HT-24S 04/10/15/20EB
Battery Smart Active Balancer
Single string 1.5V~4.5V

User Manual

Thank you for purchasing our series of products. They will bring convenience and efficiency to your battery capacity testing work. To ensure the best user experience, please read this manual carefully before use and keep it properly for future reference.

We reserve the right to upgrade the machine and modify the manual without prior notice. Thank you for your understanding!

1. Product Introduction

The HT-24S04/10/15/20EB battery intelligent active balancer is a tailored Balanced management system specifically designed for high-capacity series-connected battery packs. Utilizing supercapacitors as a medium, it achieves active energy transfer equalization. The device has a voltage acquisition range of 1.5V~4.5V with an accuracy of 1mV, and is suitable for mainstream lithium-ion, lithium iron phosphate, and lithium titanate batteries on the market. It supports 2 to 24 strings of batteries, cascading use, and disordered power-on. It is widely used in battery packs for small sightseeing cars, scooters, shared cars, high-power energy storage, base station backup power supplies, solar power stations, and other products. It can also be used in battery equalization maintenance, repair, and other applications.

2. Product Features

1) Customize the equalization current size, and the instrument automatically adjusts the equalization current during the equalization of small-capacity battery packs.
2) The equalization current is set in the app to the actual working equalization current value, which is independent of the voltage difference of the series-connected battery cells in the battery pack.
3) It features Bluetooth communication and comes with a companion mobile app software. Through Bluetooth connection to the equalizer, users can view data such as cell voltage, maximum cell voltage, minimum cell voltage, average cell voltage, maximum voltage difference, total battery pack voltage, real-time equalization current, operation time, equalization status, and device temperature. It allows online modification of device equalization parameters.
4) Supports cascading use, supports disorderly power-on, supports disorderly power-on detection and protection, and supports power-off detection for cable disconnection, misconnection protection, and fault alarm function.

3. Product Parameters

model	HT-24S04/10/15/20EB
Number of applicable strings	2S~24S
cascade	cascade support
Overall dimensions	04EB：L140 x W128 x T22（mm） 10EB：L142 x W155 x T28（mm） 15/20/25EB：L313xW193xT43（mm）
Weight (including packaging)	470g/810g/2530g
Substrate material/surface treatment	FR-4/Lead-free HASL
Supported battery types	Lithium-ion battery with nickel cobalt manganese (NCM)/lithium iron phosphate (LFP)/lithium titanate (LTO)
Operating Range of Cell Voltage	1.5V~4.5V
Undervoltage Protection Sleep Voltage	Customizable settings via APP: 1.5V~4.2V
Equilibrium method	Time-shared single-channel transfer, point-to-point

	energy transfer
Balanced current	Customizable settings via APP: 1A~4A/10A/15A/20A
Voltage equalization accuracy (customizable via APP) External Power Supply Required	Battery power supply: accuracy 3mV (typical value)
	15/20EB：External power supply: Accuracy 1mV (typical value)
Power-fail detection function	10EB:Can be powered by an external power supply (24V-100V, accuracy ±1mV) or by batteries (accuracy ±3mV). An external power supply is required when fewer than four battery cells are connected in series. When the total voltage of the battery system is lower than 24V（HT-24S15/20EB）/25V（HT-24S04EB）, an external boost module or an external power supply is required for power supply
Misconnection protection function	Support power-down detection for flat cables
Reverse Connection Protection	Supports reverse connection protection function
Fault alarm function	Support out-of-order power-on detection/protection
Buzzer	Support fault alarm function
power consumption	Customizable settings through APP
Power Consumption Approximately	1W when the equalization system is turned on, and approximately 0.5W when it is turned off
Working environment temperature	-20°C to +55°C

4. Schematic diagram of product appearance and dimensions

1) Product appearance

HT-24S04EB：



HT-24S10EB：

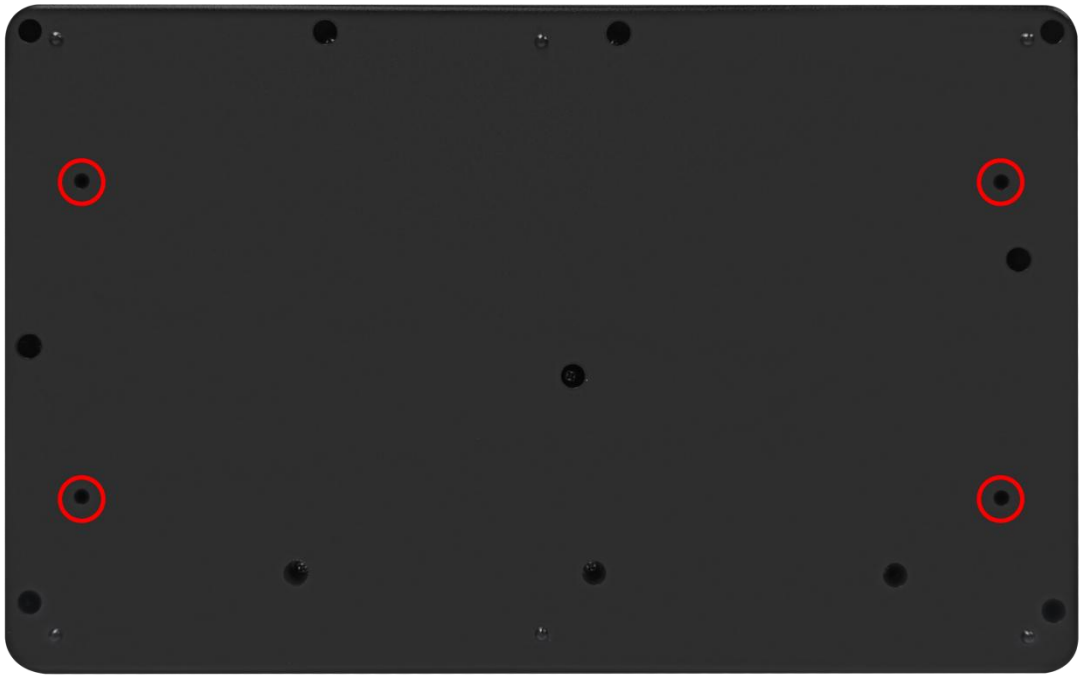

HELTEC BMS
WWW.Heltec-energy.com
SMART ACTIVE BALANCER
Model: HT-24S10EB
Balancing current: 1-10A
Accuracy: 1mV
String suitable for: 2-24S
Battery type: NCM/LFP/LTO
Power supply: DC12-100V



HT-24S15/20EB：



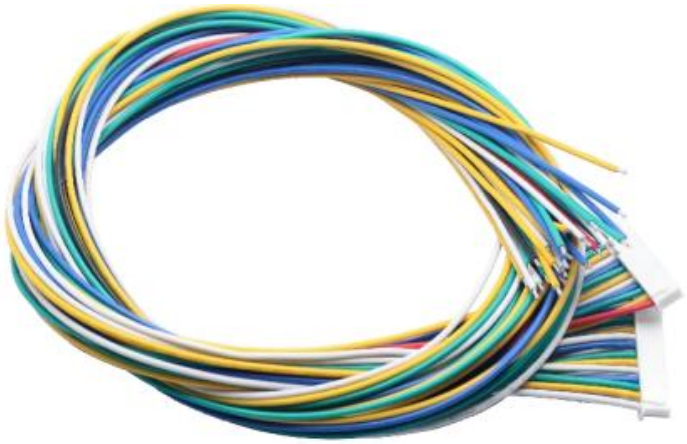




Reserved backplane mounting holes with a diameter of 4.2mm

2) Accessories

HT-24S04EB：



Accessory name	Accessory Specifications	Quantity
12 pin terminal wire	80CM/20AWG/Single end wire stripping 3mm	1
14 pin terminal wire	80CM/20AWG/Single end wire stripping 3mm	1

HT-24S10EB：



Accessory name	Accessory Specifications			Quantity
	line number	line length	Stripping and tin plating length	1
7-pin terminal wire	18AWG	80CM	3mm	2
9-pin terminal wire	18AWG	80CM	3mm	1
DC adapter	18V or 24V（random）			

HT-24S15/20EB：

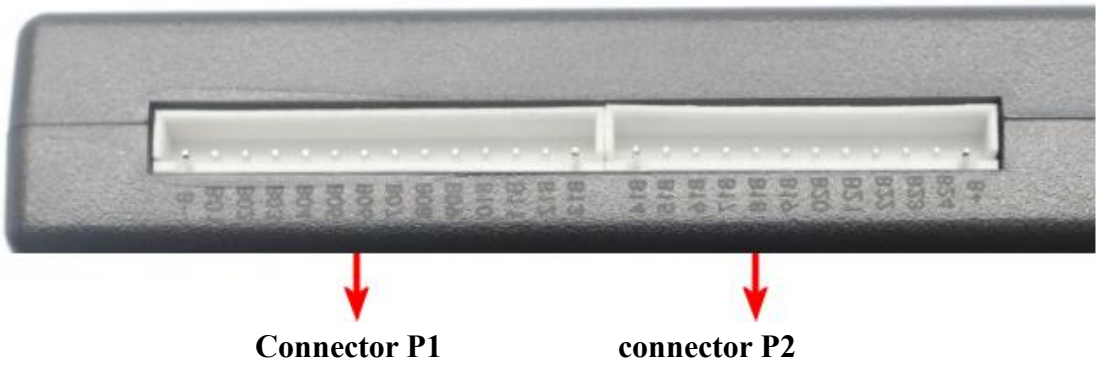




Accessory name	Accessory Specifications	quantity
7 Pin 7.62 terminal	Fixing hole with screw	1
9 Pin 7.62 terminal	Fixed hole with screw	2
DC adapter	24V (random)	1
clamp line	Cable length: 1 meter Wire gauge: 16AWG	25

3) Connector terminals

HT-24S04EB：

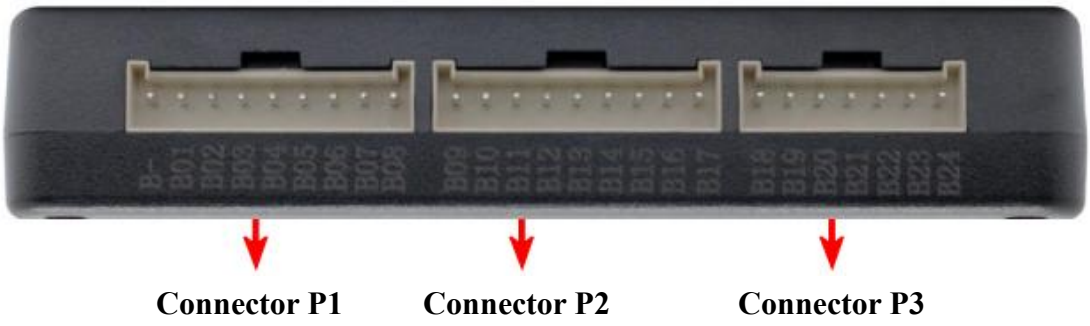


***Connector Pin Description**

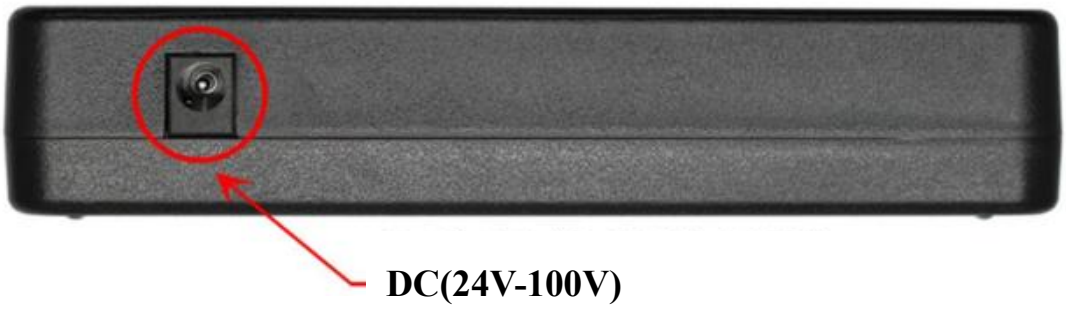
connector	pin number	name	definition
P1	1	B-	The negative pole of the first string battery
	2	B1	The positive pole of the first string battery
	3	B2	Second string battery positive electrode
	4	B3	3rd string battery positive electrode
	5	B4	4th string battery positive electrode
	6	B5	5th string battery positive electrode
	7	B6	6th string battery positive electrode
	8	B7	7th string battery positive electrode
	9	B8	8th string battery positive electrode
	10	B9	9th string battery positive electrode
	11	B10	10th string battery positive electrode
	12	B11	11th string battery positive electrode
	13	B12	12th string battery positive electrode
	14	B13	13th string battery positive electrode
P2	1	B14	14th string battery positive electrode

connector	pin number	name	definition
	2	B15	15th string battery positive electrode
	3	B16	16th string battery positive electrode
	4	B17	17th string battery positive electrode
	5	B18	18th string battery positive electrode
	6	B19	19th string battery positive electrode
	7	B20	20th string battery positive electrode
	8	B21	21th string battery positive electrode
	9	B22	22nd string battery positive electrode
	10	B23	23rd string battery positive electrode
	11	B24	24th string battery positive electrode
	12	B+	Battery pack positive electrode

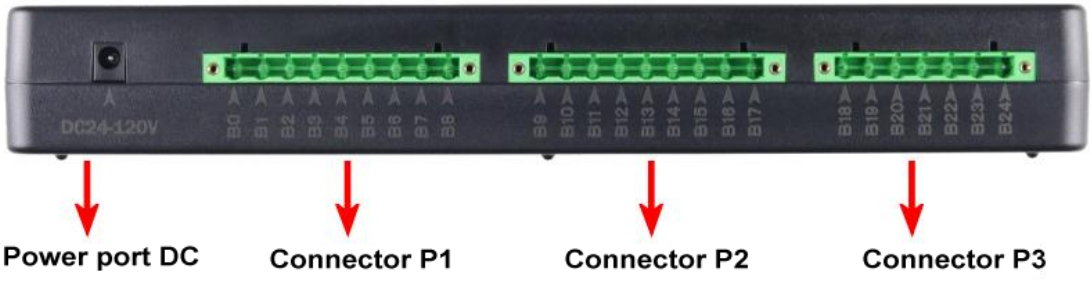
HT-24S10EB：



*HT-24S10EB DC power supply



HT-24S15/20EB（Taking 15EB as an example）：

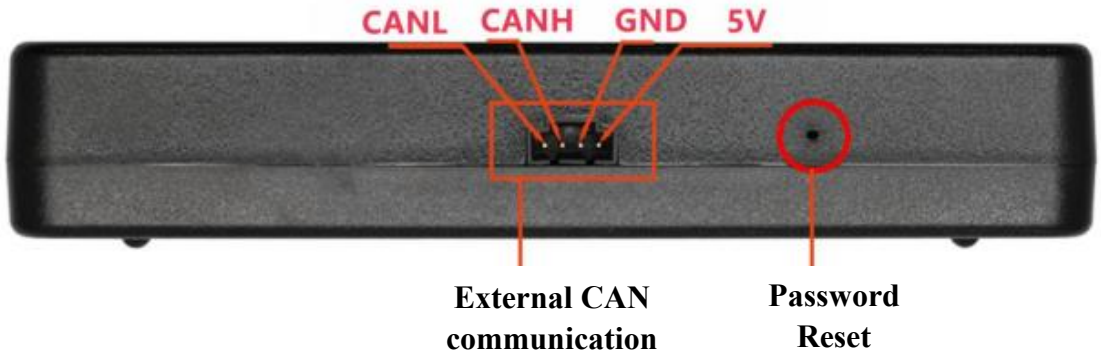


*HT-24S**10/15/20EB Connector Pin Description**

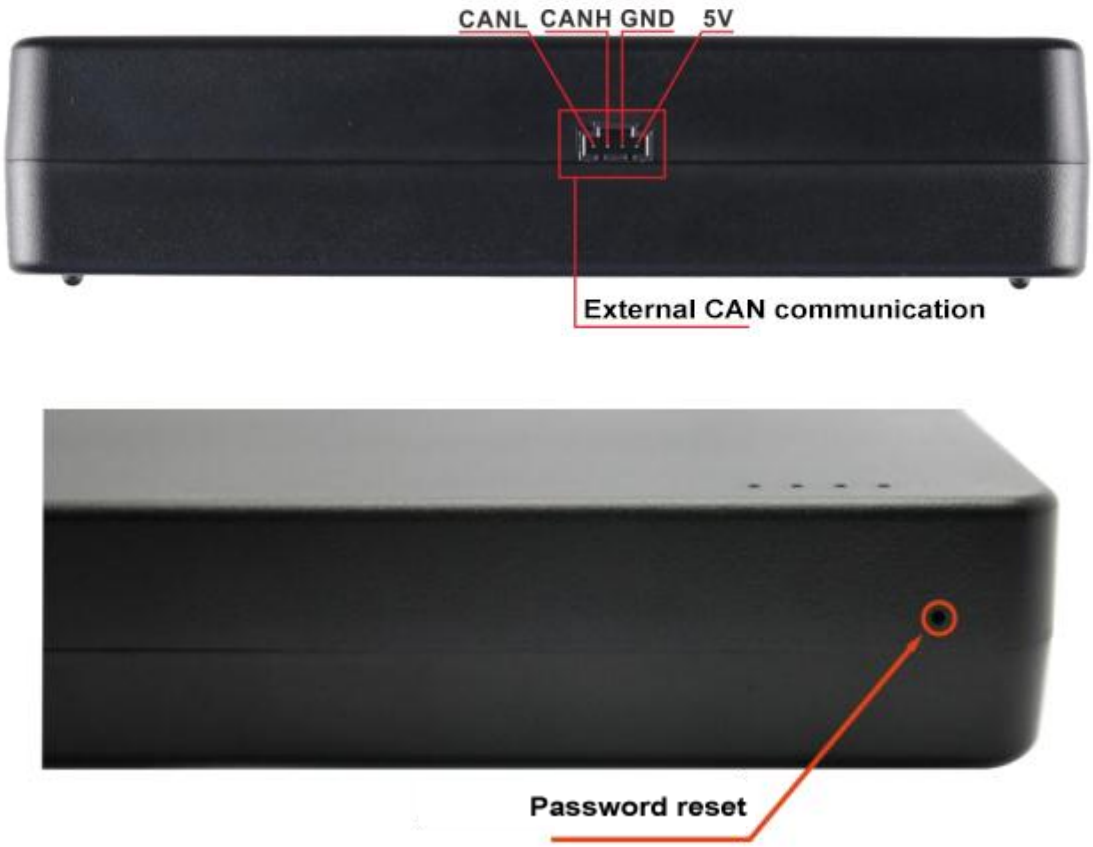
connector	Pin number	name	definition
DC（Excludes HT-24S10EB）	1	DC24-120V	DC Injector
P1	1	B0	The negative pole of the first string battery
	2	B1	1st string battery positive electrode
	3	B2	2nd string battery positive electrode
	4	B3	3rd string battery positive electrode
	5	B4	4th string battery positive electrode
	6	B5	5th string battery positive electrode
	7	B6	6th string battery positive electrode
	8	B7	7th string battery positive electrode
	9	B8	8th string battery positive electrode
P2	1	B9	9th string battery positive electrode
	2	B10	10th string battery positive electrode
	3	B11	11th string battery positive electrode
	4	B12	12th string battery positive electrode
	5	B13	13th string battery positive electrode
	6	B14	14th string battery positive electrode
	7	B15	15th string battery positive electrode
	8	B16	16th string battery positive electrode
	9	B17	17th string battery positive electrode
P3	1	B18	18th string battery positive electrode
	2	B19	19th string battery positive electrode
	3	B20	20th string battery positive electrode
	4	B21	21st string battery positive electrode
	5	B22	22nd string battery positive electrode
	6	B23	23rd string battery positive electrode
	7	B24	24th string battery positive electrode

4) **External CAN Communication Interface & Password Reset Switch**

HT-24S10EB：

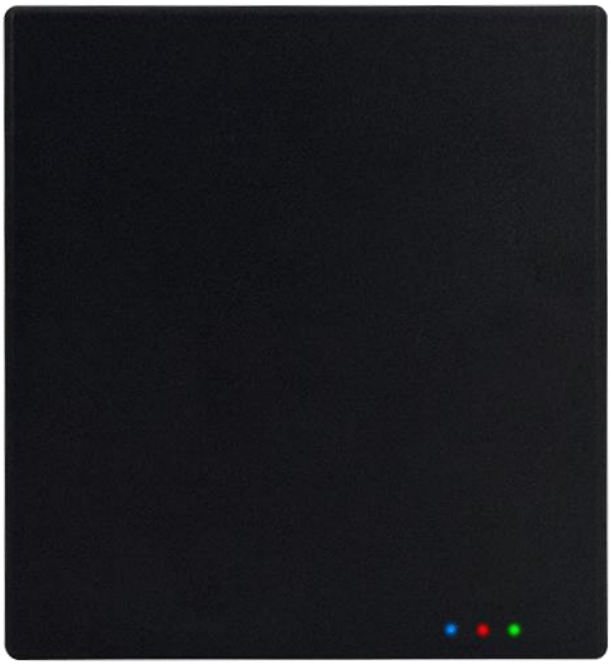


HT-24S15/20EB（Taking 15EB as an example）：



5) Indicator Light Instructions

HT-24S04EB：



Indicator light	Indicator light color	When the LED is constantly on	When the LED flashes
Bluetooth status indicator light	blue	Device connection successful	Device not connected
Fault status indicator light	green	Internal fault	Battery detection failed
Work status indicator light	red	Balanced completion	Balancing work

HT-24S10/15/20EB（Taking HT-24S15EB as an example）：



Indicator light	Indicator light color	LED constant	When the LED flashes
Power status indicator light	green	Power normal	/
Bluetooth status indicator light	blue	Device connection successful	Device connection failed
Work status indicator light	yellow	Balanced completion	Balancing work
Fault status indicator light	red	The number of battery cells does not match the settings	The resistance of the balance line is too high

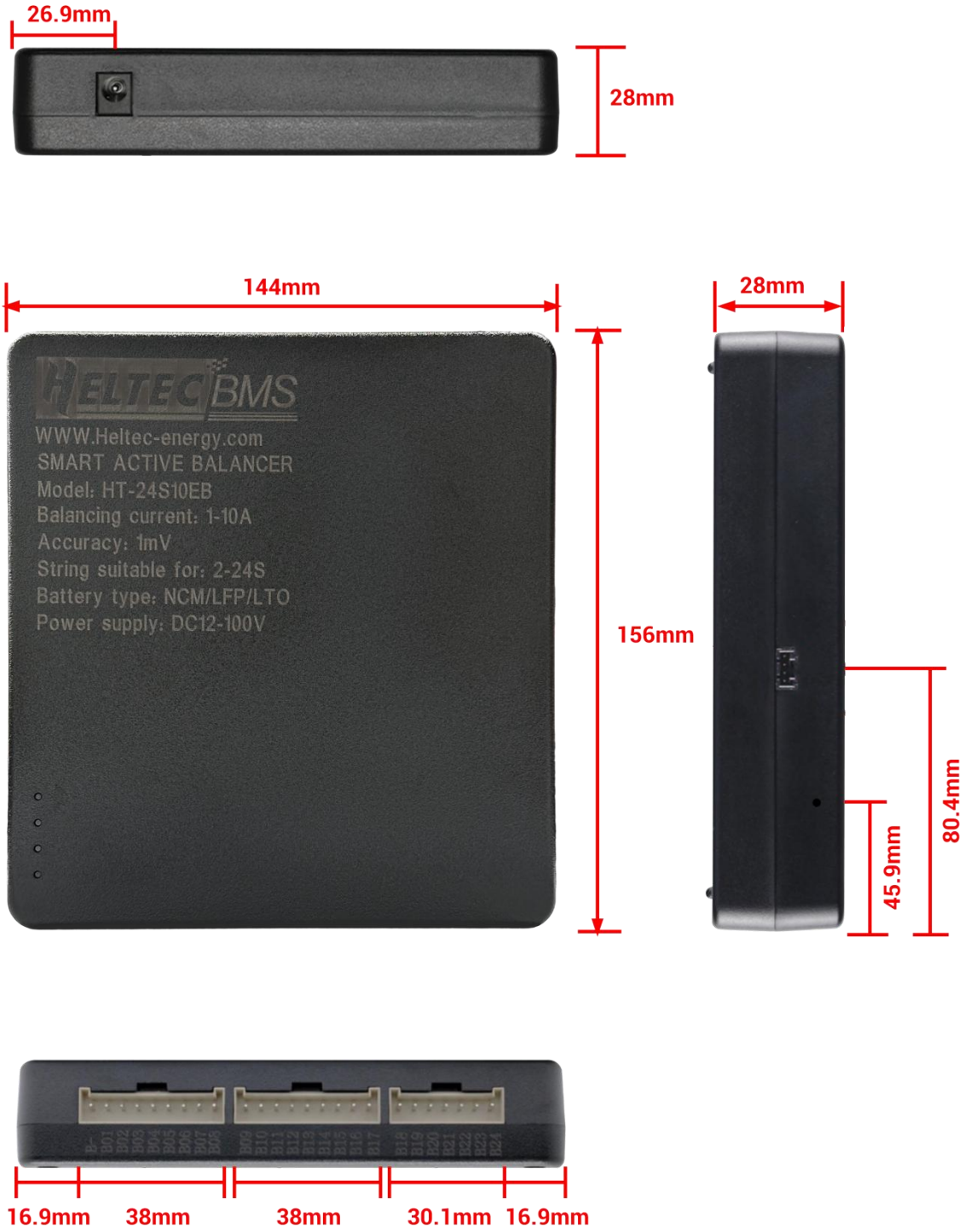
6) Product dimensions

Note: Dimensions are in millimetres, with a tolerance of ±0.5mm.

HT-24S04EB:

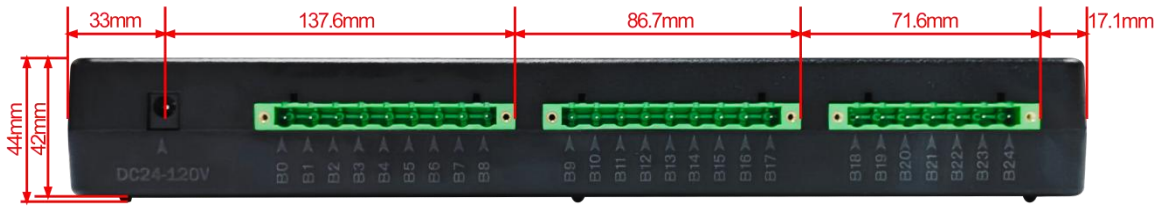


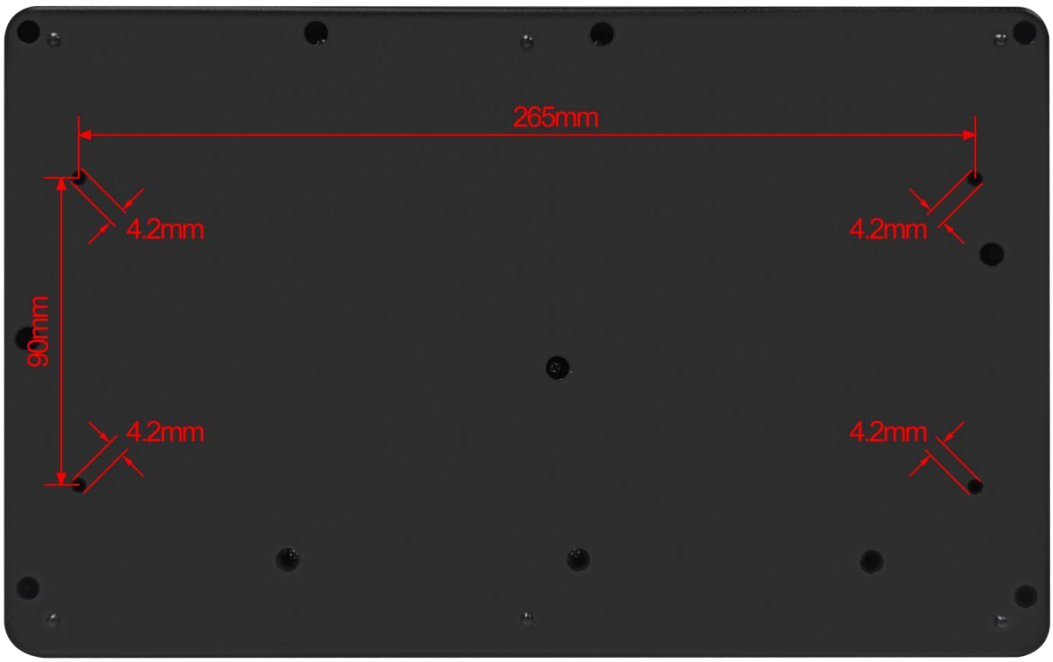
HT-24S10EB：


26.9mm
28mm
144mm
28mm
HELTEC BMS
WWW.Heltec-energy.com
SMART ACTIVE BALANCER
Model: HT-24S10EB
Balancing current: 1-10A
Accuracy: 1mV
String suitable for: 2-24S
Battery type: NCM/LFP/LTO
Power supply: DC12-100V
156mm
80.4mm
45.9mm
16.9mm
38mm
38mm
30.1mm
16.9mm

HT-24S15/20EB（Taking 15EB as an example）：







5. Balanced Introduction

1）Principle of equilibrium

The equalization process of this active balancer consists of the following three steps, which cycle in sequence until the maximum voltage difference is within the set range:

(1) Detect the maximum and minimum cells;

(2) The maximum charging current of the supercapacitor in the equalizer is the set current, with a maximum of 04/10/15/20A;

(3) The supercapacitor in the equalizer discharges the smallest cell, with a discharge current of the set current and a maximum of 04/10/15/20A;

(4) Repeat steps 1-2 in sequence until the voltage difference is within the set range.

2) Single transfer capacity

(1) Calculation formula for single transfer capacity of equalizer: Balanced current/3600 * Duration (2-5S).

For example,if the balanced current is 4A, the single transfer capacity value is between 0.0022Ah-0.0056Ah. if the balanced current is 15A, the single transfer capacity value is between 0.008Ah-0.0208Ah. If the balanced current is 20A, the single transfer capacity value is between 0.009Ah and 0.0230Ah.

(2) If the balanced battery capacity is relatively small or the capacity difference is small, there will be excessive capacity transfer.for example，The difference in capacity between the maximum cell and the minimum cell is 0.1AH, and at this time, if the balancing current is set to 4/10/15A/20A, there will be excessive capacity shift. After the current balancing cycle ends, the original minimum cell will become the maximum cell, and the maximum cell will become the minimum cell. The simplest solution to this is to reduce the balancing current.

3) Small capacity balancing strategy

In response to the situation of excessive energy transfer caused by small capacity differences, the 04/10/15A /20Aequalizer has designed an equalization strategy to cope with this situation. When the equalization cycle ends, the original smallest cell becomes the largest cell, and the largest cell becomes the smallest cell. The equalizer waits for 3 minutes to allow the battery voltage to recover. If after 3 minutes, the maximum cell still changes to the minimum and the minimum cell changes to the maximum, it means that the equalization is indeed excessive. At this time, the equalizer automatically reduces the equalization current by half.

For example, the original 04/10/15/20A balanced current has now been reduced to 2A/5A/7.5A/10AA balanced current. If there is still a situation of over balancing, continue to reduce the balancing current until the voltage difference is within the set range.

6. Installation method and precautions

1) Unpacking inspection and precautions

(1) Handle packaging boxes, equalizers, etc. with care and try not to invert them;

(2) Before opening the box, pay attention to whether the packaging is intact, such as whether there are any impact marks, damages, etc.

2) Installation Instructions for Equalizer

(1) A single equalizer can connect up to 24 battery packs in series.

(2) When used for battery packs with less than 24 battery strings connected in series, the spare pins are suspended.

(3) When used for battery packs with a total voltage below 24V, an external power supply is required.

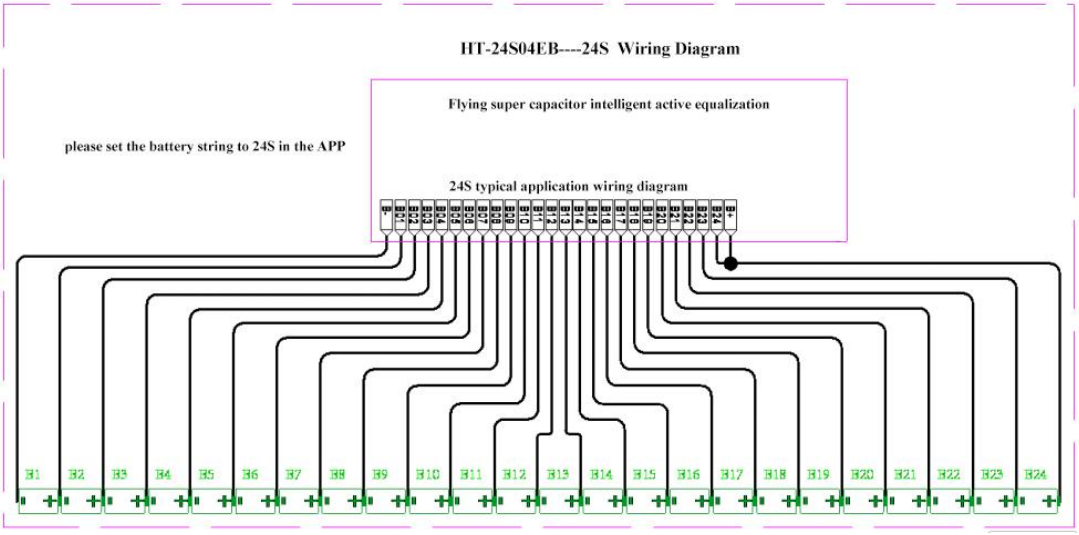
(4) When used in cascade, at least one battery serves as the energy exchange common terminal between every two equalizers.

3) wiring diagram

(1) HT-24S04EB：

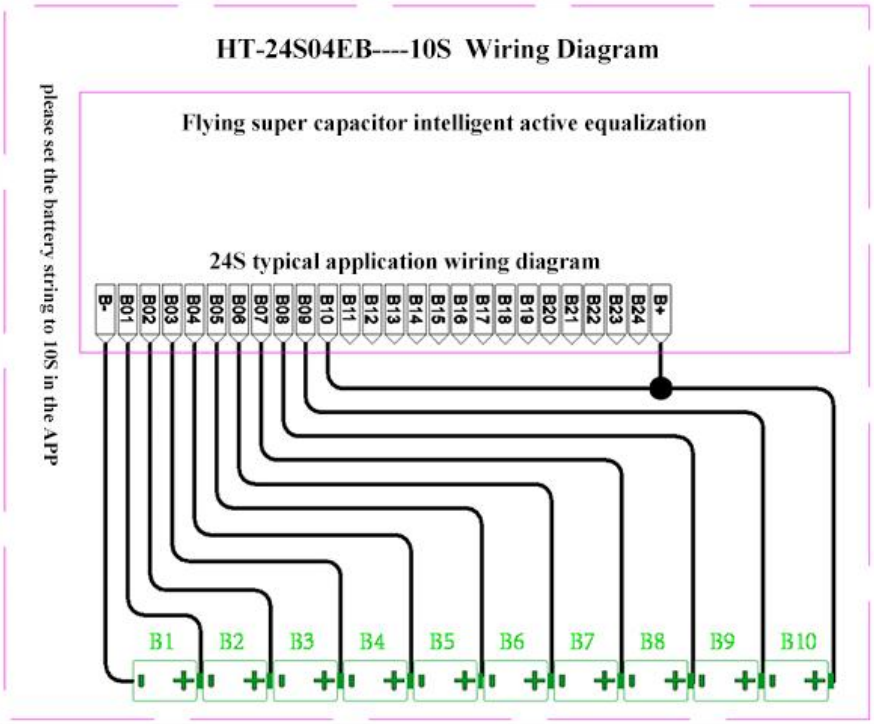
*24 series wiring diagram

*A single equalizer supports 2S-24S. The following figure shows the installation and wiring method for a 24S battery pack:



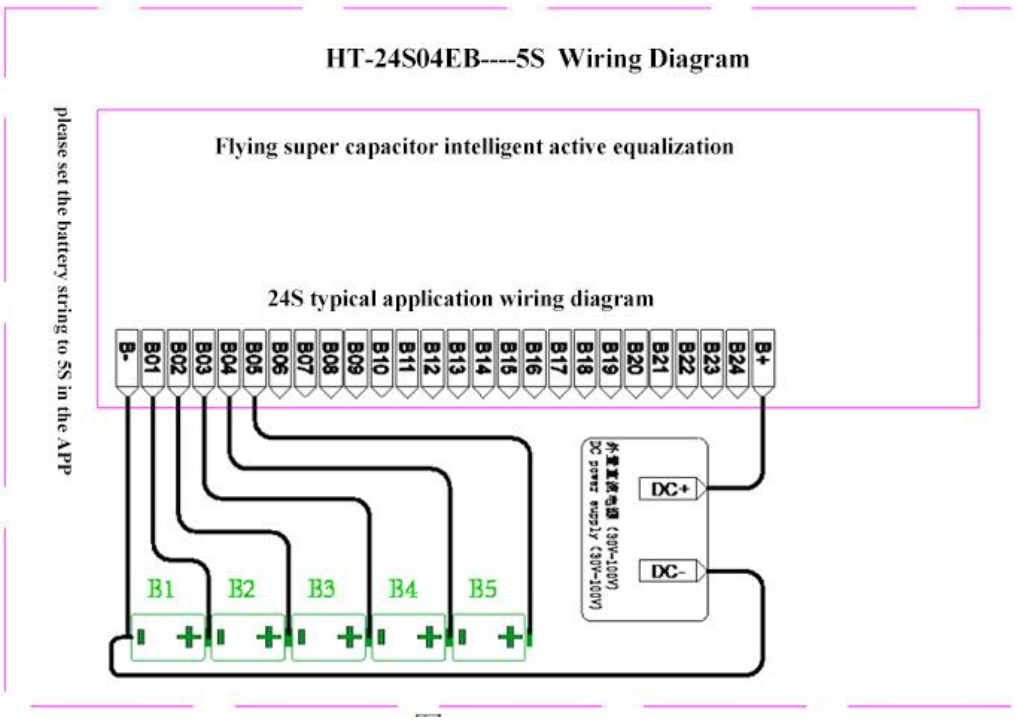
*10 series wiring diagram

*When used for battery packs with less than 24 battery strings connected in series, the spare pins are suspended. Taking 10S as an example, the installation and wiring method is as follows:



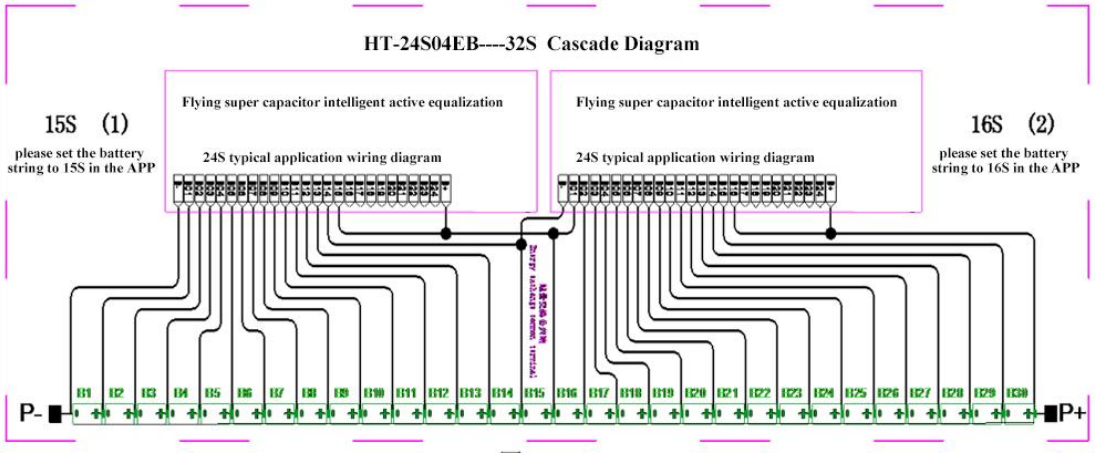
*5 series wiring diagram

*When used for battery packs with a total voltage below 25V, an external 30V~100V DC power supply is required. Taking 5S as an example, the installation and wiring methods are as follows:



*32 series cascaded wiring diagram

*HT-24S4EB supports cascading use, with at least one battery serving as the energy exchange common terminal between every two equalizers. Taking 32S as an example, the installation and wiring methods are as follows:



(2)HT-24S10EB：

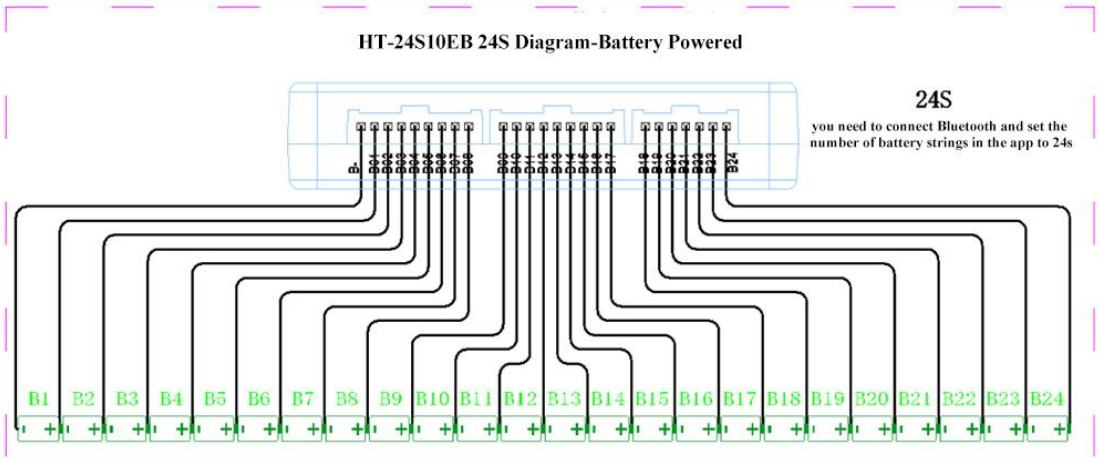
*24 series wiring diagram

*The wiring method for using battery power or DC adapter power is the same, with only the following two differences:

① Battery powered support for 4S-24S, voltage balancing accuracy ± 3mV;

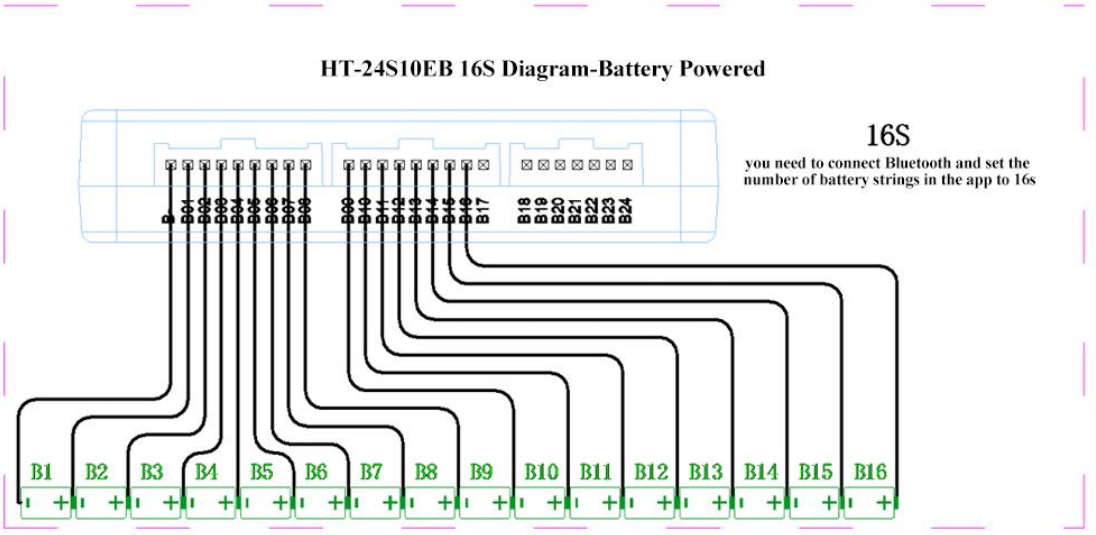
② The DC adapter supports 2S-24S power supply and has a voltage balancing accuracy of ± 1mV;

*The following diagram shows the installation and wiring method when connecting a 24S battery pack:



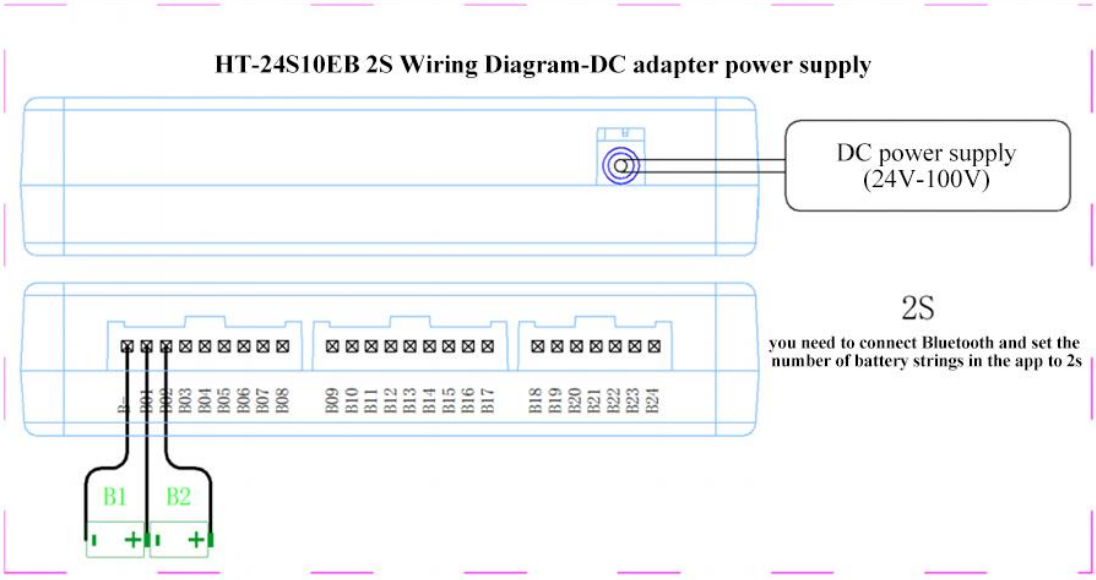
*16 series wiring diagram

*When used for battery packs with less than 24 battery strings connected in series, the spare pins are suspended. Taking 16S as an example, the installation and wiring methods are as follows:



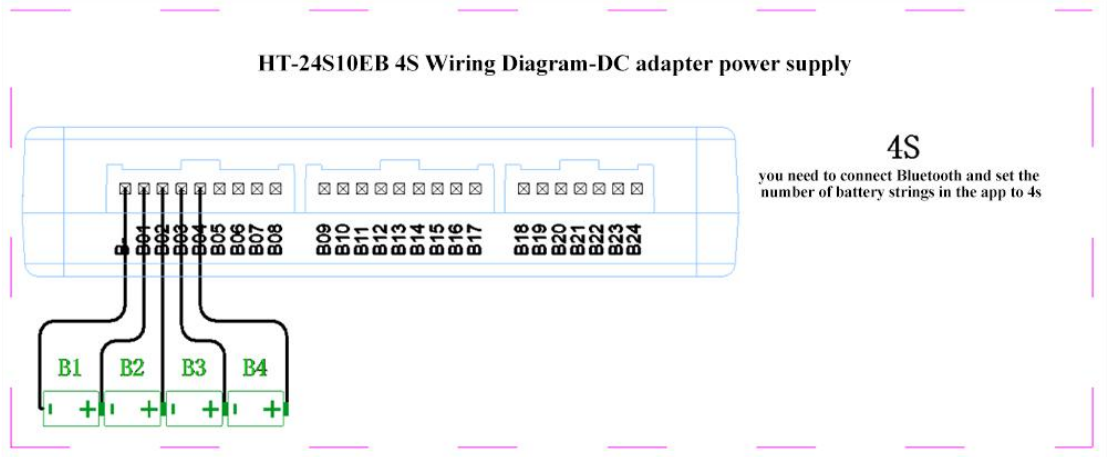
*2S wiring diagram

*When using DC power supply, the minimum support is to connect a battery pack with 2 series of batteries in series. The installation and wiring method is shown in the following figure:



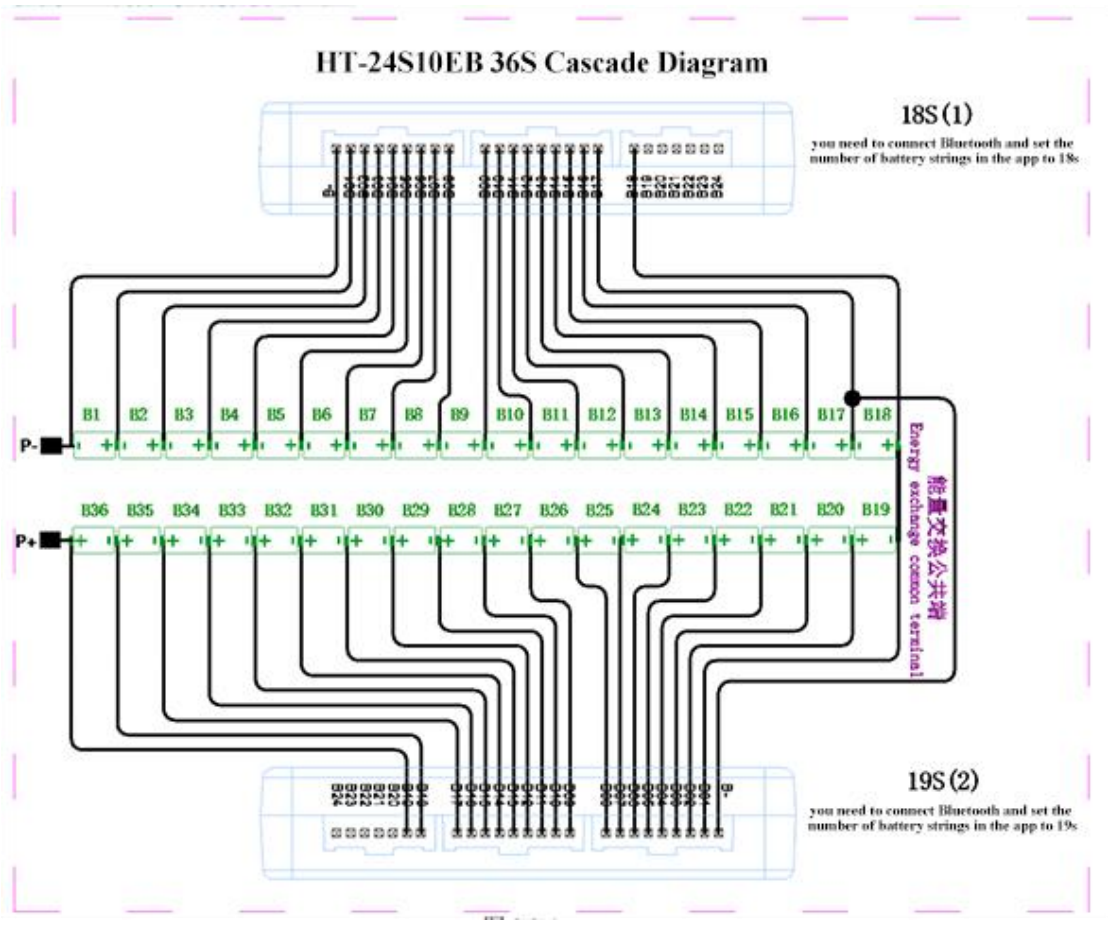
*4S wiring diagram

*When using battery power, a minimum of 4 series connected battery packs are supported. The installation and wiring method is shown in the following figure:



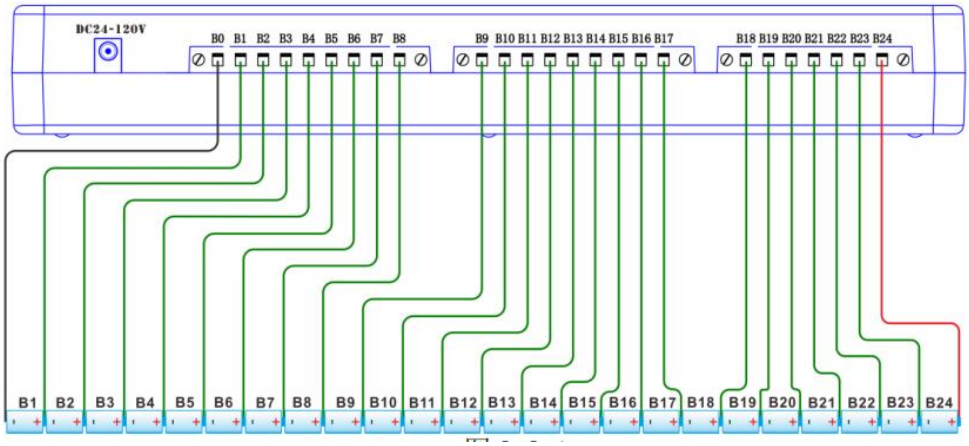
*36 series cascaded wiring diagram

* HT-24S10EB support cascading use, with at least one battery serving as the "energy exchange common terminal" between each two equalizers. Taking 36S as an example, the installation and wiring methods are as follows:



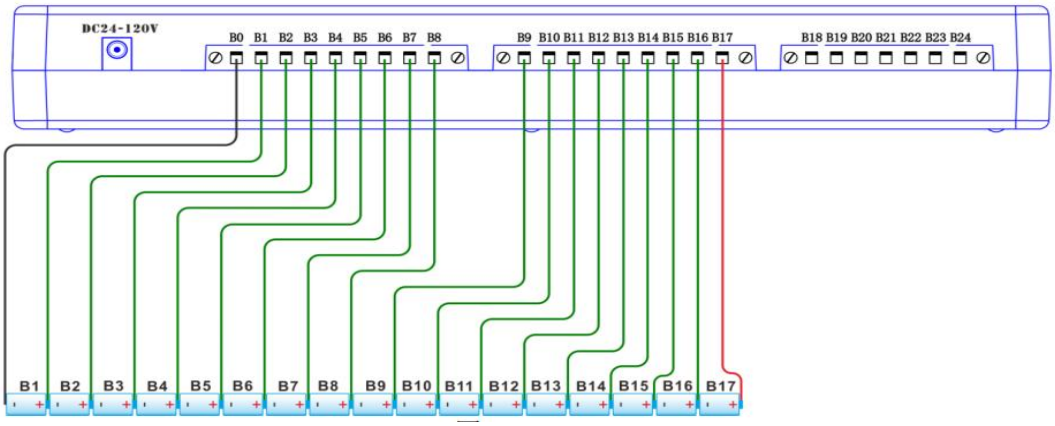
(3)HT-24S15/20EB：

*A single equalizer supports 2S-24S. The following figure shows the installation and wiring method for a 24S battery pack:



*17 series wiring diagram

*When used for battery packs with less than 24 battery strings connected in series, the spare pins are suspended. Taking 17S as an example, the installation and wiring method is as follows:



*3 series wiring diagram

*When used for battery packs with a total voltage below 24V, an external 24V~120V DC power supply is required. Taking 3S as an example, the installation and wiring methods are as follows:



***40 series cascaded wiring diagram**

*HT-24S10/15/20EB supports cascading use, with at least one battery serving as the "energy exchange common terminal" between every two equalizers. Taking the 40S as an example, the installation and wiring methods are as follows:

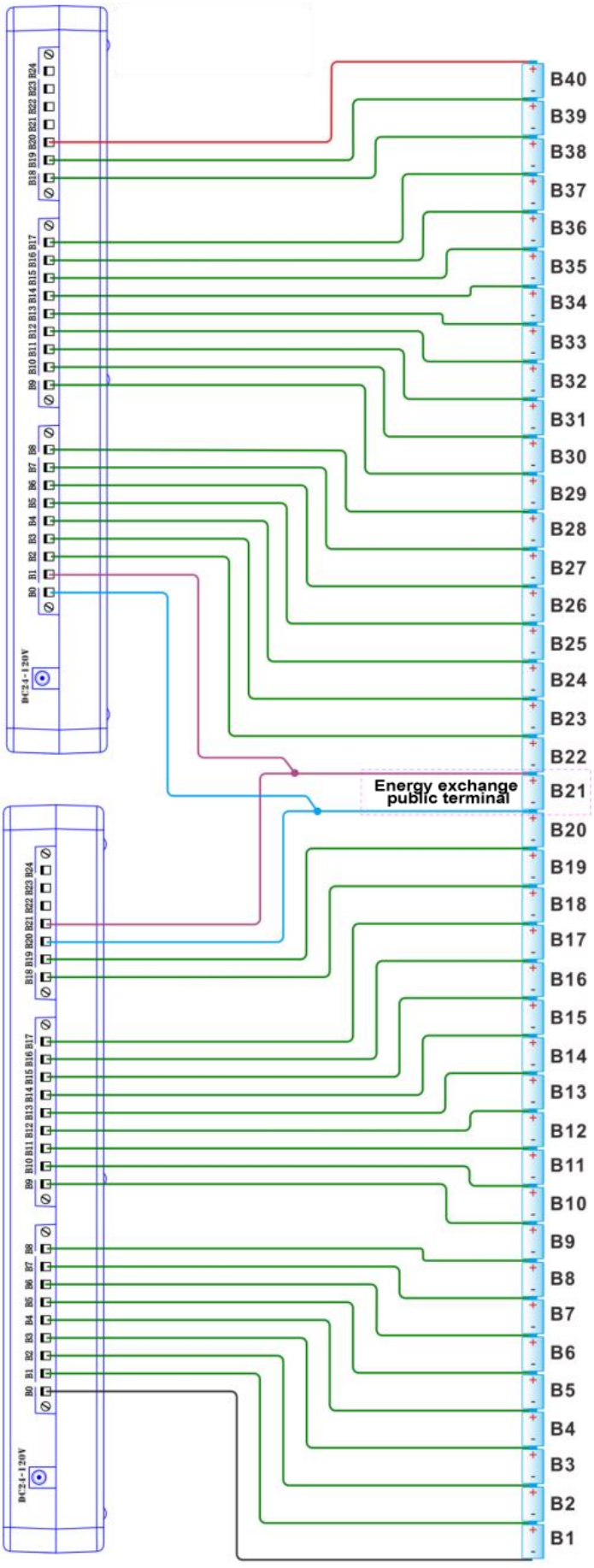
***Wiring precautions:**

①. Installing an equalizer requires a certain level of electronic knowledge reserve.

②. When wiring, first solder the terminal wire to the battery pack, and then insert the equalizer.

③. When used in cascade, there should be at least one "energy exchange common terminal" between every two equalizers. When welding, please pay attention to whether the connection here is correct and whether there are phenomena such as virtual welding and false welding.

④. Cascading is used in a high-voltage environment. Please double check the wiring for errors. If it cannot be used after connection, please contact the after-sales personnel for the corresponding cascading wiring diagram.


B40
B39
B38
B37
B36
B35
B34
B33
B32
B31
B30
B29
B28
B27
B26
B25
B24
B23
B22
Energy exchange public terminal
B21
B20
B19
B18
B17
B16
B15
B14
B13
B12
B11
B10
B9
B8
B7
B6
B5
B4
B3
B2
B1

7. APP installation

Scan the following QR code to download the mobile software for operation

APP usage（Taking 15EB as an example, the other usage methods are identical.）

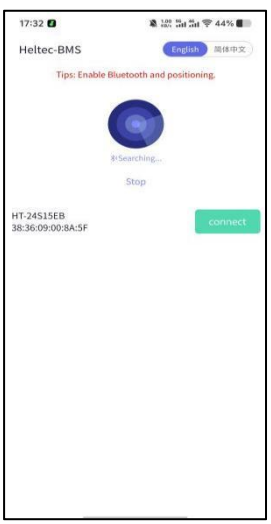
1) Pre use inspection

(1) After downloading the app, be sure to enable location and location information and allow the app to use location information, If the positioning is not enabled, it will result in the inability to search for the equalizer and the device cannot connect.

(2) Before turning on the power, please confirm that the balance line is connected properly, that the power provided to the equalizer is within the required range, that the equalizer is securely placed, and that there are no short circuits on the circuit board. Only after confirming that there are no errors, can the equalizer power be turned on.

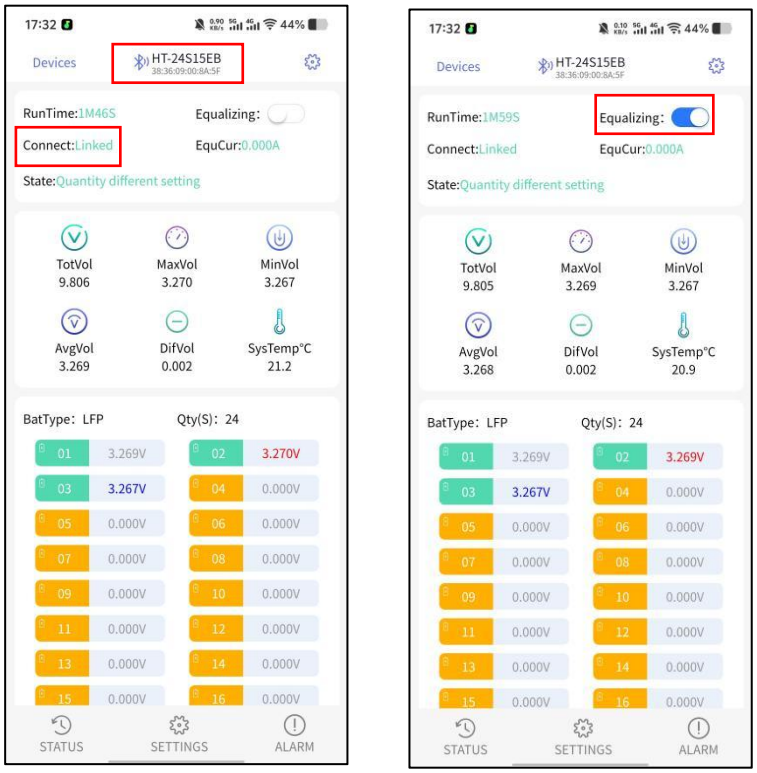
2) APP connection device steps

Step one, turn on Bluetooth and connect the device (be sure to turn on location and location information and allow the app to use location information), as shown in the following figure; After an unconnected device enters the app, the system will automatically start scanning the device.

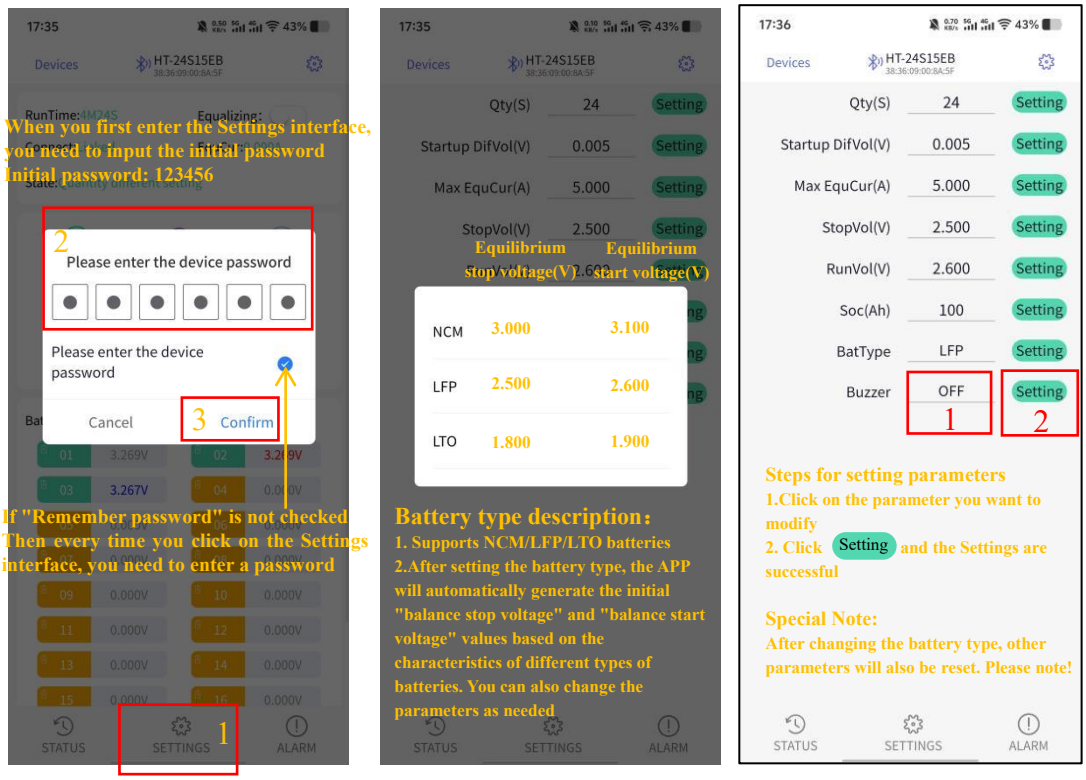




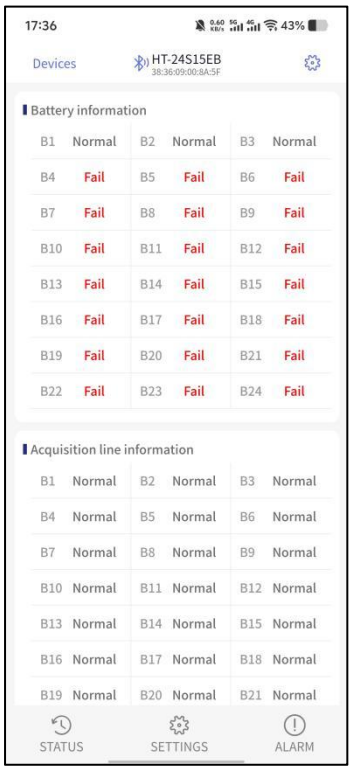
Step two, after successful connection, activate the balance switch as shown in the following figure:

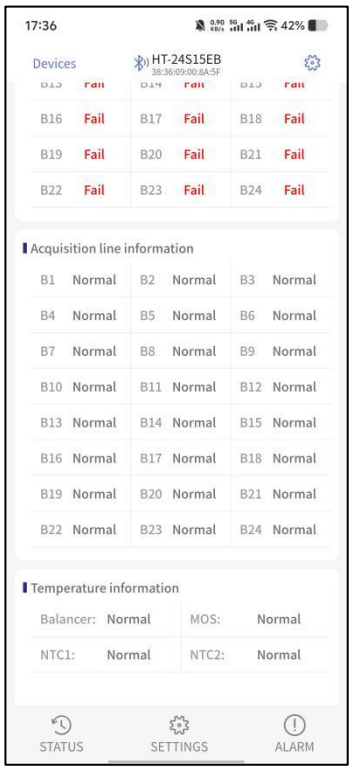


Step three, change the parameters based on the battery type and the number of battery strings (a password is required to enter the settings for the first time), as shown in the following figure:



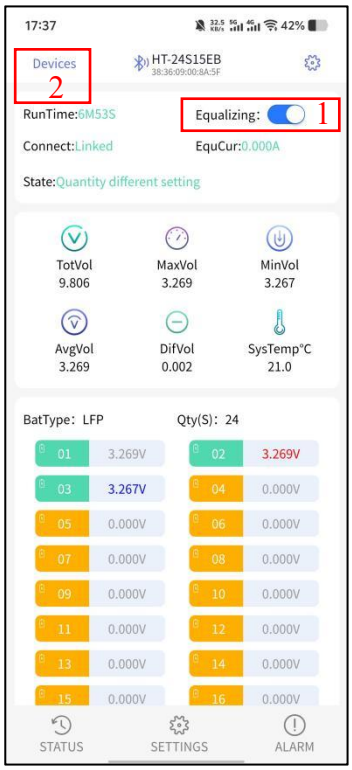
Step four, after setting the required parameters, you can monitor the parameters of each individual unit from the "Status" or "Alarm" page.

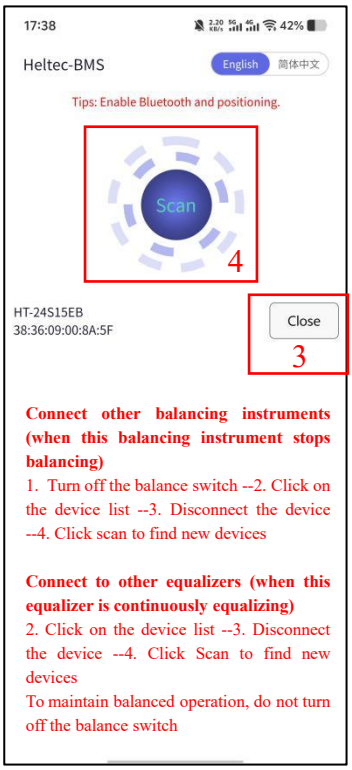




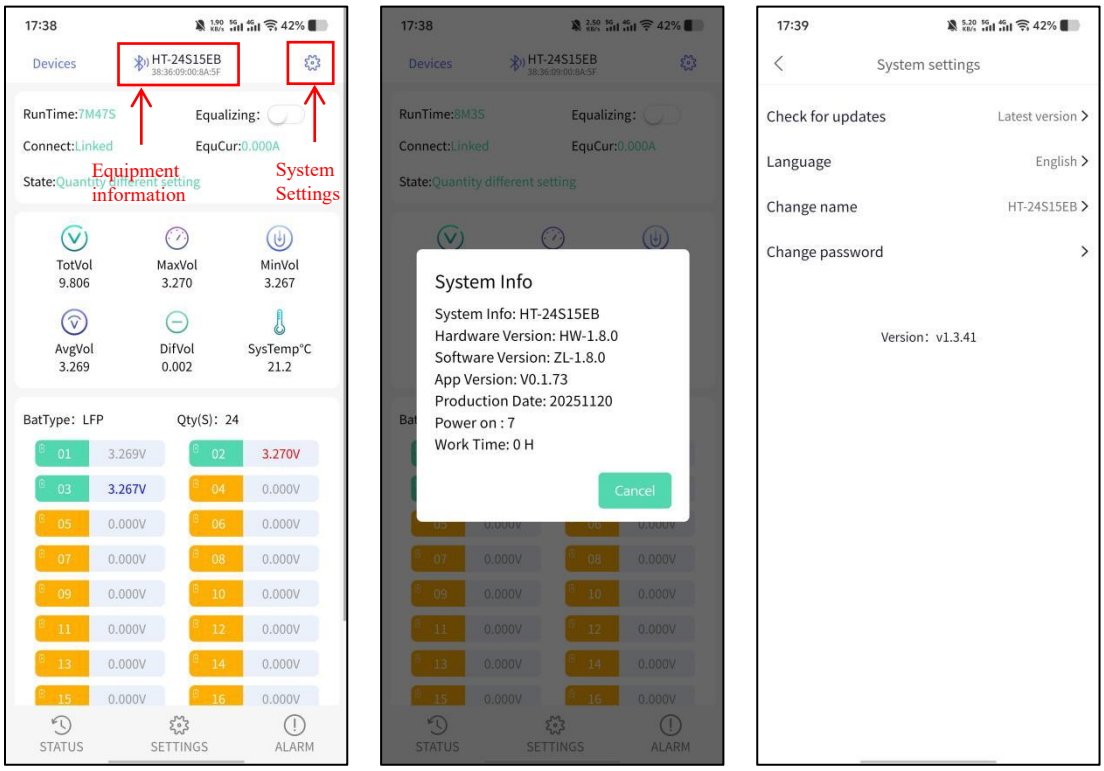
Step five, is to disconnect or replace the connected device. (If there is no need to disconnect, do not proceed with this step)

*Special note: Turn off the "equalizer switch" or remove the power/battery pack, and the equalizer will stop running.





Finally, please find attached the steps for viewing device information and changing device passwords, as shown in the following figure:



8. Attention

1) The equalizer defaults to 24S for first-time use, so when you use it for the first time, if the connected battery pack is not 24S, the fault indicator light will light up, which is a normal phenomenon. Because the number of strings set in the APP does not match the actual number of connected battery strings, in this case, after successful connection, the battery parameters should be modified first before enabling balancing.

2) When a malfunction occurs, balancing cannot be activated.

9. Phenomenon explanation

1) General fault analysis and troubleshooting

order number	Fault phenomenon	Root cause analysis	Solution
(1)	The power indicator light is not on	Equalizer power supply is abnormal	① Check if the equalizer pins are connected correctly; ② When connecting a battery pack below 12V, an external 12V~120VDC power supply must be used for power supply.
(2)	Unable to search for device	The APP does not have relevant authorization	① Check if Bluetooth is turned on ； ② Turn on location and location information and allow the app to use location information.
(3)	Equalizer not turning on	The equalizer does not meet the working conditions	Check if the voltage of the first string of batteries is higher than 2.4V. If it does not meet the conditions, please charge the batteries to above 2.4V, and then the equalizer will automatically turn on.
(4)	The APP prompts that the number of individual settings does not match the set value	Abnormal number of individual settings or connection of balance lines	Check if the number of individual settings matches the number of connected batteries. If different, simply change the actual number of connected batteries in the app.
(5)	APP prompts that the resistance of the balance line is too high	The resistance of the wire group from the battery to the connector is too large	Check if there is any poor contact in the connection between the battery cell and the connector. If there is no poor contact, please replace the wire.
(6)	Inaccurate voltage collection	Wiring error or parameter setting error	Check the connections one by one to eliminate any connection errors. Fine tune through voltage acquisition reference until accurate acquisition.
(7)	Cannot be used in cascaded	No energy exchange common end	Contact customer service or after-sales personnel to inquire about the wiring diagram for the required cascading.

***Special note:** The above are possible causes and solutions for common faults. If the fault is still not resolved, please contact after-sales service.

2）Buzzer alarm instructions

order number	phenomenon	Phenomenon explanation	Solution
(1)	The buzzer sounds twice every 1 second (when it sounds, the red fault indicator light is on)	Equipment hardware data storage failure	contact the manufacturer
(2)	The buzzer sounds 3 times every 0.5 seconds (the red fault indicator light is on when it sounds)	Bluetooth communication error	contact the manufacturer
(3)	The buzzer beeps 4 times every 0.5	Equipment hardware	contact the

order number	phenomenon	Phenomenon explanation	Solution
	seconds (the red fault indicator light only lights up during the interval)	failure: Overvoltage of supercapacitor voltage	manufacturer

3) Buzzer Description

order number	phenomenon	Remarks
(1)	After the device is powered on, the buzzer sounds three times. (At this time, the green indicator light is constantly on)	
(2)	After activating the balancing function, the buzzer will sound once. (The yellow indicator light is flashing at this time)	
(3)	After balancing is completed, a delay of 3 minutes will sound once. (At this time, the yellow indicator light is constantly on)	The buzzer function needs to be turned on in the settings.

11. Safety protection measures and transportation and storage

1) Security protection measures

(1) The equalizer itself does not have high voltage and will not cause electric shock damage to the body.

(2) There are no user repairable components inside the equalizer. All repairs should be carried out by qualified maintenance personnel.

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

(3) Before touching the equalizer sampling line, the personnel performing the operation must discharge static electricity themselves and take anti-static measures.

2) Transportation

The packaged products can be transported using conventional transportation tools without being directly affected by rain, snow, or severe collisions and bumps.

*During transportation, it is not allowed to be placed together with corrosive substances such as acid and alkali.

3) Storage

Packaged products should be stored in a permanent warehouse with a temperature range of 0 ℃~35 ℃ and a relative humidity of no more than 80%. The warehouse should be free of acid, alkali, corrosive gases, strong mechanical vibrations and impacts, and strong magnetic fields.

12.Balancer CAN Communication Protocol（V1.2）

1) Overview

This agreement outlines the electrical interfaces, data formats, communication rates, and other aspects pertaining to the external communications of the balance board.

2) Communication parameters

Communication interface	CAN
baud rate	250Kbps

3) CAN Bus Data Format

(1) During communication, only standard CAN bus frames are utilised without employing extended frames. The entire communication frame content is constrained by the arbitration field ID of the CAN bus, where ID = the device address of the equalisation board.

(2) The CAN bus standard frame arbitration field ID comprises 11 bits in total. The protocol stipulates that the upper 7 bits shall be set to zero, whilst the lower 4 bits are used to indicate the device address.

ARBITRATION FIELD	
BIT10:4	BIT3:0
0	Balancer Address(0-255)

4) Communication process

The entire communication employs a master-slave architecture, with the computer serving as the master device and the equaliser as the slave device. All communication is initiated by the master device, to which the slave device responds. During communication, the first byte of each data frame is defined as the slave device address, with the second byte indicating the data frame type. All multi-byte values employ little-endian mode, where the low byte precedes the high byte. Note that the CAN protocol frame ID must correspond exactly to the address of the first data byte.

Here, taking the example of the slave device address being 0x01, and the host obtaining the data from the slave battery pack and setting data, the communication is explained.

4).1.Request equaliser data (address 0x01)

(1) The host sends data

slave address	Frame type	Data content
1	2	3-8
0x01	0x22	0x00.....0x00

(2) Balancer response（All voltage units are in millivolts (mV), all current units are in milliamps (mA), and temperatures are in whole degrees Celsius (℃)）.

Addr	**identifier**	**Data content**					
B1	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**B8**
0x01	0x00	Voltage of Cell 1 mV		Voltage of Cell 2		Voltage of Cell 3	
0x01	0x01	Voltage of Cell 4		Voltage of Cell 5		Voltage of Cell 6	
0x01	0x02	Voltage of Cell 7		Voltage of Cell 8		Voltage of Cell 9	
0x01	0x03	Voltage of Cell 10		Voltage of Cell 11		Voltage of Cell 12	
0x01	0x04	Voltage of Cell 13		Voltage of Cell 14		Voltage of Cell 15	
0x01	0x05	Voltage of Cell 16		Voltage of Cell 17		Voltage of Cell 18	

Addr	identifier	Data content					
B1	B2	B3	B4	B5	B6	B7	B8
0x01	0x06	Voltage of Cell 19		Voltage of Cell 20		Voltage of Cell 21	
0x01	0x07	Voltage of Cell 22		Voltage of Cell 23		Voltage of Cell 24	
0x01	0x08	Current equilibrium current mA		Total voltage 10 millivolts mV		Completed balanced differential pressure value mV	
0x01	0x09	Average voltage mV		Maximum voltage difference mV		Equipment Operational Status Indicator (see Table 1)	NTC temperature ° C
0x01	0x0A	Battery Status Detection b1-b8 (0x01->b1) 0:Normal 1: Failed	Battery Status Detection b9-b16 0:Normal 1: Failed	Battery Status Detection b17-b24 0:Normal 1: Failed	Battery Cable Assembly Inspection b1-b8 (bit0->b1) 0: Normal 1: Out of specification	Battery Cable Assembly Inspection b9-b16 0: Normal 1: Exceeds Specification	Battery Cable Assembly Inspection b17-b24 0: Normal 1: Exceeds Specification
0x01	0x0B	Pressure differential value triggering the balance mV		Disable equalisation voltage value mV		Enable balanced voltage value mV	
0x01	0x0C	Maximum balanced current mA		Balanced Switch Status 0: Off 1: On	Number of battery strings 2–24	Battery Type 1: Ternary 2: Lithium Iron Phosphate 3: Lithium Titanate	Reserver

Note 1. Each time the host computer transmits a data acquisition command frame, the slave computer sequentially transmits the aforementioned 13 data frames, with an approximate interval of 10 milliseconds between each frame.

***Equipment Operational Status Table**

Data content	APP corresponding display content
1	The number of units does not correspond to the configuration.
2	Testing the balance line resistance.
3	Excessive resistance in the balancing line
4	System ready
5	Balanced operation
6	Balancing completed
7	Battery voltage too low
8	Host temperature is excessively high
9	Host failure. Please contact your agent.
10	Battery voltage too low, equalisation halted
11	Host temperature too high, balancing halted
12	Self-check completed. System awaiting further instructions.
13	Supercapacitor overvoltage, balancing halted
14	Failure of supercapacitor series-parallel testing
15	CAN communication failure
16	Slave device address setting error

4).2 Set the Equaliser Switch

*The host sends data

slave address	Frame type	Set the content	Reserver
1	2	3	4-8
0x01	0x23	Balance Switch 0: Off 1: On	0x00.....0x00

No response from the machine; a single beep will sound upon successful configuration.

4).3 Set the Maximum Equalisation Current

* The host sends data

slave address	Frame type	Set the content		Reserver
1	2	3	4	5-8
0x01	0x24	Maximum balanced current (UINT16) (mA) ≥ 500 mA		0x00.....0x00

No response from the machine; a single beep will sound upon successful configuration.

4).4 Set the Number of Monoliths

*The host sends data

slave address	Frame type	Set the content	Reserver
1	2	3	4-8
0x01	0x25	Number of units: 2 - 24	0x00.....0x00

No response from the machine; a single beep will sound upon successful configuration.

4).5 Set the Battery Type

*The host sends data

slave address	Frame type	Set the content	Reserver
1	2	3	4-8
0x01	0x26	Battery Type1: Ternary Lithium-ion 2: Lithium Iron Phosphate 3: Lithium Titanate	0x00.....0x00

No response from the machine; a single beep will sound upon successful configuration.

4).6 Set the Paused Equilibrium Voltage

*The host sends data

slave address	Frame type	Set the content		Reserver
1	2	3	4	5-8
0x01	0x27	Auto-Sleep Voltage (UINT16)(mV) 500–4190 mV		0x00.....0x00

No response from the machine; a single beep will sound upon successful configuration.

4).7 Set the Restart Balancing Voltage

*The host sends data

slave address	Frame type	Set the content		Reserver
1	2	3	4	5-8
0x01	0x28	Restart Equilibrium Voltage (UINT16)(mV) 510–4200 mV		0x00.....0x00

No response from the machine; a single beep will sound upon successful configuration.

4).8 Set the Trigger Differential Pressure for Equalisation

*The host sends data

slave address	Frame type	Set the content		Reserver
1	2	3	4	5-8
0x01	0x29	Triggering Equilibrium Pressure Differential (UINT16) (mV) 3–2000 mV		0x00.....0x00

No response from the machine; a single beep will sound upon successful configuration.

4).9 Set the Slave Device Address

*The host sends data

slave address	Frame type	Set the content	Reserver
1	2	3	4-8
0x01	0x2A	Slave device address 1–255 Address cannot be set to 0	0x00.....0x00

No response from the machine; a single beep will sound upon successful configuration.

4).10 Set the completed balanced differential pressure value

*The host sends data

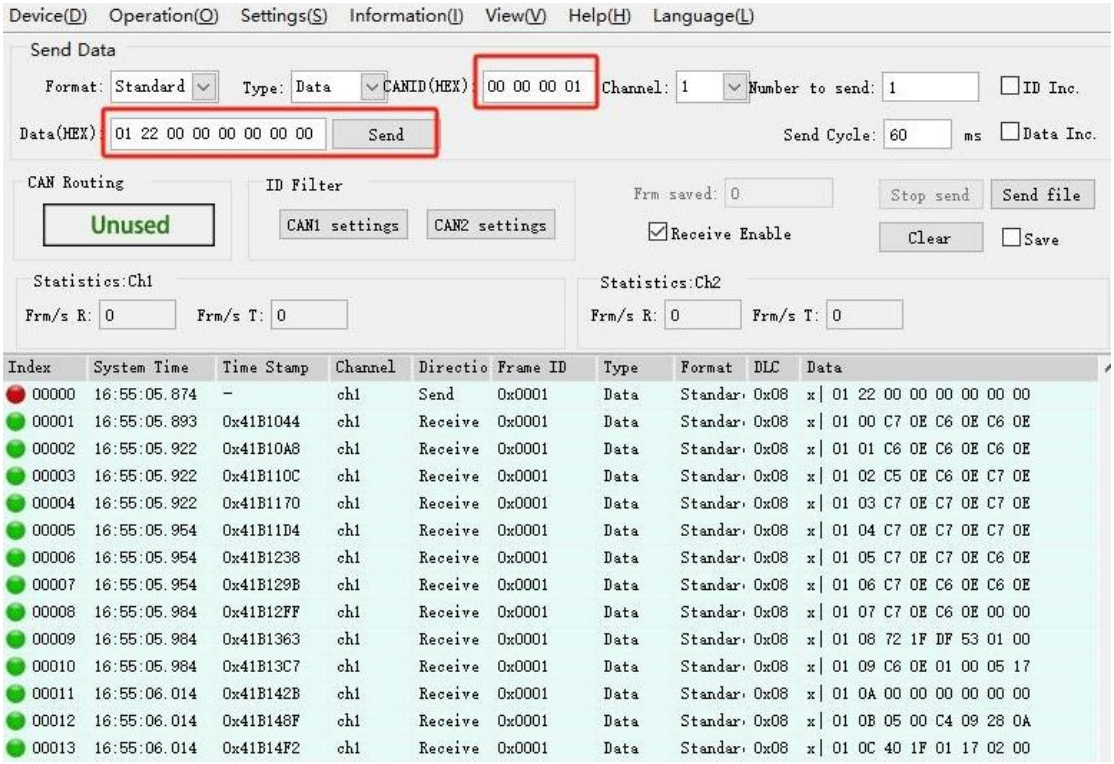
slave address	Frame type	Set the content		Reserver
1	2	3	4	5-8
0x01	0x2B	The completed equilibrium pressure difference value (UINT16)(mV) 1–1998 mV		0x00.....0x00

No response from the machine; a single beep will sound upon successful configuration.

Special note: When configuring the CAN standard arbitration field with ID=0 and slave address=0x00, this indicates setting all slave IDs simultaneously. However, data cannot be read from all slaves concurrently; data must be read sequentially based on each slave's ID, with arbitration field ID = slave address = slave ID.

5) Examples

5).1 Requesting equaliser data



Host sends frame: 01 22 00 00 00 00 00 00 ID: 01 Frame type: 0x22

Equaliser response ID: 01

*Response Data: 01 00 C7 0E C6 0E C6 0E

01 00 Battery voltage values for B1, B2, B3 (0*3+1=1) transmitted by Slave 1

C7 0E Cell 1 Voltage 0x0EC7 * 1mV = 3783mV = 3.783V

C6 0E Cell 2 Voltage 0x0EC6 * 1mV = 3782mV = 3.782V

C6 0E Cell 3 Voltage 0x0EC6 * 1mV = 3782mV = 3.782V

*Response data: 01 02 C5 0E C6 0E C7 0E

01 02 Slave 1 transmitted battery voltage values for cells B7, B8, B9 (2*3+1=7)

C5 0E Cell 1 voltage 0x0EC5 * 1mV = 3781mV = 3.781V

C6 0E Cell 2 voltage 0x0EC6 * 1mV = 3782mV = 3.782V

C7 0E Cell 3 voltage 0x0EC7 * 1mV = 3783mV = 3.783V

*Response data: 01 08 72 1F DF 53 01 00

01 08 Data with ID 08 transmitted by slave 1

72 1F Current equalisation current 0x1F72 * 1mA = 8050mA = 8.050A

DF 53 Total voltage 0x53DF * 10mV = 21471*10mV = 214.71V

01 00 The completed equilibrium pressure difference value 0x0001*1mV=1mV

*Response data: 01 0C 40 1F 01 17 02 00

01 0C Data with identifier 0C transmitted by slave 1

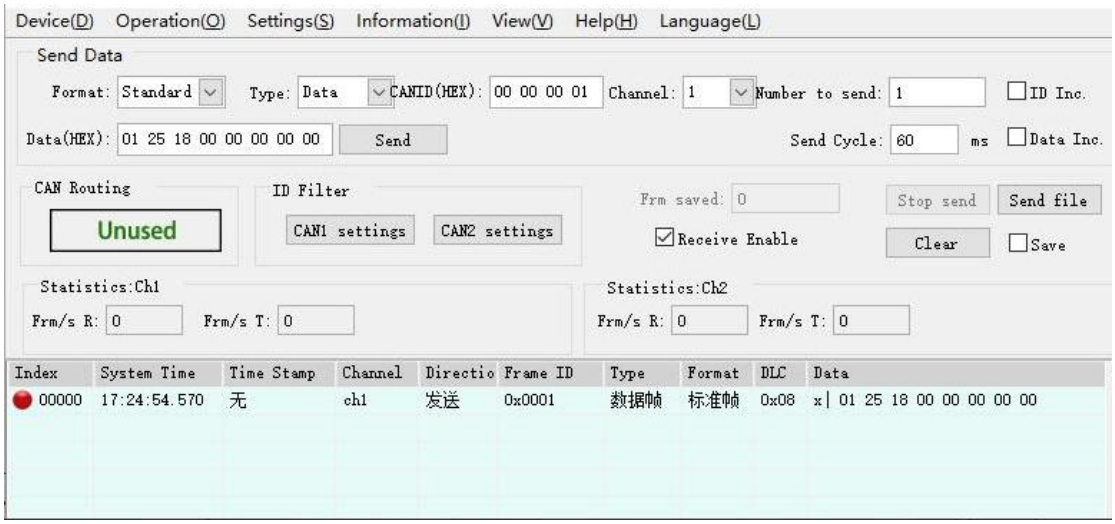
40 1F User-set maximum equalisation current 0x1F40 * 1mA = 8000mA = 8.000A

01 Equalisation switch activated

17 Number of cells 0x17 = 23 strings

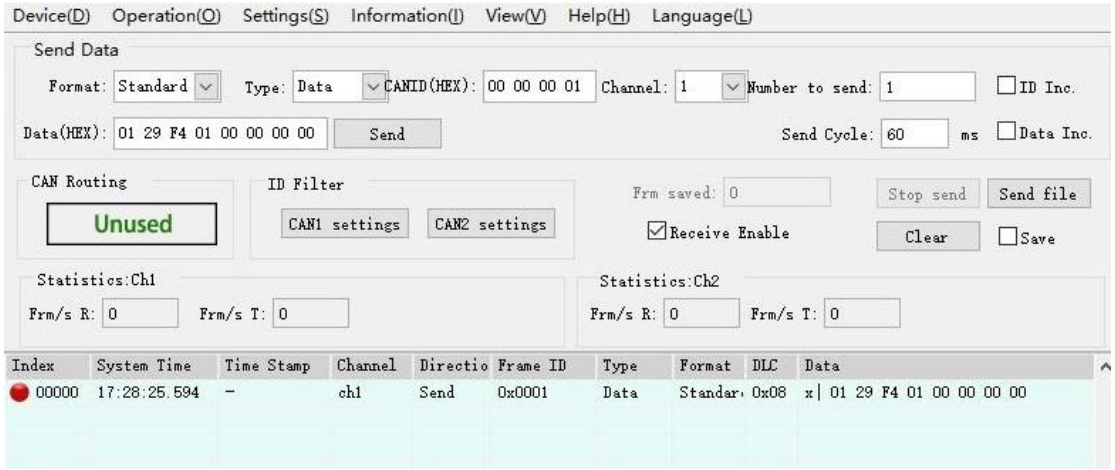
02 Battery type: Lithium iron phosphate

5).2 Setting the Quantity of Individual Units



01 25 18 00 00 00 00 00 Set the number of independent units with address 1 in the equaliser to 24 (0x18).

5).3 Set the Trigger Differential Pressure for Equilibrium



01 29 F4 01 00 00 00 00 Set trigger equalisation differential pressure 0x01F4 * 1mV = 500mV = 0.5V

Warranty Regulations

Warranty service period is 1 year.

The warranty service is limited to normal use: man-made damage, self-disassembly, modification and repair, use not in accordance with the instructions, and damage caused by external force majeure are not within the scope of free warranty.

Accessories such as test fixtures are consumables without warranty.

When you need warranty service, please contact your dealer for processing. If you cannot contact the dealer, you can contact our company by email or phone.

There are no after-sales service stations in other countries except China. If you need warranty service, please send the product to us for free repair, but you need to pay the freight for the round trip.