

Battery Active-Balancer

(JK-B1A24S/JK-B2A24S)

Specification and operation manual

Chengdu Jikong technology co. LTD

Product warranty clause

Name : Battery Active-Balancer

Warranty period : One Year

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1 Overview

Battery Active-Balancer (JK-B1A24S/ JK-B2A24S) is a balanced management system tailored for large-capacity series battery packs. The Balancer USES ultracapacitors as the medium to balance the active energy transfer.

The Balancer is suitable for 2 ~ 24 series battery packs, with the functions of voltage collection and balance. The balancer operates with a constant balance-current of 1A(JK-B1A24S) or 2A(JK-B2A24S) for energy transfer. The balan-current does not depend on the delta-voltage of the battery cells in series. Cell voltage acquisition range 1 V ~ 5V, accuracy $\pm 5\text{mV}$. Applicable to Li-ion, Lipo, Lifepo4, LTO and other battery on the market.

The balancer is equipped with bluetooth communication function and supports mobile APP software. The balancer can be connected to the phone via bluetooth to check the individual battery voltage, balance state, modify parameters and other operations. The balancer is small in size and easy to carry. It can be widely used in the battery PACK of small sightseeing car, scooter, sharing car, high-power energy storage, base station backup power supply, solar power station and other products. It can also be used in battery balance maintenance, repair and other occasions.

2 Main technical parameters

2.1 Features

- ◆ Support 2 ~ 24 cells battery packs.
- ◆ Active, balanced energy transfer, the delta-voltage between cells of battery $\leq 5\text{mV}$.
- ◆ Cell voltage acquisition range 1V ~ 5V, accuracy $\pm 5\text{mV}$.
- ◆ Support all battery on the market.
- ◆ The balan-current is set independently within the range of 0.3 ~ 2A.
- ◆ Supports balanced cascades for more than 24 battery packs.
- ◆ Bluetooth function, equipped with mobile APP, support Android and IOS.
- ◆ Balan-Wire resistance detection to find wiring errors in advance.
- ◆ Operating power supply: 40V~100V.

2.2 Operating conditions

- a) Temperature range: $-20^{\circ}\text{C} \sim 70^{\circ}\text{C}$.
- b) Operating power supply: 40~100V, Battery power or external power supply can be used.
- c) Total current consumption: Work mode 10mA@100V, Idle mode 6mA@100V.

3 Connector and interface

3.1 connectors and LED

The positions of connectors and LED are shown in figure 1.



Figure 1 Connector schematic diagram

3.2 definition of connector and LED

Connector definition and LED definition are shown in table 1.

Table 1 connector definitions

connector	Pin	Name	Description
P2	1	B-	battery negative
	2	B1	
	3	B2	
	4	B3	
	5	B4	
	6	B5	
	7	B6	
	8	B7	
	9	B8	
	10	B9	
	11	B10	
	12	B11	
	13	B12	
	14	B13	
	15	B14	
P1	1	B15	
	2	B16	
	3	B17	
	4	B18	
	5	B19	
	6	B20	
	7	B21	
	8	B22	
	9	B23	
	10	B24	
	11	B+	Power supply of balancer

connector	Pin	Name	Description
D1			Bluetooth connection indicator light, when the phone is connected to the Balancer via bluetooth, the indicator light is on, when the connection is disconnected, the indicator light blink, whether the Balancer is balancing has nothing to do with the indicator light.

3.3 Product appearance

The product appearance is shown in figure 2.



Figure 2 JK-B1A24S/JK-B2A24S appearance

3.4 Size

The size of JK-B1A24S/JK-B2A24S balancer is 162mm×100mm×20mm, and its appearance and size of mounting hole are shown in figure 3.

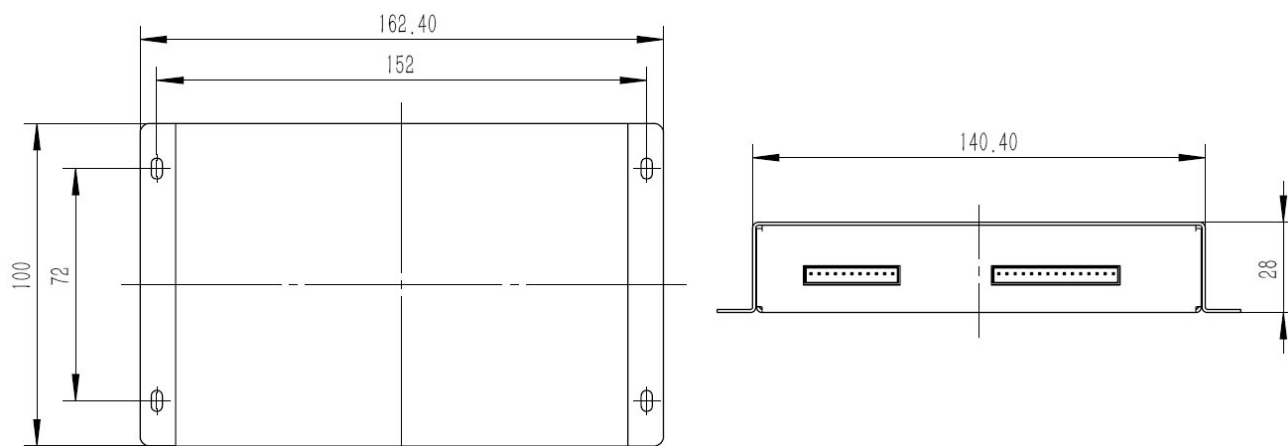


Figure 3 JK-B1A24S/JK-B2A24S dimension diagram

3.5 Weight

The balancer weighs about 360g.

4 Installation method and precautions

4.1 Unpacking inspection

Unpacking inspection and precautions are as follows:

- handle the packing boxes and balancer gently and try not to turn them upside down.
- pay attention to whether the package is in good condition before unpacking, such as whether there is any impact mark, whether there is any damage, etc.

4.2 Installation of a single balancer

Single JK-B1A24S/JK-B2A24S balancer is suitable for 2-24 batteries in series. **However, when the battery voltage is lower than 40V, the balancer shall provide an external dc power supply of 40V~100V.**

For the battery pack with 24 cells , the installation wiring method is shown in figure 4.

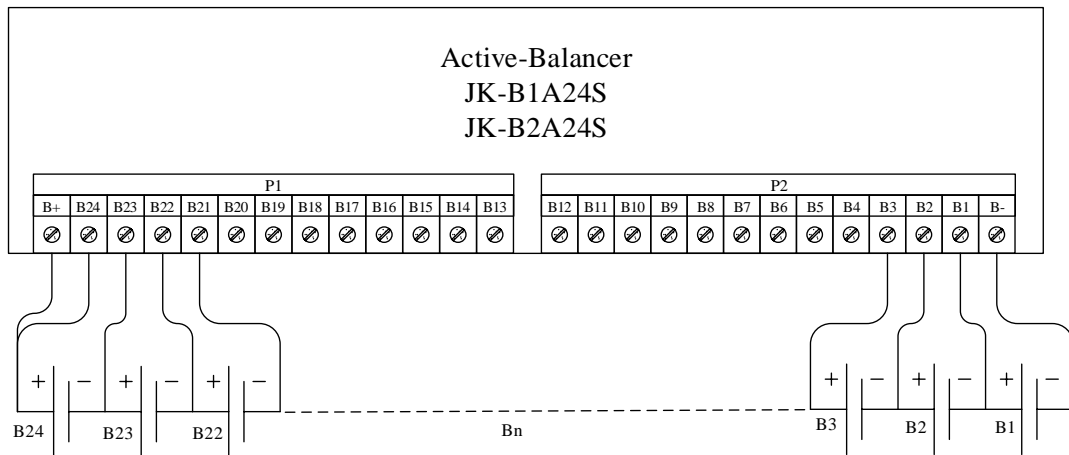


Figure 4 Diagram of 24 Cells wiring

For the battery pack less than 24 cells , the installation wiring method is shown in figure 5 (The diagram shows 20 cells cases).

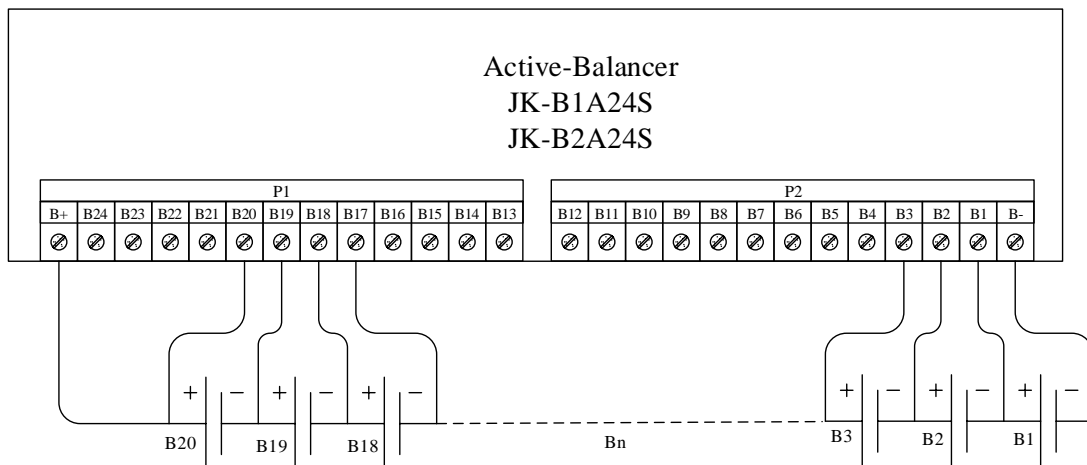


Figure 5 Diagram of 20 Cells wiring

The balancer is applied to the battery pack with a voltage less than 40V, and the wiring method is shown in figure 6 (The diagram shows 3 cells with booster module case).

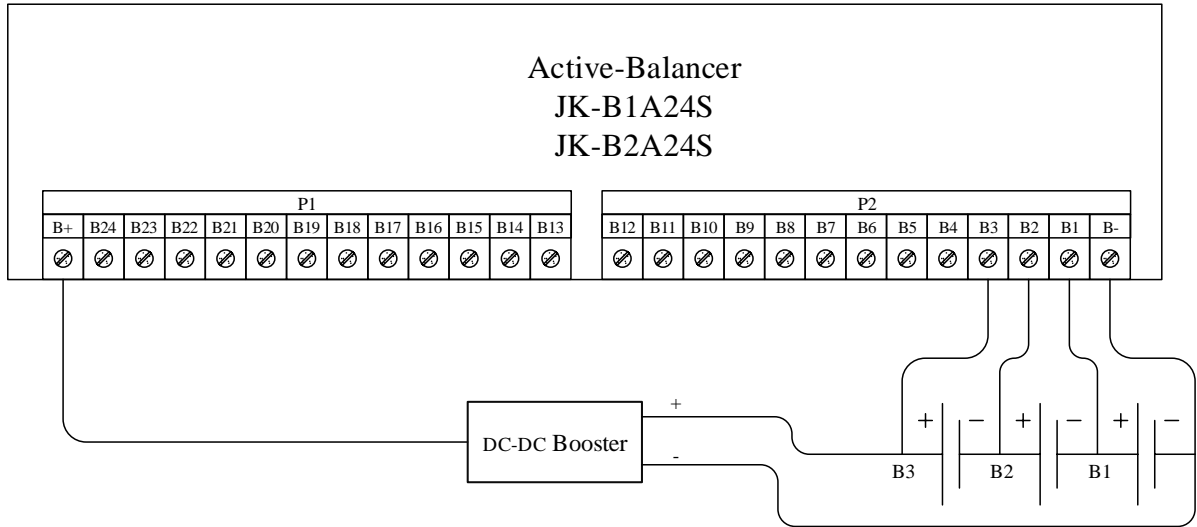


Figure 6 Diagram of 3 cells with booster module wiring

The balancer is applied to the battery pack with a voltage less than 40V, and the wiring method is shown in figure 7 (The diagram shows 3 cells with external power supply case).

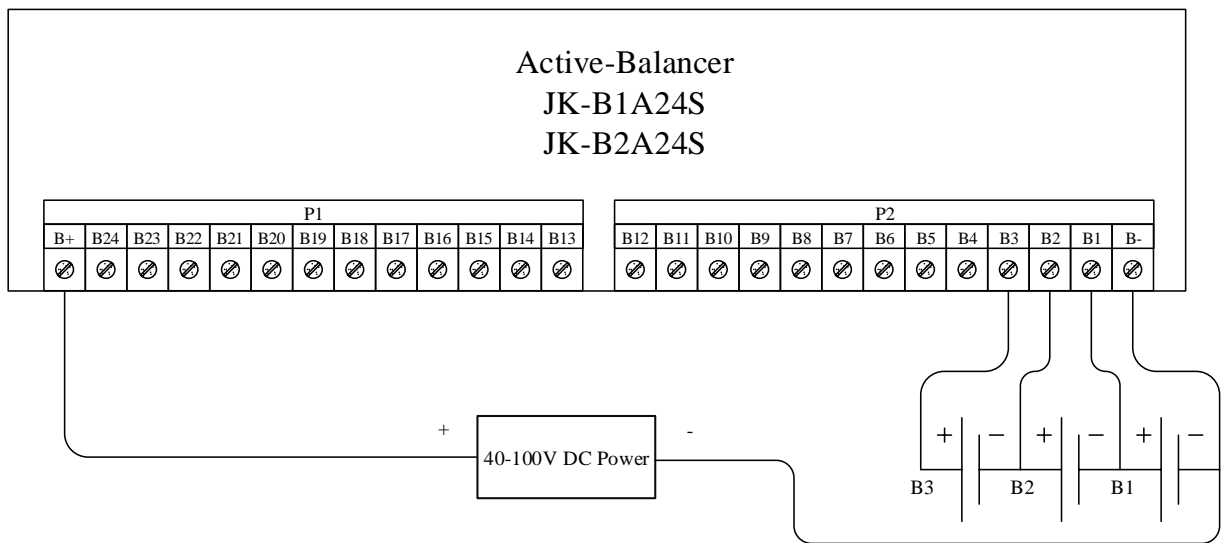


Figure 7 Diagram of 3 cells with external power supply wiring

4.3 Multiple balancer cascade installation

JK-B1A24S/JK-B2A24S balancer support cascade use, which can be applied to more than 24 cells battery packs. The diagram of cascade installation wiring is shown in figure 8.

4.4 Connection with adapter board (optional)

The adapter board can convert the XH2.54mm pins to XH2.0mm pins.

The use of adapter board can make the balancer and the battery pack protection board of the sampling line to achieve seamless connection, improve the maintenance efficiency, simplify the maintenance process, reduce the maintenance cost, more used for the occasion of balanced battery

repair.

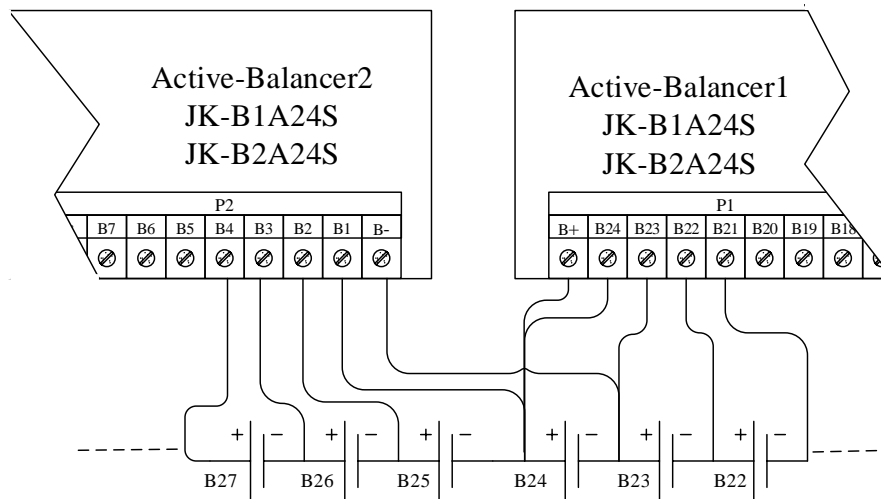


Figure 8 Cascade of balancer wiring

The interface description related to the adapter board is shown in figure 9.

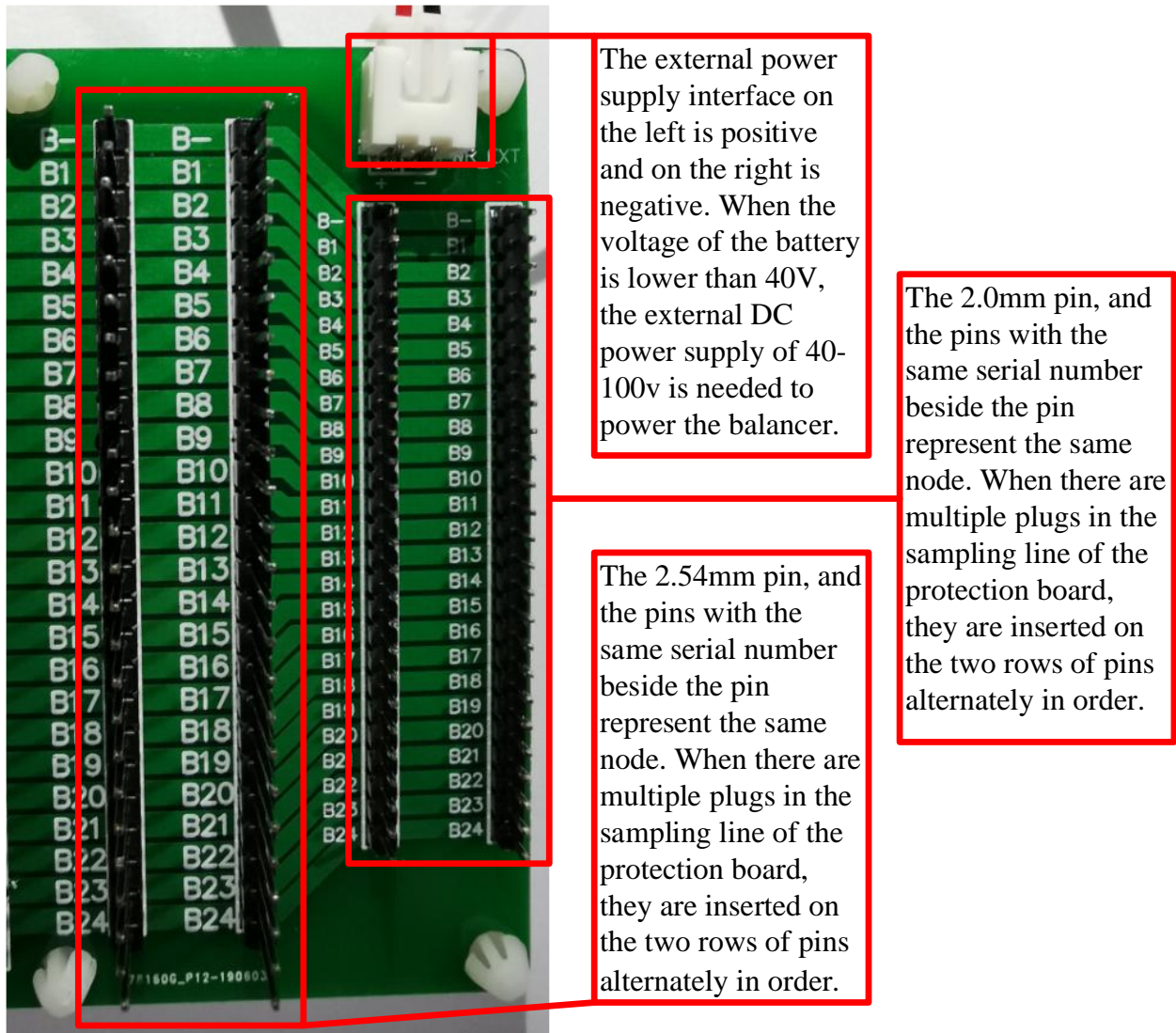


Figure 9 Instructions for use of adapter board

The adapter board use case is shown in figure 10 (**Both lines need to be connected**).

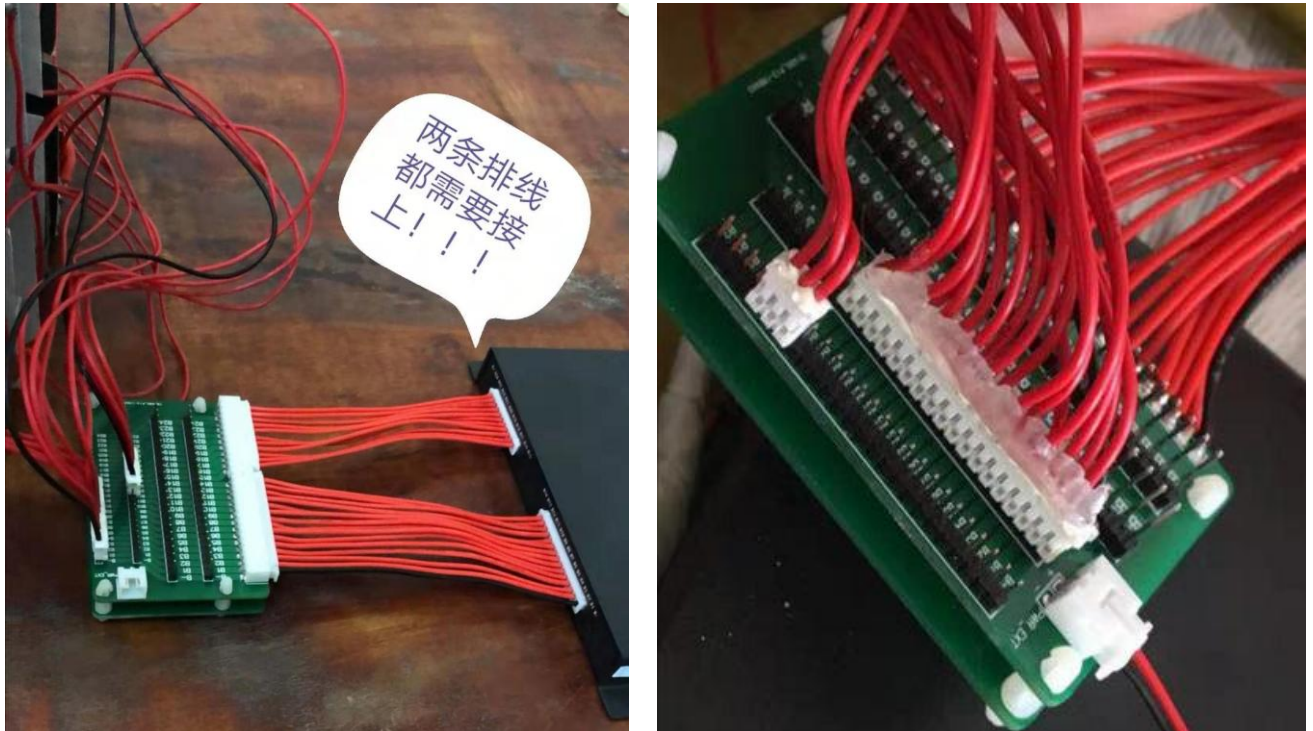


Figure 10 The adapter board use case

4.5 The APP install

By scanning the QR code shown in figure 11, you can get the mobile APP matching the product.



Figure 11 APP QR Code

5 Operation guide

5.1 Preparation and inspection before use

Before turning on the power supply, please confirm again whether the balan-wire connection is normal, whether the power supply provided to the balancer is within the power supply range, check whether the ebalancer has been placed securely, only after the confirmation can be connected to the balancer power supply, otherwise it may cause abnormal work, even burning and other serious consequences.

5.2 Balancer start to work

Once the above operation is confirmed, the balancer can be powered. JK-B1A24S/JK-B2A24S balancer does not have power-on button, it only needs to connect the 'B+' of balancer to the power, and the balancer starts to work automatically.

5.3 APP operation guide

5.3.1 Device operation in APP

a) Connect to device

First of all turn on the bluetooth function of the phone, then open the APP, as shown in figure 12.

Click the icon in the upper left corner to scan the device, as shown in figure 12. After scan, click the name of the device to be connected(eg "JK-B1A24S") .The APP will prompt for the password at the first connection, as shown in figure 13. The default password of the device is "1234". After the device is connected, the APP will automatically record the password.

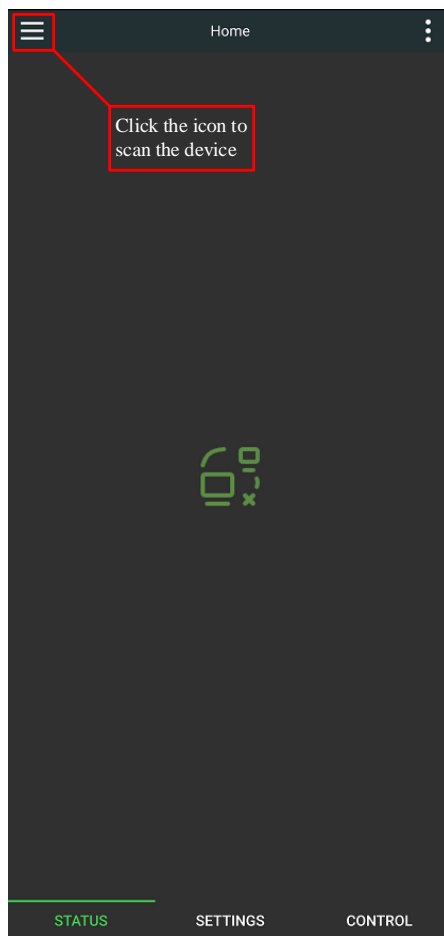


Figure 12 Scan the device

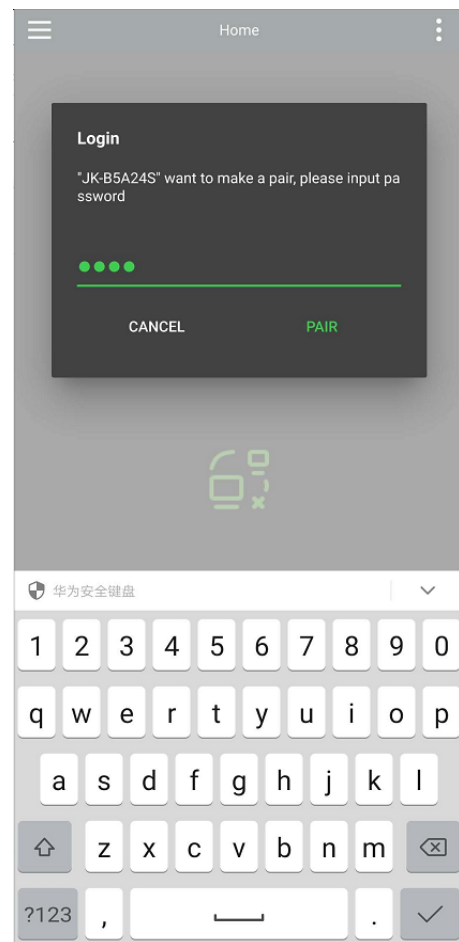


Figure 13 Prompt for the password

b) Modify the password and device name

After the device is connected, click the pen icon on the right of the device list to change the device name and password.

Modify the device name, as shown in figure 14.

Modify the password, as shown in figure 15.

To modify the device password, you must first enter the old device password. Only the old password is correct you can enter the new password. After entering the new password twice, select "OK" to complete the device password modification.

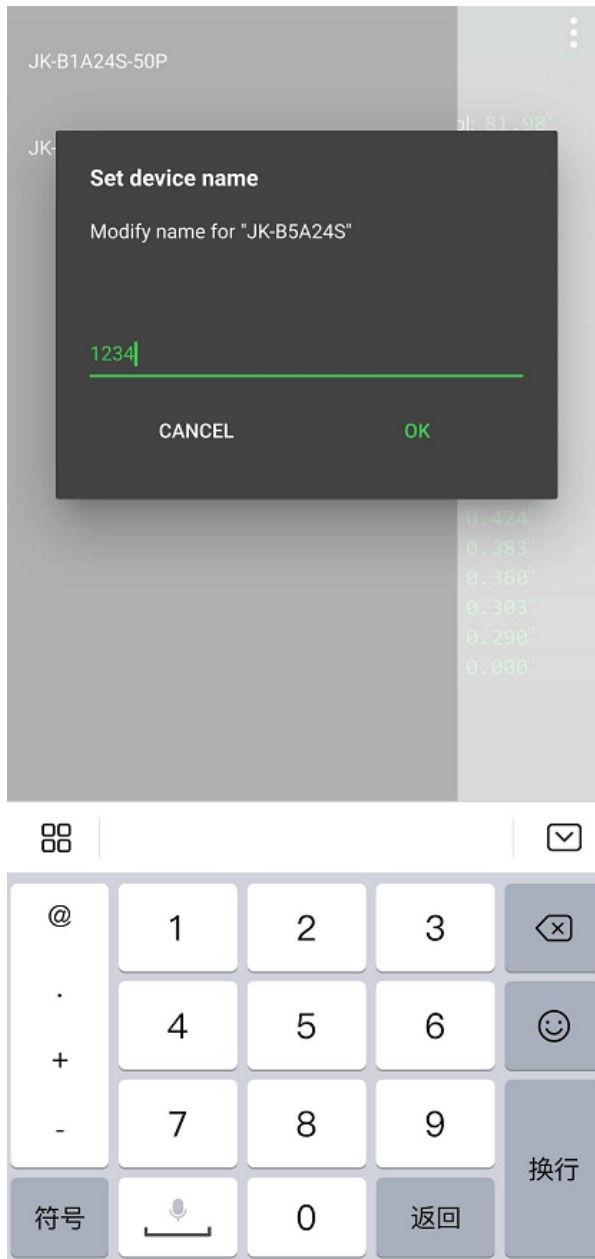


Figure 14 Modify the device name

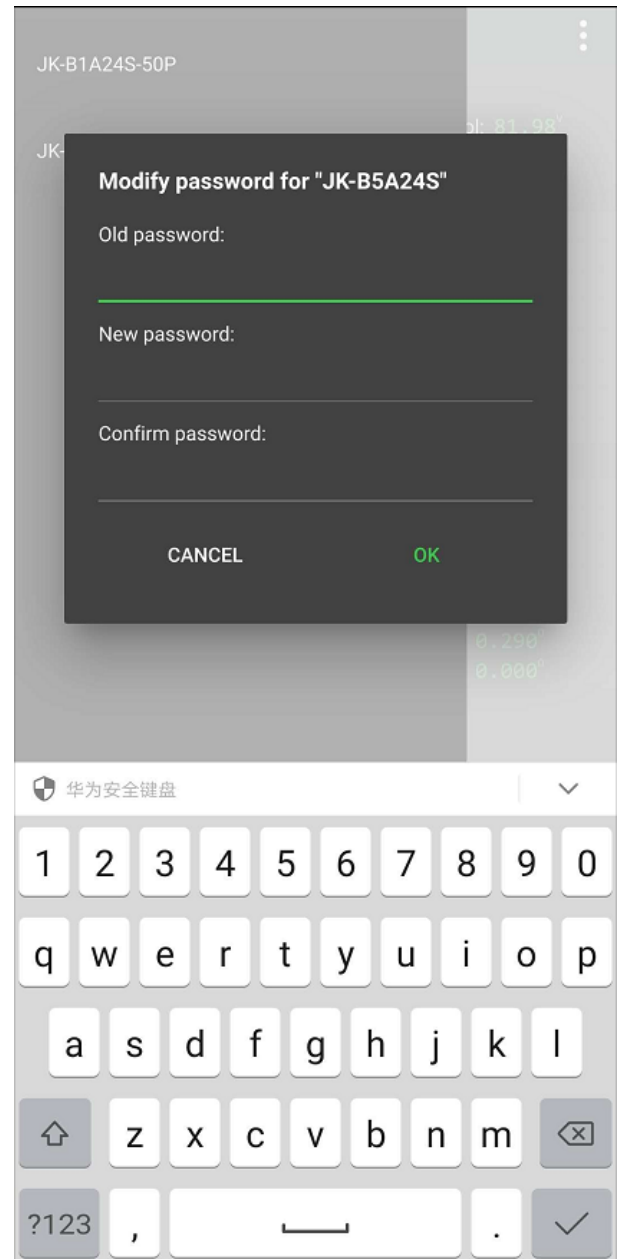


Figure 15 Modify the password

5.3.2 Real-time status

The real-time state is shown in figure 16.



Figure 16 Real-time state

In the real-time status page, you can check the Cells voltage, battery voltage, maximum delta-voltage, Cells voltage average, balance state, balance-current, cells wire resistance and other information.

The definitions of each parameter are as follows:

a) Cells voltage

The "cells voltage" area displays all the cell voltage of the current battery, in which BLUE is the current highest voltage of cells and RED is the current lowest voltage of cells.

In balancing, the BLUE cell battery discharge to the balancer to stored, then balancer use the energy which store in it to charge the RED cell battery, This is called energy transfer.

b) Balance-current

Balance current displays the current balance in real time.

In balancing, BLUE represents the discharged cell battery and red represents the charged cell battery. The negative current indicates that the BLUE cell battery is discharging, when blue blink, the positive current indicates that the RED cell battery is charging, when red blink.

c) Battery voltage

The battery voltage represents the total voltage of the current battery and the sum of all the cells voltages.

d) Maximum delta-voltage

The maximum delta-voltage represents the difference between the highest cell voltage and the lowest cell voltage for the current battery pack.

e) Cells wire resistance

The cells wire resistance represents the resistance that connects the balancer to the cells. This value is just a preliminary calculation, the purpose is to prevent the wrong wiring, or poor contact, when the "wire resistance is too large" alarm, please check the wiring.

5.3.3 Setting

The Settings page is shown in figure 17.



Figure 17 Settings page

On the setting page, you can set the cells count、trigger balance delta-voltage、maximum

balance current、 voltage calibration and so on.

The definitions of each parameter are as follows:

a) Cells count

The "cells count" represents the number of cells in the current battery pack. Please set this value accurately before using, otherwise the balancer will not work properly (maybe note " Cell count is not equal to settings " in STATUS page with blink).

b) trigger balance delta-voltage

The trigger balance delta-voltage is the only parameter that controls the balance. With the balance switch on, when the maximum delta-voltage of the battery exceeds this value, the balancer starts to balance until the balance completed when the "Maximum delta-voltage" falls below this value.

For example, set the trigger balance delta-voltage to 0.01v, start balance when Maximum delta-voltage of the battery is greater than 0.01v, and finish balance when it is lower than 0.01v.(it is recommended to set the trigger balance delta-voltage for batteries above 50AH as 0.005v, and for batteries below 50AH as 0.01v).

c) Maximum balance current

balance current represents the continuous current of high voltage cell battery discharge and low voltage cell battery charge during energy transfer. The maximum balance current represents the maximum current in the energy transfer process, and the maximum balance current should not exceed 0.1C. For example: 20AH battery not exceeding $20 \times 0.1 = 2A$.

The maximum balance current can be set for JK-B1A24S is 1A, and the maximum balance current can be set for JK-B2A24S is 2A.

d) Voltage calibration

The voltage calibration function can be used to calibrate the voltage acquisition accuracy of the balancer.

When the battery voltage display on the balancer is found to be in error with the voltage of the battery, the voltage calibration function can be used to calibrate the balancer. The calibration method is to fill in the current battery voltage measured by the multimeter, and then click on the "small plane" ico behind the voltage calibration box to complete the calibration.

Note: after any parameter is modified, click the "small airplane" ico beside the parameter box. when the balancer successfully receives the parameter, it will emit a "di" sound.

5.3.4 Control

This function is for use on the Protection board, JK-B1A24S/JK-B2A24S Balancer does not have this function, and the page is vacant.

6 General failure analysis and troubleshooting

Fault causes and treatment are shown in table 2.

Table 2 Fault causes and treatment

NO.	phenomenon	causes	Elimination method
1	The power indicator is off	Not powering properly	Check the power supply
2	Cell count is not equal to settings	"cells count" set wrong	set a right value to "cells count"
3	wire resistance is too large	Wrong wiring or	check the wiring
4	Voltage collection error	Wiring error or parameter setting error	Check the wires one by one to eliminate wiring errors. Calibrate through the voltage calibration function.

As listed above, common faults, possible causes and solutions, if not, please contact Chengdu jikong technology co., LTD.

7 Transportation and storage

7.1 Transportation

The products after packing are not directly affected by rain and snow and can be transported by normal means of transportation. It is not allowed to be put together with corrosive substances such as acid and base during transportation.

7.2 Storage

The packaged products should be placed in a permanent warehouse for storage, the temperature of the warehouse is 0℃ ~ 35℃, the relative humidity is not more than 80%, the warehouse should be free of acid and alkali and corrosive gas, no strong vibration and impact mechanism, no strong magnetic field.
