery has been kept in high temperature (100° Fahrenheit or 38° Celsius or higher). It is recommended to keep the batteries at around 70° Fahrenheit or 24° Celsius for the longest usage life.

No. of hours at critically high temperature:

Shows the number of hours the battery has been kept at very high temperatures (over 130° F or 55° Celsius). Batteries kept in this temperature range will exhibit rapid capacity loss and performance degradation.

No. of hours at low temperature:

Shows the number of hours the battery has been kept at low temperatures (40° Fahrenheit or 5° Celsius or lower), although this will not necessarily harm the battery, it will hinder its performance as lithium chemistries perform best at 70° Fahrenheit or 24° Celsius. **NOTE:** utilizing the battery's inbuilt heating system can prevent this condition.

No. of hours at critically low temperature:

This value shows the number of hours the battery has been kept at extremely cold temperatures (0°Fahrenheit or - 18° Celsius) can cause damage to your battery as it can lead to the electrolyte freezing. **NOTE:** utilizing the battery's inbuilt heating system can prevent this condition.

No. of hours in AMP Boost:

This value shows the total number of hours the battery has been used under Amp Boost. The SFK315EX/EX+ is designed for 125 amp continuous draw, while it is possible to run higher amps for long periods, thermal limitations will limit the battery's performance. If you find you are constantly in AMP Boost mode, you may consider adding an additional battery to get your per battery amp loads to under 125 amps.

Active Balancer:

The active balancer icon will appear under the BMS Alerts when the 315EX+ has active balancing turned on.

Regulate High SOC:

When the Regulate High SOC function is actively running this BMS alert will appear letting the user know this function is engaged.

Calibration Charge Recommendation:

On the 315EX+ if the battery has not been fully charged (both to full voltage and SOC) a BMS alert will appear letting the user know a full charge is recommended because the BMS SOC value may no longer be accurate.

Charge Pulse:

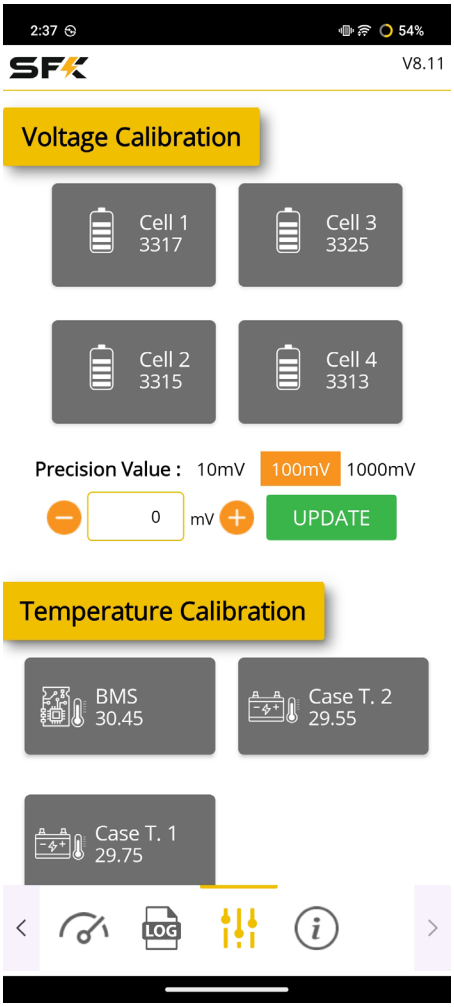
If Charge Pulse is active a BMS alert will appear letting the user know the battery has enabled the discharging mosfets so that chargers and other devices see a viable voltage.

SOC Calibration Required:

If the 315EX+ has not been fully charged for 30 days more a SOC calibration alert will appear letting the user know that the current SOC reading is inaccurate and should be relied upon. A full charge (both to full voltage and SOC) will be needed to show accurate SOC readings.

Calibration

The SFK315EX/EX+ is calibrated at the factory by Sun Fun Kits technicians during final testing, this includes values such as cell voltage readings , temperature probe readings, and shunt (amp) readings. If you find these readings are not matching up to your testing apparatus, they can be re-calibrated. **NOTE:** Accessing this menu requires an access code that is only available to Sun Fun Kits Dealers and Sun Fun Kits Techs, you must contact them to obtain the code in order to access this menu.



Voltage Calibration:

The voltage calibration menu allows you to adjust the voltage readings of the cells, this is normally calibrated from the factory, however, in case a deviation develops, the calibration menu allows you to adjust the readings between 2.5 - 3.65 volts.

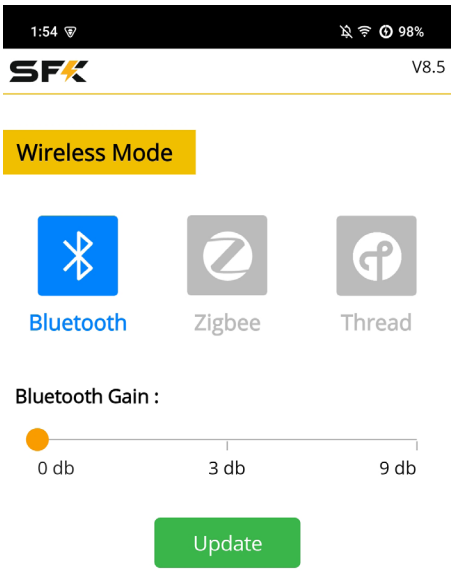
Temperature Calibration:

In case the temperature probes become out of spec and are not reporting accurate readings they can be re-calibrated in this menu. Please note calibration should be done around 70 degree Fahrenheit and the battery must have been in stand by for at least 2 hours.

Shunt Calibration:

The shunt is calibrated at the factory for both charging, discharging and idle. If you are detecting significant variation between what the app is saying vs what your own measuring device is, you may calibrate the shunt. You will need to perform 3 calibration for Idle, charging and discharging.

Wireless Mode



Wireless Mode:

The 315EX+ includes 3 wireless communication modes: BLE, Zigbee, and Thread. Settings for each of these wireless modes is available in the Network Tab icon. **NOTE:** You can only switch between wireless modes by clicking on the physical button on the GEN 3 A switch

Bluetooth:

The 315EX+ uses BLE (Bluetooth Low Energy) as its main communications protocol, users can change BLE related settings by selecting the Bluetooth Icon.

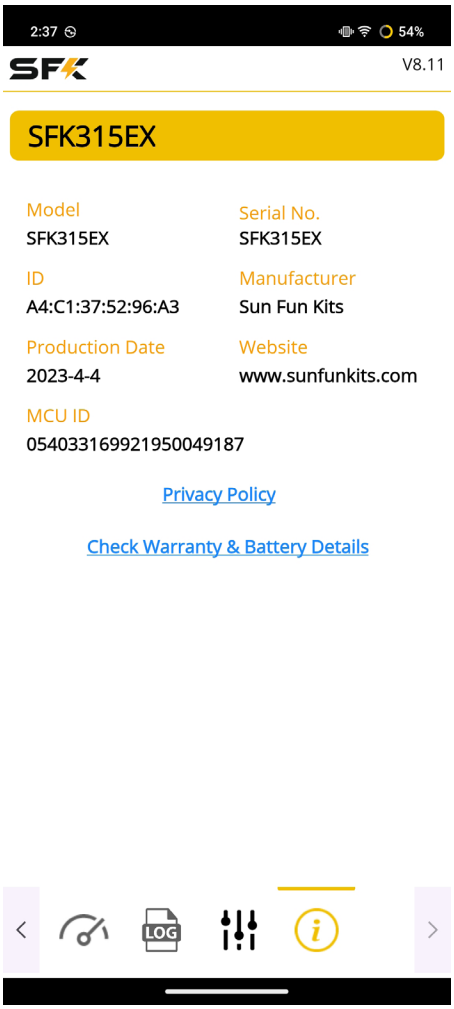
Zigbee:

Settings for Zigbee communications are available under the Zigbee button.

Thread:

Settings for Thread communications are available in the Thread button.

About Tab



About Tab:

The About Tab provides you information about your battery including important details such as the date it was manufactured, IDs and serial numbers (**NOTE:** some information may not be available on IOS devices). You can also view the warranty information of your device as well as the details for each of the four certified cells used in your battery by clicking on the battery information link, this will take you to the Sun Fun Kits website where you can view the details of your battery.

MCU ID:

The MCU ID is a unique 96 bit ID that is used to identify the micro-controller on the BMS, this information serves as a unique non-changeable identifier.

NIC ID:

This is the Network Card ID, (315EX+ Only).

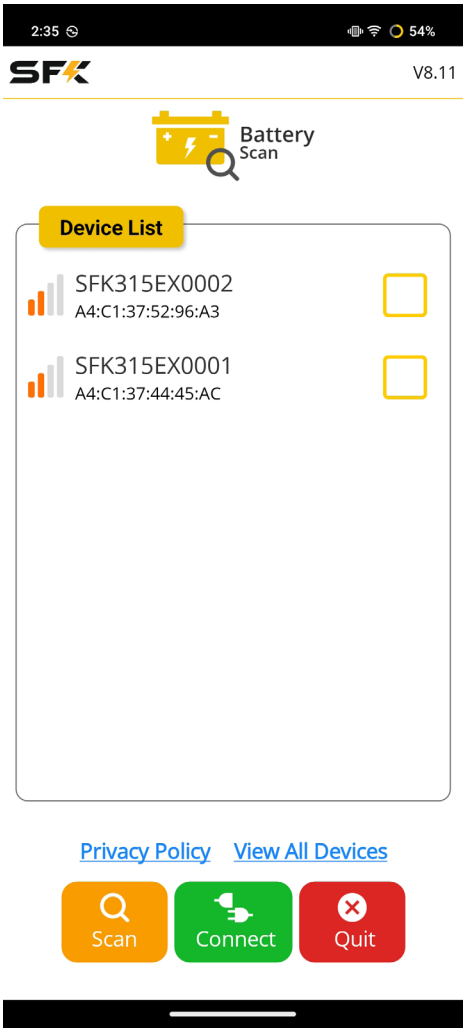
Firmware:

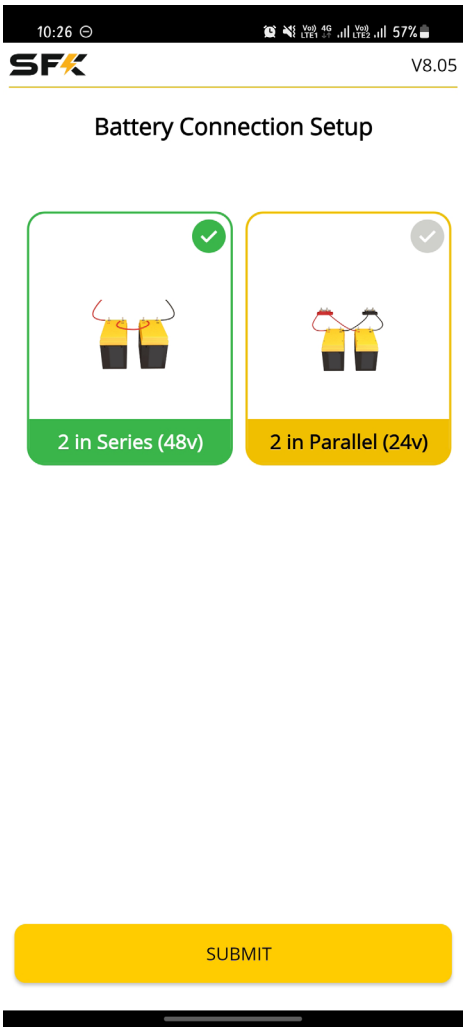
Depending on the date you purchased your SFK315EX/EX+ it may not have the latest firmware, if you notice some options are missing from the app, you may need to get updated firmware for your device. Sun Fun Kits will be releasing options to update the firmware, however, this requires the Data Port add-on as well as the official RS-485 Sun Fun Kits data cable to perform the update.

Multi-View

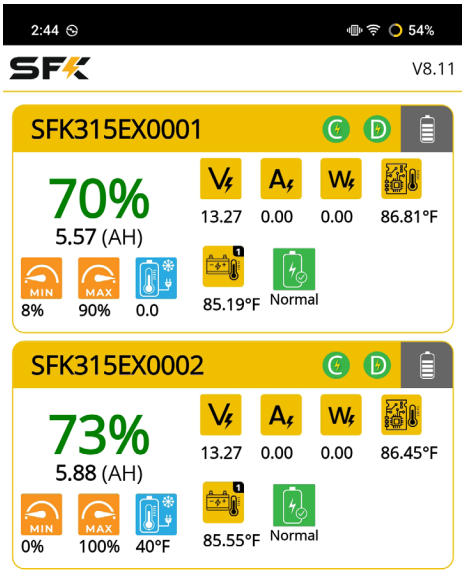
With Multi-View, the Sun Fun Kits BMS app allows you to simultaneously view up to 6 devices. Multi-View will also show the combined amp and watt output of your batteries.

NOTE: when connected in multi-view, many details such as tools and device details will not be available; if you need to view this information, you will need to go back to the scan menu and only select a single device to connect to.



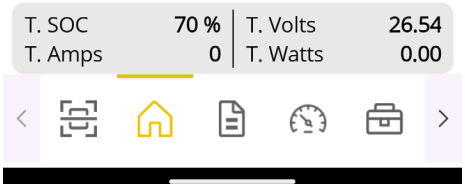


Once you have selected the batteries to connect to (maximum of 6), you can then inform the app on how you have them connected (e.g. in parallel, series, or parallel & series). This will then display information to you regarding the voltage levels, amps, and approximate state of charge of the batteries as a combined bank.



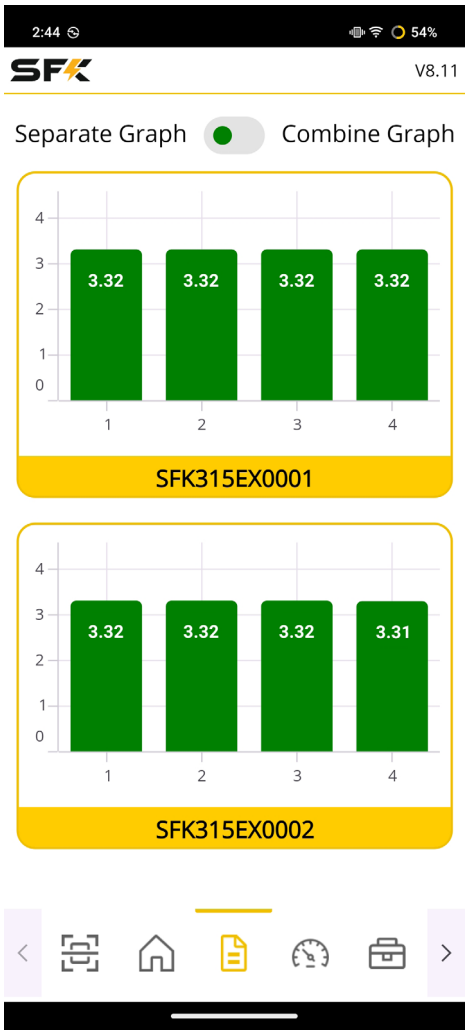
The Multi-View system allows you to view up to 6 batteries simultaneously. Here you can view a condensed version of information that is normally available when you connect to a single battery at a time. Due to space constraints some information is not displayed or has been truncated to fit on screen. For users that plan on using the multi-view functionality on a regular basis, a dedicated device such as an Android tablet is recommended as it will have a higher power BLE antenna and range which will assist in keeping a connection active with up to 6 batteries.

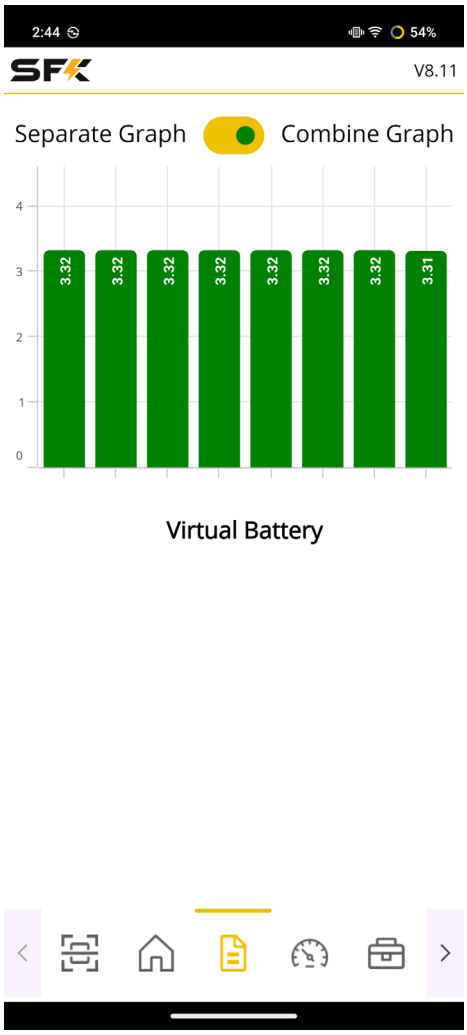
A summary of the combined **SOC** (state of charge), total volts, total amps, and total watts is displayed on the gray overlay summary bar which will give you a snapshot of your connected battery bank.



NOTE: You will notice some information is displayed only as icons, we explained what the **C** and **D** icons mean on page 31.

Multi-View Details & Tools Tab





When connected to Multi-View you will notice various options that differ from the single view. Here you can analyze information that represents all of your connected batteries as a single bank.

The details tab will display information for your cell voltages per pack, or you can view them together in a single large graph. This is useful to ensure all of your cells are balanced and are working properly as well as able to hold voltage under load.

NOTE: For devices connected wirelessly the graph can show up to 4 connected batteries or up to 16 cells.

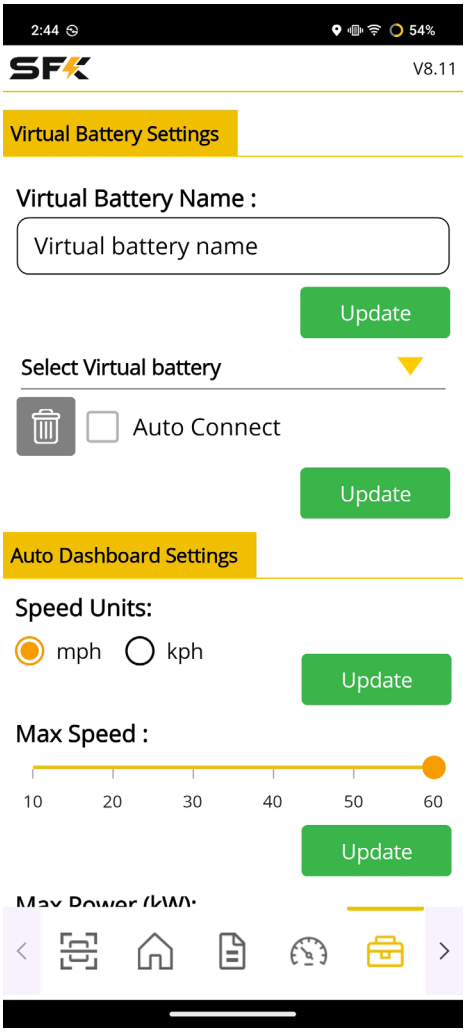
Auto Dashboard

When the SFK315EX/EX+ is used in a small UTV or golf cart, customers can utilize the Auto Dashboard which will allow them to see a condensed view that will show the speed, state of charge (shown as a fuel pump icon), power output, and battery temperatures.

The units or the legend of the auto dashboard can be adjusted in the multi-view tools tab, here users can select the range for power output, set the maximum speed of the gauges, as well as select between MPH or KPH units.

NOTE: Location services and a GPS enabled device is needed to use the Auto Dashboard; not all operating systems will update in the same manner so GPS performance may vary depending on the device running the app.

The Auto Dashboard supports up to 4 connected batteries.

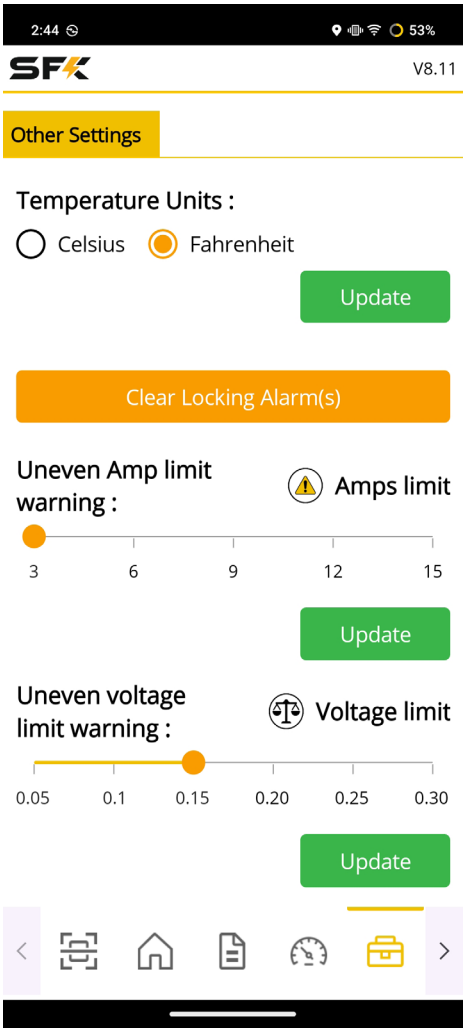


Virtual Battery Settings:

Multi-view supports saving battery configurations as virtual batteries. Virtual batteries are a quick way to reconnect to a configuration you have set up, e.g. if you have 2 batteries in parallel 12v, you can now save them as a virtual battery in the app. Once saved you will see this battery appear in the scan screen, selecting it will connect to both batteries along with the correct wiring configuration.

You can set a name for your virtual battery so it's easier to manage in the app, this can also be set to auto connect when the app launches. Should you have separate banks; you can create more virtual batteries as needed.

NOTE: Batteries can only be connected to a single Bluetooth device at a time, please make sure no other device has an active Bluetooth connection to the battery before trying to connect or the connection may fail.



Temperature Units:
Temperature units control how the temperature is displayed in multi-view. You can select between Celsius or Fahrenheit.

Uneven Warnings:
When connected to multiple batteries or a virtual battery, the SFK BMS app can inform you if deviation is detected in the amp draw or voltage among the batteries; should this happen a warning icon or balance icon will appear flashing letting you know of this condition. Users can select the deviation limit of either amps or voltage via the slider switch.

NOTE: this setting serves only as an indicator of the deviation, it will not have any effect on the functionality of the battery.

APP LINKS:

You can find the Sun Fun Kits BMS app on your device's app store; if you are having difficulty, use the links below to go directly to the device listing:

Sun Fun Kits BMS App for Android devices (Tablets & Smartphones):
https://play.google.com/store/apps/details?id=com.companyname.sfkble&hl=en_US&gl=US

Sun Fun Kits for Apple IOS Devices (Tablets, Smartphones, and other Bluetooth enabled devices):
https://apps.apple.com/us/app/sun-fun-kits-bms/id1600445506?uo=4&at=1000l5Zh

10 Year Warranty

Sun Fun Kits guarantees purchases made from its website or authorized retailers are free from manufacturer defects and will repair or replace battery and kits that fail to meet specifications at our discretion within the warranty period. Warranty is only offered to the original purchaser and will require a warranty transfer to any user that the battery has been sold to thereafter by the end user (limited to a maximum of 1 transfer). Warranty details are explained below:

SFK-315EX/EX+ 8 Year 60/96 Warranty

The extended 60/96 warranty provides free repair/replacement of items for the first 60 months, and a prorated repair/replacement for the remaining 36 months. This warranty also guarantees a minimum of 80% battery capacity retention for a period of 96 months. After approximately 1500-2000 cycles customers can expect between 80-70% of the original rated capacity. Capacity is measured based on the amp-hour rating of the battery for warranty purposes at a .2C discharge rate.

10 Year Dealer Installed 60/120 Warranty (Pre-Built Batteries): Customer who have batteries installed at authorized dealers shall receive an additional 2 years of warranty coverage (a total of 10 years on HP & EX models and 7 years on MH and S models) The Dealer Installed 60/120 warranty provides free repair/replacement of items for the first 60 months, and a prorated repair/replacement for the remaining 60 months. This warranty also guarantees a minimum of 70% battery capacity retention for a period of 120 months. After approximately 1500-2000 cycles customers can expect between 80-70% of the original rated capacity. Capacity is measured based on the amp-hour rating of the battery for warranty purposes at a .2C discharge rate.) Proof of purchase is required (receipt) for warranty redemption.

EXCLUSIONS

Improper Installs

Damage resulting from improper installs are not covered under warranty, this includes (but is not limited to) short circuits, reversed polarity damage, not placing the battery upright, excessive moisture, temperatures that exceed OEM thresholds, improperly installed terminal cables, poor ventilation, and excessive vibration.

Modifications to electronic components

Customer agrees not to perform modifications to battery cells, bms components, case mounting, or any other change that alters the OEM specifications. Doing so will void the warranty.

Changing BMS parameters with unauthorized tools

Customer agrees to only use official Sun Fun Kits software tools made for IOS / Android / Windows to manage battery systems, the use of unauthorized software tools will void the warranty.

Using battery in non-approved applications

Customer agrees not to use battery & components in automotive operations such as using it as an engine starting power source (CCA applications), high power applications that exceed 5000 watts total output, subjecting battery & components to unreasonable tests that do not represent real-world scenarios (e.g. putting battery in a cold freezer or oven), using the battery as a power source for DC arc welding. These and other non approved scenarios will void the warranty.

Physical damage and neglect

Customer agrees any physical damage to the battery systems and components (such as dropping the battery, impaling the battery, submerging the battery in liquid) will result in voiding the warranty. Customer furthermore agrees subjecting the battery systems and components to environmental factors that exceed OEM thresholds (exceeding rated temperature limits, charge/discharge watt limits) will result in voiding the warranty.

Failure to maintain battery

Customer agrees to perform proper maintenance on the battery. This includes ensuring cycling the battery at least once every 4 months when not in use and ensuring the battery has a 50% or greater charge when kept in storage. Keeping the battery at less than 15% charge for an extended period of time will damage the battery and will void the warranty. Battery and kits must not be exposed to temperatures greater than 110° Fahrenheit or lower than 20° for an extended period (greater than 4 hours) NOTE: Sun Fun Kits BMS system keeps an internal log and Sun Fun Kits technicians can determine if proper maintenance was not done.

Legal Information

Sun Fun Kits LLC DBA Sun Fun Kits offers its products with the terms, conditions and notices as follows: The following terms and conditions apply to all sales and uses. Please review carefully. These terms and conditions include limited warranties and disclaimers of liabilities. Keeping, using or allowing use of Sun Fun Kits products indicates your agreement to these terms. By checking “Agree” on our website at checkout also constitutes your agreement to these terms.

Terms of use

This product is offered to you conditioned upon your acceptance without modification of the terms, conditions, and notices contained herein.

Use limitation

You may not modify, copy, distribute, transmit, display, perform, reproduce, publish, license, create derivative works from, transfer, or sell, any information, software, products or services obtained, from Sun Fun Kits’ website or its products.

Level of Risk

Lithium batteries, Inverters, high powered DC/AC devices, and apparatus sold by Sun Fun Kits can be associated with a high level of risk and may pose risk of serious physical injury, burns, disability and/or death. Users of our products choose to do so at their own risk.

Assumption of Risk

By buying, using, or allowing the use of Sun Fun Kits’ products, you understand and agree that the nature of high powered devices can be associated with a high level of risk and, to the extent permitted by law, YOU EXPRESSLY AND VOLUNTARILY ASSUME THE RISK OF DEATH OR OTHER PERSONAL INJURY

SUSTAINED WHILE USING OUR PRODUCTS, WHETHER OR NOT CAUSED BY THE NEGLIGENCE OR OTHER FAULT OF Sun Fun Kits, including but not limited to equipment malfunction from whatever cause, or any other fault of Sun Fun Kits. Additionally, you agree to indemnify, defend, and hold Sun Fun Kits harmless from any third party claims arising from such High Risk Uses, or any use or misuse of our products.

Limitation Of Liability

As set forth above under the limited warranty provisions, Sun Fun Kits' liability is limited to repair or replacement of its products which are returned to it in the specified period of time. In no event shall Sun Fun Kits; liability exceed the value of the product(s) sold. In no event shall Sun Fun Kits' be liable for any direct, indirect, punitive, incidental, special or consequential damages whatsoever arising out of or connected with the use or misuse of any of its products.

Warning

Use and misuse of products sold by Sun Fun Kits involves serious risks including injury, disability and death. Purchasers assume all risks. Inspect before each use. This product must be inspected for use to ensure it has not been damaged in shipment. If damaged, do not use and immediately return the product to Sun Fun Kits for a replacement.

Entire Obligation

The PRODUCT LIABILITY DISCLAIMER document states the entire obligation of Sun Fun Kits with respect to the products. If any part of this disclaimer is determined to be void, invalid, unenforceable or illegal, including, but not limited to the warranty disclaimers and liability disclaimers and liability limitations set forth above, then the invalid or unenforceable provision will be deemed superseded by a valid, enforceable provision that most closely matches the intent of the original provision and the remainder of the agreement shall remain in full force and effect.

Applicable Law

Any and all disputes or claims relating in any way while using your Sun Fun Kits products or services will be resolved by arbitration rather than in court by the American Arbitration Association (AAA). Either party Sun Fun Kits or the customer may initiate the claim. Claims may also be asserted in East Baton Rouge Parish Small Claims court if the claim is within small claims court limits.

Arbitration awards are limited, however, an arbitrator can award on an individual basis the same damages and relief as court (including injunctive and declaratory relief or statutory damages). To request arbitration you will need to submit in writing via certified mail to: **Arbitration Request - Sun Fun Kits 11636 Industriplex Blvd, Baton Rouge, LA 70809**.

You will need to accompany your request with a demand letter detailing your complaint. You will then need to contact the AAA by visiting www.adr.org and file the initiation fee. Sun Fun Kits will reimburse these fees to you if the arbitrator(s) finds in your favor, however, if the arbitrator(s) finds in Sun Fun Kits favor then no fees will be reimbursed. Both parties agree that they will be responsible for their own attorney fees regardless of the decision by the arbitration process. All ongoing arbitration fees will be split between the customer and Sun Fun Kits evenly (50% by each party) after the initial filing fee to start arbitration.

The venue of arbitration proceedings shall be within East Baton Rouge Parish; you may also request to have arbitration done via phone conferences or via web/video meeting online. East Baton Rouge Parish Small Claims court awards are limited to $5,000.00 and do not require an attorney, however, you will be required to file your claim as well as present your case in person for a resolution. If you wish to proceed with a small claims court claim you may contact the East Baton Rouge Parish Small Claims Court by visiting: https://www.brla.gov/319/Civil-Suit-Interactive-Forms

Modifications To Terms

Sun Fun Kits reserves the right to change the terms, conditions, and notices under which it's products are offered at any time.

Test Report & QR Code

Technician Notes:

Share with us

twitter.com/sunfunkits

Share a photo of you new SFK battery in action!
Tag @sfkbattery and use #sunfunkits

SFK

Sun Fun Kits LLC
11636 Industriplex Blvd
Baton Rouge, Louisiana,
70809
United States of America
1-225-289-6525
www.sunfunkits.com
cs@sunfunkits.com

ASSEMBLED IN THE **USA**

Engineered & Designed in the USA

RoHS 2002/95/EC

CE FC

FCC ID: QDS-BRCM1078

Bluetooth™

sunfunkits.com