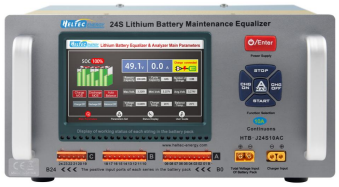
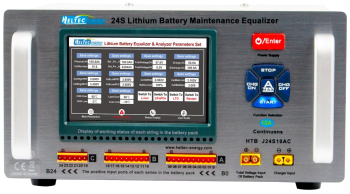
# 2-24S/32S Lithium Battery Maintenance Instrument Instructions

# Heltec Energy

# 1. Product type

| 2-24S 10A/15A/25A Battery Maintenance Instrument | | |
|---|---|---|
| **HTB-J24S10AC** | **HTB-J24S15AC** | **HTB-J24S25A** |
|  |  |  |
| 2-32S 15A/20A/25A Battery Maintenance Instrument | | |
| **HTB-J32S15A** | **HTB-J32S20A** | **HTB-J32S25A** |
|  |  |  |
| 0-120V 10A/0-135V 8A Power Supply | | |
| **DC1000-120** | **DC1000-135** | |
|  | | |

# 2. Product Dimension

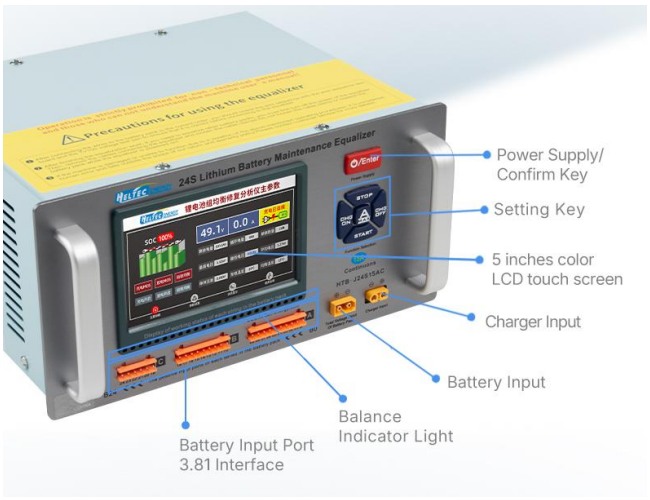
*Note: Please refer to the actual size. There is a slight error in manual measurement.

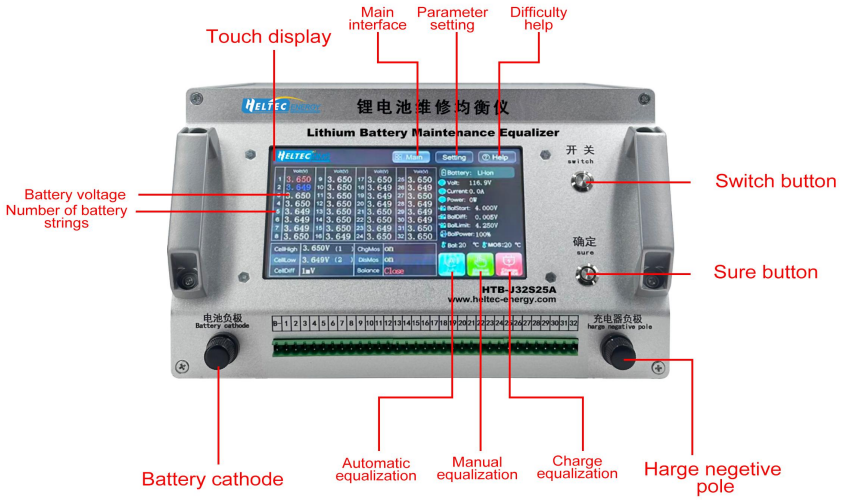





## 3. Wiring Instructions

- B- the black wire clip connect to the total negative pole of the battery pack, B1 connect to the total positive pole of the 1st string of batteries, and B2 connect to the positive pole of the 2nd string of batteries... After each string is connected, observe whether the voltage shown on the screen is correct, and so on. When connecting the batteries, the clamping should be kept tight, especially when clamping thin nickel sheets. Poor contact will directly affect the voltage display and balancing accuracy.
- Connect to the 220V power supply. Since the instrument is of high precision, a ground wire is required when connecting to 220V to reduce interference to the accuracy of the instrument.
- Turn on the instrument and enter the main interface only after setting the correct battery type, number of strings and battery connection method actually connected.
- After entering the "main interface", you should first check the correctness of the data displayed by the device. The charging status and discharge status will display "on". If the wiring is wrong, "balance line dropped" will be displayed, then check the voltage of each string, find out the abnormal string position, and readjust the correct wiring method.
- After restarting again, after both "ChgMos" and "DisMos" both show "OpenLine", you can turn on the "Sure" button on the front panel of the instrument (the indicator light will be on to indicate) to perform balancing work. If the "Sure" button is turned on when the "balance line dropped", it will cause damage to the equipment.




## 4. Equalization Settings

- **Manual Equalization**

Manually set the voltage and operate it. When the device status is normal, click "Manual Balance" to modify the "Voltage Value" (the setting value must be within the valid range of the current type of battery) and click OK to achieve discharge of this set value. Balance to ensure that all string voltage values are consistent with the set value.

- **Automatic Equalization**

Automatic equalization is suitable for small-capacity battery packs in low-speed vehicles. The balancing power is 5%-30%. In operation, when the device status is normal, click "Auto Balance" and the device will automatically identify the highest voltage and the lowest voltage, and use the lowest voltage as the standard to balance

the high voltage - put it down and keep it consistent with the low voltage.

- **Charging Equalization**

Charge equalization generally refers to the voltage of the cells in the battery pack when it is half charged. The charge equalization setting parameters are as follows:

➢ **Lithium iron phosphate equalization parameters:**

Monomer over-voltage protection: 3.65V

Monomer over-voltage recovery: 3.65V

Forced equalization voltage: 3.650V

Equalization monomer voltage difference: 0.005V

Equalization current ratio: 5%~100%

➢ **Ternary lithium equalization parameters:**

Monomer over-voltage protection: 4.25V

Monomer over-voltage recovery: 4.20V

Forced equalization voltage: 4.25V

Equalization start voltage: 4.00V

Equalization monomer voltage difference: 0.005V

Equalization current ratio: 5%~100%

## 5. Setup instructions

Start equalizing voltage: During the charging process of connecting to the charger, the equalizing work will only start when the voltage of a certain string in the battery pack reaches this set value. When it is < this set value, the equalizing will not be started. After the equalizing is started, the charging current is recommended. Around 5A, the small current balancing effect will be better.

Equalize cell pressure difference: When charging and balancing, the cell pressure difference of the battery pack is equalized to this set value range. After reaching this set value range, the equalization work will automatically stop;

Single over-voltage protection: During the charging equalization process, when any string in the battery pack ≥ this set value, the system will automatically turn off

the charging switch and stop charging:

Cell over-voltage recovery: During the charging equalization process, when a certain string in the battery pack is protected from overvoltage, charging will stop. After the high-voltage string voltage drops below this set value, the system will reopen the charging switch and resume charging. :

Forced equalization voltage: In any case, after setting the equalizing voltage value in "Balance Settings", return to the main interface and click the "Manual Equalization" button to discharge and equalize the battery pack (this setting value must be in the battery Within the effective voltage range, never be greater or less than the effective range, otherwise the battery will be over-discharged);

Balanced current ratio: battery clamp connection 5%-100%, adapter board 5%-50% (it is recommended to use it according to the actual balancing situation, over-current use will cause damage to the balancing harness).

## 6. Manual Equalization Instructions

Connect the power supply for adapter, turn on the switch, click continue -- Choose battery type -- Input the number of cells in series -- Set the balance power at 100% -- Click next.

Then use multimeter to measure the batteries. Turn the multimeter to the DC gear, and confirm the positive and negative poles of the batteries. Use the black pen to measure total negative pole, and the red pen to measure total positive pole.

Check the multimeter and see if both black pen and red pen are measuring the correct positive pole and negative pole of your battery pack.

The instrument has two black cables with clips on the end. The two black wire clips must be clipped to the negative pole of the battery.

Put the black pen at the position of black clips, and then use the red pen to measure the batteries. When it showing around 3.6V which means the red pen is

measuring the positive of first string.

Pick up the clip of B1 and connect it to the positive pole of the first string, now the voltage of the first string will be displayed on the screen.

Pick up the multimeter to measure the second string, place the black pen at the position of B1 clip, and then use the red pen to measure the battery. When it showing around 3.6V which means the red pen is measuring the positive of second string. If measuring two strings at the same time, the voltage will be around 7V, which is wrong. The voltage should be between 3-4.2V of one single cell.

Pick up the clip of B2 and connect it to the positive pole of the 2nd string, where the red pen just placed. Now the voltage of the 2nd string will be displayed on the screen.

Place the black pen at the position of clip of B2, then use the red pen to measure the battery. When it showing around 3.6V which means the red pen is measuring the positive of third string.

Pick up the clip of B3 and connect it to the positive pole of the 3nd string, where the red pen just placed. Now the voltage of the 3nd string will be displayed on the screen.

Connect all the batteries in the same way, and all voltages will be displayed on the screen.

If connected incorrectly, the instrument will sound the alarm. Connect all the batteries, and the equalization indicator is on.

Now we can choose manual equalization mode. For example, now the lowest voltage 3.648V, so we input 3.648. Manual equalization method takes the lowest string voltage as the standard, and lowers the voltage of all high-voltage batteries to the same level. All equalization work in done simultaneously. Press the button “sure”, the voltage difference will decrease rapidly which means it’s balancing efficiently. When the equalization is done, press the button “sure” again, and disconnect all clips.

## 7. Charging Equalization Instructions

Adjust the DC switch of the power supply to the direction of the black stud, and the black stud cable is connected to the right stud of the instrument. The positive pole of the adjustable power supply is connected to the end of all strings, which is the 32nd clip in this video, and the two wire clips are clamped at one point.

Adjust the voltage of power supply: For example, I want to charge each string to 3.7V, click the “parameter” setting, start the equalization voltage and set it to the lowest value of all strings. Check the lowest value, 3.648V now, so we input 3.648 and confirm. If I want to charge each string to 3.7V, so set the balance voltage, Charging over-voltage protection and Charging over-voltage recovery value at 3.7V.

Confirm and back to the main menu.

Now adjust the voltage of the power supply. For example we want to charge all cells to 3.7V, and we have 32 strings of cells, 3.7 multiplies by 32 equals 118.4. The voltage can be set a little higher, so we can set 119V in this case.

Voltage can be a little higher but not too low. Now rotate the current knob in the left to the end, when the voltage decreases, rotate back one circle. Open the DC switch in the back, now we can set the current. 5 amps better, not too large. When there’s voltage difference, balancing will automatically start. When the voltage difference disappears, it will automatically stop.

## 8. Power Supply Instructions

Turn the multimeter to the DC gear to measure the battery pack. When we measure the first string,it showing around 3.6V which means black pen and red pen measuring positive and negative pole correctly.And we will charge it to 4V. Adjust the DC switch of the power supply to the direction of the black stud (turn off), Connect the black clip to the negative pole and the red clip to the positive pole.

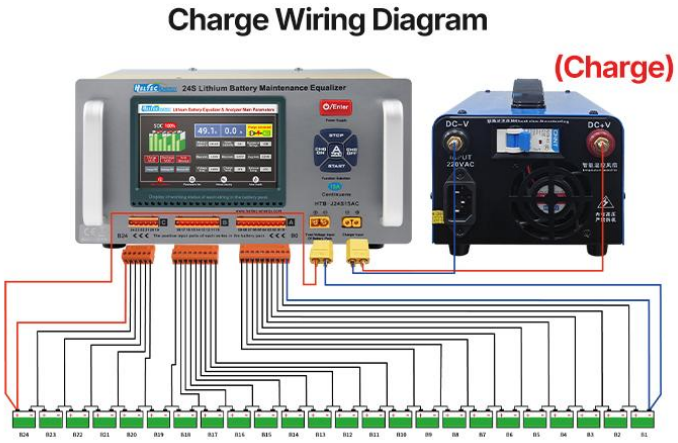
Rotate the voltage knob and set value at 4V and then rotate the current knob in the left to its end, and the rotate back one circle. Open the DC switch to start charging.

Now we can adjust the current at around 5A.

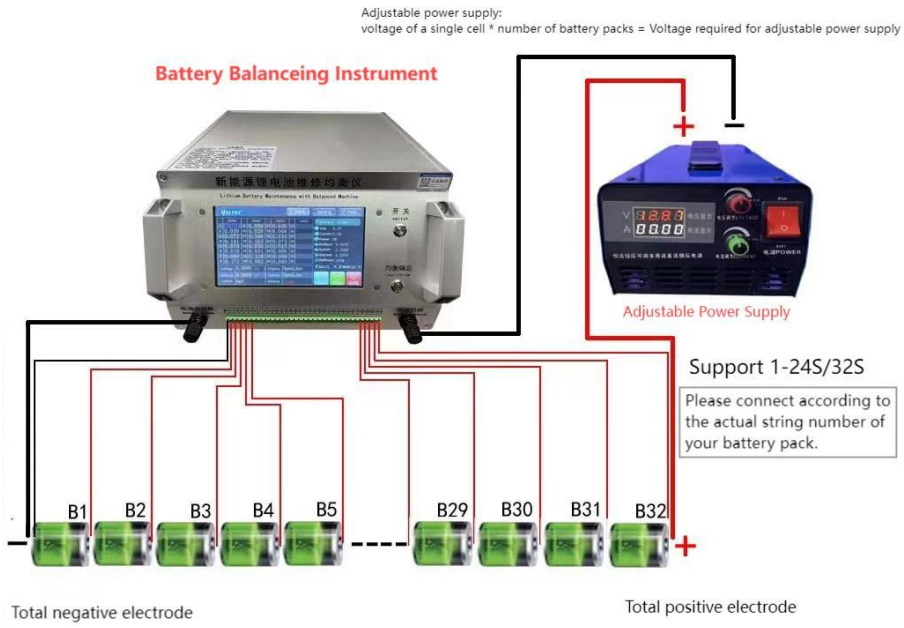
Attention here, when all things are connected and set up, do not adjust the voltage while it's working. Now we can increase the current. When it's charging, the voltage will increase as the current decreases slowly. When there's no current, the batteries are fully charged.

## 9. Battery connection diagram

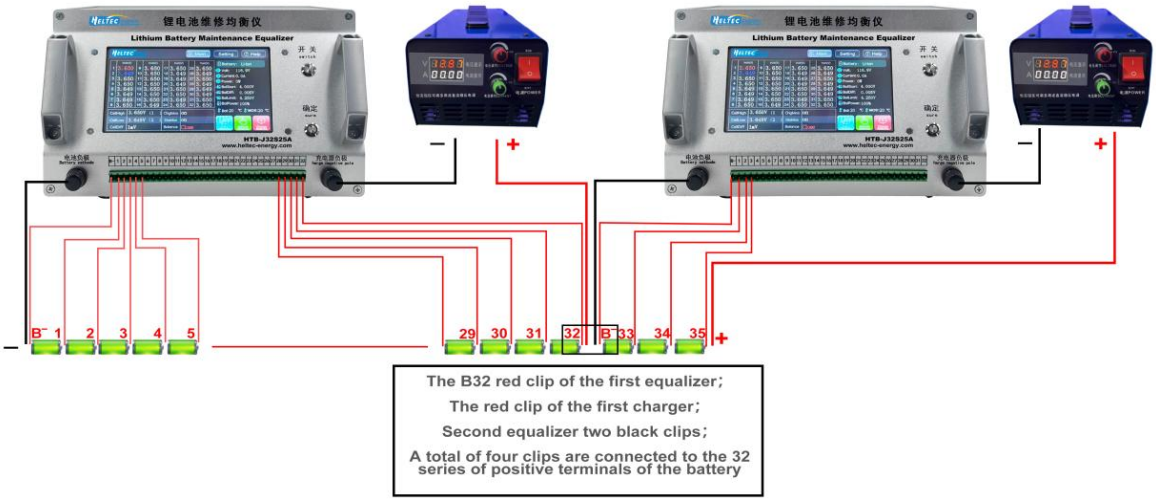
1. Battery strings ≤ 24S




2. Battery strings ≤ 32S




3. Battery strings ＞ 32S



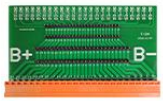

## 10. Packing List


HTB-J24S15AC


Power Cord


Balance Connection Cable


Battery Connector



Line Sequence Test Board


Instructions



Lithium Battery Maintenance Equalizer X1


Battery connection line X1


AC/DC adapter X1


Equalizing transfer plate X1


Fixture line X1