



# 锂电池均衡维护仪 用户手册 | User manual

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## I. Product Introduction

As a maintenance device for lithium battery packs in new energy vehicles, the lithium battery pack charging and discharging balance maintenance instrument can address the problem of continuously expanding power imbalance among cells due to their inconsistency after they are connected in series and grouped, which result in shortened battery life, reduced duration, and even complete battery failure.

The main design concept is to collect parameters about cells, and to analyze and judge the underlying problems of the battery pack using intelligent algorithms. The outdated batteries are accurately recharged by the method of “series charging and replenishment” to ensure that each cell in the series is fully charged, and to maintain the power difference between each cell in the group to the delivery level, thus eliminating the short board effect of battery pack and restoring the entire capacity of battery pack to near the delivery level.

## II. Technological advantages of product:

1. Automatic identification of wiring harness. The device can automatically identify the number of battery connections, dispense with manual configuration;
  2. The charging and discharging output current is infinitely adjustable, and the current can be freely set within 0.1-5A;
  3. The operation log function facilitates the traceability of operation records, and operation logs can be exported to a USB drive;
  4. Test report function. After battery balancing is completed, regardless of normal or manual operation, a test report will be generated, including the voltage when the balance starts and ends, provides a clearly transparent pressure difference at the start and end;
  5. Data recording function. Data such as battery voltage and balanced capacity are continuously recorded since the device is powered on. If
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required, they can be exported through a USB flash drive, and the exported file can be opened through Excel;

6. Remote program upgrade function. If the device program at the company side has been upgraded, the client device can be directly connected to the device for upgrade;

7. Scanning gun function. The device supports connection to a scanning gun that can save battery model data in the balance test report for future traceability (currently this feature is not supported by the shell, but will be available after the shell is modified afterwards);

8. 0V battery reviving function. There is a little chance to revive the high-quality lithium iron phosphate battery that accidentally discharges the voltage to 0V. Our device can directly charge the 0V battery in the forced manual mode. A rise in the voltage means that the battery can be revived.

9. Fixed-capacity charging function. Users can limit the charging and discharging capacity by setting a value.

10. The product is easy to operate and highly intelligent. Press the “Start” button to start maintenance.

11. The device, which is designed with excellent heat dissipation, can operate at high temperatures for a long time without damage, and maintain ideal stability.

12. The product’s self inspection program can identify users’ wiring errors and improper operation. If the device is damaged, the display screen will report the specific location of the damage and incorrect wiring, and locate the specific module string.

13. The device is small, light and portable, fully facilitating the convenient use and portability for users.

## II. Usage Scenario

The product is mainly used for battery balancing of lithium iron

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phosphate, ternary lithium, and lithium titanate, suitable for voltage levels below 5V.

### III. Notes before Reading

#### (I) device Model

This Manual is applicable to all the following devices. If your device's screen style is different from the one described in the Manual, please contact the manufacturer to upgrade the screen to version 2. x.x.

	GAEA series	DEYA series
Applicable models	GAYA-724-05A	DEYA-424-05A
	GAYA-736-05A	DEYA-436-05A
	GAYA-748-05A	DEYA-448-05A
	GAYA-760-05A	DEYA-460-05A

#### (II) Explanation of Terms

Device: Portable lithium battery balance maintenance instrument.

Power cord: input power cord with triangle spacing interfaces.

External wiring harness: 12 series power strips, crocodile clips.

Control board: Circuit board inside the device.

Screen: Ddisplay screen of the device.

Battery: lithium iron phosphate battery, ternary lithium battery, and lithium titanate battery.

USB drive: The file system is in FAT32 format and the allocation unit is 4096.

### IV. Agreement

New engineers should operate the device under the guidance of experienced ones. If the device is purchased for the first time, please read the User's Manual carefully.

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!: Remained users of what they need to know by black characters.

!: Remained users of precautions by orange characters.

!: Remind users of special precautions with red characters.

Operate the device by strictly following the User's Manual.

## V. Description of External Interfaces



'1': External harness interface

The wiring harness accompanying the device is used to connect the device and battery, usually in a row or crocodile clip.

Generally, the power strips or crocodile clips are used together with the device's wiring harness to connect the device and battery. In case of an adapter board, connection should be implemented under the guidance of the manufacturer's technical personnel.

**! Do not make external wiring harnesses without permission**

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'2': Interface for switch and power cord

Accompanying the power cord of the device.

'3': USB interface, connected to the screen

The device stores balance reports, usage logs, and real-time recording data on its own, and can export data when a USB flash drive is inserted.

'4': USB interface, connected to the control board

Backup interface for connecting to the computer, upgrading programs, and online activation.

## VI. Indicator Light

**Green:** Device in standby or battery balancing completed

**Blue:** being balanced

**Red:** Device in abnormal condition

## VII. device Parameters

(I) Device parameters

3. GAEA series

Number of strings	Weight (kg)	Dimensions (length x width x height mm)
24	5.15	416x236x212
36	6.2	416x236x212
48	8.15	416x336x212
60	9.5	416x336x212

4. DEYA series

Number of strings	Weight (kg)	Dimensions (length x width x height mm)
24	6.85	416x219x212

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36	10.15	416x336x212
48	12.10	416x336x212
60	16.15	416x442x212

## (II) Machine specification

No.	Indicators	Parameter Values
1	Rated voltage	AC220V±15%
2	Rated frequency	50Hz±10Hz
3	Output power	900W
4	Output current	0.5~5.0A adjustable
5	output voltage	5V
6	Current accuracy	±50mA
7	Voltage accuracy	±1mV
8	Protection level	IP21
9	Cooling method	Forced air cooling
10	Flame retardant grade	94V ~ 0
11	Noise	68 dB

## (III) Module specification

! The following working parameters are frequently set by engineers, and therefore this section is worth reading in detail. If you have any doubt about the parameters, contact the manufacturer for explanation.

No.	Indicators	Parameter Values
1	Number of battery strings	0 ~ 12 series
2	Target voltage	1.500V ~ 4.350V
3	Lower limit voltage	1.000V ~ 4.350V
4	Output current	0.5 ~ 5.0A
5	Cut-off current	0.5 ~ 5.0A

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6	Charging and discharging capacity	50Ah
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Number of battery strings:

Manually set the number of battery strings. For devices, the battery must be continuous. If there are a total of 12 battery strings, and the 6<sup>th</sup> one is damaged, a maximum number of 5 strings can only be set; If the number to be set is greater than 5, an exception about the 6<sup>th</sup> one will be reported, resulting in the inability to implement balancing.

Target voltage:

The voltage that the battery has to reach when the balancing is completed, which is also a condition to stop working in manual mode.

The device performs discharging when the target voltage is less than the battery voltage, and implements charging when the target voltage is larger than the battery voltage.

Lower limit voltage:

The minimum voltage at which the device operates must be less than the battery voltage.

To prevent battery damage due to excessive discharge, the default value is 1.000V, which means that batteries with a voltage less than 1V cannot operate in a balanced manner.

Output current:

Within the range of 0.5 to 5.0A, adjust the step by 0.01A.

Cutoff current:

One of the conditions for completing balancing. If, when the battery reaches the set target voltage through charging or discharging, the balancing is manually stopped immediately, a significant deviation in

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battery voltage can be observed after waiting for a moment. Due to the short board effect of the battery, users sense insufficient capacity during use, which is what we understand as “virtual charge”.

When the battery is about to reach the target voltage, this device will, based on the cutoff current, adjust the charging strategy to eliminate the short board effect, so that the voltage will not fluctuate significantly after battery balancing, thereby increasing the battery capacity.

The parameter is 1.0A by default, and the smaller the cutoff current, the longer the balancing time; the larger the cutoff current, the shorter the balancing time.

#### Charging and discharging capacity:

One of the conditions for completing equilibrium, either the balancing operation will stop as long as either the charging and discharging capacity or the cut-off current reaches.

If the parameter value is set to 1Ah, the operation will stop when the charging or discharging capacity of any cells reaches 1Ah.

The parameter is 500Ah by default, and normally the battery cannot reach this capacity, and this parameter means not taking effect.

#### (IV) Insulation performance and withstand voltage

No.	Indicators	Parameter Values
1	Power line to battery harness	Max 2,500V
2	Power cord to shell	Max 2,500V
3	Device's insulation performance	Max 10MΩ
4	Withstand voltage at wiring harness interface	Max 80V

(V) Limit parameter

! Limit parameter means that the device cannot remain in the following state for a long time, otherwise irreversible damage may be caused to the device.

No.	Indicators	Parameter Values
1	Working temperature	-20 ~ 60℃
2	Storage temperature	-30 ~ 80℃
3	Working humidity	≤ 90%, no condensation

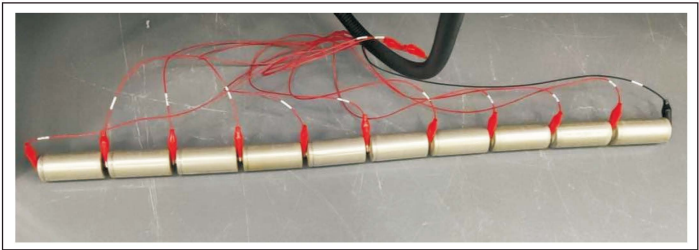
VIII. Usage Method

(I) Electrical connections

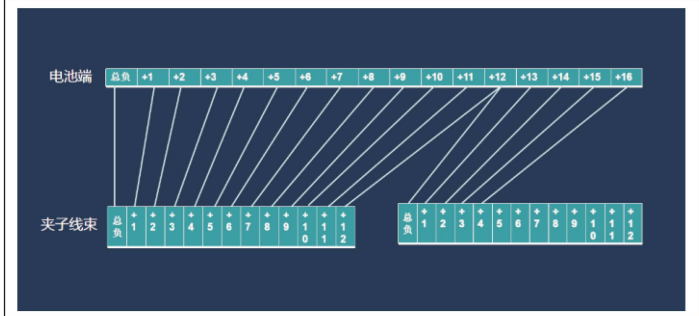
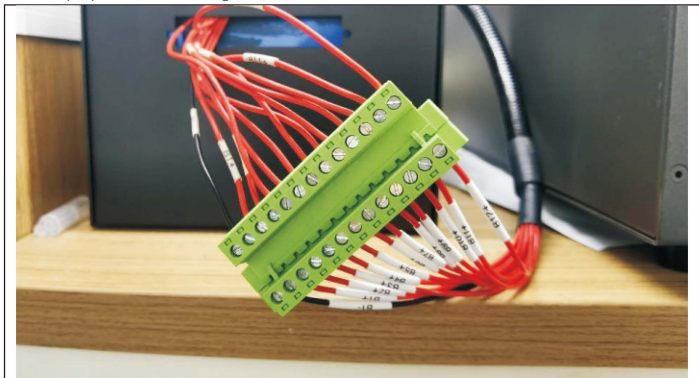


Connect the device to the power cord, power it on, turn on the power switch, observe the screen, and enter the main interface, an indication of successful power-on.

(II) Strip connection



### (III) Crocodile clip connection



## IX. Function Description

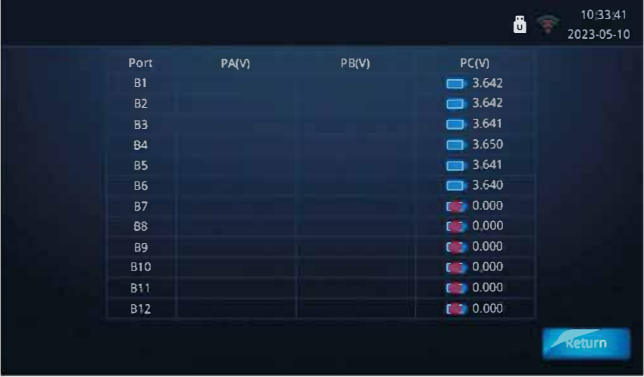
### (I) Main interface















Connect correctly according to the method in Section VIII, click on Automatic Configuration, and the number of battery connections will change. The device will display the status of “Standby”, indicating that the device has recognized and successfully connected the battery. Click on “Start balancing” to immediately start working.

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## (II) Information on cells



The screenshot shows a dark-themed interface with a table of battery information. The table has four columns: Port, PA(V), PB(V), and PC(V). The PC(V) column includes a battery icon and a numerical value. Ports B1 through B6 show positive voltage readings, while B7 through B12 show 0.000. A 'Return' button is located at the bottom right. The top right corner displays the time 10:33:41 and the date 2023-05-10.

Port	PA(V)	PB(V)	PC(V)
B1			 3.642
B2			 3.642
B3			 3.641
B4			 3.650
B5			 3.641
B6			 3.640
B7			 0.000
B8			 0.000
B9			 0.000
B10			 0.000
B11			 0.000
B12			 0.000

Click on the Information on Cells, and the screen will display the status and voltage measurement values of the battery connected. The battery that is not recognized will not be displayed. If it is confirmed that the battery is connected but cannot be recognized, the parameter configuration function can be used to manually set the number of strings, and we can enter the Information on Cells again to observe the voltage information of the interface.

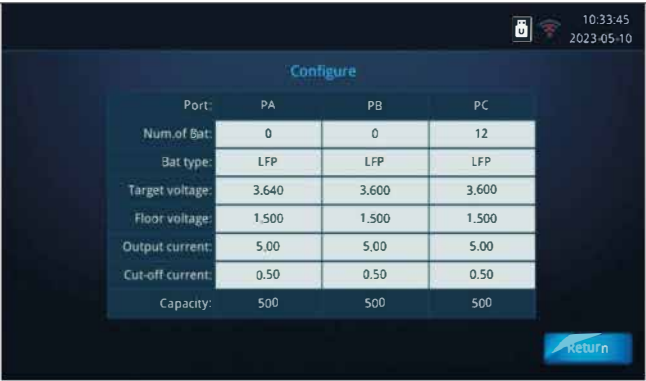
When the device alarms, this interface will reflect some information, such as battery wiring errors, and can display the specific location of wiring error.

## (III) Language switching

Click on Language Switching, and the device will switch from Display in Chinese to Display in English. If the device is currently displayed in English, it will switch to display in Chinese.

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(IV) Parameter configuration



Refer to 7.2 for parameter description.

Click on the parameters to be set, and a small keyboard will pop up. Just return after setting the parameters.

(V) Manual mode



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Click on the cells to be activated to open or close the charging unit, and click again to close it.

The manual mode function is used for product testing and for manually controlling the recharge of individual cells that cannot be charged due to low battery voltage.

Stop charging and discharging when the battery reaches the target voltage.

Temporarily activate the forced mode when the battery voltage is too low.

! For safety reasons, the manual operation of the device is in safe mode by default, and is limited by the output configuration and parameters. Batteries with a voltage lower than the lower limit voltage cannot be charged;

! In forced mode, the device only has charging function. The biggest difference between forced mode and safe mode is that the former is not limited by output configuration and set parameters. This function is not effective when the battery voltage is greater than 3V.

! To use forced mode, it is necessary to ensure that the wiring harness is properly connected, as incorrect wiring may cause damage to the device or battery.

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## (VI) Test report

10:33:59  
2023-05-10

Module:PC				Detail Report				
Bat type	LFP	Num of Bat	12	Port	Start Volt	End Volt	Capacity	Time
Target Volt	3.600	Capacity Setting	500.00	PC1	3.641	3.642	0.00	1 min
Floor Volt	1.500	Start Volt diff	0.010	PC2	3.641	3.642	0.00	1 min
Output	5.00	End Volt diff	0.010	PC3	3.640	3.640	0.00	1 min
Cut-off	0.50			PC4	3.650	3.650	0.00	1 min
Start time	2023-05-09 13:57:00			PC5	3.641	3.641	0.00	1 min
End time	2023-05-09 13:58:23			PC6	3.640	3.640	0.00	1 min
Method	State			PC7	3.641	3.641	0.00	1 min
Intelligent analysis:				PC8	3.641	3.642	0.00	1 min
				PC9	3.641	3.641	0.00	1 min
				PC10	3.642	3.642	0.00	1 min
				PC11	3.641	3.640	0.00	1 min
				PC12	3.641	3.641	0.00	1 min

PreviousNextDeleteReturn

Click on the Test Report to view the latest work report.

Every time you click to start balancing, a test report will be generated, whether it is a manual stop, abnormal stop, or a full capacity stop.

Each report contains the data of all modules. You can switch by Clicking the Previous Module and the Next Module.

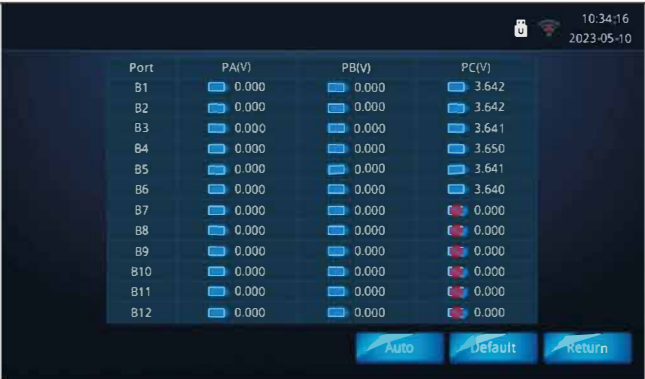


(VII) System settings



System settings include channel configuration, collection calibration, network configuration, user manual, usage logs, and system information, which are not commonly used.

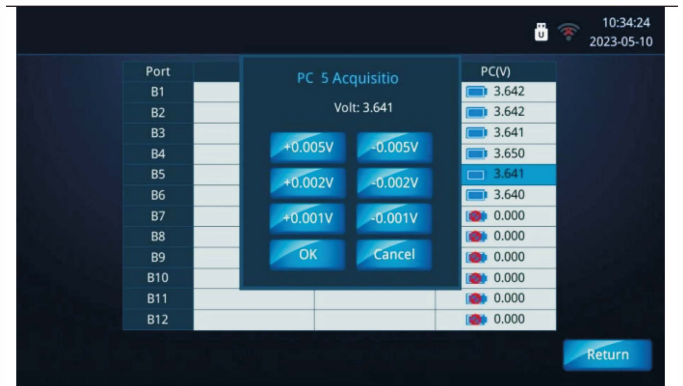
(VIII) Channel configuration



Channel configuration affects the overall situation, including module balancing, information on cells, manual mode, acquisition calibration, etc. The module cannot start working if there is an abnormal battery in the battery pack. At this time, the channel configuration function can be used to isolate the corresponding channel.

Click on the battery icon, and the channel will switch between Enable and Disable. Click on Automatic Configuration, the channels with batteries connected will be enabled, while those without batteries connected will be disabled. All channels can be enabled when you click on the default configuration.

(IX) Collection calibration



Connect the battery to the device correctly and measure the voltage of each string of batteries at the battery end using a high-precision multimeter. Compared with the voltage displayed on the screen, calibration can be performed when the error is greater than  $\pm 1\text{mV}$ . Calibration is insignificant when the error of collected voltage is less than

± 1mV.

This function, after being successfully set, will not be cleared when the device is restarted and will take effect permanently. Generally, only once calibration is needed when the device is delivered from the factory.

**! Recalibration is required after the control program is upgraded.**

**!The adjustment range can only be within 2%, and the settings beyond the rate of 2% are invalid.**

(X) Network configuration



The device will automatically scan for available WiFi. If no WiFi is not displayed in 3 seconds, the user can manually click Refresh, and then click on the corresponding WiFi name to log in.

**! It is necessary to restart the device if WiFi is actually available but no WiFi is displayed after multiple refreshes.**

10:34:33  
2023-05-10

## Login

Please enter password

SSID: MEGASKY

Password:

Connect
Return

7	CMCC-DN6K	
8	H3C_GUEST	

Refresh
Return

## (XI) Usage logs

10:34:41  
2023-05-10

## Log

2023 Year 5 Mon 10 Day
Search

Num	Time	Type	Content
6	2023-05-10 10:33:50	Manual Mode	OFF
5	2023-05-10 10:33:46	Manual Mode	ON
4	2023-05-10 10:20:03	Manual Mode	OFF
3	2023-05-10 10:19:54	Manual Mode	ON
2	2023-05-10 09:45:27	Error	0
1	2023-05-10 09:44:49	Error	10

Return

Operation records of device.

## (XII) System information



Basic information about the device, including Screen Upgrade and Software Upgrade.

To enable screen and software upgrade, it is required to realize network connection before upgrade related operations, which takes approximately 30 seconds.

## X. Fault Analysis

No.	Status	Description
1	Communication error	Internal communication error. Contact the manufacturer
2	Battery wiring error	Abnormal connection of device battery harness View abnormal channels on the interface Information on the Cells and check the connected lines.
3	Battery charging error	Device charging and discharging unit fails.

4	Internal storage device error	Contact the manufacturer.
5	Activation code error	Connect to WiFi and activate it automatically after successful WiFi connection. If the error does not disappear after networking, contact the manufacturer.
6	System time error	Connect to WiFi and automatically calibrate the time after networking; After time calibration, restart the device. If the time is still incorrect, it may relate to a damaged clock of the display.
7	Too low battery voltage	Battery voltage below lower limit voltage Re-select the appropriate battery type
8	Too high battery voltage	
9	Synchronous signal error	Poor wiring. Contact the manufacturer
10	Expired activation code	Contact the manufacturer to activate
11	Too high temperature inside the machine	Avoid direct sunlight Check if the ambient temperature is too high
12	Too low temperature inside the machine	Check if the ambient temperature is too low
13	No screen signal	Screen damage. Contact the manufacturer Poor screen wiring. Contact the manufacturer

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## XI. Maintenance and Upkeep

Keep the device, when not in use, in a flat and dry place with suitable temperature and minimal dust;

Keep the device away from direct sunlight or heating devices;

Keep the device away from the stove or the areas prone to smoke erosion or splashing with water or oil. Do not disassemble the device without permission;

If the balancing is not carried out for a long time, run the device regularly to avoid dampness.

To avoid scratching, do not touch the screen surface with nails or other sharp objects (hard objects);

To avoid touch screen inaccuracy and internal component damage caused by heavy pressure, do not place any foreign objects on the touch screen;

To extend the service life of touch screen, do not expose the touch screen to direct sunlight or ultraviolet light;

The surface of LCD screen may attract dust due to static electricity. It is recommended to purchase a dedicated LCD screen cleaner and wiping cloth to clean the instrument screen, instead of wiping the touch screen with other chemical cleaners or fingers.

## XII. Safety Instructions

Do not use the device beyond the limit parameters, insulation performance, and withstand voltage parameters.

When maintaining the battery pack on the device, it is necessary to separate the battery pack from the load (vehicle).

Do not change the wiring when the device is working.

Do not cover the ventilation openings (ducts) of the casing during device operation, and ensure that the device operates in a well ventilated environment.

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Do not operate the device under direct sunlight, and provide protection against water when the device is being operated outdoors.

Do not use the device above heat sources or in an environment with thermal radiation.

Do not charge the device in a flammable and explosive environment. There should be no flammable materials such as waste paper, cloth, or plastic bags around the charger, since accidental movement of such articles may cover the charger, causing danger.

Ensure that the battery access side is connected reliably when the device is working

The original power cord should be used for AC input connection.

### XIII. Quality Assurance and Service

The buyers can request remote video guidance from the manufacturer when they are unable to complete installation and debugging on their own for the first use.

The device is provided with a one-year warranty and lifetime service.

If the device malfunctions during normal use within the warranty period, it can be returned to the manufacturer for free repair. In case the device malfunctions during normal use outside the warranty period, the manufacturer will provide paid repair services, with the cost calculated based on the actual condition of damage. (**Abnormal use: using the device against any of the safety instructions in Section XII**)

If, during the warranty period, the device malfunctions due to abnormal use, the manufacturer will provide paid repair services, with the cost calculated based on the actual condition of damage.

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#### XIV. List of Delivery

	Accessories	QTY
1	Lithium battery balancer	1
2	Wire harness	1
3	Adapter board	1
4	Power cord	1
5	User's Manual	1
6	Certificate of conformity	1
7	Warranty card	1
8	USB cable	1

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