Document No.: EK-BM3R8S120A-V1.0
Version No.：V1.0

Lithium battery protection board

（EK-BM3R8S120A）

Product Datasheet

Shenzhen Enerkey BMS Power Technology Co., LTD

Shenzhen Enerkey BMS Power Technology Co., Ltd.

Product Name	Lithium battery protection board
Product Model	EK-BM3R8S120A
Version	V1.0
Adapt Battery String	3S/4S/5S/6S/7S/8S
Adapt Battery Type	Li-ion/LiFePO4/Lto/SIB
Function	Overcharge protection, over-discharge protection, over-current protection, over-temperature protection, short-circuit protection
Effective date	20th.Nov.2024

Product change history			
Version	Date	Change point description	Approve
V1.0	2024-11-20	Initial version	

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Contents

1. Overview

①. This series of lithium battery protection boards is a power management system (BMS) tailored for ternary lithium batteries.

②. This series of lithium battery protection boards uses automotive-grade MOS, 2oz thickened copper foil and copper strips for current sharing, making the protection board highly precise, with ultra-low internal resistance and ultra-low heat generation.

③. On the basis of basic protection board functions such as overcharge protection, over-discharge protection, over-current protection, over-temperature protection, short-circuit protection, etc., a balancing function, reset function, electrostatic protection, dust-proof protection and moisture protection are added.

④. This lithium battery protection board (EK-BM3R8S120A) adopts 3S/4S/5S/6S/7S/8S integrated solutions. You can flexibly select the required number of strings according to the wiring diagram provided by our company.

⑤. It is mostly used in the battery packs of electric scooters, electric bicycles, power tools, car washers, small household appliances, model aircraft and other products. Mainly plays the role of protecting the battery pack.

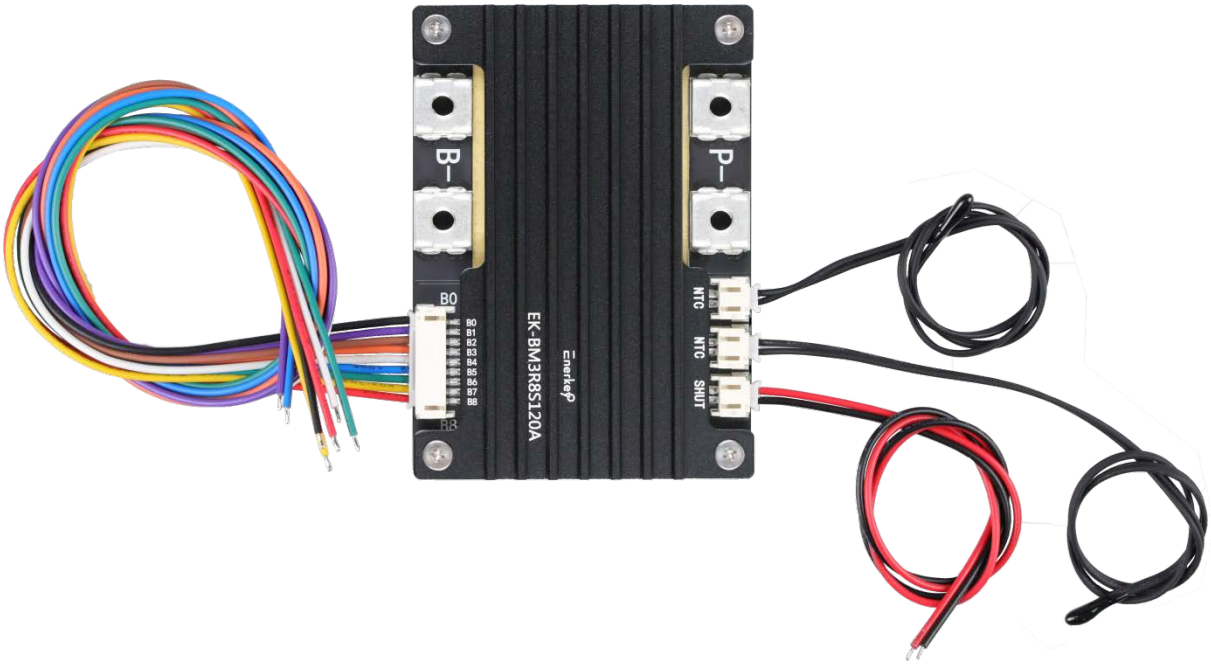
2. Technical Parameters

	Item type		Parameters							
1	Parameter Overview	Product Model	EK-BM3R8S120A							
		Product Size	L95*W68*T15mm							
		Product Weight	0.15kg							
		Product Material	FR-4 / Lead-free spray tin							
		Applicable battery string	**3S/4S/5S/6S/7S/8S**							
		Rated discharge current	**120A**							
		Peak starting current	**300A**							
		Applicable battery type	Lifepo4		Li-ion		Lto		SIB	
	Item type		**Trigger (time)**	**Trigger (time)**	**Trigger (time)**	**Trigger (time)**	**Trigger (time)**	**Trigger (time)**	**Trigger (time)**	**Trigger (time)**
2	Charging protection	Overvoltage protection voltage value	3.65V/1S	3.50V/1S	4.25V/1S	4.05V/1S	2.85V/1S	2.75V/1S	3.95V/1S	3.80V/1S
		Balanced phase difference voltage value	Trigger voltage difference 30mV / trigger time 0.5S / balance time 10S cycle							
		Balanced voltage value	3.45V		3.70V		2.50V		3.10V	
		Overcurrent value	120A/2S, disconnect charger to recover							
		Low temperature value	Charge over-temperature protection 60℃/2S / Release 55℃/2S							
		Overtemperature value	Charging low temperature protection -5℃/2S / Release 0℃/2S							
3	Discharge protection	Undervoltage protection voltage value	2. 30V/1S	2. 70V/1S	2. 75V/1S	3. 0V/1S	1. 70V/1S	1. 80V/1S	1. 50V/1S	2. 00V/1S
		①Overcurrent protection value	150A/2S, disconnect load or activate charging							
		②Overcurrent protection value	250A/0.5S, disconnect load or activate charging							

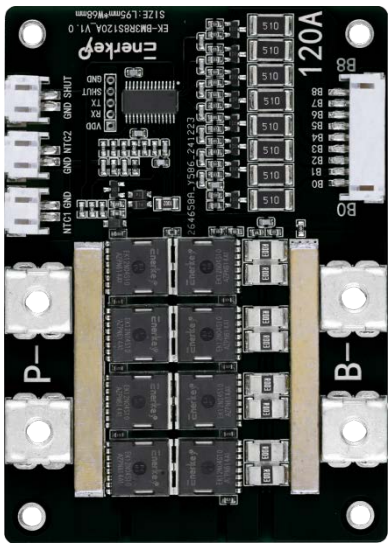
		Short circuit protection value 500A/128uS, disconnect load or charge activated	
		Low temperature value	Discharge over-temperature protection 65℃/2S, release 60℃/2S
		Overtemperature value	Discharge low temperature protection -20℃/2S, release -10℃/2S
4	Others	Standby current consumption	25uA
		Motherboard lock voltage	/

3. Product Photo

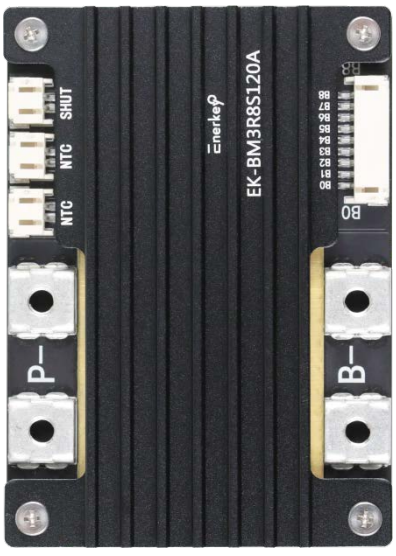
1) Product Appearance



Front



Front with heatsink



Special Note: All shipped products are coated with three-conformal paint.

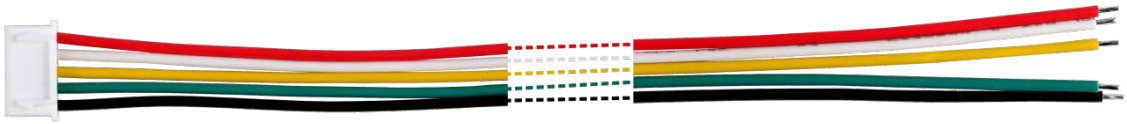
1. NTC Terminal cable

Thermistor terminal cable specifications				
Terminal Specification	Resistance	B value	length	Remark
PH2.0mm_2Pin	10K 1%	B3435	30cm	Customizable

2. Switch cable

Terminal cable specifications					
Terminal Specification	Material	Number	length	Stripping length	Q’ty
PH2.0mm_2Pin	Cu	24AWG	25cm	3cm	1

3. Terminal cable



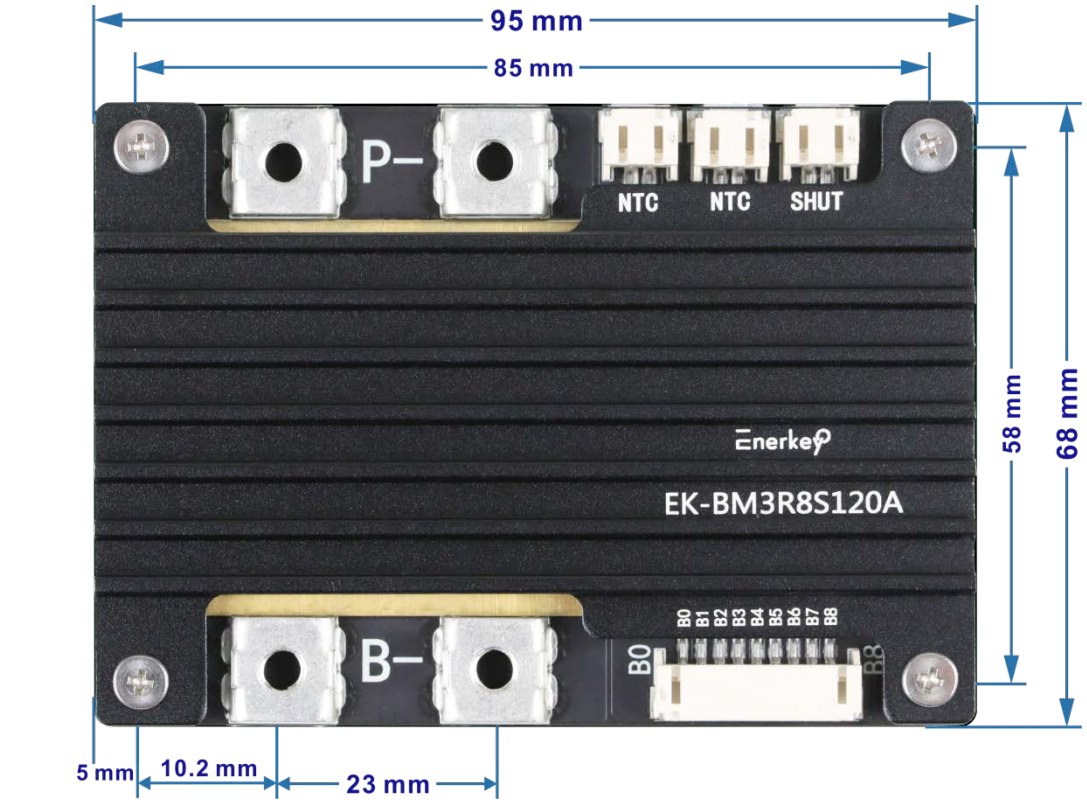
Terminal cable specifications					
Terminal Specification	Material	Number	length	Stripping length	Q’ty
PH2.54mm_9Pin	Cu	22AWG	40cm	3cm	1

4. Terminal Lugs and Screws

Accessories Specifications					
Material Model	Material	Hole	Screw holes	Terminal length	Q’ty
OTZ6-5 Terminal Lugs	Cu	4MM	5.2MM	23MM	4
M5 Screws	Nickel-plated	-	-		4

4. Product Drawing

(No tolerance noted：±0.15， Unit: mm)



Side Photo

PCB Specifications			
Material	FR-4	Layer	2 layer
PCB thickness	1.6±0.10	Copper(CU) thickness	2.0 oz
Pads plating	Lead-free spray tin	Plate thickness	
Solder	Green	Silkscreen	White

5. Product wiring diagram

1). Wiring diagram

EK-BM3R8S120AR supports 3-strings , The wiring method is shown in "Figure 5.1.1".

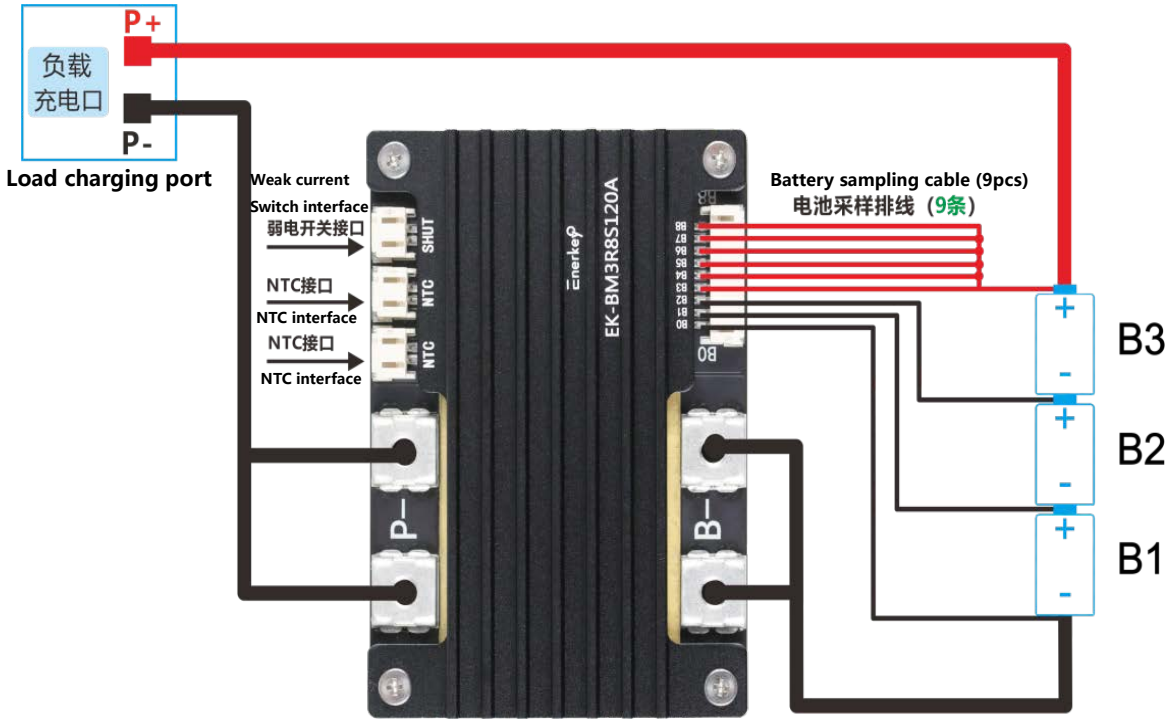


Figure 5.1.1

EK-BM3R8S120AR supports 4-strings , The wiring method is shown in "Figure 5.1.2".

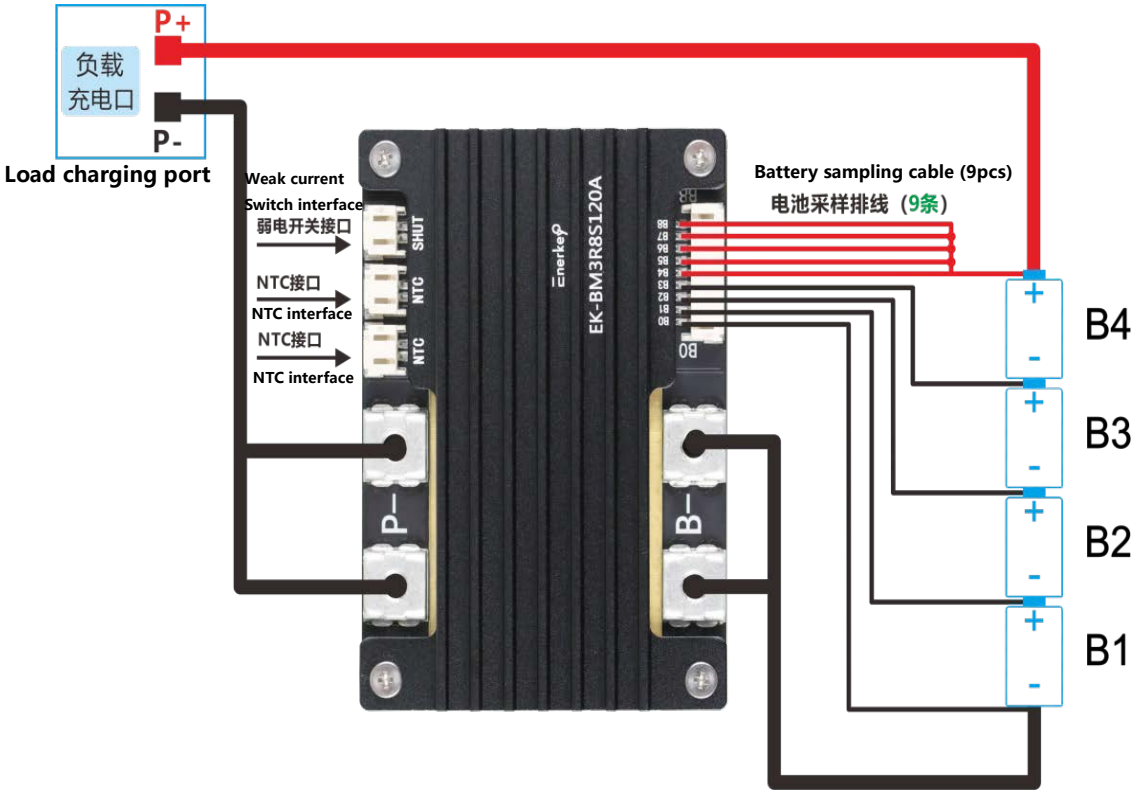


Figure 5.1.2

EK-BM3R8S120AR supports 5-strings , The wiring method is shown in "Figure 5.1.3".

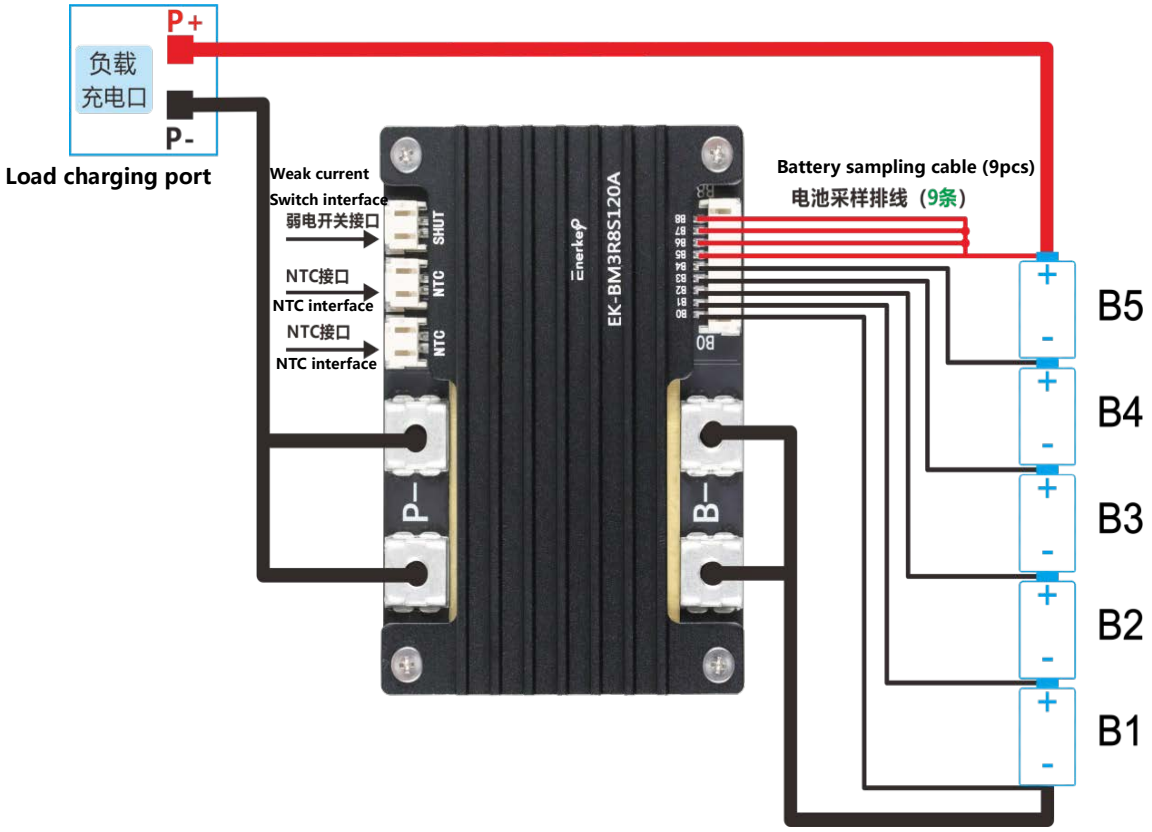


Figure 5.1.3

EK-BM3R8S120AR supports 6-strings , The wiring method is shown in "Figure 5.1.4".

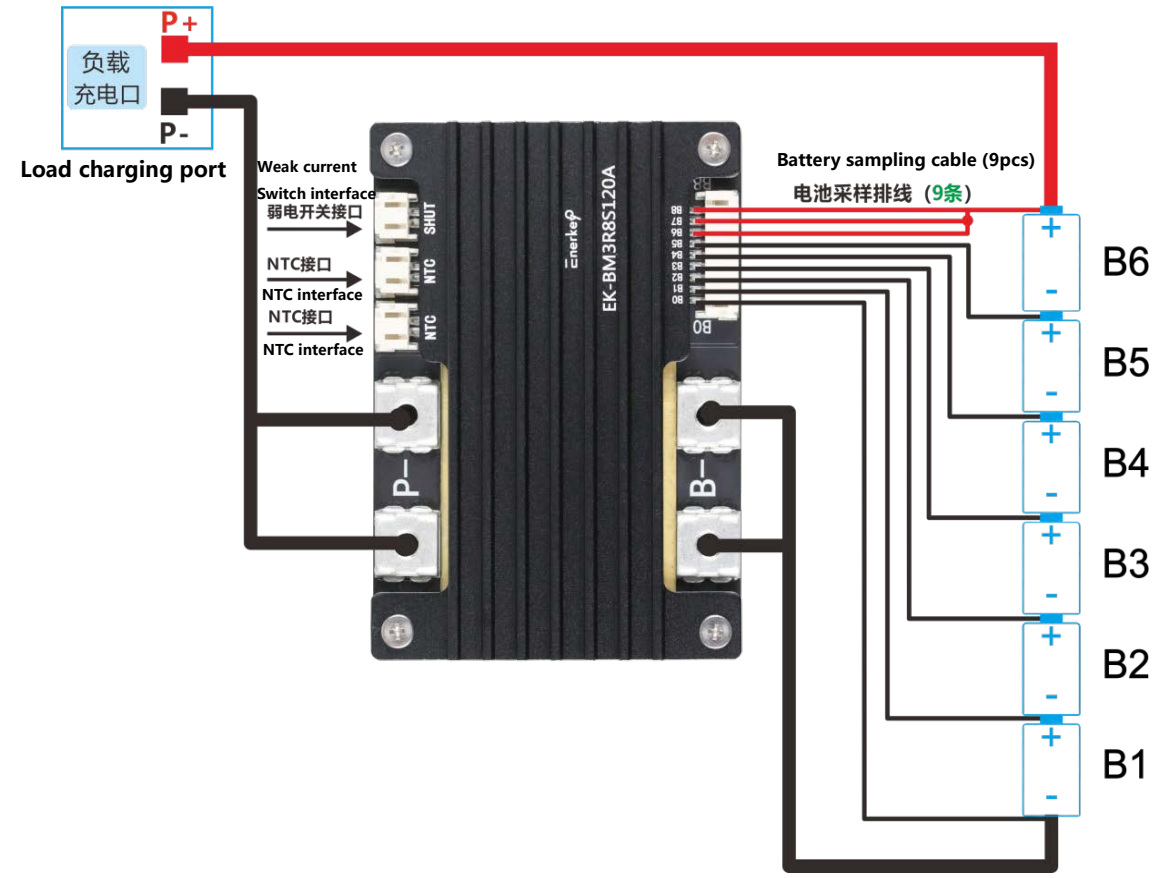


Figure 5.1.4

EK-BM3R8S120AR supports 7-strings , The wiring method is shown in "Figure 5.1.5".

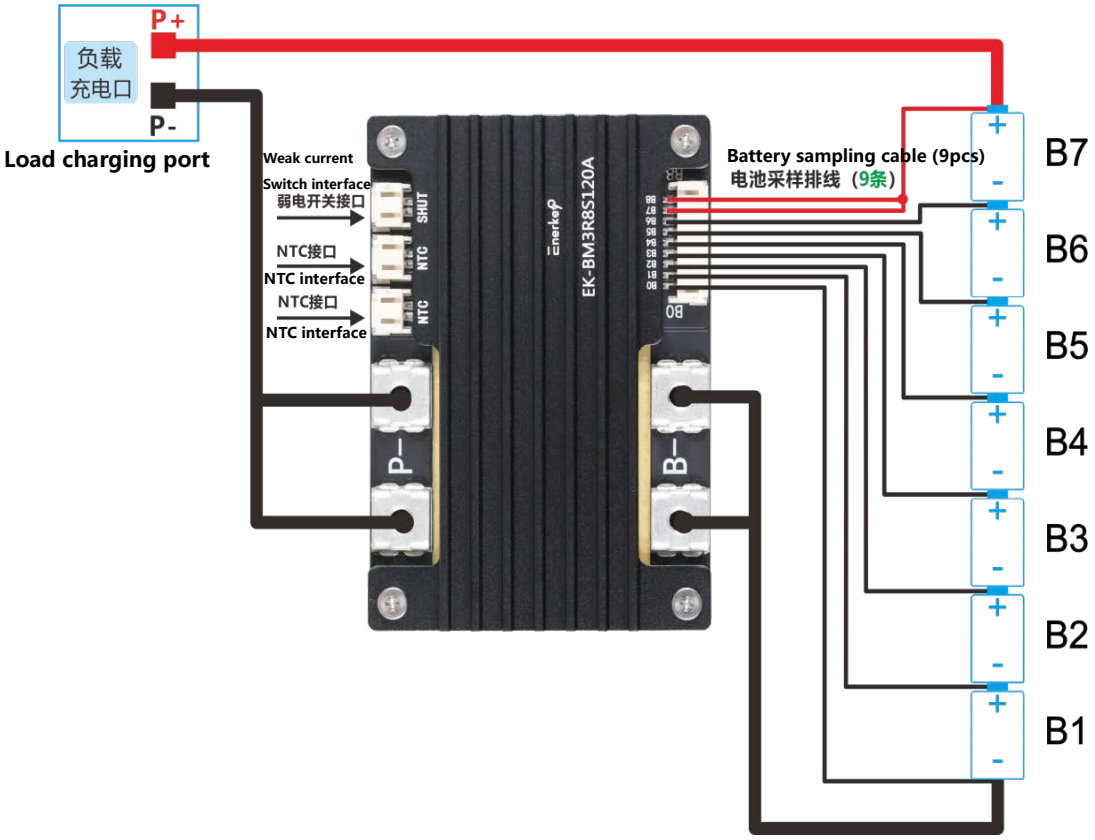


Figure 5.1.5

EK-BM3R8S120AR supports 8-strings , The wiring method is shown in "Figure 5.16".

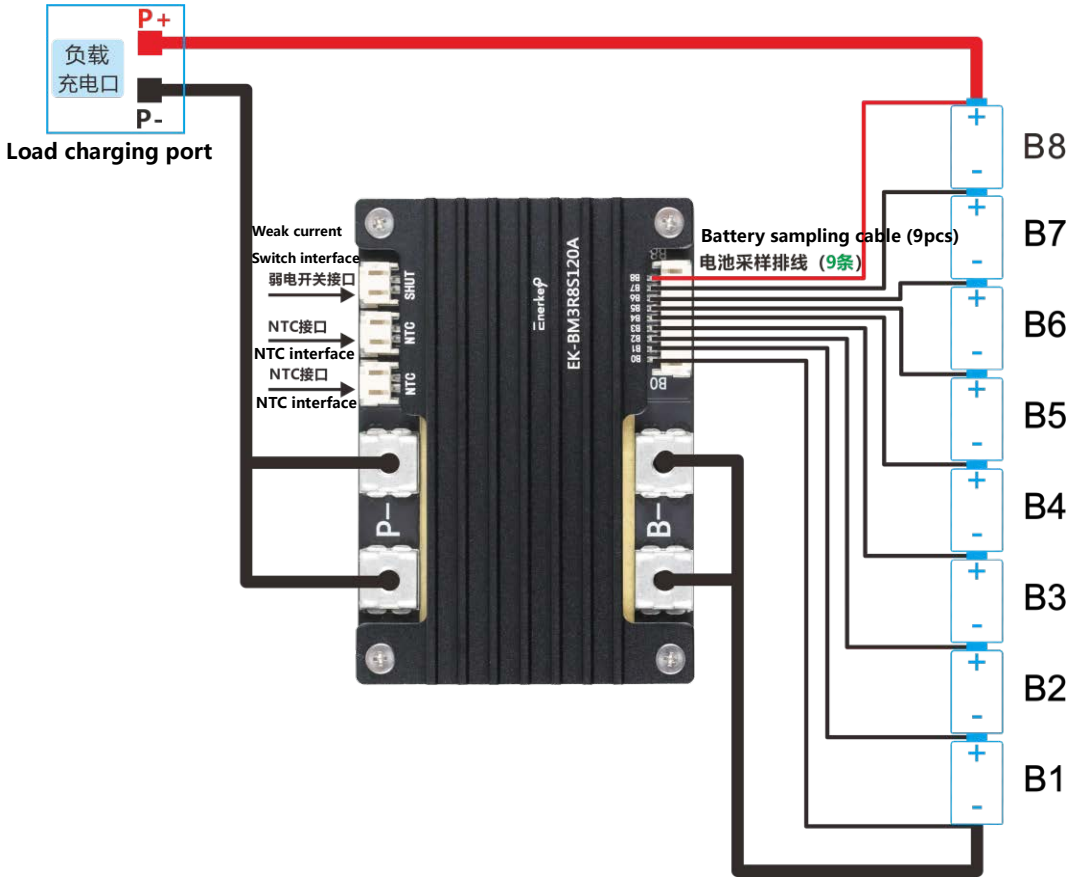


Figure 5.1.6

3). Precautions for wiring

①. Installing the battery protective board requires a certain amount of technical electronic knowledge.
②. When wiring, first connect the B- line at the soldering pad position to the total negative terminal of the battery (the B- line should be soldered to a short and thick wire).
And first solder the wired terminals to the battery pack, and then insert the protective plate.
③. The connection between the battery terminal B- and the protection board terminal B- should be short and thick, otherwise it will cause the protection board to charge and discharge in advance and malfunction.
You need to use thick wires when wiring P+/P-. Wires that are too thin and too long will burn the board!
④. After connecting the battery, please pay attention to the insulation protection of the product to avoid short circuit when the power is on;

6. Frequently Asked Questions

Phenomenon	Solution
After the protective board is installed, No output or wrong output voltage	① Activate the protection board: Connect the charger to power on or short-circuit P- and B- for 2-3 seconds, and then measure whether the output voltage is normal; ② The wiring order is wrong: measure whether the voltage of each battery string is normal.
After the protective board is installed, After using it for a while, the power was cut off.	Check whether the installation position of the NTC probe is normal, It should be installed close to the battery and not placed on the protective board.

7. Environmental substance requirements

Each battery corresponds to an LED indicator, and you can clearly observe whether each cell is balanced.

Harmful Substance	Limit standard (mg/kg)
Lead (Pb)	1000
Cadmium (Cd)	100
Mercury (Hg)	1000
Hexavalent chromium (Cr6+)	1000
Polybrominated biphenyls (PBB)	1000
Polybrominated diphenyl ethers (PBDE)	1000

8. Safety protection measures, transportation and storage

1) Safety protection measures

①. There is no high voltage in the protection board board itself, and it will not cause electric shock damage to the body.

②. Do not repair the balancing board while the power is on. All repairs should be performed by qualified service personnel.

If the working voltage set by the factory is changed, the safety certificate no longer applies.

③. When using, please pay attention to the insulation treatment of the product to avoid short circuit.

④. Pay attention to ESD protection when using this product.

⑤. This product complies with the company's thrust standards: 0402 components ≥1.0KgF; 0603 components ≥1.5KgF; IC and MOS tubes ≥2.0KgF.

2) Packaging and shipping

①. Separate and package PCBA with anti-static bubble bags.

②. The packed products can be transported by ordinary means of transportation when they are not directly affected by rain, snow or violent collisions and bumps.

It is not allowed to be placed together with corrosive substances such as acids and alkalis during transportation.

3) Storage

Packaged products should be stored in a permanent warehouse with a temperature of 0℃~35℃ and a relative humidity of no more than 80%.

The warehouse should be free of acid, alkali and corrosive gases, strong mechanical vibration and impact, and no strong magnetic field.