12S7P 18650 /21700 Assembly Manual

WARNING: Read the ENTIRE instruction manual to become familiar with the device and its features before operating. Failure to operate the product correctly and safely may result in damage to the product, personal property and cause serious injury.

This product must be operated with caution, common sense and in harmony with any regulations in place. Usage requires mechanical and electrical ability and training. Failure to operate this product in a safe and responsible manner could result in injury or damage to the product or other property. This product is not intended for use by children! Do not attempt disassembly, use with incompatible components or augment product in any way without given approval by the manufacturer. This manual contains instructions for safety, operation and maintenance. It is essential to read and follow all the instructions and warnings in the manual, prior to assembly, setup or use, in order to operate correctly and avoid damage or serious injury.

Age Recommendation: Not for children

Only to be used by trained adult persons. Lithium batteries are dangerous and special skills are needed to handle them safely.

Throughout the literature the following terms will be used to indicate various levels of potential harm when operationg this device.

NOTICE : Procedures which, if not properly followed, create a possibility of physical property damage AND a little or no possibility of injury.

CAUTION : Procedures which, if not properly followed as described in this manual, create the probability of physical property damage AND a possibility of serious injury.

WARNING: Procedures which, if not properly followed, create the probability of property damage, collateral damage, and serious injury OR create a high probability of superficial injury.

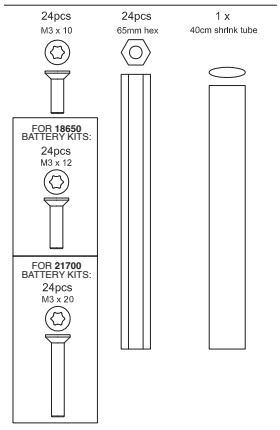
WARNING: This device may not be used for applications requiring fulfillment of special safety standards. Among others this includes: Vehicles, aircrafts, certain machines and operation in safety critical environments like medical, nuclear and military!

WARNING: For safety reasons do not assemble the product inside or in close proximity to a building. Keep sufficient distance to inflammable things like trees, cars etc.

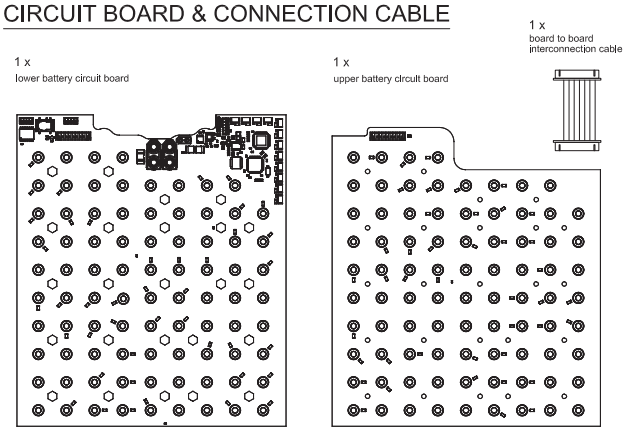
BATTERY KIT PARTS

- FIXINGS & SHRINK TUBE
- LOWER CIRCUIT BOARD
- UPPER CIRCUIT BOARD
- INTERCONNECTION CABLE
- GF BASE PANEL
- 2x GF CELL SPACERS
- GF SPRING PANEL

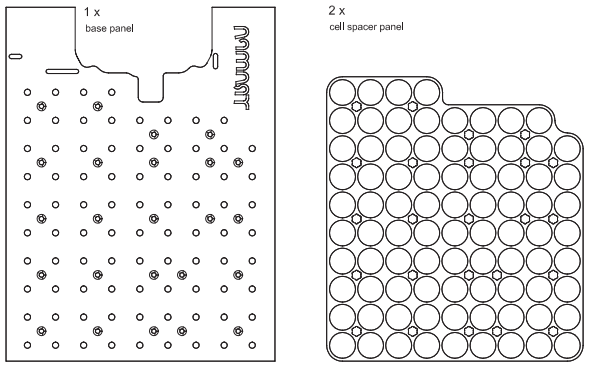
FIXINGS & SHRINK TUBE



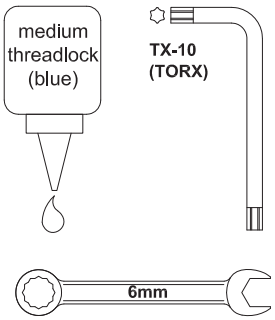
CIRCUIT BOARD & CONNECTION CABLE



FIBREGLASS PANELS

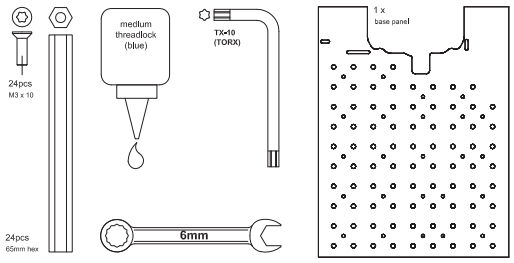


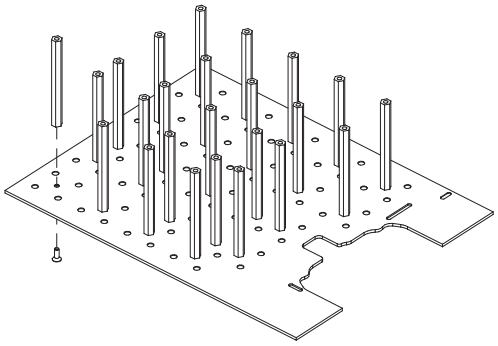
TOOLS AND THREAD LOCK



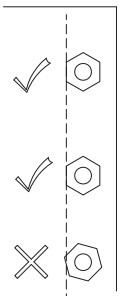
Mechanical assembly:

Step 1: mount all 24 hex spacers to base panel
Use medium strength threadlock on all 24 screws.
Align all hex spacers perfectly parallel to the long side of the base panel.

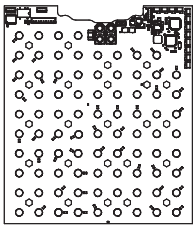


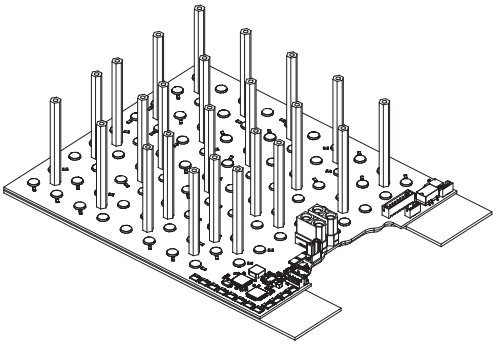


short side

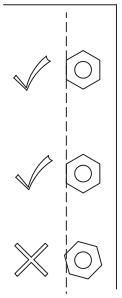


Step 2: Slide lower circuit board onto the assembly. If the board does not slide easily, realign the hex spacers. The lower circuit board must rest totally flat on the base panel. **CLEAN ALL BATTERY CONTACTS** with Ethanol or isopropanol (100% alcohol). Avoid touching afterwards!



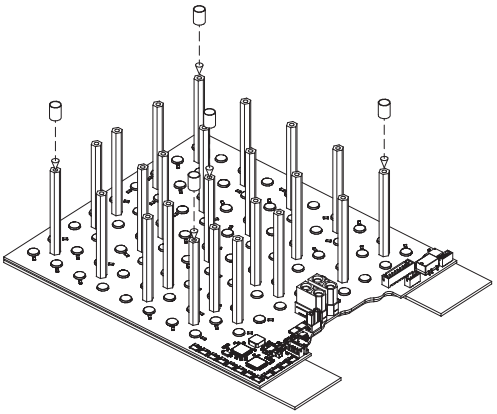


realign if necessairy

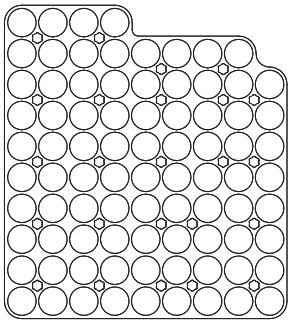


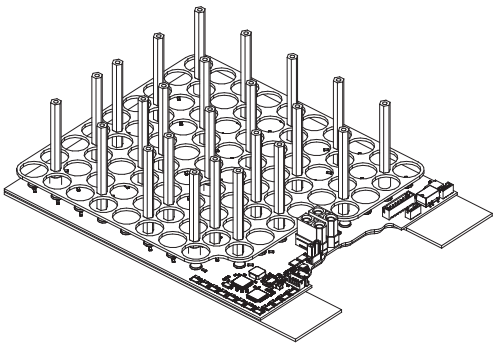
Step 3: Place 10mm long shrink tube spacers into each corner and on one central hex spacer

5x

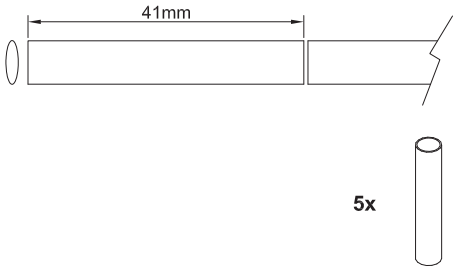


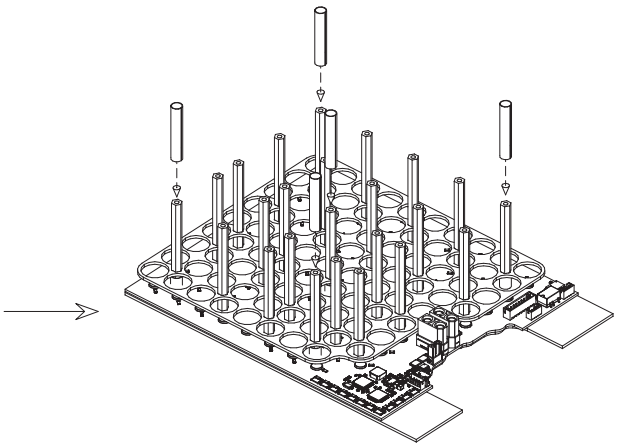
Step 4: Slide lower cell spacer into position



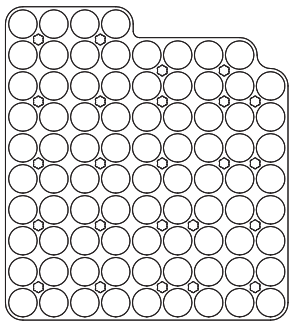


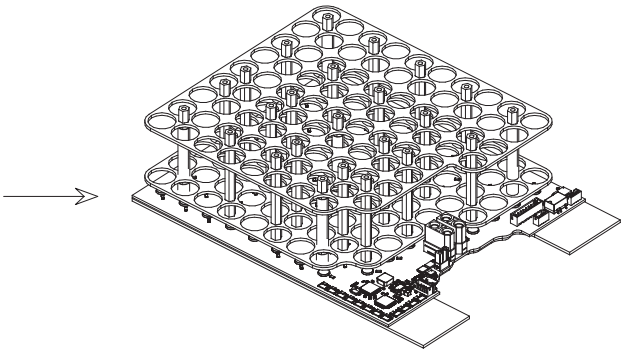
Step 5: Place 41mm long shrink tube spacers into each corner and on one central hex spacer



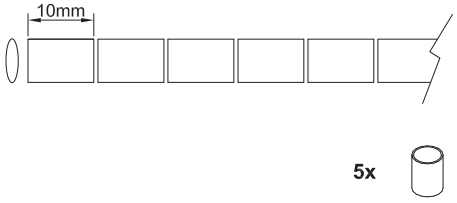


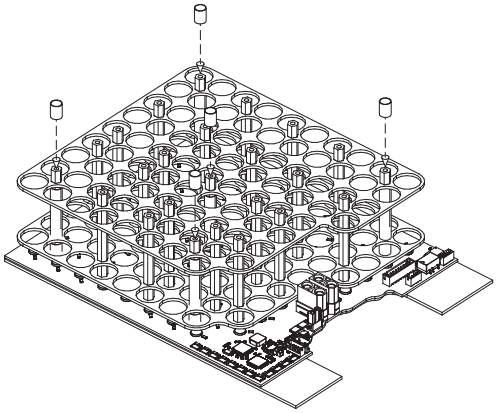
Step 6: Slide upper cell spacer into position





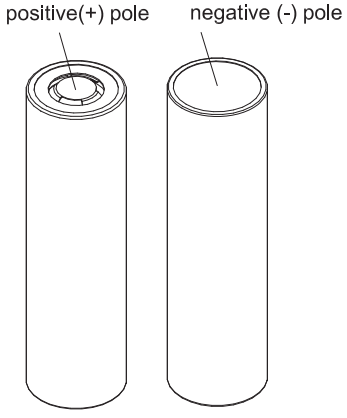
Step 7: Place 10mm long shrink tube spacers into each corner and on one central hex spacer

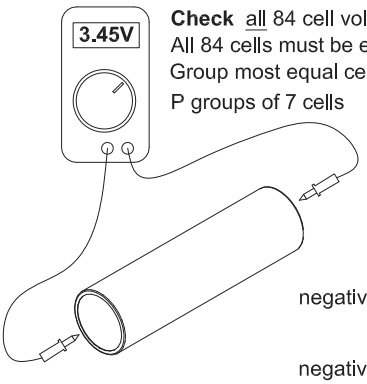




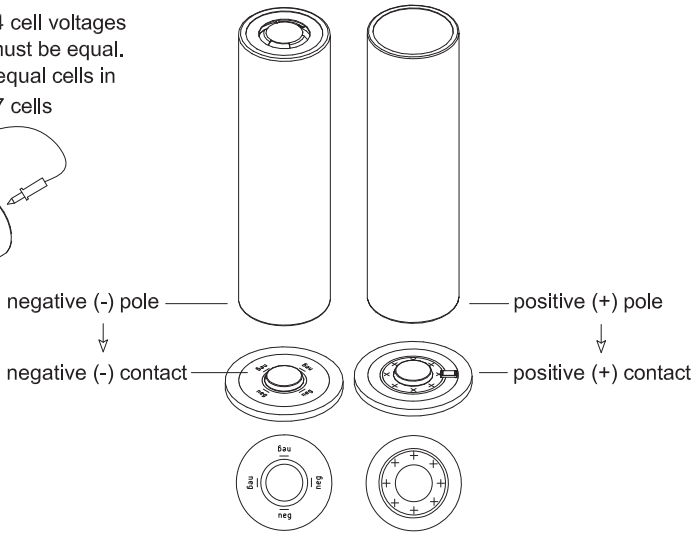
Step 8: Prepare / check cells.

WARNING All battery cells must be of the same type, age, wear and charge level! Never use damaged cells! Shrink wrap intact?



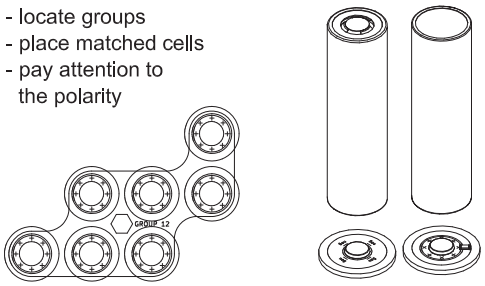


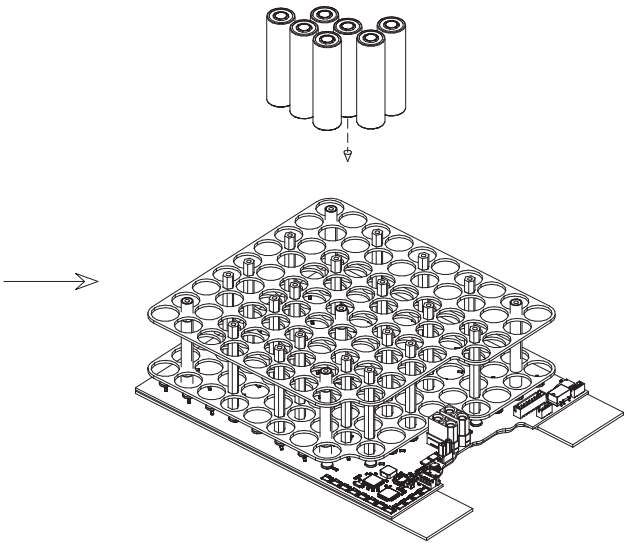
Check all 84 cell voltages
All 84 cells must be equal.
Group most equal cells in
P groups of 7 cells



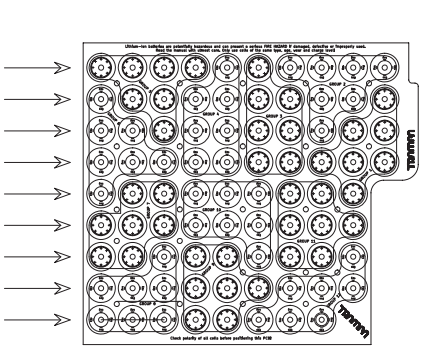
Step 10: Clean all battery poles with isopropyl alcohol, place parallel (P) grouped cells into the cell grid. Insert cells group by group. All cell in one group must have very similar voltage / charge level.

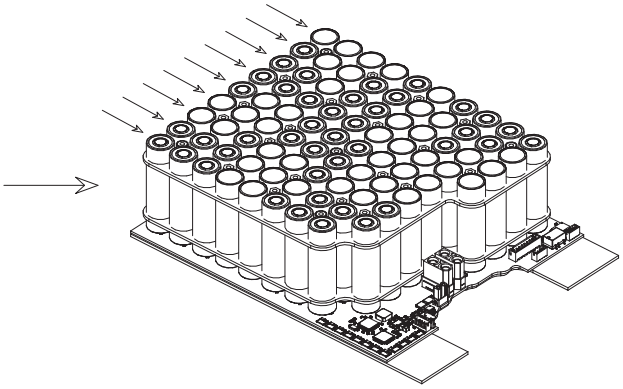
- locate groups
- place matched cells
- pay attention to the polarity



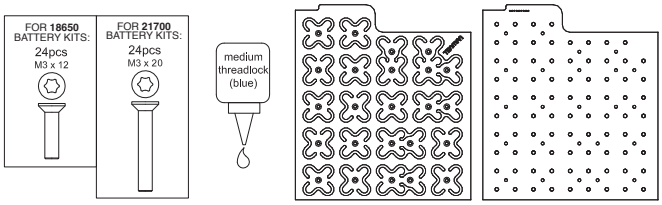


Step 11: After placing all cells, double check cell polarity. Use upper PCB to compare, check row by row

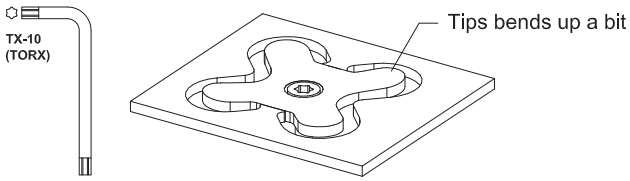


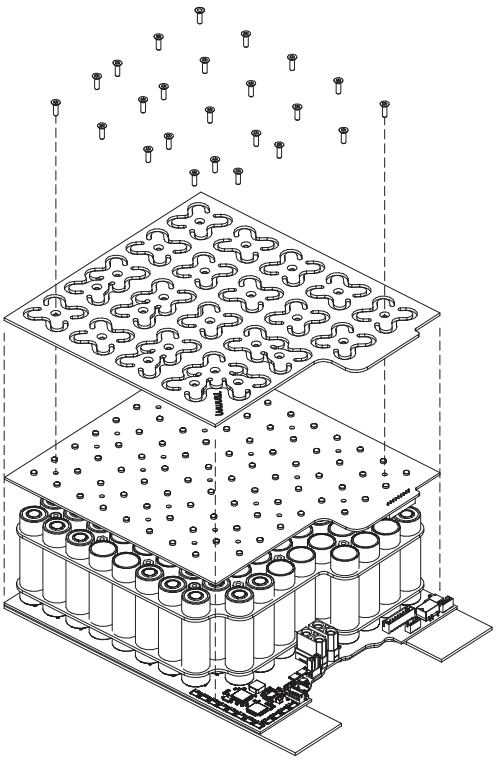


Step 11: Clean and position upper circuit board and spring panel. Use 100% alcohol to clean contacts.
CAUTION: make sure to align the PCB carefully when presenting to the assembly! Do not shift it sideways during assembly.

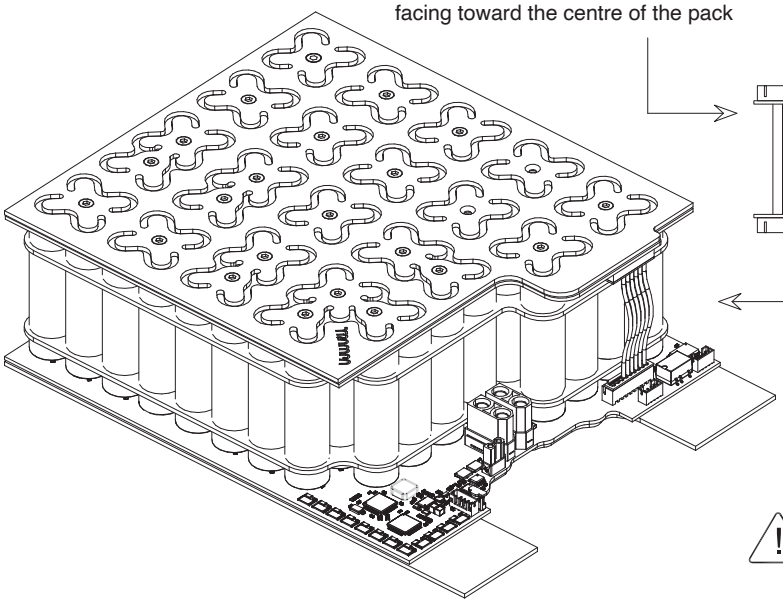


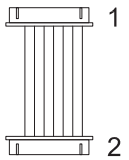
Tighten screws carefully until the centre of the spring lowers and the tips bend up a bit.





1x 6 pin board-to-board interconection cable - connected in the same orientation as shown in the image, with missing cable slots facing toward the centre of the pack

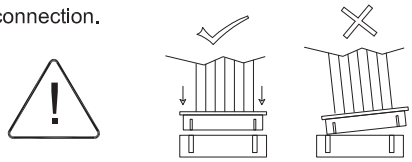




Final Step: Interconnect lower and top circuit board with 6 pin wire connection. Make sure the cable connectors are fully plugged into the mating board connectors.

Warning!

Plug cable into **upper** connector **first** (1)! Then plug cable into lower connector (2). Make sure to **100% align** the male and female connector before establishing final connection.



Congratulations, your pack is now ready for use.Before the first use, the pack should be allowed to balance all cells to the same charge level/voltage. You can manually start the blancing process in the VESC-Tool software (read page 6) After balancing you should charge up the pack and check for balance during that process. If the pack goes out of balance during the first charge cycle, some cells might have a bad contact. Stop the charge process if you see a drift in cell balance. In that case either there is some small debris on the contacts and/or the spring panel was not sitting tight enough. Check contacts and spring tension of the group in question. Also repeat step 8 of this manual to figure out which cell are affected.

For 21700 BATTERY PCBS ONLY

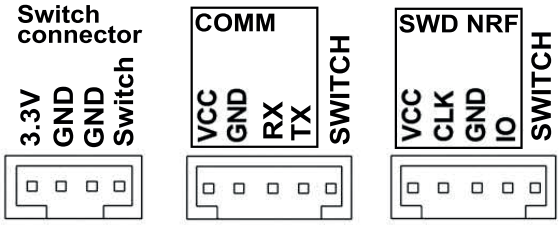
The Trampa 21700 Battery System has an onboard NRF wireless dongle built into the upper circuit board.

This wireless dongle has no connection to the BMS! It serves an external wireless dongle for a VESC motor controller and is connected to the VESC motor controller via a COMM cable bridge. If your VESC motor controller already features a built in wireless dongle, you may want to deactivate the built in dongle and use the dongle on the battery PCB instead. It sits in a well exposed location for good radio reception.

The 21700 Battery System also features a loop through fused charge port (4) and a loop through power switch connector (3) for a VESC motor controller.

Board connectors on upper PCB

- 3.3V is connected to VCC
- all GND pins are interconnected
- all SWITCH pins are interconnected

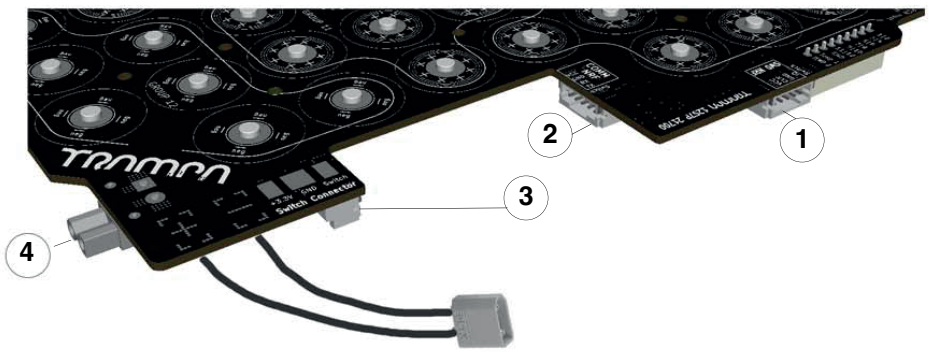


1. SWD port of NRF wireless chip. Used for firmware update on the NRF wirless chip.

2. Comm interconnection port to VESC-motor controller (COMM to COMM).

3. Powerswitch loop through to VESC motor controller.

4. Fused charge port loop through.



IF you have any questions or problems please contact Support@trampaboards.com Or give us a call on +44 7734 905 883

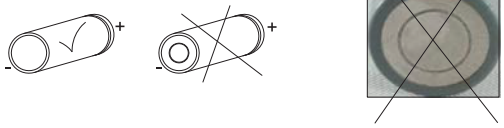
Do not purchase Lithium batteries before reading and understanding these safety cautions. Using a lithium-ion cell incorrectly may cause it to leak, generate heat, smoke, catch on fire, or explode.

Suitable battery cells:
The 21700 and 18650 battery kits are designed for high discharge cells only. They have been tested with the following cells. Use of other cells is at your own risk.

18650 cells:
Sony / Murata Konion US18650VTC6 3000mA
Sony / Murata Konion US18650VTC5A - 2600mAh
Samsung INR18650-30Q 3000mAh

21700 cells:
Samsung INR21700-40T 4000mAh
Molicel IMR 21700-P42A

Battery cell venting system:
Lithium based battery cells feature overpressure valves. Most cells have their over pressure valve on the positive (+) pole. Some cells have the over pressure valve on the bottom side, the negtive (-) pole side. Those cells are not suitable in combination with this kit!!



Discharge settings in VESC-Tool:
The battery discharge settings need to be adjusted in accordance with the cell used. Use the following formula to find the correct *"Battery Current Max"* setting:

Single drive:
Max continuous cell discharge x 7
Twin drive:
Max continuous cell discharge x 3.5
Quad drive:
Max continuous cell discharge x 1.75

Total discharge current of the pack should not exceed 145A peak! Pack must be linked to VESC-Motorcontroler via CAN bus

Charger:
Only use suitable, certified for your country, 12S Lithium-Ion CCCV chargers! Maximum charge current must match cell charge current handling! Divide charge current by 7 to find out cell level current.

Charge process:
Do not leave the charging process unattended. Allow the battery to cool down before and after the charge process. Keep battery dry and clean. Never charge a battery that has known issues. Check BMS data prior to charge process (cell balance, temperature, individual cell voltages).
Do not charge indoors! Plug charger into mains first, then plug into battery.

Software:
This device may only be configured via VESC-Tool! Do not change parameters unless you are 100% aware of the consequences. Use latest firmware, delivered with the latest stable VESC-Tool release. Check for updates on a regular basis.

Intended use:
This product is not designed for stunt riding, jumping and extreme use, such as in competitions and conditions where severe crashes are expected. For touring use only.

Cell clamping:
tighten down cell clamping screws with care and by hand! Do not over tighten the screws. Apply just enough pressure to establish a good contact. Not more, not less. Check cell balance to see if all cells make good contact. Groups with bad contact will charge and discharge faster.

General Cautions

- The cell must stay in the operating temperatures outlined in its data sheet
- The cell must not exceed voltage, current, and other ratings in its data sheet
- Be careful not to short-circuit
- Store batteries separately, and do not transport without proper packaging
- Never store or transport together with conductive or metallic objects particularly in a pocket or bag
- Do not keep in the sun, in a hot car, or anywhere with direct heat
- If you notice an unusual odor, rust, can deformation, damaged surface, or fluid discharge, especially on first use, discontinue use.
- Keep cells away from animals and children
- If the cell is attached to a PCB, keep it away from high-static environments
- When nominal capacity after full discharge cycle is less than 80% of rated capacity, please discontinue use
- Recycle discontinued batteries according to local regulations and cover terminals with insulating tape before disposal

Charging

- Use the charging method Constant Current-Constant Voltage (CC/CV)
- Use a stipulated charger for lithium-ion batteries
- Never charge with a cigarette lighter charger or directly by electric outlet
- Before using a charger or electronic device, read its user manual
- Confirm terminals are aligned correctly before inserting cell into charger or device
- Do not exceed max. charge voltage and current, and charge operating temperatures
- Do not charge near high temperatures or flammable materials like cardboard boxes
- Discontinue charging after exceeding charge time outlined in the user manual or data sheet
- If the cell does not increase charge after prolonged time in the charger, discontinue use
- Charger or device should implement warning for over-voltage, over current, and over-temperature, control of overcharge, and charge timer

Discharging

- Peak or burst current ratings should only be used theoretically for the design of battery packs with protection circuitry
- Discharge within the operating temperature range
- Do not exceed maximum continuous discharge current, and other limits detailed in the cell data sheet
- Discharge end or cut-off voltage in data sheet is lower-limit for discharge cycle and should not be exceeded

Prohibited

- Do not exceed any of the rated specifications
- Do not charge or discharge near flammable materials or gas
- Do not charge unattended
- Do not throw, puncture, or incinerate
- Do not ingest
- Do not let batteries get wet or submerged
- Do not allow the positive and negative poles to connect with conductive materials
- Do not reverse polarity
- Do not insert insulation or other objects between the metal plate, cell, or other components
- Do not store or transport improperly
- Do not mix use with other battery brands or models
- Do not solder directly on the cell
- Do not overheat, overload
- Do not touch a leaking cell

Lithium-Ion Battery Packs

- Only construct battery packs if you are competent in doing so
- Inspect each cell visually before packaging or assembly into battery pack
- Do not use cells with any conspicuous signs of deformation like discoloration, can-distortion, fluid discharge, rust, or electrolyte odor
- Use cells of the same capacity/voltage rank or Lot Number
- Different cell brands or models should not be combined into a battery pack
- Handle stripped leading wires and contact plates carefully; insulate exposed contacts and conductors when possible
- Position the battery pack as far away from source(s) of heat as possible