

# **3A Capacitive Balancer for Lithium Battery**

**(4212S4/4212S8/4212S16)**

## **Operation and Maintenance Manual**

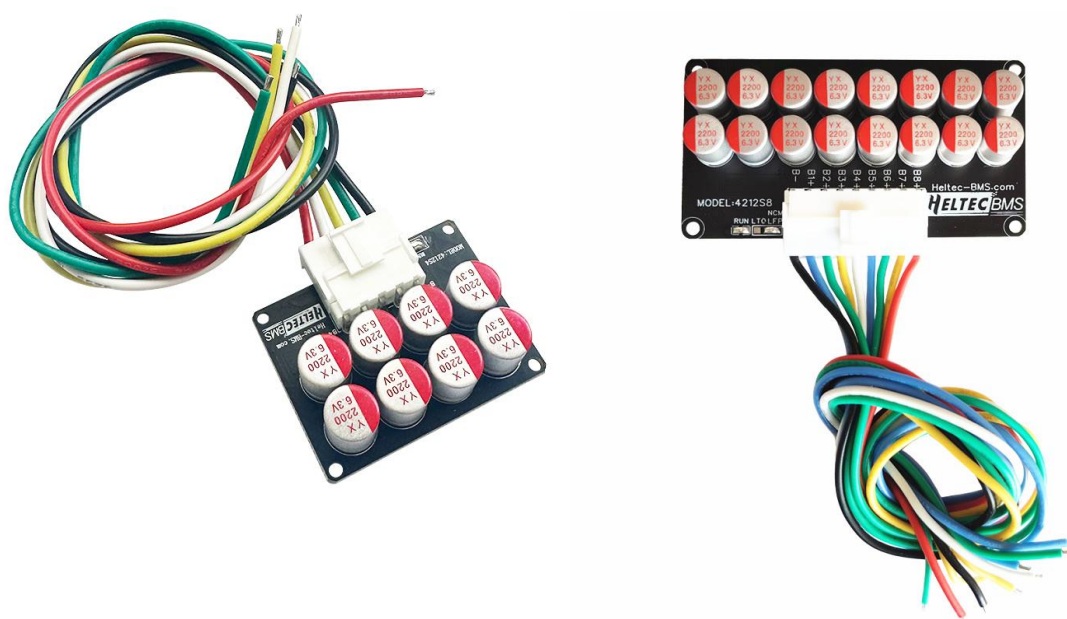
**Heltec Energy**

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## 1. Introduction

The lithium battery active balancer is tailor-made for charging and discharging large-capacity series-parallel battery packs. It has full indiscriminate balancing of the entire pack, automatic low-voltage sleep, and temperature protection. The circuit board is sprayed with three-proof paint, which has excellent insulation, moisture-proof, leakage-proof, shock-proof, dust-proof, anti-corrosion, anti-aging, corona resistance and other properties. It can effectively protect the circuit and improve the safety and reliability of the product. The circuit board is equipped with an aluminum heat sink, which has the characteristics of fast heat dissipation and low temperature rise when working with high current. This product is suitable for ternary lithium, lithium iron phosphate, and lithium titanate batteries. The maximum equalizing voltage difference is 0.01V and the maximum equalizing current is 3A. When the voltage difference is 0.1V, the current is about 0.5A (actually related to the capacity and internal resistance of the battery). When the battery is lower than 2.7V (ternary lithium/lithium iron phosphate), it stops working and enters sleep, with over-discharge protection function. Appearance shown below.



## 2. Technical Specifications

The main technical indicators of the active balancer are shown in Table 1.

Table 1. The Main Technical Indicators of The Capacitive Balancer

Technical Indicators	SKU		
Applicable Number of Strings	3-4S	6-8S	9-16S
SKU	4212S4	4212S8	4212S16
Applicable Battery Type	Ternary Lithium/Lithium Iron Phosphate	Ternary Lithium/Lithium Iron Phosphate/ Lithium Titanate	
Working Voltage Range	Ternary Lithium/Lithium Iron Phosphate: 2.7-4.2V Lithium Titanate: 1.8-3.0V		
Balanced Voltage Range	5mV (Typical)		
Balance Mode	The whole group of batteries participates in active balancing of energy conversion at the same time		
Balance Current	When the voltage difference is 0.01V, the equalizing current is 0.5A. The larger the voltage different, the larger the equalizing current. The maximum equalizing current is 3A.		
Undervoltage Protection Sleep Voltage	Ternary Lithium/Lithium Iron Phosphate: 2.7V Lithium Titanate: 1.8V		

Product Size (mm)	48*36.5*16	90*49*16	125*100*16
Working Temperature	-10°C ~ 60°C		
External Power	No external power supply is required, relying on the energy transfer inside the battery to achieve the balance of the entire battery pack.		

### 3. Solder Joints

1. The circuit solder joints (LTO/NCM/LFP) for mode selection (run) are strictly prohibited from being soldered together with RUN. This will cause short circuit and damage the balance board;

2. You can add a switch to control the on/off of the switch and connect both ends of RUN.



3. In addition to the 3/4S designed specifically for NCM / LFP (ternary lithium / lithium iron phosphate), other new versions with connectors are available in NCM / LFP / LTO (ternary lithium / lithium iron phosphate / lithium titanate) used on.

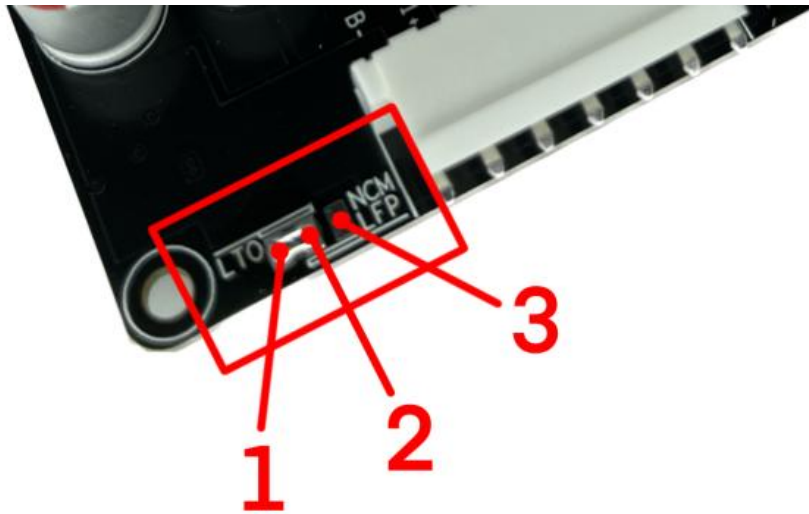
LTO Version:



NCM/LFP Version:



As shown in the picture and text below: how to make the balancer used on LTO.



(from left to right)

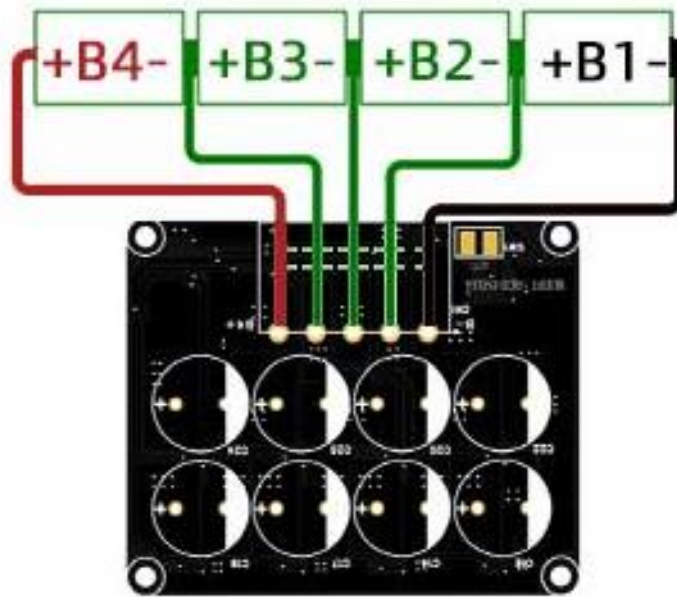
1+2 pad short: For LTO (lithium titanate).

2+3 pad short: For NCM and LFP (ternary lithium/lithium iron phosphate).

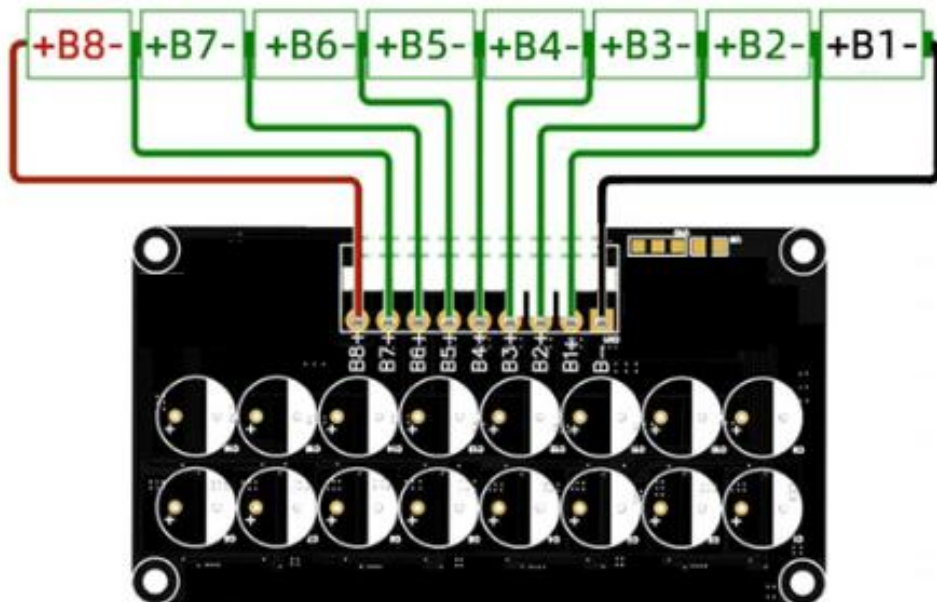
#### 4. Port Description

1. The battery nodes are B-, B1, B2, B3, B4, B5, B6, B7, and B8;
2. The two pads marked "RUN" on the silk screen of the balancing board are short-circuited by default, so that the balancing board enters the balancing working state after being powered on, or you can disconnect the leads and add a switch to control the balancing work;
3. The RUN indicator light indicates the continuous working status of the balance and will only go out when the battery is under voltage protection or the balance board fails;
4. The order on the balance board is generally B- → B1 → B2 → B3 → B4 → B4 → B5 → B6 → B7 → B8, from low to high.

### 5. Wiring Diagram



3S-4S (4212S4)



6S-8S (4212S8)

(9S-16S to be completed)

## 6. Precautions for Use

- During use, you must follow the design parameters and usage conditions, and do not use it contrary to the parameters in this specification, otherwise it will easily damage the balancing board, and then damage the battery pack.
- Anti-static during use, when testing, installing, and touching the equalization board, there must be corresponding anti-static measures.
- Be careful not to touch the components on the circuit board with lead wires, electric soldering iron, tin slag, etc. during use, otherwise the balance board may be damaged.
- If any abnormality occurs during use, please stop using it immediately and return it to the original factory or ask professional maintenance personnel for repair.
- This balance board has done a lot of reliability tests, the reliability is much higher than the general balance board on the market, and the technology of the battery cell must be guaranteed at the same time, so as to reduce the occurrence of combustion as much as possible.

### \* Safety Precautions:

Our company is committed to the improvement of quality and reliability, but generally speaking, electrical components will have a certain probability of failure. The use environment and conditions are different, and the durability will be different. The redundant design is used to avoid overloading. Abnormal heat, smoke, and even personal accidents, fire accidents, social damage, etc.