1、Overview

In the usage scenarios of lithium batteries, low-temperature scenarios are essential, but battery performance declines greatly in low-temperature environments. Mainly manifested in the following aspects:

Reduced capacity: The capacity of lithium-ion batteries will be reduced in low-temperature environments, because low temperature will cause the internal chemical reaction rate of the battery to slow down, reducing the energy output of the battery.

Reduce power: In low temperature environments, the internal conductivity of the battery decreases, the internal resistance of the battery increases, and the battery output power decreases, resulting in poor vehicle acceleration performance.

Extend the charging time: Low temperature will cause the internal chemical reaction rate of the battery to slow down and the internal resistance of the battery to increase, resulting in prolonged charging time and accelerated battery aging.

Reduced lifespan: Long-term use in low-temperature environments will cause changes in the internal structure of the battery, such as shedding and passivation of electrode materials, resulting in shortened battery life.
For this reason, the battery heating function came into being, which can effectively improve the performance degradation of lithium batteries caused by low temperature.

2、 Features

This function is to realize the battery heating control function by detecting the battery temperature, combined with the charging low temperature protection/restoration temperature and the charger status.

Maximum heating current: 3A

Recommended current: 2.5A@standard battery voltage

Maximum heating voltage: 100V

3. control logic

Heating activation conditions, when condition 1 is met and condition 2 or condition 3 is met at the same time, the charging and heating function can be turned on

Condition 1. The battery temperature is lower than the charging low temperature protection temperature;

Condition 2, turn on the heating through the APP, do not detect the charger status, and heat when reaching low temperature conditions, which will consume battery power;

Condition 3, charger insertion is detected. This function is related to the protection board hardware and charger, so please confirm the technical status before placing an order.

4、Heating film selection

The first step is to determine the maximum total battery voltage. For example, the maximum total voltage of 20-cell lithium iron is 20*3.6=72V, and the maximum total voltage of 24-cell lithium iron is 24*3.6=86.4V.

The second step is to determine the resistance value of the heating film. Resistance value = maximum total voltage ÷ 3A, such as: 72V ÷ 3A = 24Ω. Select a resistance value that is close to the heating film specifications on the market. The heating film specification is 72V/24Ω/216W.

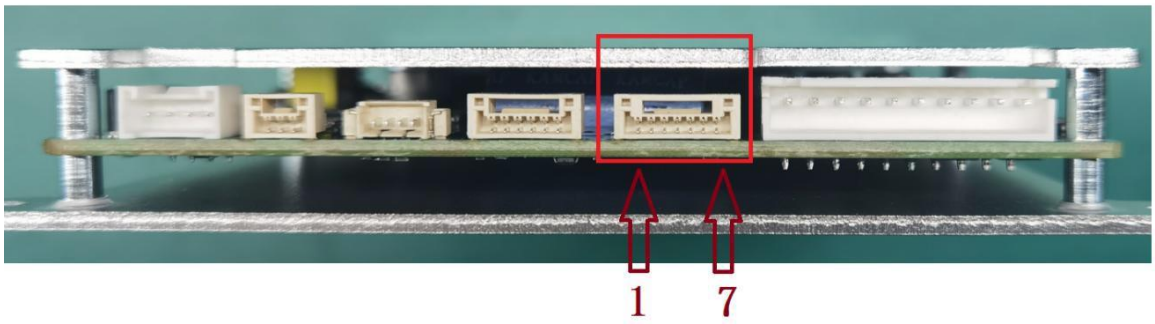
5、 Heating interface definition and cable pictures

5.1 interface definition table

	PIN	Signal	describe	接线描述
Heating interface (optional function)	1~5	HT-	Heating the negative electrode	Connect either end of the heating film, and the other end of the heating film to the main
	6	CD+	Charging indicator input positive	Need to be used with a charger with 12V auxiliary power supply, respectively Connect the positive and negative poles of the auxiliary power supply. If there is no auxiliary power supply, do not connect them.
	7	CD-	Charging indicator input negative pole	

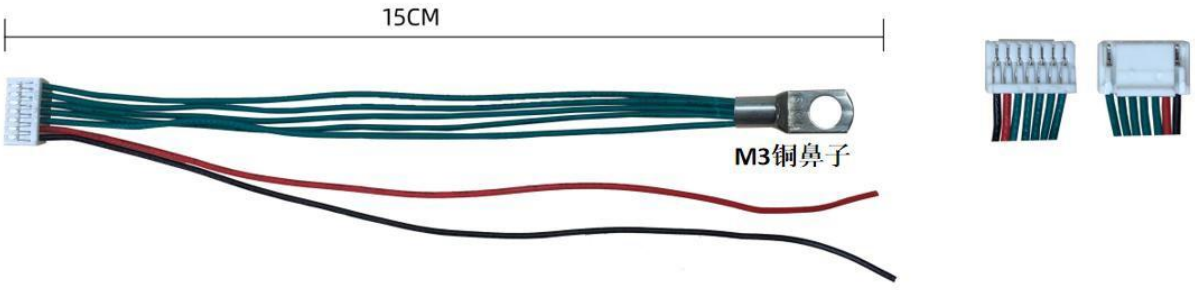
5.2 Interface identification diagram

The figure below is the appearance diagram of the protection board interface of each model.



6、Cable and Wiring Diagrams

6.1 Cable pictures



6.2Wiring diagram

In order to prevent the loss of the protective plate heating switch circuit from causing overheating of the battery and causing safety risks. It is recommended to connect a temperature control switch in series in the heating circuit as a secondary protection to ensure foolproofness. It is recommended to choose a 45~65℃ normally closed temperature control switch. When the temperature exceeds the nominal temperature, the switch will automatically open to prevent continued heating.