

Sun Fun Kits V5 24v Quick Build Manual

Revision 1.0



Before you Begin:

Thank you for purchasing your Sun Fun Kits V5 24 volt DIY heated battery kit, diy battery kits make assembling your battery quick and easy and only require basic tools and hardware to assemble. We recommend having a basic understanding of DC wiring in order to assemble your battery pack and you will also need the following tools:

- Hex driver set: 3mm, 4mm, 5mm, and 8mm
- Insulated drives for securing bolts
- Thread locking compound (such as blue Loctite)
- Kapton or PET tape 1" to 2" in width
- Double Sided Sticky tape
- Velcro style loop
- DC Voltmeter
- Standard scissors
- 90% isopropyl alcohol.
- Adjustable DC Power Supply that is able to charge up battery cells (3.65 volts, 20 Amps) if manually balancing or standard 28.8v to charge the battery.
- 300-400 grit sandpaper
- 6mm and 10mm Inner diameter spiral wrap for cable management.

Optional:

- Electrical Safe Silicone sealant (for those looking to make a water resistant battery)
- Hot glue gun (if you wish to secure wires using this method)





Preparing your battery cells:

In this manual we will be using the Ruipi REPT 150 cells, the kit has these cells picked and pre-installed for you with the heating pads and center fiberglass separators already installed.

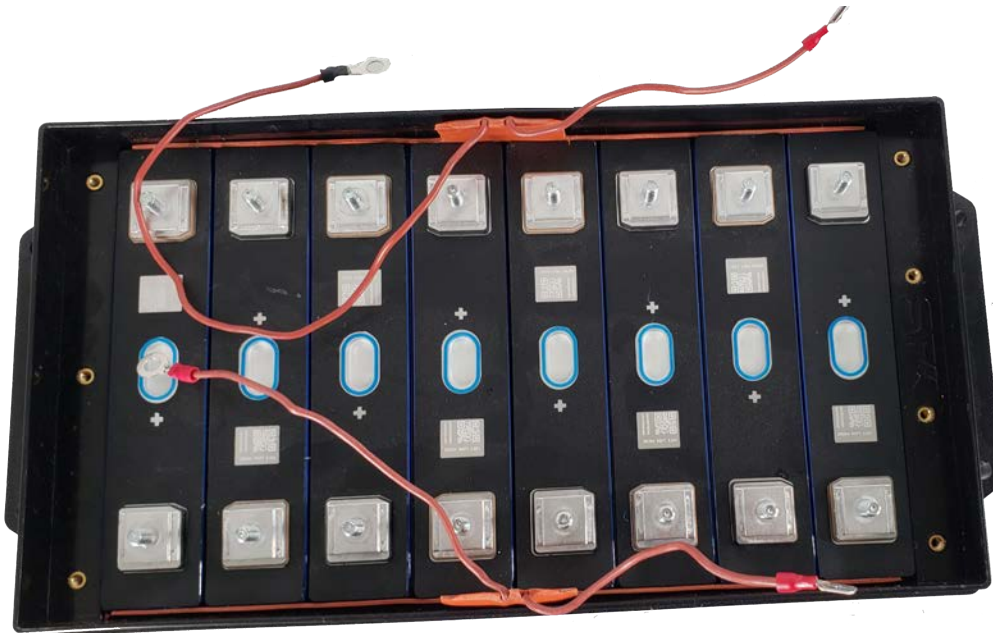


In the V5 24v kits we are using thin .15mm fiberglass separator sheets to keep our cell bank as thin as possible. This step has already been done for you, the pictures below show how the pack is arranged before it is installed.



We are using dual heating pads in a 24v configuration and these are attached to the sides of the cells to provide for adequate battery heating.

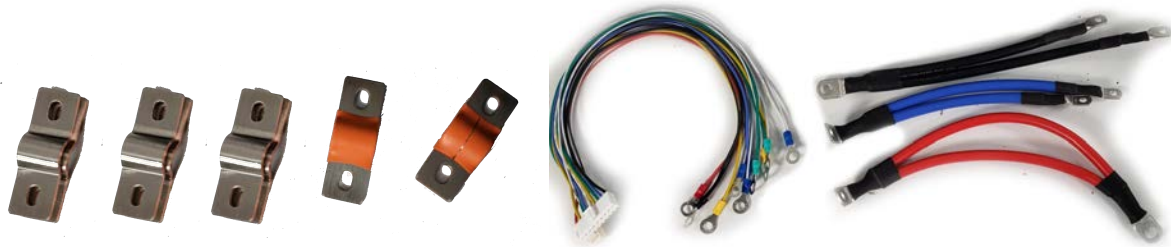
The completed battery block can be removed from the kit should you need to perform service, we also ensure the polarity has been set up properly.



The image below shows how the kit will arrive. Notice the 24v main mounting point is considerably different from the 12v kits, however, the mounting of the rail points remain the same.



Please take note of the cell orientation and ensure it matches the image above, if you find it does not, **STOP the build and contact Sun Fun Kits Immediately.**



The V5 24 volt kit uses flexible busbars, these include a small heat shrink wrapping on them and needs to be removed to ensure proper contact with the larger terminals on the REPT 150 cells, use a utility knife to cut the heat shrink and remove it. V5 kits have pre-cut and crimped bms/active balancer wires as well as the main power leads to connect the cells to the BMS.

Note: Before beginning this step it is EXTREMELY IMPORTANT that you clean and wipe down all of your bus bars, washers, terminals and battery post with 90% isopropyl alcohol. Dirty terminals and connections will result in improper readings and poor results.



Begin by placing your bus bars in the orientation shown below, you DO NOT need to put a washer on top of the bus bars with the combination harness as it is using a large lug connector which acts as a washer, but you may put a washer on the posts that do not have a balance lead attached to it.



Now you will add your series terminals and BMS balancing/monitoring wires as well as the active balancer wires (NOTE the initial negative post; and the final positive post are shared between both the active balancer & BMS, all other posts may be separate for each cell). Secure using the included M6 Nylon insert nuts and tighten to 4-6 N/M.



NOTE: The main power wires have a 90 degree bent lug, these attach to the cell.

Note: CAUTION! In many prismatic cells the positive terminal is colored black and the negative terminal is colored brown! Please double check your cells with a volt/multimeter before continuing. THE BLUE WIRE SHOULD NOT TOUCH THE POSITIVE TERMINAL OF THE FIRST CELL OR IT WILL ARC AND DESTROY THE CELL.

Verify your voltages using a volt/multi-meter

Double black wire (black lug) = cell 1 negative (0.00 Volts)
1st double white wire (blue lug) = cell 1 positive / (3.3 Volts)
2nd white/green wire (green lug) = cell 2 positive / (6.6 Volts)
3rd white/yellow wire (yellow lug) = cell 3 positive / (9.9 Volts)
4th double white wire (blue lug) = cell 4 positive / (13.2 Volts)
5th white/blue wire (blue lug) = cell 5 positive / (16.5 Volts)
6th white/green wire (green lug) = cell 6 positive / (19.8 Volts)
7th white/yellow wire (yellow lug) = cell 7 positive / (23.1 Volts)
Double Red wire (red lug) = cell 8 positive (26.4 Volts)

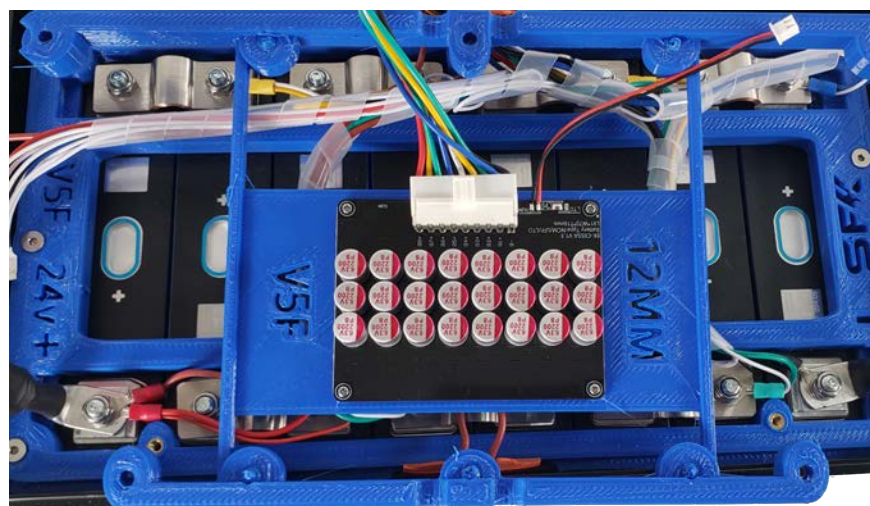
You will need to ensure a tight fit, take care not to strip your battery terminals, if you are using a torque wrench you will want to tighten down to 4-6 NM. **WARNING!** Loose terminals will cause the cells & batteries to fail.

The heating pads share the main positive of cell 8. You will want to make sure the heating pad lug sits on top of the bms/active balancer lug. The negative (black lug) of the heating pad will connect to the HT port on the BMS. Once the wires have been connected we can then perform some cable management using some spiral wrap.



Installing riser and BMS mounting plates:

After you have verified that your cells are mounted correctly **AND VERIFIED** they have correct voltage readings, you can now begin mounting the BMS and other related electronics. Begin by mounting the riser plate by first inserting the active balancer connector into the balancing unit and then rotate it so that it matches the mounting holes on the main kit plate:



Secure the top riser plate with 5x M4x20mm countersunk bolts. We recommend only using hand tools for this process.



After this process we will now install the BMS plate. You will use 5 of the M4x16mm button head screws with a washer to secure the plate to the riser. With version 5 all bolts are now exactly the same.



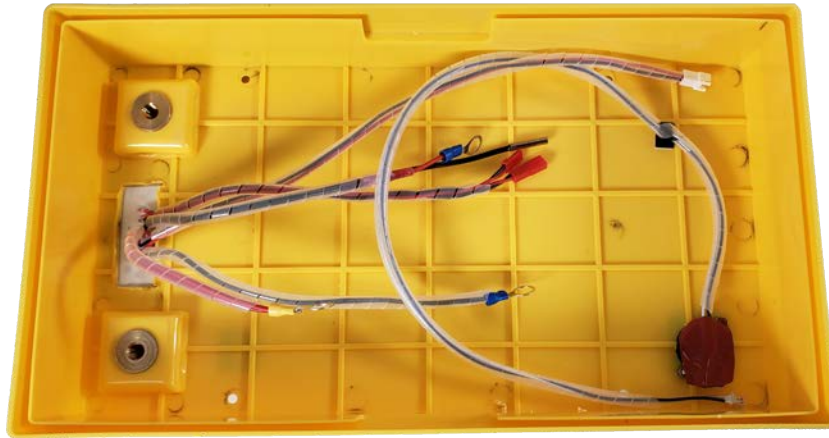


You can place some of the stick on wire keeps as needed, this will assist in securing wires used by the Gen 2 I/O switch. The SFK-8S-100 BMS includes 2 external temp probes, these can be mounted in the positions of your choice, use the included stick-on wire keeps as well as Kapton tape to mount them into position. Also included is a high temp thermal disconnect that may be mounted near the 8th cell.



NOTE: Make sure the balancing lead is **NOT** connected to the BMS! This will be inserted in a later step.

Examine the underside of the LID. V5 kits include the option of a RS-485 Data port that uses a RJ45 connector. The SFK-8S-100 BMS is set up to use half-duplex transmission mode and uses PINS 1 & 2 of the connector as RS-485B and RS-485A wires respectively. Also included are power transmission cables for the Bluetooth adapter that allow V5 kits to hard cut power to the bluetooth dongle thereby turning off BLE functionality.



Also of note is the active balancer control that allows the GEN2 switch to configure how the active balancer will function in the kit (it can be set to ON the entire time (**blue light**), ON only during periods of high voltage or near fully charged (**green light**), or it can be disabled where only the standard passive balancer of the BMS will manage the cells).

Setting Up Electronics & Cell wiring:

Version 5 24 volt kits come exclusively with the SFK-8S-100 AMP Smart BMS with Dual Mode Heating, meaning that heating can be turned on manually via the GEN2 I/O switch, or is done automatically when the battery detects low temperature and the user attempts to charge the battery.

During the injection molding process some residual abs material may have gotten deposited onto the main brass conductor rings, these need to be cleaned. Using 300-400 grit sandpaper, gently scrub the conductor ring until all traces of residual abs plastic are removed.



Once cleaned, use isopropyl alcohol to wipe clean and then begin to attach the main BMS and cell wires. You will attach the main negative (black wire) harness to the lid and then begin attaching the remaining wires to the battery.

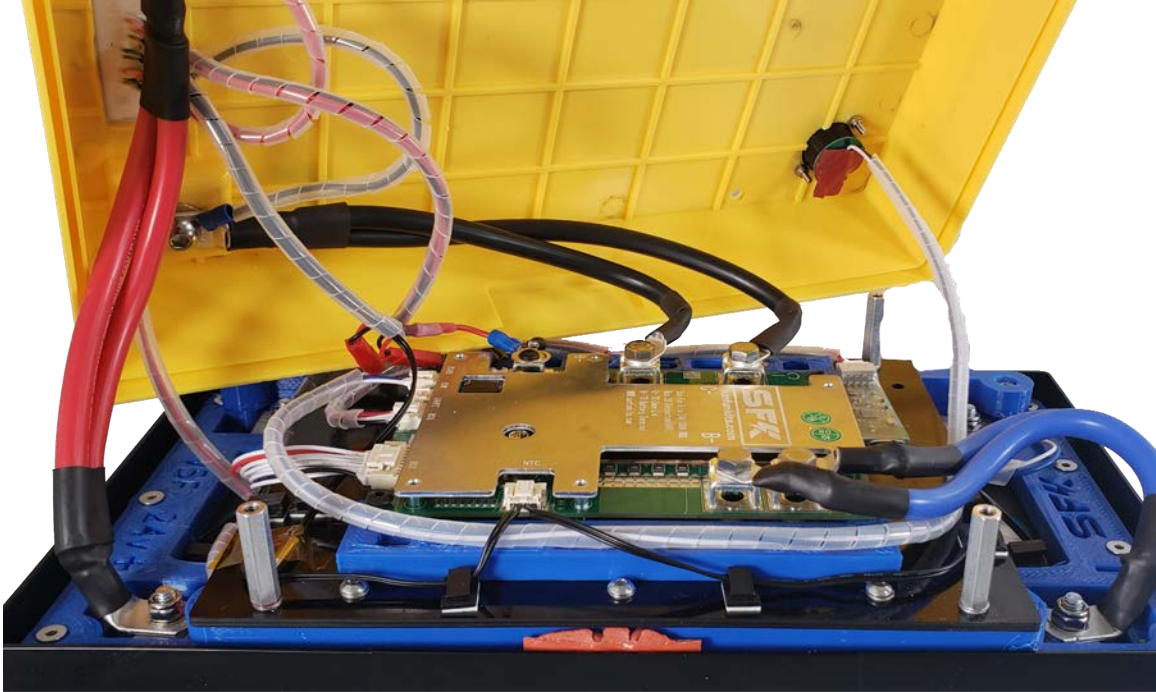


With V5 24v Kits, the opening orientation of the lid is to its side, this allows easier management of the battery should you need to perform service / maintenance on the battery.



Mount the black main lugs to the BMS using the included dual M6 bolts note: the wires have a slight u-bend to them as this provides sufficient slack for you to open/close the lid as needed.

Position the lid on the side of the case and begin by installing the main black lug, make sure it has direct contact to the main brass terminal and the black wire with the blue lug is on top of it, secure with the included m8x10 button bolt.



Attach the Bluetooth switch control using the JST connectors, then tuck the remaining wire underneath the BMS plate.

Attach the white active balancer activation wire to the active balancer and use one of the stick on wire keeps to keep the wire in place.

Secure the temperature probes at the location of your choice and mount with kapton tape. Attach the black lug of the thermal pads and the black lug of the GEN2 switch to the HT port on the BMS and secure it with the m4 bolt.

Finally attach the GEN 2 Switch's temperature sensor to the position of your choice, for our install it near the BMS as it will get the ambient inside case temperature reading to determine if the heating pads should turn on or not (when heating is enabled on the switch).

Once done, review your wire installation and make sure when the lid is closed it is **NOT PINCHING** any wires **AND ONLY WHEN ALL THIS IS DONE, SHOULD YOU INSERT THE BMS BALANCING WIRES into the BMS.**

Starting in 2024, we are now including a rubber gasket/seal to enhance the moisture/temperature protection of the battery; this is provided as a self-adhesive strip that can be attached to the inner lip of the case. ENSURE YOU CLEAN the lip with 91% isopropyl alcohol and let dry before installing:



There should be sufficient length to cover the entire perimeter of the case, you do not need to stretch the rubber, but keep a firm grip to prevent slack while installing. Once done use a utility knife to remove any excess for a flush fit.



Verify your install works by turning on the bluetooth function, press the bluetooth icon and it will illuminate as **blue** indicating bluetooth is active. Press again to deactivate bluetooth functionality.

You can turn on the active balancer by pressing the active balancer icon; the **blue** light indicates the balancer is on and working in normal mode. If you prefer the active balancer only works when the battery is near high voltage (about 3.35v/cell or 13.4v or higher) then press the button again and you will see a **green** light, this is called Hi-Mode. To turn off the active balancer altogether, press again.

V5 kits have dual heating modes: low temperature charging mode and stand by heating mode. The low temperature charging mode is always on, meaning if you attempt to charge the battery below the threshold set in the app, the battery will turn on the heating pads and divert incoming power to the heating pads, once the temperature has risen above the threshold normal charging can resume.

Standby heating on the other hand will keep the battery around 60 degree Fahrenheit or about 16 degrees celsius and will turn the heating pads on/off as needed to maintain temperature. To turn on standby heating simply press the heating icon. When standby heating is active it will appear as **white** icon, if the GEN2 switch detects low temperature it the icon will switch to **red** letting you know that the heating pads are active.

To finish your build, install the SFK handles and secure the nylon handle ropes to the side of the case:



Monitoring Apps & Tests:

You can now connect to your battery and perform tests; visit Google Play Store or Apple IOS App store and search for: Sun Fun Kits BMS

<https://play.google.com/store/apps/details?id=com.companynam.sfkble&hl=en&gl=US>

<https://apps.apple.com/tt/app/sun-fun-kits-bms/id1600445506>