Meaningful Innovation.

WEEE Number: 80133970

INSTRUCTION MANUAL

10 YEAR WARRANTY*

SKU	DESCRIPTION
12328	RECHARGEABLELi-ionBATTERYSYSTEM (LIQUID COOLING)

INTRODUCTION

Thank you for selecting and buying V-TAC Product. V -TAC will serve you the best. Please read these instructions carefully & keep this user manual handy for future reference. If you have any another query, please contact our dealer or local vendor from whom you have purchased the product. They are trained and ready to serve you at the best.

MULTI-LANGUAGE MANUAL QR CODE

FR Les piles et batteries se recyclent — À DÉPOSER EN MAGASIN ou À DÉPOSER EN DÉCHÈTERIE

Points de collecte sur www.quefairedemesdechets.fr

In case of any query/issue with the product, please reach out to us at: support@v-tac.eu

For More products range, inquiry please contact our distributor or nearest dealers.

V-TAC EUROPE LTD. Bulgaria, Plovdiv 4000, bul.L.Karavelow 9B

CONTENT

IMPORTANT NOTES

- This product contains battery type "Secondary" (rechargeable).
- Electrical and electronic equipment that has become waste is known as old equipment/device. Old devices must not be disposed of with other household waste.
- Owners of old devices at the end of its service life must return the device by taking them to the collection points set up by public waste disposal authorities or distributors. This return does not entail any costs for you.
- Owners of old devices have an obligation to remove accessible batteries / rechargeable batteries as well as non-destructively removable lamps from the old device prior to return. This does not apply if old devices are being prepared for reuse with the participation of a public law firm.
- Battery removal warning: The battery contained in this product must be removed only by professional personnel only. The battery must never be removed by the end user, if not removed correctly it could damage the battery which could cause fire.
- Batteries removed from an old electronic device should be disposed of separately. This return of battery does not entail any costs for you and the user is obliged to return the battery.
- Please make sure that this product is not powered on when removing the battery. Fire hazard! Avoid short-circuiting the contacts of a detached battery. Do not incinerate the battery. Please handle the battery with Caution!
- If electrical appliances or batteries are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, damaging your health and well-being.

- The symbol of "Crossed rubbish bins "indicates that this product should not be disposed of with other household wastes and must be collected separately from unsorted municipal waste at the end of its service life.
- Please use the link below to view the online directory of the collection and return points:https://www.ear-system.de/ear-verzeichnis/sammel-und-ruecknahmestellen

Label for Waste Electrical and Electronic Equipment (WEEE) Directive (2012/19/EU)

Warning electric shock.

RoHS CE UKCA

1. Important information in the manual

1.1 Scope

Summaries

Thank you for choosing the energy storage system product!

This document gives a description of the energy storage system OHL-233, including the features, performance, appearance, structure, working principles, installation, operation and maintenance. etc.

Please save the manual after reading, in order to consult in the future.

NOTE

The figures in this manual are just for illustration, details please take the actual product as standard.

Target Group

* User
* Technical support engineer
* Installation engineer
* Debugging engineer
* Maintenance engineer

Suitable Model

* OHL-233

Symbol Conventions

The manual quotes the safety symbols, these symbols used to prompt users to comply with safety matters during installation, operation and maintenance. Safety symbol meaning as follows.

Symbol	Description
DANGER	Alerts you to a high risk hazard that will, if not avoided, result in serious injury or death.
WARNING	Alerts you to a medium low risk hazard that could, if not avoided, result in moderate or minor injury.
CAUTION	Alerts you to a low risk hazard that could, if not avoided, result in minor injury.
	Anti-static prompting.

	Be care electric shock prompting.
TIP	Provides a tip that may help you solve a problem or save time.
NOTE	Provides additional information to emphasize or supplement important points in the main text.

Change History

Record the content of each document update. The latest version contains the updates of all previous document versions.

Issue 01 (2025-05-05)

First issue.

1.2 Safety Description

This chapter mainly introduces the safety announcements. Prior to performing any work on the device, please read the user manual carefully, follow the operation and installation instructions and observe all danger, warning and safety information.

1.2.1 Safety Announcements

⚠ CAUTION

Before operation, please read the announcements and operation instructions in this section carefully to avoid accident.

The promptings in the user manual, such as "Danger", "Warning", "Caution", etc. don't include all safety announcements. They are just only the supplement ofsafety announcements when operation.

NOTE

Any device damage caused by violating the general safety operation requirements or safety standards of design, production, and usage will be out of Kehua's guarantee range.

1.2.1.1 Safety Announcements

⚠ DANGER

Damaged device or device fault may cause electric shock or fire!

* Before operation, please check if the device is damaged or has other danger.
* Check if the external device or circuit connection is safe.

⚠ DANGER

Don't touch terminals or conductors that connected with grid to avoid lethal risk!

⚠ WARNING

Please do not put finger or tool into the rotating fans to avoid human injury or device damage.

⚠ CAUTION

The product is grade A device. If the product is used in residential area, it may cause wireless interference. User should take actions to avoid the interference.

1.2.1.2 Symbol Illustration

WARNING

The warning labels on the energy storage system and in the cabinet include the important information related to the device safe operation. DO NOT tear them up.

The illustration for the labels of energy storage system is as shown inTable1-1.

Table1-1 Symbol illustration

Symbol	Illustration
	Observe the user manual.
	There is dangerous voltage which may endanger human safety, be care of electric shock.
	After powering down, please wait for 10min to make the device discharge completely.
	Do not dispose the device together with the household waste but in accordance with the disposal regulations for electronic waste applicable at the installation site.
	Pay attention to safety
	External grounding mark. It needs to be connected with grounding to keep the operator safe.
	Beware of hot surface. While operating, the temperature of air outlet maybe high, do not touch the air outlet louver to avoid scald.
	Take precautions against noise. Please wear the hearing protection equipment.

1.2.1.3 Battery Use Announcements

Lethal high voltage exists in the negative and positive of energy storage batteries, touching by accident will cause electric shock even endanger human safety.

DANGER

When maintaining the device, make sure that the connection between the PCS and energy storage battery has been disconnected completely. And set warning mark in the disconnected position to avoid reconnecting by accident.

DANGER

There is lethal high voltage between the positive and negative poles of batteries, DO NOT short circuit the positive and negative poles, once short circuit, the battery will generate large current and release a large number of energy, even cause battery thermal runaway, firing or explosion. To avoid battery circuit, DO NOT maintenance the battery with electricity.

DANGER

DO NOT place the battery under the environment where with high temperature or heating device, such as resistance furnace, boiler etc. Battery over-temperature is easy to cause leakage, smoking, releasing flammable gas, thermal runaway, firing or explosion.

DANGER

DO NOT dismantle, transform or damage the battery (such as impale the battery with sharp object, crush with dead weight or water logged, falling off, collision, etc.) to avoid causing electrolyte leakage, smoking, release flammable gas, thermal runaway, firing or explosion.

DANGER

DO NOT use the battery modules with different type together.

DANGER

The battery electrolyte is toxic and with volatility. When the electrolyte is spilled or with abnormal gas, please avoid touching the spilled electrolyte or gas. DO NOT approach unless professionals. Please contact the professionals immediately to deal with it.

DANGER

The gas generated from burning battery is harmful to eyes, skin and throat, please attention to the protection.

WARNING

Before installing the energy storage system, please configure the fire-fighting device according to the construction standards, such as fire-fighting sands, carbon dioxide extinguisher, etc. Before commissioning, ensure that the fire-fighting device has satisfied the requirements of local laws and regulations.

WARNING

Fasten the screws of copper bars and cables by specified moment of force, and check the screws' condition regularly. The false connection of the screws will cause the connection voltage drop to be too large, and even a large amount of heat will burn the battery when the current is large.

NOTE

When first startup, if the battery temperature is too low, SOC saltation may occur at the end of charge and discharge. The phenomenon is normal and not affect the normal operation. We suggest that keep the battery's temperature return to above 15℃ as far as possible and then start to discharge.

1.2.1.4 Grounding Requirements

WARNING

High leakage risk! Device must be grounded before performing electrical connection. The grounding terminal must be connected to ground.

* When installing, the device must be grounded first. When dismantling, the grounding wire must be removed at last.

* Don't damage the grounding conductor;

* The device should be connected to the protection earth permanently. Before operation, it should check the electrical connection to ensure the device is grounded reliably.

DANGER

In the event of grounding fault in the energy storage system, some part that should not be charged may have lethal voltage, and touch by accident will cause serious damage. Before installation and operation, ensure that there is no system grounding fault and take appropriate protective measure.

1.2.1.5 Electrical Connection

The electrical connection must be performed strictly according to the description and wiring principle diagram in the user manual and labels on the energy storage system.

WARNING

The configuration and technical specifications (such as voltage, current, etc.) of energy storage batteries, must meet the technical requirements of the energy storage system.

Grid-tied operation should be allowed by the local power supply department and the related operation should be performed by professionals.

All electrical connection must meet the electrical standards of the country or local region where the project located.

1.2.1.6 Measurement Under Operation

CAUTION

There exists high voltage in the device. If touching device accidently, it may cause electric shock. So, when perform measurement under operation, operator must be accompanied by someone and take protection measure (such as wear insulated gloves, etc.).

The measuring device must meet the following requirements:

* The range and operation requirements of measuring device meets the site requirements;

* The connections for measuring device should be correct and standard to avoid arcing.

1.2.1.7 ESD Protection

CAUTION

The static produced by human body may cause the sensitive components on the PCB damage.

* Avoid unnecessary touch for PCB.

* Wear an anti-static wrist strap before touching sensitive components, and the other end should be well grounded.

1.2.1.8 APP Parameter Setting

⚠ CAUTION

Parameter setting is closely related to the operation of energy storage system, so the setting should be performed after estimating.

* Improper parameter setting may affect the function of energy storage system.

* Only qualified professional can perform the parameter setting.

1.2.1.9 Moisture-proof and Sand-proof Protection

⚠ CAUTION

Moisture or sand incursion may cause the energy storage system damage!

Observe the following items to ensure the energy storage system works normally.

* When the air humidity is more than 95% or under the circumstance of sandstorm, strong wind, hailstone, etc., don't open the door of the energy storage system.

* In the wet or damp weather, don't open the door of energy storage system to maintain or repair.

1.2.1.10 Safety Warning Mark Setting

⚠ CAUTION

In order to avoid accident for unwanted person getting close to inverter system or makes improper operation, it should observe the following requirements when perform installation, daily maintenance or repair.

* Set warning marks at the battery connection and grid connection of energy storage system to avoid switching on the breakers improperly.

* Set warning signs or safety warning belt in the operation area, which is to avoid unwanted person entering and cause human injury or device damage.

* After maintenance, ensure that pull out the key of energy storage system and save it properly.

1.2.2 Operator Requirements

⚠ CAUTION

The operation and wiring for energy storage system should be performed by qualified person, and ensure the electrical connection meets the related standards.

Before installing, operating and maintenance, the operator must understand the safety announcements, know correct operations and be trained strictly. The operator should meet the following requirements.

* With a certain knowledge of electrical connection, mechanical installation, and familiar with the electrical and mechanical principle.
* Be fully familiar with the constitution and operating principle of whole energy storage system.
* Be familiar with the structure and operating principle of connected device of energy storage system.
* Trained by professional electrical operation, installation and debugging.
* Can handle with the emergency conditions while installing, debugging.
* Be familiar with the related country and district standard.
* Be familiar with the illustrations in the user manual.

1.2.3 Others

* For the energy storage system are also installed far away from downtown, please prepare the emergency rescue facilities in advance.
* Take all possible auxiliary measures to ensure the safety of personnel and device.

2.Overview

2.1 Product Intro

This product is a battery energy storage system with a system capacity of 233kWh. The energy storage battery, temperature control system and fire protection system form an integrated system. The output end is connected to an inverter, which combines photovoltaic and mains power to charge and discharge the battery, achieving energy storage and backup functions. It can be applied to small and medium-sized commercial places (stores, supermarkets, delis, hospitals, etc.), small and medium-sized factories and charging stations, etc.

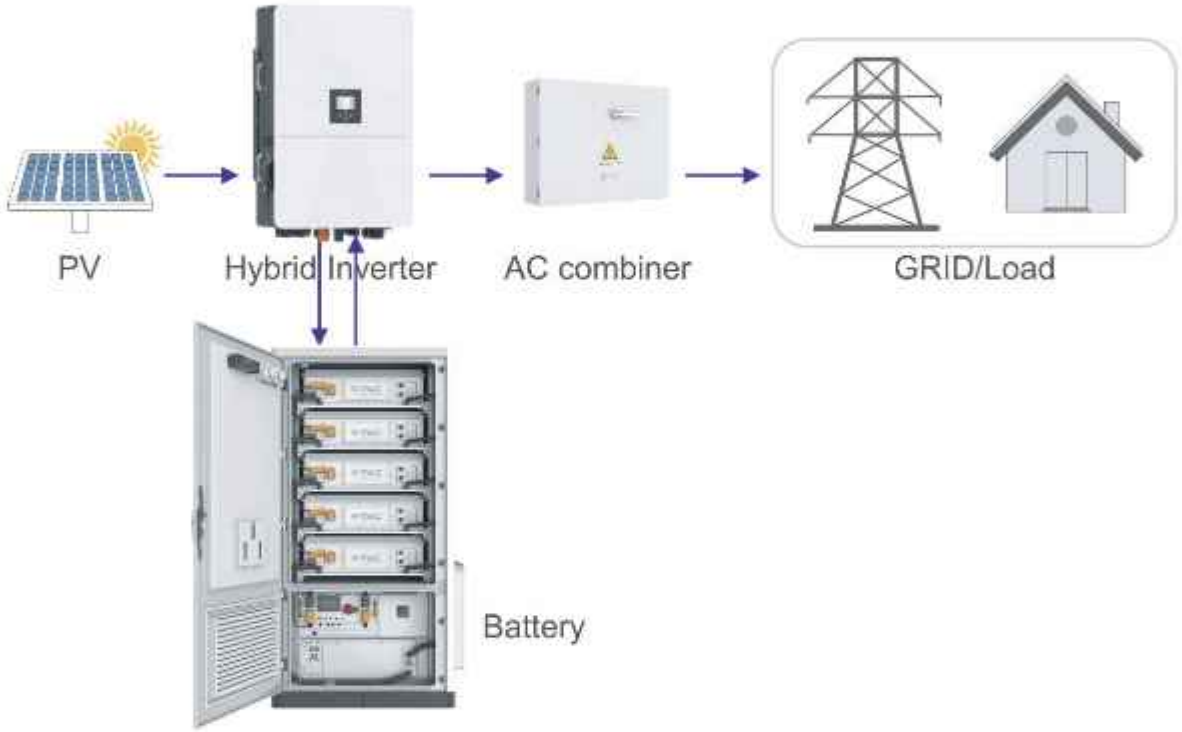


Figure2-1 Energy storage system constitution

⚠ CAUTION

Grid-tied operation of energy storage system needs to obtain the permission of local power supply department and performed by professionals.

2.1.1 Features

Innovative Structure Design

* With small volume, high power density, the footprint is small.
* The modules adopt front pull-out maintenance, easy to replace.

Safe and Reliable

* Double fire-fighting of Pack and system.
* Three-level explosion-proof of cell, pack and energy storage system.
* Two-level BMS safe redundancy management, ensure the battery operating safely.

Smart Management

* **Smart liquid-cooling**, perfect heat dissipation, effectively decrease the temperature different and enhance the battery use ratio.
* System adopts multi-level linkage design to achieve smart control and protection.

2.1.2 Technical data

Table2-1

Model	OHL-233
Main Parameter	
Cell Chemistry	LiFePO4
Module Energy (kWh)	46.59
Module Nominal Voltage (V)	166.4
Module Capacity (Ah)	280Ah
Battery Module Qty In Series (Optional)	5
System Nominal Voltage (V)	832
System Operating Voltage (V)	728~949
System Energy (kWh)	232.96
System Usable Energy (kWh)	209.66
Recommend Charge/Discharge Current (A)	100
Max Charge/Discharge Current (A)	140
Dimension (W/D/H,mm)	1100*1400*2105 (Inverter not included) 1600*1400*2105 (Inverter included)
Weight Approximate (kg)	~2560
Installation Location	Floor-mounted
Cooling method	Liquid Cooling(PACK)

Communicaiton	CAN
Ingress Protection	IP65
Altitude	≤2000m
Cycle Life	25±2°C,0.5C/0.5C,EOL70%≥6000
Monitoring Parameters	System voltage,Current,cell voltage,cell temperature,module temperature
SOC	Intelligent algorithm
Working Temperature	0℃~55℃ Charge -20℃ ~55℃ Disharge
Storage Temperature	0~35℃

2.2 Appearance and Structure

2.2.1 Appearance

Figure2-2 Appearance

2.2.2 Structure Layout

The energy storage system adopts compartment design, the upper is battery cabin, the bottom is electric cabin. The fire extinguishing of cabinet adopts aerosol, and equips with smog sensor and leak

detection controller. The structure layout is as shown in Figure2-3, corresponding component illustration is shown in Table2-2.

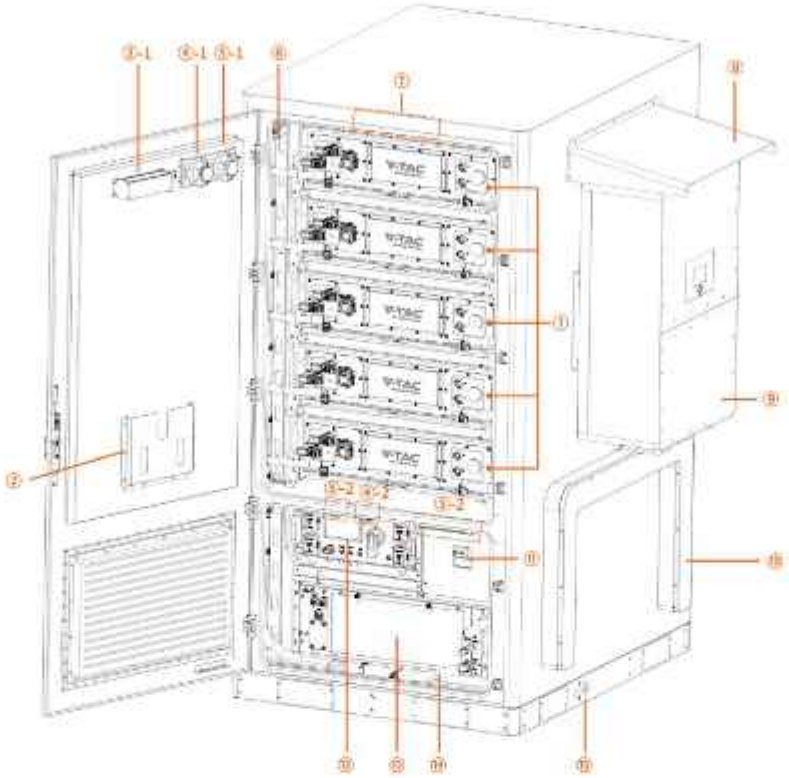


Figure2-3 Structure layout (open the front door)

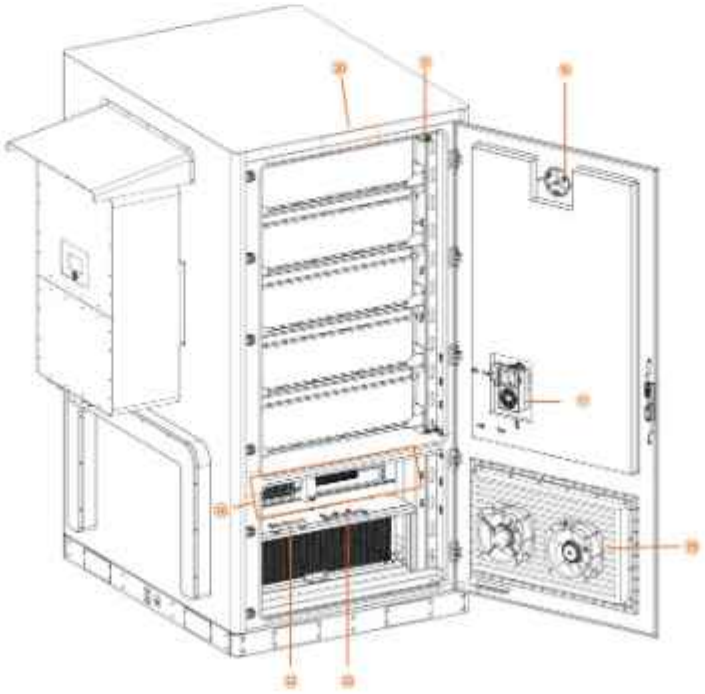


Figure2-4 Structure layout (Open the back door)

Table2-2 Structure layout illustration

NO.	Name	Description.	Position
①	Lithium Iron Phosphate Battery	166.4V280Ah	Front
②	document bag	Used for instruction manuals and inspection records	Front
③-1/2	Aerosol firefighting	Used to protect battery clusters from combustion	Front
④-1/2	smoke detector	Used to detect battery compartment fire	Front
⑤-1/2	temperature detector	Used to detect whether the battery compartment has abnormal temperature	Front
⑥	Travel switch	Used to control the switch of the light	Front
⑦	light	Used for illuminating battery compartment	Front
⑧	Rain cover	Used to shield the inverter from rainwater	side
⑨	inverter	Due to the conversion of energy storage DC to AC (customer supplied)	side
⑩	Cable tray	Wire slots for inverter incoming and outgoing lines	side
⑪	dc switch	Used to control the on/off between the high-voltage box and the inverter	Front
⑫	High voltage box	Used to control the current of the battery pack and detect information about the battery pack	Front
⑬	Liquid cooling machine	Used for temperature control of coolant	Front
⑭	Liquid cooled pipeline	Transportation pipeline for coolant	Front
⑮	grounding	External grounding of cabinet body	side
⑯	Explosion proof valve	Used to balance the pressure difference between the inside and outside of the battery pack	behind
⑰	dehumidifier	Used to balance the humidity inside the cabinet	behind
⑱	Control board	Used to control the on and off of liquid coolers, sockets, and dehumidifiers	behind
⑲	FAN	Liquid cooler cooling fan	behind
⑳	light	Used for illuminating battery compartment	behind

㉑	Travel switch	Used to control the switch of the light	behind
㉒	Zero row	Used for electrical neutral circuit	behind
㉓	Ground wire	Used for grounding electrical equipment	behind

Rechargeable Li-ion Battery Module

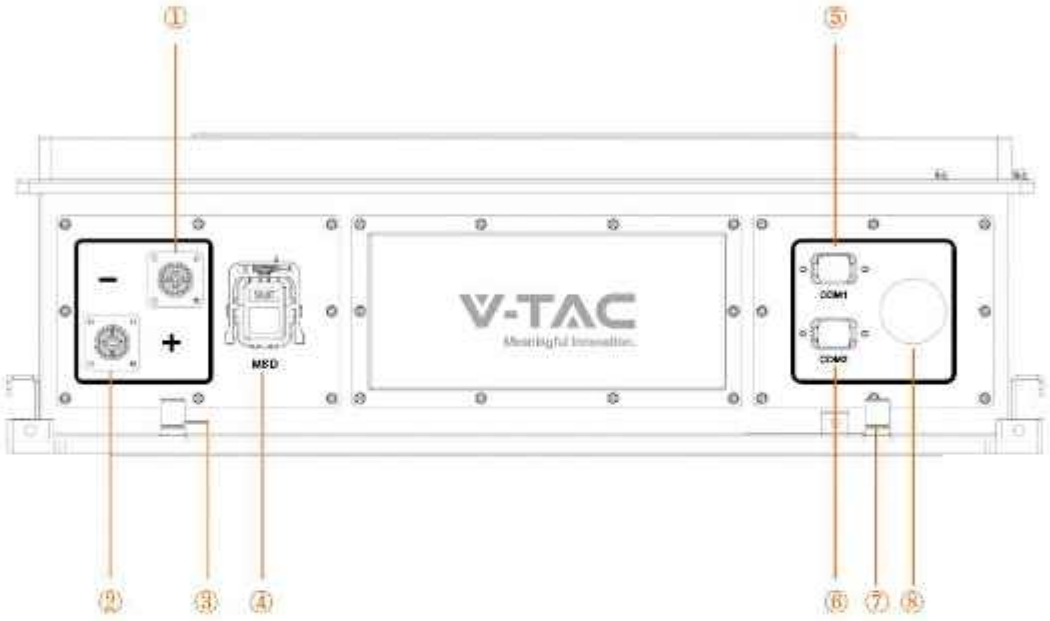


Figure2-5 Structure layout

Table2-3 Structure layout illustration

NO.	Name	Description.	Position
①	B+	Battery module positive pole (orange)	Front
②	B-	Battery module negative pole (black).	Front
③	COOLANT INJECTION	Interface between the pipeline of the liquid cooler and the battery pack	Front
④	MSD	During installation, transportation, and maintenance, the connection should be disconnected to ensure safety.	Front
⑤	COM1	Connection position of battery module communication supply input or output. Definition: 1:CAN1、2:CANH、3:P+、4:P-、5:DI、6:/、7:CANG、8：P_EN	Front

⑥	COM2	Connection position of battery module communicationand power supply input or output. Definition: 1:CAN1、2:CANH、3:P+、4:P-、5:/、6:DO、7:CANG、8：P_EN	Front
⑦	COOLANT INJECTION	Interface between the pipeline of the liquid cooler and the battery pack	Front
⑧	Explosion proof valve	Used to balance the pressure difference between the inside and outside of the battery pack	

High voltage battery cluster control box

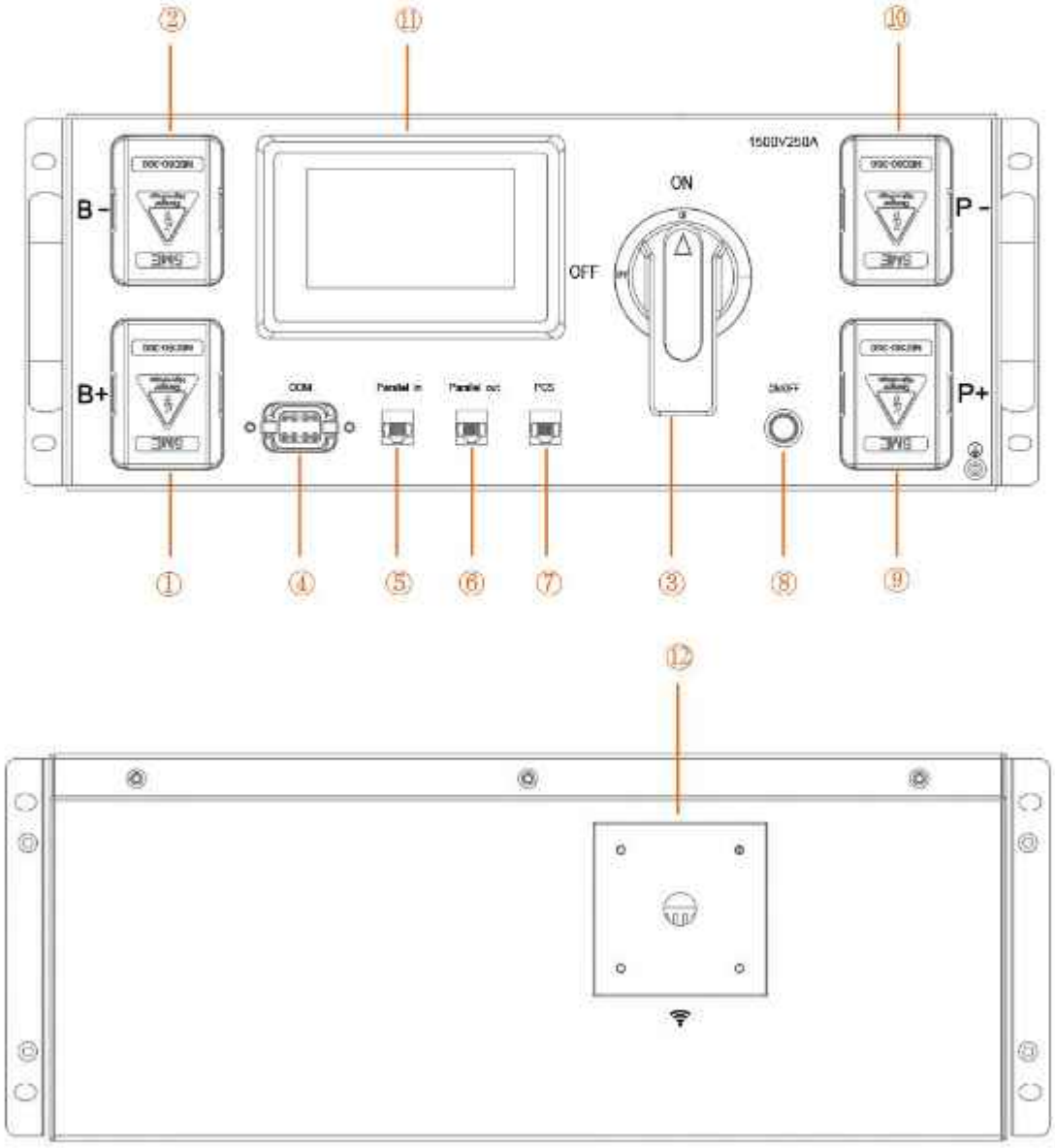


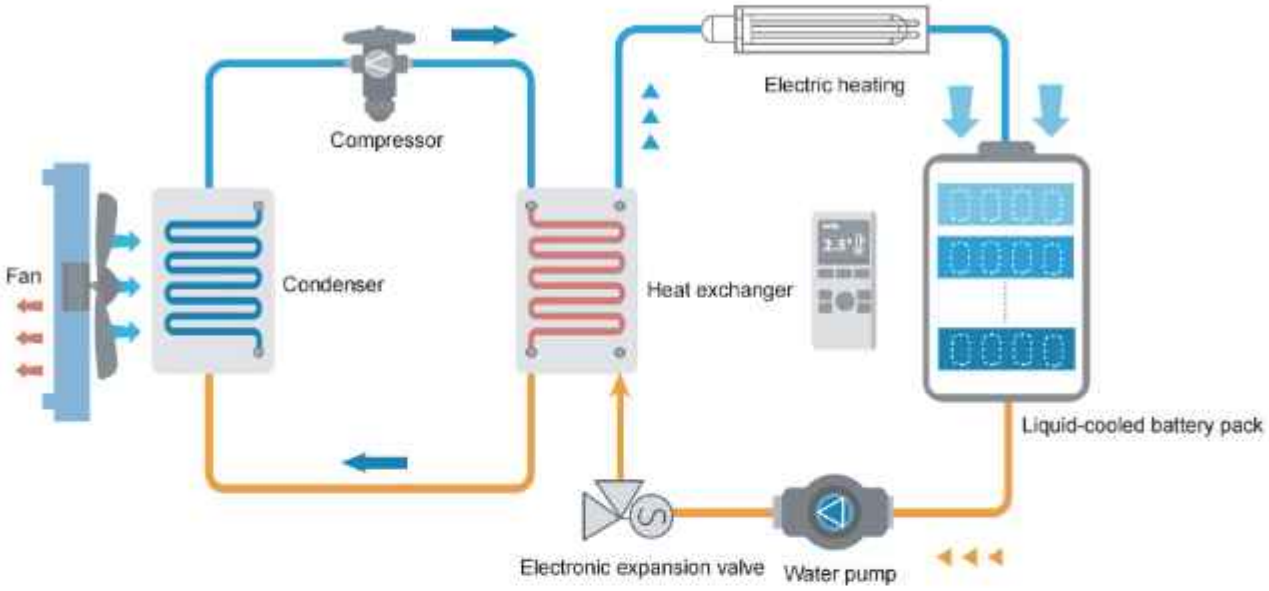
Figure2-6 Structure layout

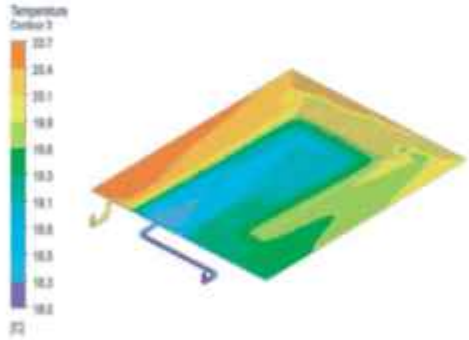
Table2-4 Structure layout illustration

NO.	Name	Description.	Position
①	B+	High voltage box module positive pole (orange)	Front
②	B-	High voltage boxmodule negative pole (black).	Front
③	Air switch	Used to manually control the connection between the batteryrack and external devices.	Front
④	COM	Communication port between battery and high-voltage box Definition: 1:CAN0H、2:CAN0L、3:P+、4:P-、5:/、6:DO、7：CANG、8:F_EN	Front
⑤	Parallel in	Parallel communication input port Definition: 1:GND 、 2:GND 、 3:CAN2G 、 4:CAN2H 、 5:CAN2L 、 6:SW1_OUTA、7:DEBUG CANH、8：DEBUG CANL	Front
⑥	Parallel out	Parallel communication output port Definition: 1:GND 、 2:GND 、 3:CAN2G 、 4:CAN2H 、 5:CAN2L 、 6:SW2_OUTA、7:DEBUG CANH、8：DEBUG CANL	Front
⑦	PCS	Inverter communication port Definition: 1:RS485A_1 、 2:RS485B_1 、 3:CAN2G 、 4:CAN2H 、 5:CAN2L、6:RS485G_1、7:DEBUG CANH、8:DEBUG CANL	Front
⑧	ON/OFF	BMS start button and Green indicator light	Front
⑨	P+	Connect the high-voltage box to the positive pole of the inverter	Front
⑩	P-	Connect the high-voltage box to the negative pole of the inverter	Front
⑪	Human-machinei nterface (HMI)	Display some important battery information.	Front
⑫	Wifi	High voltage box WiFi signal antenna	behind

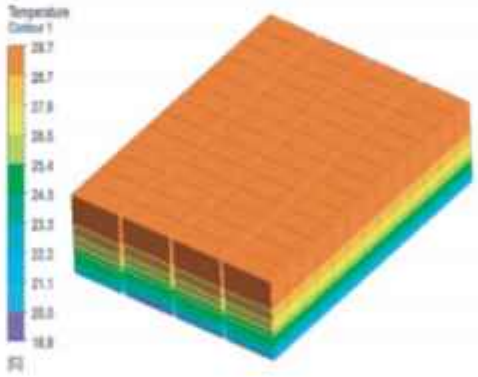
2.3 Liquid Cooling System

2.3.1 System principle





Cloud map of the coolant temperature field



Battery temperature field cloud map

Figure2-7 System schematic diagram

2.3.2 Specifications

Parameter Specifications

The parameter specifications of the EMW30D and EMW50C chillers are shown in Table 2-5.

Table 2-5 Parameter specifications

Parameter Model		EMW50HFNC1A
Dimensions, Weight & Mounting Method		
Dimension(W×D×H)	mm	245×700×900

Weight(without coolant)	kg	75
Installation Method		Horizontal Embedded
Application		Outdoor
Inlet and Outlet Connection		DN20 Quick Connector
Environmental Protection & Performance		
Working Temperature Range	℃	-30~+55
Storage Temperature Range	℃	-40~+70
Noise Level@1m	dB(A)	75
Corrosion-proof Grade		C3M
Appearance		RAL7035 Outdoor Orange Stripe
IP Protection Level		IPX5
Refrigerant		R134a
Coolant		50% Glycol Solution
RoHS Compliant		Yes
Design Lifetime	Year	10
Air Outlet Method		Rear Air Outlet
Cooling/Heating Capacity		
Cooling Capacity@W18/L35	kW	5.0
Heating Capacity@Tu=10℃	kW	2.0
Outlet Coolant Temperature	℃	18
Parameter Determination		
Outlet Temperature Setting Range	℃	10~35 (Heating Point≤ Cooling Point)
Default Cooling Set Point	℃	18
Default Heating Set Point	℃	15
Communication Protocol		RS485/CAN
Recycled Flow		
Rated Circulating Flow	L/Min	46.5@60kpa
Power Consumption		
Cooling Input Consumption@W18/L35	kW	2.50

Heating Input Consumption@Tu=10℃	kW	2.35
Self-cycling Mode(Single pump operation) Consumption	kW	0.25
Max. Power Consumption	kW	3.60
Power Supply		
Rated Operating Voltage	V, Hz	220~240V 50/60Hz
Power Supply Range	V, Hz	220±15%,50/60±3Hz
Max. Operating Current	A	19.2

2.3.3 Coolant Specifications

Coolant：**50% ethylene glycol aqueous solution.**

The specifications of the coolant used in the air-cooled chiller must meet the requirements of Table 2-6.

Table 2-6 Coolant specifications

Parameter	Value
PH	(7) 7.5–8.5
Conductivity	200–3000 μS/cm
Evaporation residue	< 500 mg/dm³
Sedimentary material	< 3 mg/dm³
Hardness	3–8 °dH (for German-speaking regions)
Ca + Mg	0.5–2 mmol/l (for international regions)
Bicarbonates	1–5 mmol/dm³ (60–300 mg/dm³)
Free carbon monoxide	< 10 mg/dm³
Sulfide	< 0.01 mg/dm³
Chloride	< 50 mg/dm³
Sulfate	< 250 mg/dm³
Nitrate	< 25 mg/dm³
Nitrite	< 0.1 mg/m³
CSB	< 7 mg/dm³
NH4	< 0.05 mg/dm³
Fe	< 0.1 mg/dm³
Mn	< 0.1 mg/dm³
Cu	< 0.1 mg/dm

⚠ WARNING

Ethylene glycol is a substance that pollutesgroundwater, so the equipment operator must abideby the relevant national and local regulations, andmay not discharge it at will.

2.2.4 Control Logic

The control logic of the EMW30D and EMW50C chillers is shown in Table 2-7.

Table 2-7 Control logic

Item	Control Logic	Description
Refrigeration	Refrigeration demand ≥ 50%: the refrigeration is started.	Refrigeration demand (%) = (actual control temperature - refrigeration set point) / refrigeration sensitivity * 100% When the refrigeration set point is 18°C and the refrigeration sensitivity is 3°C, the refrigeration start point is 19.5°C (18°C+3°C *50%=19.5°C), and the refrigeration stop point is 16.5°C (18°C-3°C*50%=16.5°C). When the outlet coolant temperature is used as the actual control temperature: l When the outlet coolant temperature is ≥ 19.5°C, the chiller will start cooling. l When the outlet coolant temperature is ≤ 16.5°C, the chiller stops cooling.
	Refrigeration demand ≤ -50%: the refrigeration is stopped.	
Heating	Heating demand ≥ 100%: the heating is started.	Heating demand (%) = (heating set point - actual control temperature) / heating sensitivity * 100% When the heating set point is 15°C and the heating sensitivity is 3°C, the heating start point is 12°C (15°C-3°C*100%=12°C), and the heating stop point is 15°C (15°-3°C*0%=15°C). When the outlet coolant temperature is used as the actual control temperature: l When the outlet coolant temperature is ≤ 12°C, the chiller will turn on the electrical heaters. l When the outlet coolant temperature is ≥ 15°C, the chiller will stop the electrical heaters.
	Heating demand ≤ 0%, the heating is stopped.	

NOTE

Refrigeration/heating set point and refrigeration/heating sensitivity can be configured according to actual planning.

For detailed parameters and operation procedures, please scan the QR code on the device to download the user manual.

2.4 Dehumidifier

Figure2-8 Smart Dehumidifier

Figure2-9 Temperature and humidity sensor

Table 2-8 Technical parameters

input specification	1. Temperature and humidity input module	working power supply	AC/DC 85-260V
measuring range	Temperature: -40℃ -120℃; humidity: 5%RH-95%RH	Product power	Power of 60W when start-up dehumidification
resolving power	Temperature was 0.1℃ and humidity was 1%RH	work environment	Temperature 0-50℃, humidity 85%RH
control method	stepping control	intrinsic error	Temperature: ± 0.5℃ (10℃ -50℃), ± 1℃ (0℃ -100℃)
Output specifications	1 passive relay output, 250VAC / 3A or 30VDC / 3A		Humidity: ± 3%RH (10%RH-90%RH), ± 5%RH (0%RH-99%RH)

Table 2-9 Parameter setting menu:

order number	Parameter code	Parameter name	Parameter range	Explain
1	F01	Temperature control mode	0 Or 1	Factory setting is 0 (set 0 for cooling, 1 for warming)
2	F02	Temperature control value	0-100℃	Factory setting is 5℃ (0-100℃ adjustable)

3	F03	Temperature return difference	0-40℃	The factory is set to 5℃ and the return value is positive or negative value of temperature. The return value is 5. In heating mode, setting temperature is 5, the return value will stop working as long as the temperature is higher than 10℃.
4	F04	Humidity control value	0-100%RH	Factory setting is 85%RH (0% -100% adjustable)
5	F05	Humidity return difference	0-40%RH	The factory is set to 5RH% and the return value is positive and negative value of humidity. For example, the humidity is set to 85 and 5 return value will stop if the humidity is lower than 80%RH.
6	F06	postal address	1-255	To set the corresponding address of the device, which is unique throughout the communication bus.
7	F07	Baud rate	1/2/3	Factory Set 3 (1:2400bps 2:4800bps 3:9600bps)

* For detailed operations, please refer to the documents accompanying the goods，《**Smart Dehumidifier User Manual**》

2.5 Cooling fan

Cooling fan：It is used for heat dissipation in liquid coolers and high-pressure control boxes.
When the internal temperature of the cabinet reaches 30℃, the fan will start to operate to cool down the interior of the cabinet.
When the internal temperature of the cabinet drops to 25℃, the fan stops working.

Figure2-10 Cooling fan

Table 2-10 Technical parameters

ITEM		Specification Condition		
01	Part No.	HY22580HA2B-C		
02	Dimension	225×225×80mm		
03	Rated Voltage	220VAC 50/60Hz		
04	Operating Voltage	70~260 VAC		a. Rated Voltage b. 25℃ c. 65%RH d. Measured after 5 Mins
05	Rated Current	0.30/0.34 A	±10%	
06	Rated Power	65/75 W	±10%	
07	Rated Speed	2530/2800 RPM	±10%	
08	Max.Airflow	637 CFM 1080 m³/H		a. Rated Voltage b. Rated Current c. P&Q d. Stand:AMCA
09	Max.Static Pressure	197 Pa 0.79 InchH_2O		
10	No.of Blade	9		
11	Noise Level	59 dB(A)		a. Rated Voltage b. Non-Echo Chamber c. Distance:1.0M
12	Life Expectancy	60000Hrs at 25℃		a. Rated Voltage b. L10 at Conf.Level 90%
13	Rotating Direction	Clockwise(From Label side)		
14	IP Level	IP55		
15	Motor Type	Capacitor motor		
16	Type of protection	Thermal protection		
17	Weight	2200g		

NOTE

The temperature setting for turning the fan on/off can be adjusted according to the actual situation.

Figure2-10 Temperature Control

TECHNOLOGY PERFORMANCE

1) Operating voltage: AC100-240V, consumption less than 2W; DC8~24V < 200mA,（Other power supply can be customized）
2) Measurement accuracy: 0.5% Fs ± 1, temperature test range : -50 ~ -19.9 ~ 99.9 ~ 120 °C , control range: -19.9 ~120 °C
3) Display type: 0.36 inches high brightness red LED (Other color can be customized)
4) Working conditions: -10 ~ 50°C, (relative humidity below 80%)
5) Relay output: Passive output, contact capacity AC 10A/250V , DC 10A/30V
6) Dimension: W36*D84*H64mm

PARAMETER SETTING INSTRUCTIONS

In normal display mode. press and hold SET key to enter setting mode. Then press SET key repeatedly to switch the next mode. Switching sequence as below:

RST (Reset function) –>CF(Unit switching) –>FLT(Filter coefficient) –>LC(Temperature deviation correction value) –>PD(Power-on

delay) –>TY1(Relay 1 alarm type) –>AL1(Relay 1 alarm value) –>HY1(Relay 1 return difference) –>DT1(Relay1 time delay value) –>ADD(Address code) –>TY2(Relay 2 alarm type) –>AL2（ Relay 2 alarm value)

–>HY2(Relay 2 return difference) –> DT2(Relay2 time delay value) –>Back to normal display mode.

1） When switch to the mode you want to set, press o to enter, parameter correction bit is flashing.

2）Press repeatedly , value will be increased singly in every press, press and hold , value will be increased continuously.

After release, press and hold again, value will be decreased continuously. Press repeatedly, value will be decreased singly in every press,.

（Note: Press and hold to switch the direction of increase and decrease, also can move the correction bit by pressing , and then adjust the value.)

3） After parameter setting done , press SET key once to save the setting value and back to previous mode .

If press and hold SET key, the setting value will not be be saved and back to previous mode.

4) After parameter setting done , press SET key to switch setting mode , until back to the normal display mode .

(In setting mode, if no key pressed within 30 seconds, it will automatically back to normal display mode.)

5) Repeating the above 1-4 steps can set other parameters .

2.6 Grounging Design

There are 1 external grounding terminals at the front and back of energy storage system, as shown in Figure2-10.

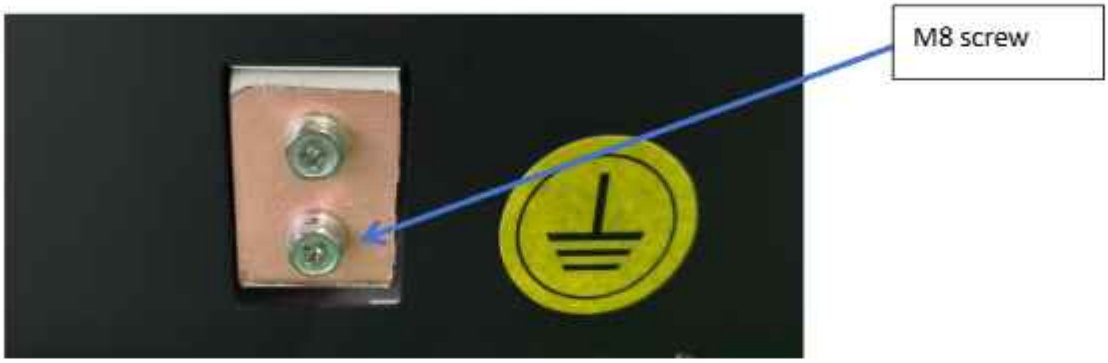


Figure2-11 Cabinet grounding terminals diagram

2.7 Wiring Holes Design

The connection wires between the energy storage system and the inverter have been pre-connected. You just need to open the wire trough cover and take them out.

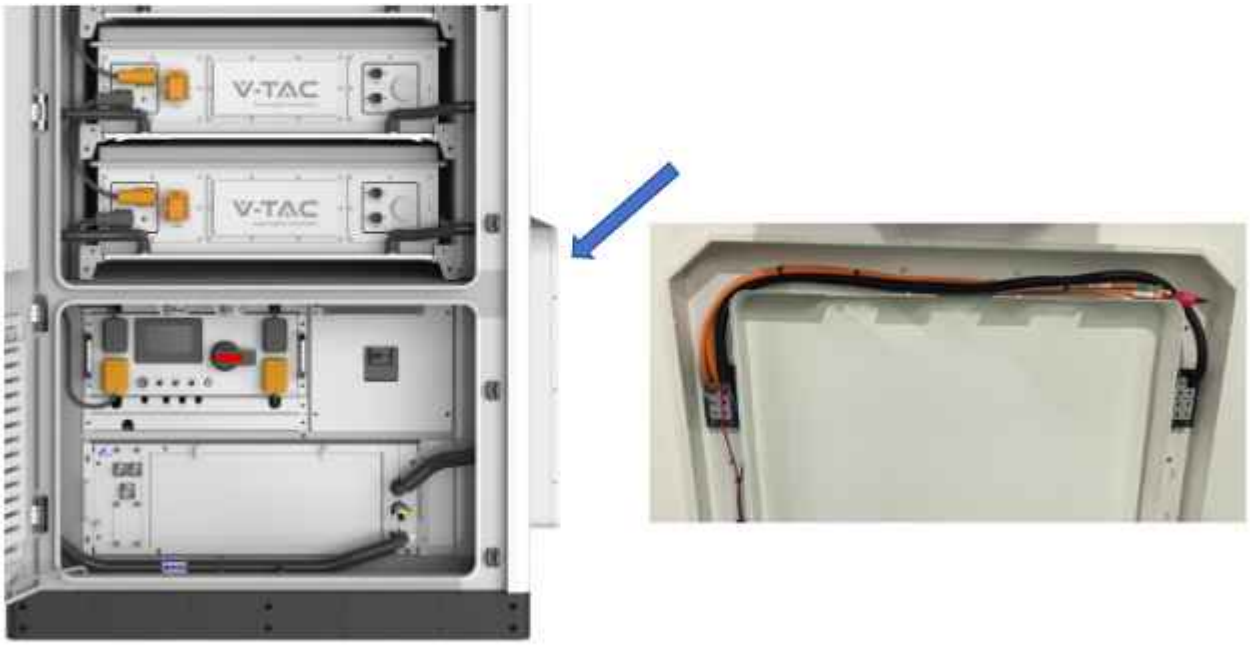


Figure2-12 Inside the wire trough

2.8 Working Principle

The energy storage system consists of a 233kWh energy storage system, a temperature control system and a fire protection system. The energy storage unit is composed of five liquid-cooled battery packs, each consisting of 52 batteries with a cell capacity of 280Ah. Each energy storage system is 1P260S and has a nominal capacity of 233kWh. During discharge, the DC output power of the battery cluster is connected to the inverter through a DC circuit breaker, and then converted into AC power and output to the power grid or load through an AC circuit breaker. When charging, the power grid outputs alternating current to the inverter, which converts the alternating current into direct current to charge the battery, or the photovoltaic direct current is directly used to charge the battery through the inverter.

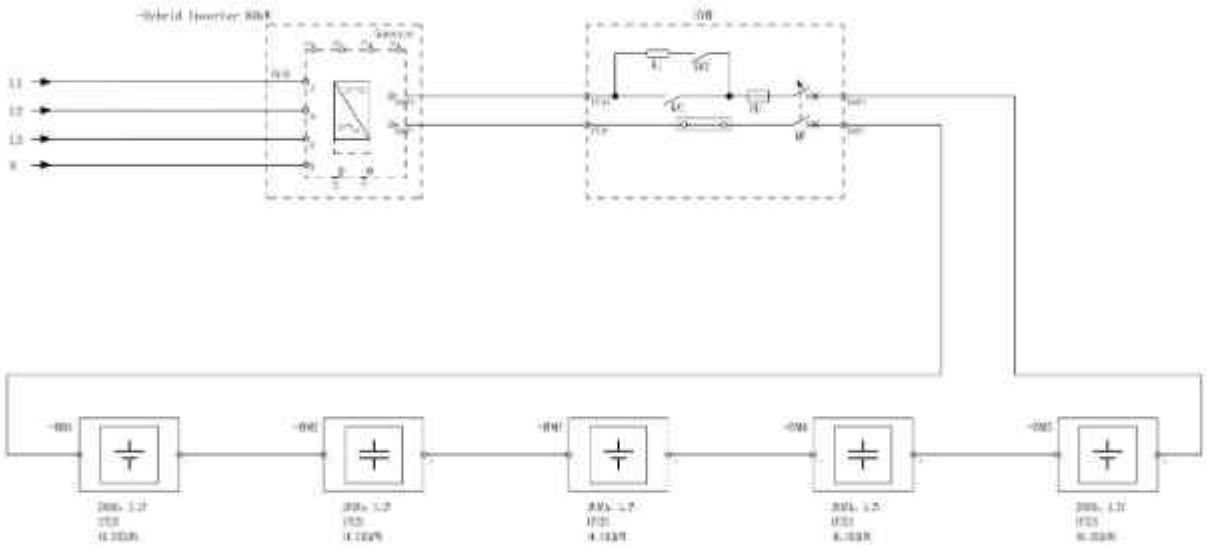


Figure2-13 Electrical schematic diagram

3.Installation

3.1 Installation Process

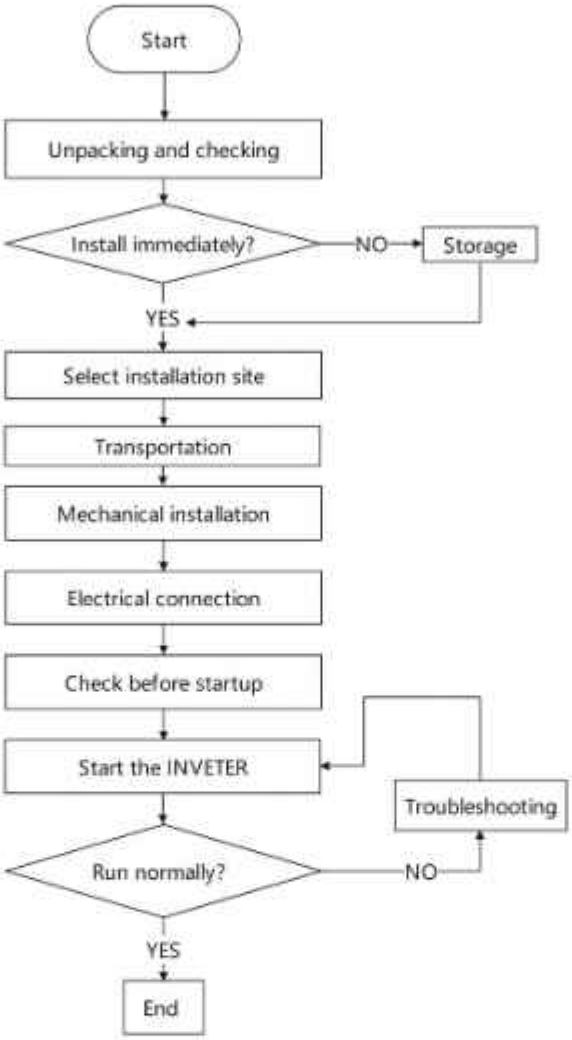


Figure3-1 Installation process

3.2 Unpacking and Checking

NOTE

Determine the unpacking site in advance. Generally, the unpacking site should be as close to the installation position as possible.

Check the External Package

The energy storage system has been completely tested and strictly inspected before leaving the factory, but damage may still occur during transporting, so a detailed inspection is required after arrival.

* Check the model, etc. of energy storage system (the delivering information can be find on the label at the side of the package, position as shown in Figure3-2), ensure that the model is in accordance with the ordered model.

* Inspect the package appearance for shipping damage, such as holes, cracks or other signs that could cause internal damage.

* Rainy days maybe encountered during transporting, please check whether the energy storage is flooded with rainwater.

NOTE

If any shipping damage is found, do not open the package and contact the manufacturer immediately.

Check the Deliverables

Unpack the package, check if the types of the accessories are complete and correct. If there is any discrepancy, take notes and contact the distributor immediately.

NOTE

The name and quantity of deliverables, please see the packing list.

After unpacking, if the energy storage system will not be used immediately, please store it according to following requirements.

CAUTION

Please store the energy storage system on the basis of storage requirements. If the damage caused by mismatch storage requirement, it will be out of warranty.

* Package the energy storage system by original package, keep the desiccator in the package plastic bag, seal the inner plastic bag.

* The energy storage system should be placed in the place where is clean and dry and avoid

direct sunshine, rain or ponding, strong mechanical vibration, impact or strong electric field. No corrosive or inflammable or explosive gas or object in the storage environment.


Figure3-3 Storage environment requirements

* Storage temperature: -20~45℃ (for long term storage, the temperature should be within the range of 0~35℃, if the energy storage system is stored out of temperature range for long time, it will affect the performance and service life of battery.

 0℃~ 35℃ (long term)	 0%~ 95%, without condensation

Figure3-4 Storage temperature and humidity

* The placed direction of energy storage system should be accord with the marked direction on the package. The package should be padded 20cm from the floor and keep at least 50cm away from the wall, heat source, cold source, window or air inlet.

* When multi energy storage systems are stored, DO NOT stack them together.

* DO NOT tilt or invert the packed energy storage system.

* During storage, please check the energy storage regularly (we suggest checking it once every 3 months). If the package is damaged by insects or rats, please replace the package in time.

* Under the storage condition above, the storage period is 6 months. If the energy storage system is stored over 6 months, the energy storage system should be checked and tested by professionals, and then,it can be put into use.

⚠ CAUTION

From the date of delivery, every 6 months of storage, please recharge the energy storage system according to the specified requirements .

When the energy storage system has entered or passed through a humid environment, it is recommended to keep it in a dry and ventilated environment for more than 24 hours.

Before operation, perform an insulation impedance test. After the insulation impedance test is passed, perform a voltage withstand test. Only after all the tests have been passed can the energy storage system be operated.

If the insulation impedance test and voltage withstand test fail, continue to dry and ventilate the

energy storage system.

Generally, the energy storage system can operate normally after drying and ventilating twice.

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* If the product needs to be transported again, please strictly pack it before loading it for transporting.

3.3 Selection of Installation Site

When choosing an installation site, observe the following principles at least.

* The site where the energy storage system is placed should be solid and flat, well-drained, free of obstacles or protrusions, and avoid sites with existing underground utilities.

* The site should be open or solid enough above the site, with no risk of water or foreign objects falling on it.

* The surrounding environment of installation should be dry and well ventilated, and there should be no flammable, explosive or corrosive substances. Keep away from areas where dust, fumes, corrosive gases and noxious gases are generated.

* Do not install the energy storage system outdoors in salt damage areas.

NOTE

Salt damage areas mainly refer to coastal areas within 500m from the coast. The precipitation amount of salt spray varies greatly depending on the characteristics of seawater in the neighboring sea, sea breeze, precipitation, air humidity, terrain and forest cover.

* Do not install the energy storage system in locations accessible to children.

* The installation location needs to meet the necessary traffic conditions and have a reliable fire protection system.

* The energy storage system should be installed at a distance of no less than 12m from residential buildings and greater than 30.5m from crowded places such as schools and hospitals.

* The distance between the energy storage system and the production building must meet local fire codes or standards.

– The safety distance between the energy storage system and the Class A production building should not be less than 12m.

– The safety distance between the energy storage system and the Class B production building shall not be less than 10m.

– The safety distance between the energy storage system and the production buildings of class C, D and E that meet the fire resistance rating of not less than grade II shall not be less than 10m.

– If the outer walls of two adjacent buildings are non-burning and there are no door or window openings or exposed burning eaves, the fire separation distance can be reduced by 25% according to the safety distance corresponding to each type of production building.

– If the safety distance of production buildings does not meet the requirements, a protective wall with a fire resistance of at least 3 hours must be equipped for protection. The protection spacing is not limited, and the length and height of the firewall should exceed the outer perimeter of the energy

storage system by at least 1m. At the same time, it is necessary to take into account the space requirements required for various operations of the energy storage system.

* Installation space expansion conditions must be considered during the life cycle.

3.3.1 Installation Environment Requirements

According to the EMC and noise level, the energy storage system is used in an industrial environment, and the installation site should be selected from an outdoor site away from the living area. The installation environment requirements are as follows.

* Environment temperature: -20℃~+55℃.
* Relative humidity: 0%RH~95%RH, non-condensing.
* Altitude: 0m~3000m.
* Ensure that the installation site is well ventilated and free from excessive dust, acid, alkali, corrosive and explosive particles and gases.

NOTE

When the energy storage system is exposed to sunlight, the internal temperature rise will increase, which may affect the charging and discharging performance, so it is recommended to install the energy storage system with a sunshade or other sheltering facilities .

3.3.2 Installation Space

Reserve enough space around the energy storage system (as shown in Figure3-5) for installation, operation, and maintenance, and normal ventilation. If allowed, it is recommended to leave more space between the energy storage system and other devices or walls for heat dissipation and maintenance, to ensure the stable and efficient operation of the energy storage system.

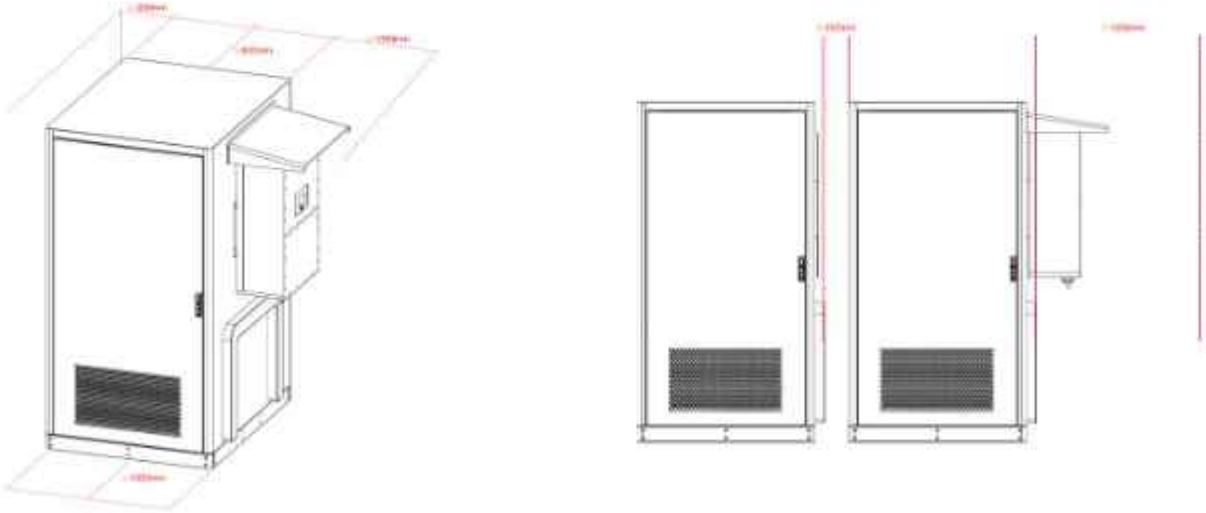


Figure3-5 Installation space (unit: mm)

3.3.3 External Fire-fighting Suggestion

* A fire-fighting water supply system should be provided at the installation site of the energy

storage system.

* Municipal water supply is preferred as the water source of fire-fighting, and fire-fighting water or natural water supply may also be used. When natural water sources are used, reliable water intake settings should be set.

* The designed flow of fire-fighting water supply shall be determined according to the sum of the maximum designed flow of water extinguishing systems that need to act simultaneously. The water consumption for fire-fighting shall be calculated according to the number of fires at the same time and the maximum water consumption required for extinguishing a fire.

* External fire hydrant system design shall meet the following requirements:

- Fire hydrants should be evenly arranged along the roadside of the site. The distance between the fire hydrants and the energy storage system should be not greater than 20m.
- Each energy storage system is recommended to have at least one fire hydrant, and the water consumption of the fire hydrant should not be less than 20L/s.
- Anti-freezing measures should betaken against outdoor fire hydrants in cold areas.
- Outdoor fire hydrants should be provided with permanent fixed markings.
- Spray guns should be provided near the power distribution unit area.
- The station area should be set up with a dedicated fir room (box) equipped with a fire hose, water gun and fire-fighting wrench.

3.4 Transportation

Please select suitable transportation device according to the weigh (<2.7t) and size (1100mm×1400mm×2105mm (W×D×H), without inverter) of energy storage system.

When transporting on the installation site, the forklift or crane can be used to transport the energy storage system.

⚠ WARNING

In the process of loading,uploading and transporting, the operation safety regulations of thecountry/region where the project is located must be obser ved.

⚠ CAUTION

Improper transporting operations may result in the device damage or personnel injury.

* The energy storage system must be carried by trained professionals and should be directed by a professional on site at all times.

* Pay attention to the center of gravity of the energy storage system and move it carefully to avoid impact or fall.

* Do not tilt or lay the energy storage system down during handling. Otherwise, the internal

components will bear great stress, which may cause damage to the components and adversely affect the performance. If the energy storage system is damaged due to improper operation, it is not covered by the warranty.

3.4.1 Forklift Transportation

This device can be carried by forklift. When you move the energy storage system by forklift, the forklift arm must be inserted from the front of the device and completely pass through the bottom of the device, as shown in Figure3-6.

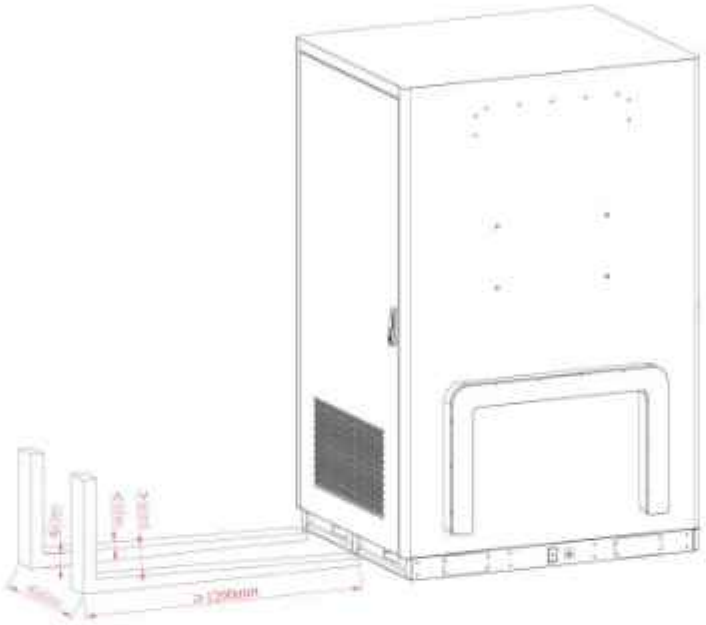


Figure3-6 Forklift transportation diagram (unit: mm)

⚠ CAUTION

* Forklift should have a safety factor of at least 2 times weight of the energy storage system.

* When lifting the energy storage system, keep the centre of gravity of the energy storage system at the center of the two forks and keep the handling process slow and smooth.

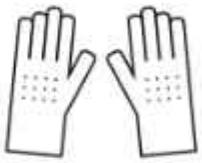
* Pay attention to the width and inserted depth between the fork arms to prevent instability or tipping.

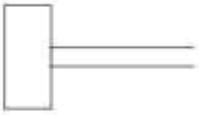
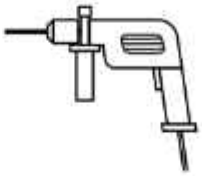
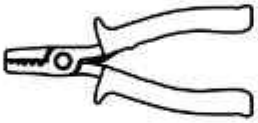
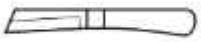
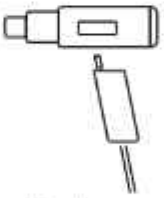
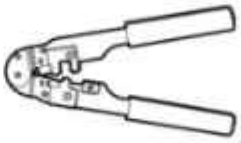
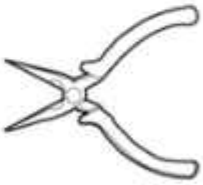
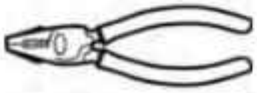
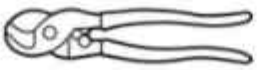
* Pay attention to the distance between the forklift and the device to avoid damage to the appearance, door locks and louvers.

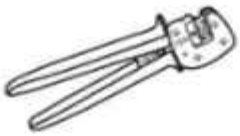
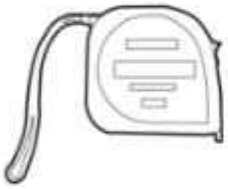
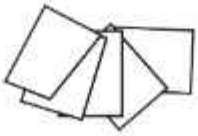
* During moving, the tilt angle of the energy storage system should not exceed 10°, do not put it down or lift it up suddenly, and pay attention to the turning, up ramps and down ramps to avoid collision of the device.

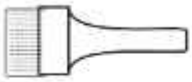
3.5 Installation Preparation

3.5.1 Tools

Personal protection			
 Safety helmet	 Protective glasses	 Insulated shoes	 Reflective jacket
 Dust mask	 Protective gloves	 ESD gloves	 Insulated gloves
 Safety belt			
Transportation tools			
 Forklift	 Manual forklift		
Installation tools			
 Flat-headscrewdriver	 Phillips screwdriver	 Socket wrench	 Adjustable wrench

 Torque wrench	 Wrench	 Electric screwdriver	 Ladder
 Rubber hammer	 claw hammer	 Hammer dril	 Mark pen
Wiring tools			
 Diagonal pliers	 wire stripper	 COAx crimping tool	 Hydraulic pliers
 Electrician's knife	 Heat shrink tubing	 Heat gun	 Label paper
 cable tie	 Cutting plier	 Network cable crimping plier	 Needle-nose plier
 Plier	 Wire cutter	 Tube plier	 Crimping plier

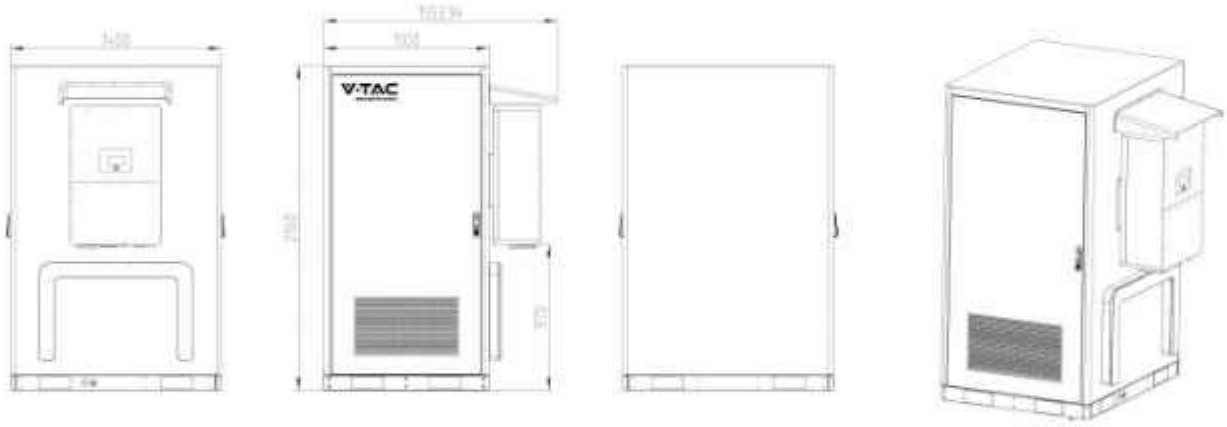
 Open-ended wrench	 Crimping plier		
Measurement tool			
 Levelling instrument	 Steel ruler	 Rectangular ruler	 Long tap measure
 Tap measure	 Long coiled steel ruler	 Altimeter	 Laser locator
 Thermometer	 Level	 Phase sequence meter	 Pressure tester
 clamp meter		 Network cable tester	 Ammeter
1. Cleaning tools			
 Vacuum cleaner	 cotton cloth		
Others			

 Cable coil reel	 Sealant, sealant gun	 Insulation resistance meter	 Small cutter
 Flashlight	 Flashlight	 Sand paper	 Insulation tape

⚠ CAUTION

The installation tools need to be insulated to avoid electric shock.

3.5.2 Size



3.6 Mechanical Installation

The energy storage system can be installed on the foundation according to the actual condition on site.

⚠ WARNING

The energy storage system can only be installed without damage or fault.

⚠ CAUTION

* Only trained professionals are allowed to install the energy storage system. Improper installation

may result in injury.

* Wear suitable protective equipment for personal protection in case of accidents during operating.

3.6.1 Foundation Installation

If the foundation installation is used, the foundation must be built according to the requirements for bottom installation holes and wiring holes of the energy storage system.

WARNING

The energy storage system is heavy (<2.6t). Before building the foundation, the installation site conditions (mainly geological conditions and environmental climate conditions, etc.) should be investigated in detail. And then the design and construction of the foundation can be performed.

Foundation Requirements

Unreasonable foundation construction will bring great difficulties or troubles to the placement, opening and closing of the energy storage system and later operation, therefore, the foundation of the energy storage system must be designed and constructed in accordance with certain standards in advance to meet the requirements of mechanical support, cable routing, and later maintenance.

The foundation should be constructed according to the following requirements at least:

* The foundation must ensure the stability and safety of the installation of the energy storage system.

– The foundation must have sufficient bearing capacity to effectively support the energy storage system.

– The soil at the installation site needs to be compact. If the soil is loose, take measures to ensure that the foundation is stable.

– The bottom foundation pit must be tamped and filled up.

– The upper surface of the foundation must be at the same level (no more than 5 mm).

* The foundation should be higher than the natural floor to avoid erosion of the bottom and interior of the energy storage system after rain or snowmelt water.

* Construct corresponding drainage measures according to local geological conditions.

* Build a cement foundation with sufficient cross-sectional area and height. The height of the foundation is to be determined by the construction party according to the geology on site.

NOTE

The excavated soil during the foundation construction should be cleared in time to avoid affecting the subsequent forklift operation of the energy storage system..

When designing the direction of the air outlet, the wind direction of the installation site should be considered.

Grounding System Requirements

When constructing the foundation, the grounding flat steel should be reserved, and the grounding with the energy storage system needs to be bolted firmly.

⚠ CAUTION

The grounding system should be constructed by the user according to the geological conditions of the installation place and relevant regulations. No matter what kind of grounding method, the grounding resistance should be no more than 0.1Ω .

4.Electrical Connection

4.1 Installation Process

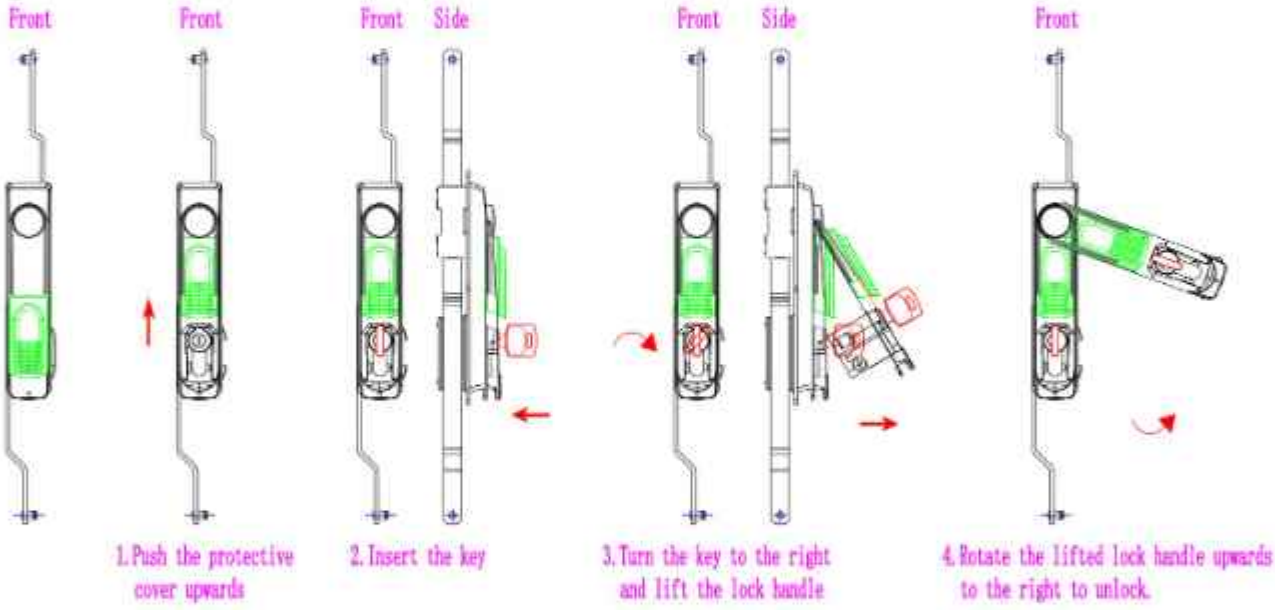
4.1.1 push plate

The user needs to open the cabinet door of the energy storage system before wiring. The opening and closing of the cabinet door both require the use of a cabinet door key. The opening steps are illustrated in the following figure:

⚠ CAUTION

*Please use the key provided with the machine to open the cabinet door. To close the door, please perform the reverse operation.

*Please keep the key properly after use.



4.1.2Electrical connection sequence

4.1.3Battery MSD installation

⚠ CAUTION

* The cable connections between the batteries inside the energy storage system have been completed. The connections shown in the figure are for illustration only.

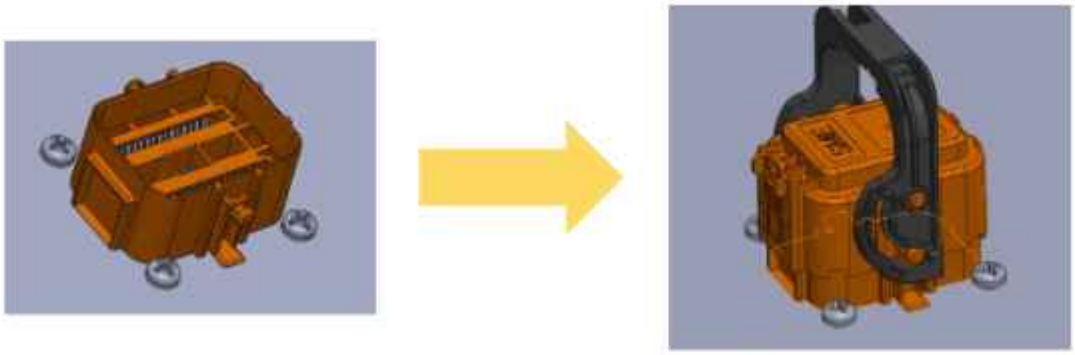
* The MSD on the energy storage system PACK is in an uninstalled state to ensure safe transportation.

Step 1: Before connecting the power cord, please wear insulated shoes and insulated gloves, etc. Before installing the MSD, please ensure that the connection cable between the PACK and the HV BOX is disconnected .

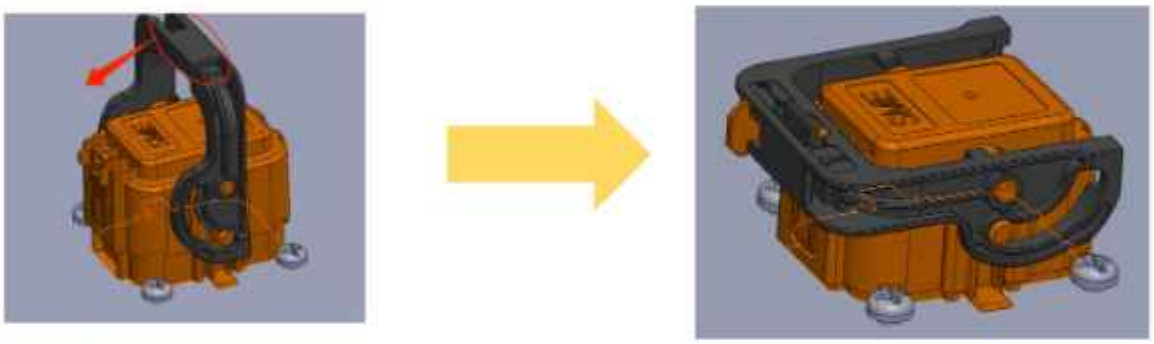
Step 2: Install the MSD cover plate on the corresponding interface. After it is tightly inserted, it will make a "click" sound. Please ensure that the MSD is securely inserted.

Step 3: After ensuring the connection is tight, press down the orange connection plate on the cover plate. Once it is tightly inserted, it will make a "click" sound.（The steps for removing the MSD are reversed.）

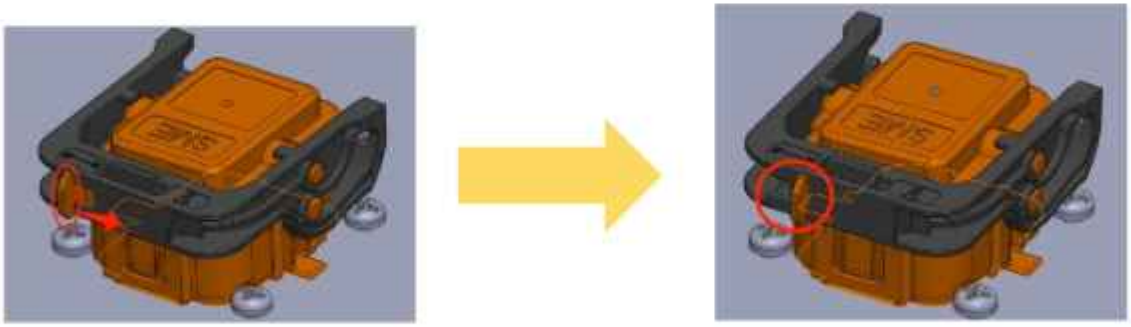
(1) Pre-install the plug on the base.



(2) Rotate the handle as shown in the figure below. A "click" sound is heard when the handle is rotated to the right position



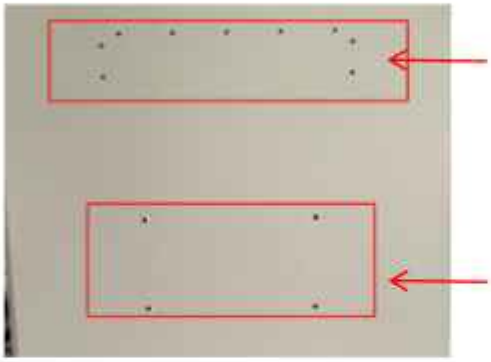
(3) Push the button to the locked position.



4.2 Wiring

Step 1:Open the back and take out the inverter rainproof plate. Note: Be careful of bumps and injuries.

Step 2:Remove the inverter and fix it on the side of the cabinet. Note: The inverter is quite heavy. Be careful not to bump it. Installation must comply with the inverter standards.



The fixed holes positions of the inverter rainproof plate.

The fixed holes positions of the inverter.

Step 3:Install the rainproof plate for the fixed inverter.

Step 4:Open the cable tray on the side panel of the cabinet and remove the connecting wires. Connect BAT1+, BAT1-, BAT2+, BAT2-, BMS1 and PCS220V respectively.

⚠ CAUTION

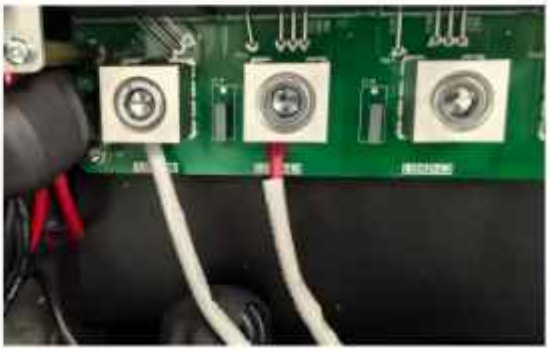
* Before wiring, it is necessary to confirm that the control box of the high-voltage box and the DC switch are all in the disconnected state.

* Safety precautions need to be taken.

* The wiring installation must comply with the specifications of the inverter.

* After the wiring is completed, install the wire trough cover plate. It is recommended to fill the wire outlet holes with fireproof mud.



Step 5:Complete the wiring and conduct the inspection..

After the entire installation of the energy storage system is completed, a comprehensive inspection

of its mechanical installation and electrical connections should be carried out. At least two staff members should conduct the inspection according to the items listed in the table below. Records should be kept during the inspection. If any items that do not meet national, industry, and regulatory requirements are found, they should be corrected immediately.

Mechanical installation inspection
☐ The energy storage system is not deformed or damaged
☐ The bottom of the energy storage system is fixed and the support is stable and reliable
☐ There is plenty of space around the energy storage system
☐ The temperature, humidity and ventilation conditions of the environment where the energy storage system is located meet the requirements
☐ The cooling air circulates smoothly
☐ The cabinet body has complete and reliable sealing protection
Electrical installation inspection
☐ The grounding of the energy storage system is complete and firm
☐ The positive and negative poles of the DC input are connected correctly, and the tightening torque meets the requirements
☐ The communication wiring is correct and should be kept at a certain distance from other cables
☐ The cable wire numbers are marked correctly, clearly and easily distinguishable
☐ The insulating protective cover is complete and reliable, and the danger warning label is clear and firm
Other examinations
☐ All the vacant cables are fastened tightly with insulating cable ties
☐ There are no remaining tools, parts, conductive dust or other foreign objects from drilling inside the cabinet
☐ There is no condensed moisture or ice inside the cabinet

5.System debugging

5.1 Startup check

DANGER

Before operating, check and make sure that there is no damage on the energy storage system or exist other potential hazards.

Number	Check items
1	The equipment is installed firmly, the installation position is convenient for operation and maintenance, the installation space is convenient for ventilation and heat dissipation, and the installation environment is clean and tidy.
2	The protective earth wire, grid-connected AC line, load line and communication line are correctly and firmly connected.
3	The cable binding meets the wiring requirements, is distributed reasonably and has no damage.
4	The battery cluster switch, AC switch and DC power supply switch have been disconnected.
5	The voltage and frequency of the grid-connected access point of the energy storage system shall meet the grid connection requirements of the country/region where it is located.

5.2 The system is turned on

Step 1:Press the ON/OFF circular button of the high-voltage control box. When you hear the sound of the relay engaging, check whether the display interface is a fault alarm.

Step 2:Rotate the selection handle ON the high-voltage control box to ON.

Step 3:Turn the DC circuit breaker ON.

Step 4:Turn on the inverter and check the operating data.

Step 5:Open the back and close the switches in sequence. Check whether the liquid cooling unit is operating normally.

5.3 The system shuts down

DANGER

* When operating and maintaining the energy storage system, please power off the system. Operating the equipment with power on May cause damage to the energy storage system or pose an electric shock hazard.

* After the energy storage system is powered off, it will take some time for the internal components to

discharge. Please wait until the device is completely discharged according to the required time label.

Step 1:Confirm that all the loads have been turned off. Open the backdoor and turn off all the switches.

Step 2:Turn off the inverter.

Step 3:Turn the DC circuit breaker OFF.

Step 4:Select the handle on the high-voltage control box to OFF, press the circular switch, and hear the sound of the relay disconnecting.

Step 5:Disconnect any MSD switch to disconnect the DC high-voltage circuit.

6.OHL'S User Interface

6.1 Main Interface

NO.	Description	Function
1	SOC	Display real-time SOC value of energy storage system
2	Voltage	Display real-time voltage
3	Temperature	Displays the maximum and minimum battery temperatures
4	Voltage	Displays real-time maximum and minimum cell voltages
5	Current	Display battery real-time current
6	System status	Display battery fault name (For details, see Table 5-2)

6.2Alarm description and processing

When protection mode is activated or system failure occurred, the alarm signal will be given through the system status on the LCD. The network management can query the specific alarm categories. If the fault such as single cell over voltage, charging over-current, under-voltage protection, high-temp protection and other abnormalities which affects the output, please deal with it according to Table 5-2.

Table 5-2 Main alarm and Protection

Statue	Alarm category	system status	Processing
Charge state	Over-current	Over-current during slow charging	Stop charging and find out the cause of the trouble
	Over-voltage	Cell voltage too high in charge	Stop charging
	High temp	Temperature too high in charge	Stop charging
	Low temp	Temperature too low in charge	Stop charging

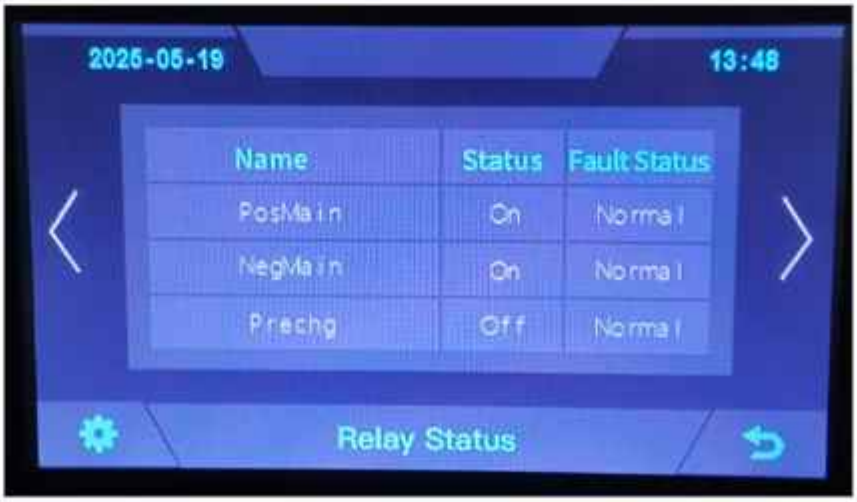
Discharge state	Over-current	Continuous over-current	Stop discharging
	Low-voltage	Cell voltage too low in discharge	Stop discharging
	High temp	Temperature too high in discharge	Stop discharging
	Low temp	Temperature too low in discharge	Stop discharging

6.3 Cell Voltage

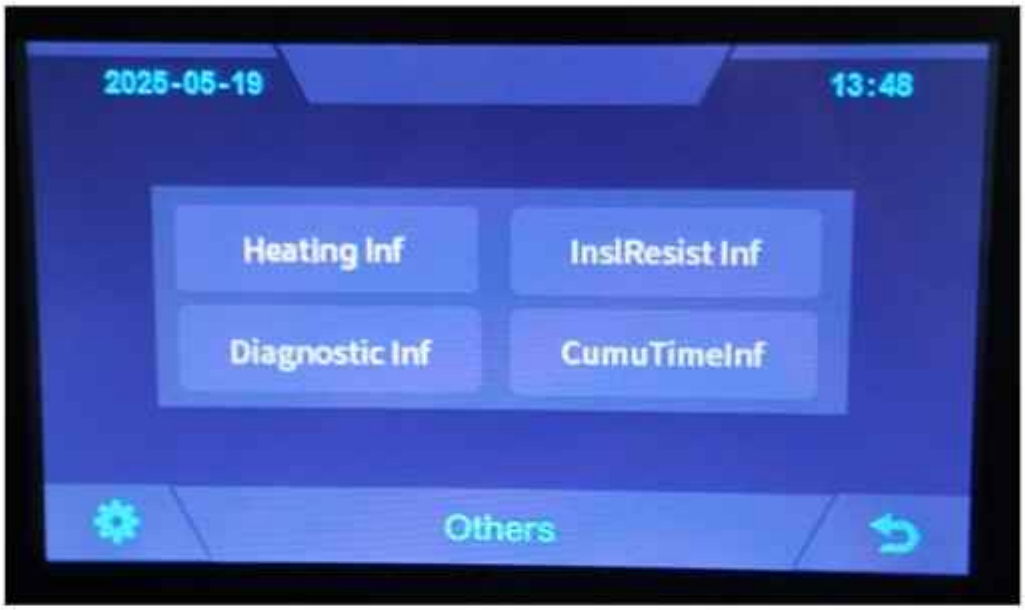
6.4 Cell Temperature

6.5 Heating Temperature

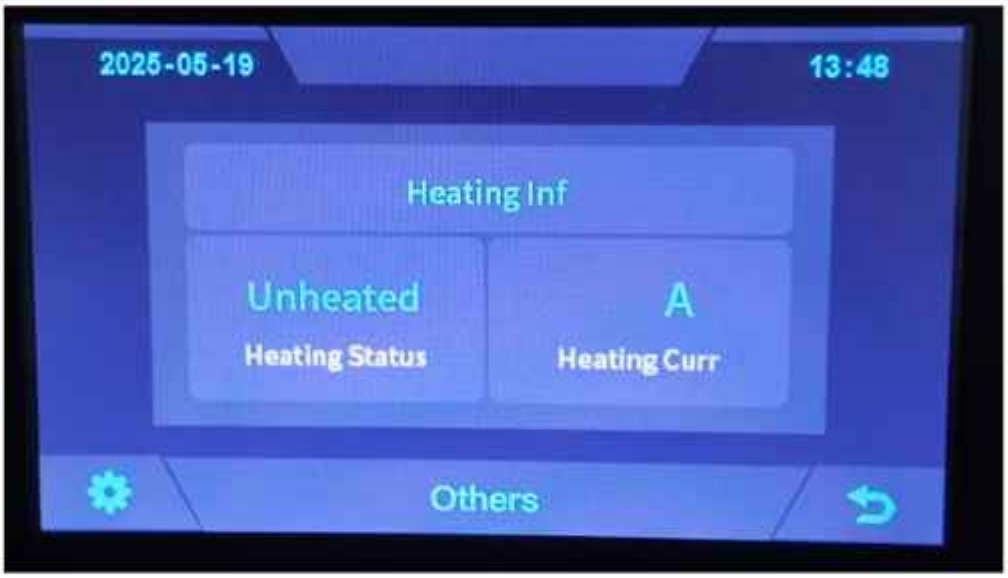
6.6 Relay Status



6.7 Other

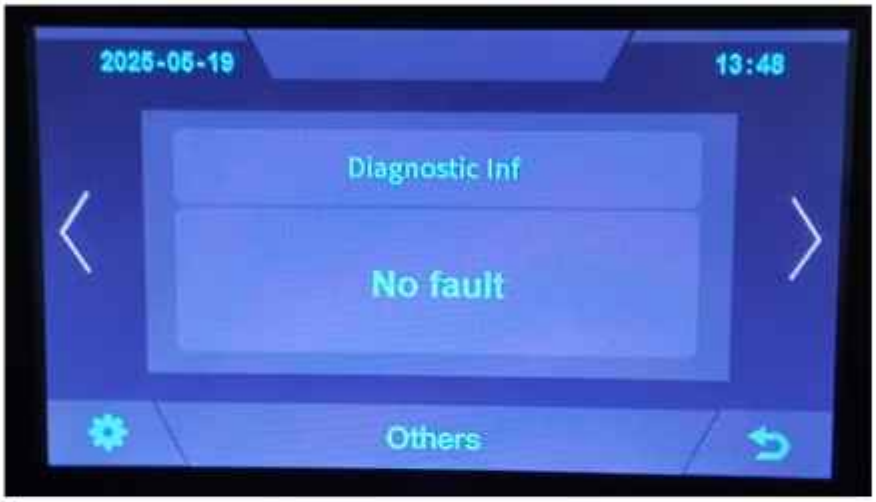


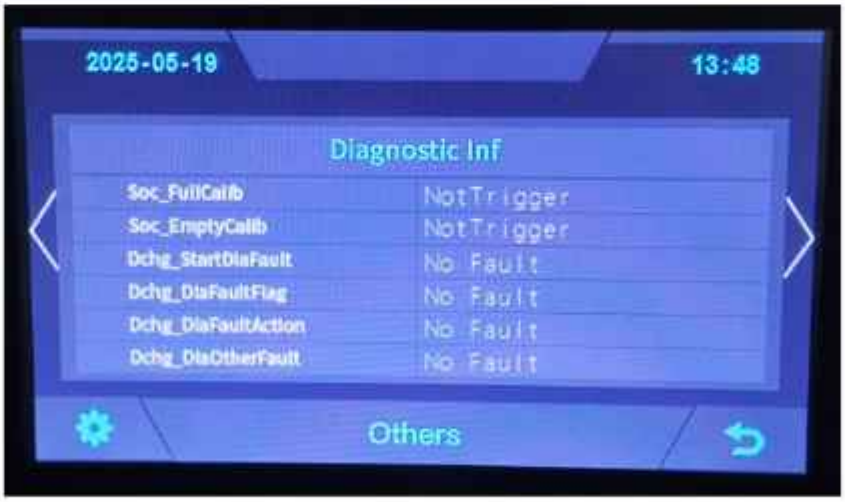
6.7.1 Heating Information



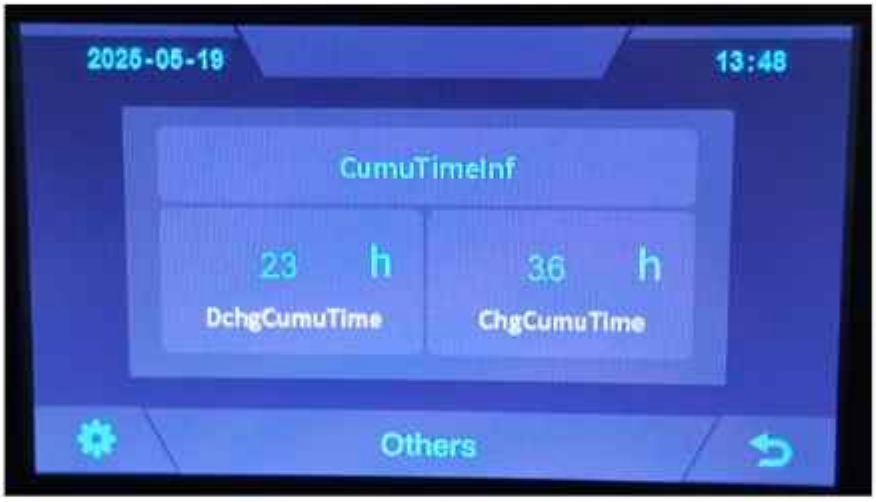
6.7.2 Insulation Resistense

6.7.3 Diagnostic Information

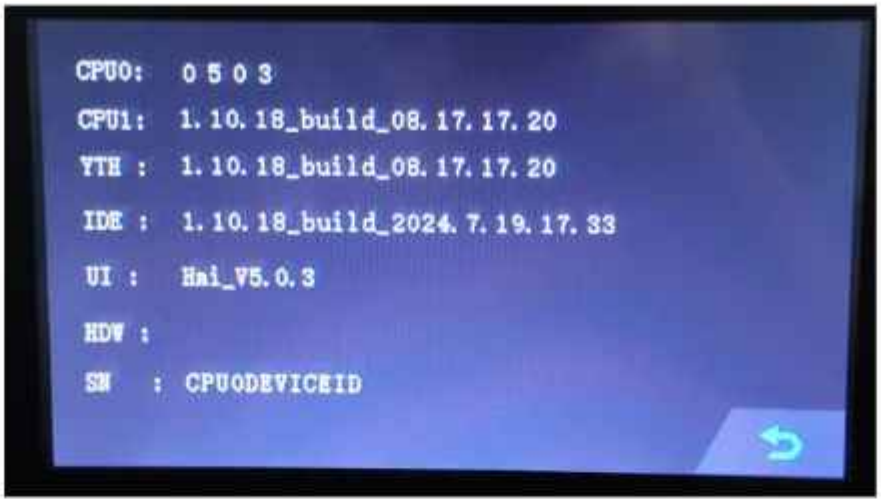




6.7.4 Cumulative Time Information



6.8 Set Up


CPU0: 0 5 0 3
CPU1: 1.10.18_build_08.17.17.20
YTH : 1.10.18_build_08.17.17.20
IDE : 1.10.18_build_2024.7.19.17.33
UI : Hai_V5.0.3
HDW :
SN : CPU0DEVICEID

7. Xiaodan Energy Storage App

7.1 App download

7.1.1 Android version

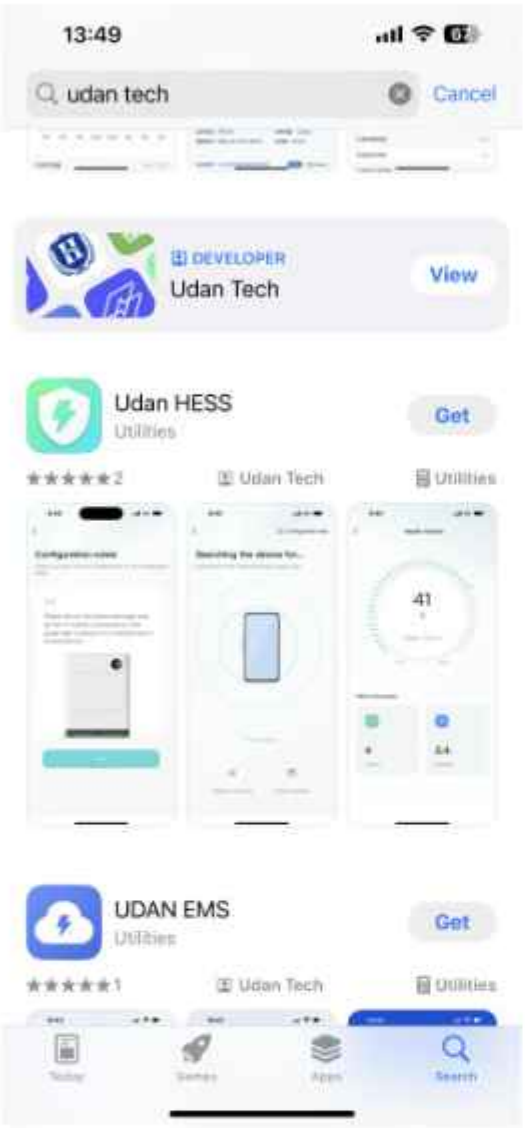
1. Enter the official website of Youdan Technology https://www.udantech.com/#/ , click on the "SAAS Application" column in the top navigation bar, pull down to the mobile app application module, and you can see the mobile WeChat Mini Program and App application download.

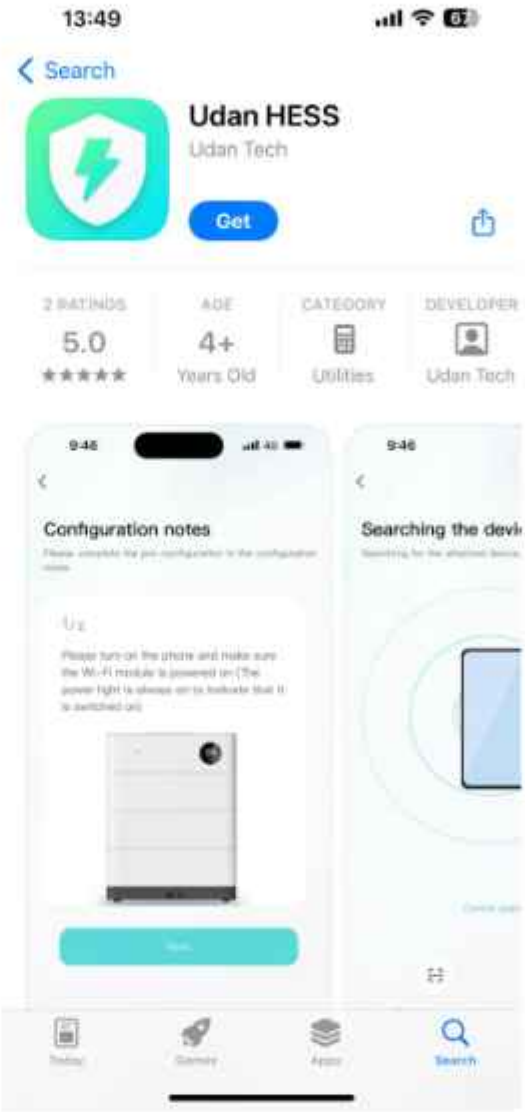
Wechat mini program scan code experience

APP download

7.1.2 iOS version

Enter the mobile App Store, search for "Xiaodan Energy Storage", and you can download and install it.

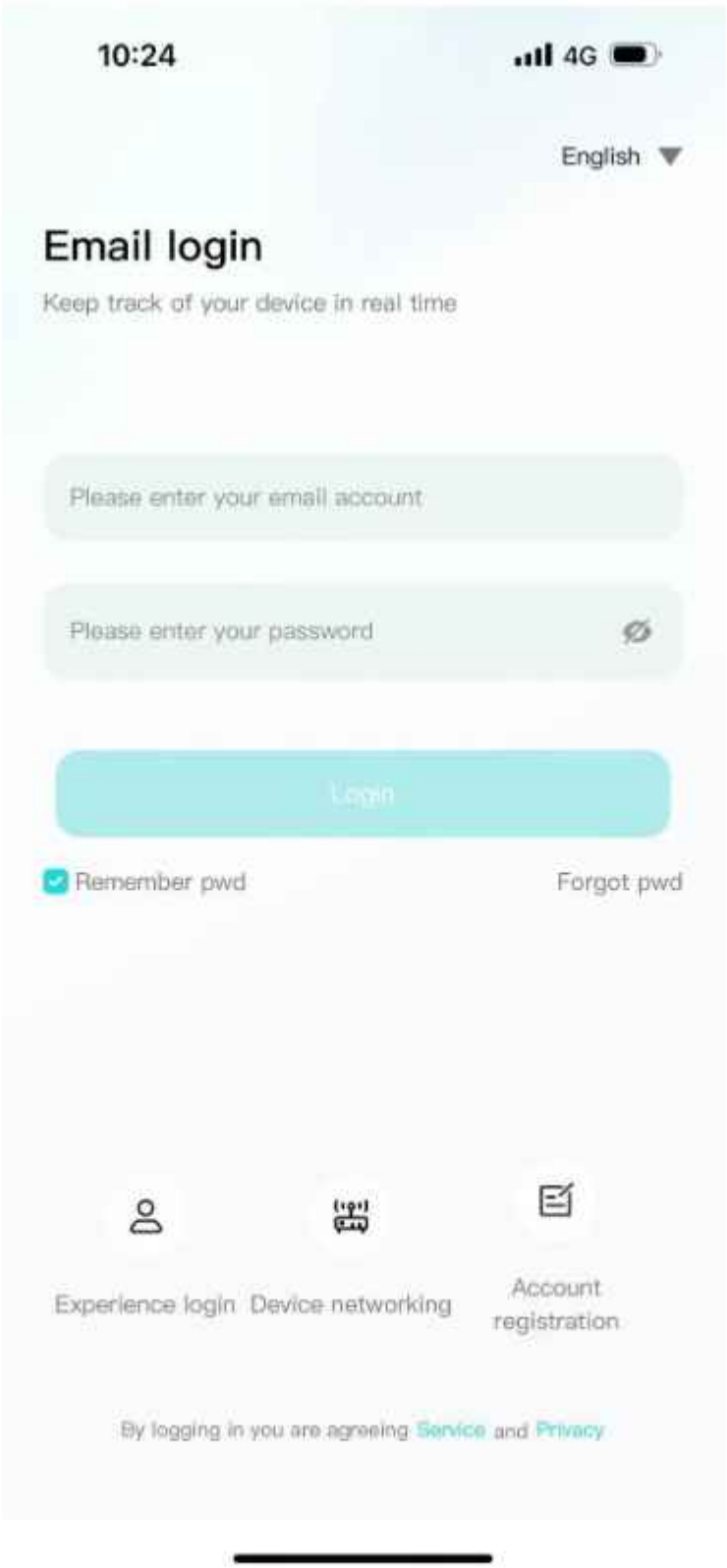




7.2. Log in and register

7.2.1 Log in

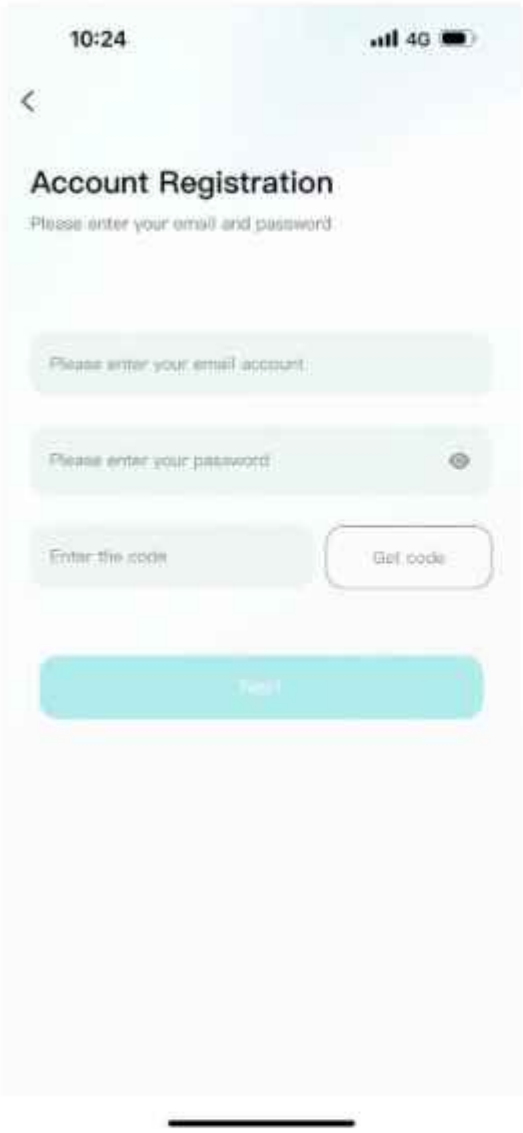
- After opening the APP, enter the login interface to log in with your account.
- Currently supports logging in through email accounts

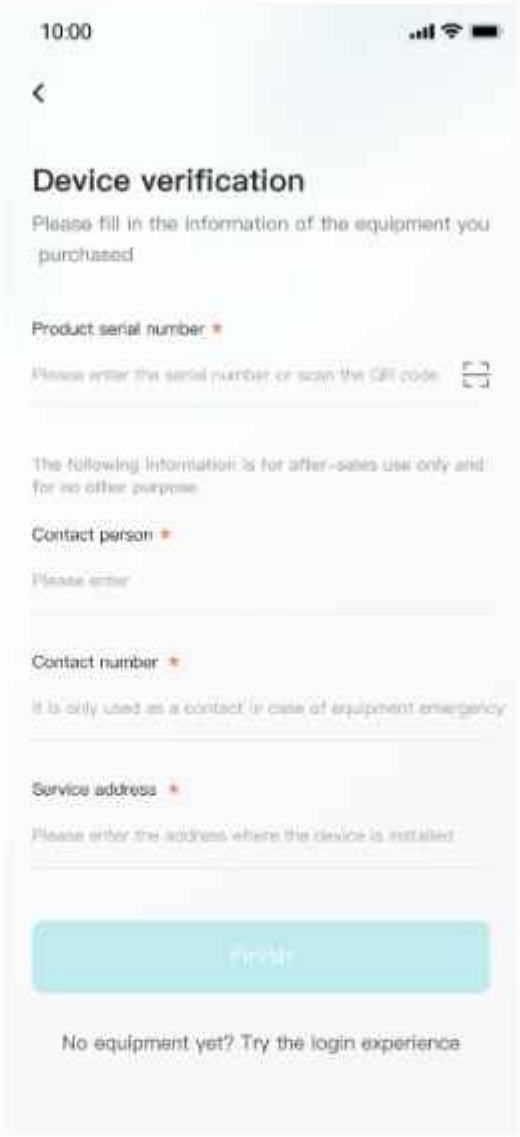


7.2.2 Register

- At the bottom of the login page, click the "Account Registration" button to enter the registration process.

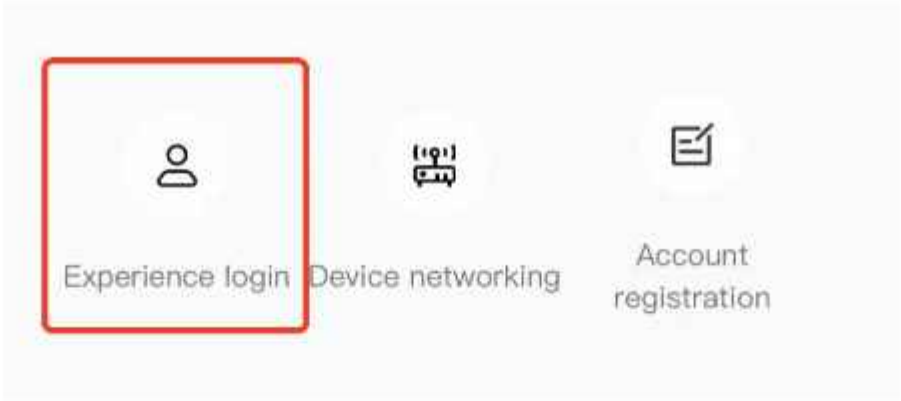
- Currently, you can register with an email account. After registration, you need to go through the device verification process and enter the device SN code or device QR code for identification.





7.2.3 Experience login

- At the bottom of the login page, click the "Experience Login" button to experience the app function without registration as a tourist.



7.3. Equipment distribution network

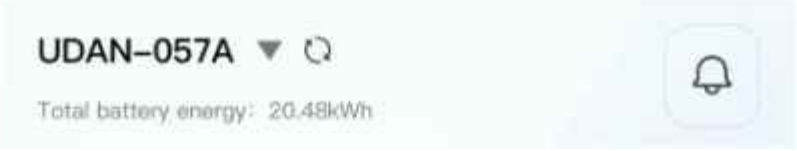
The system adopts a **4G module** and there is no need to reconfigure the network.

7.4. App page

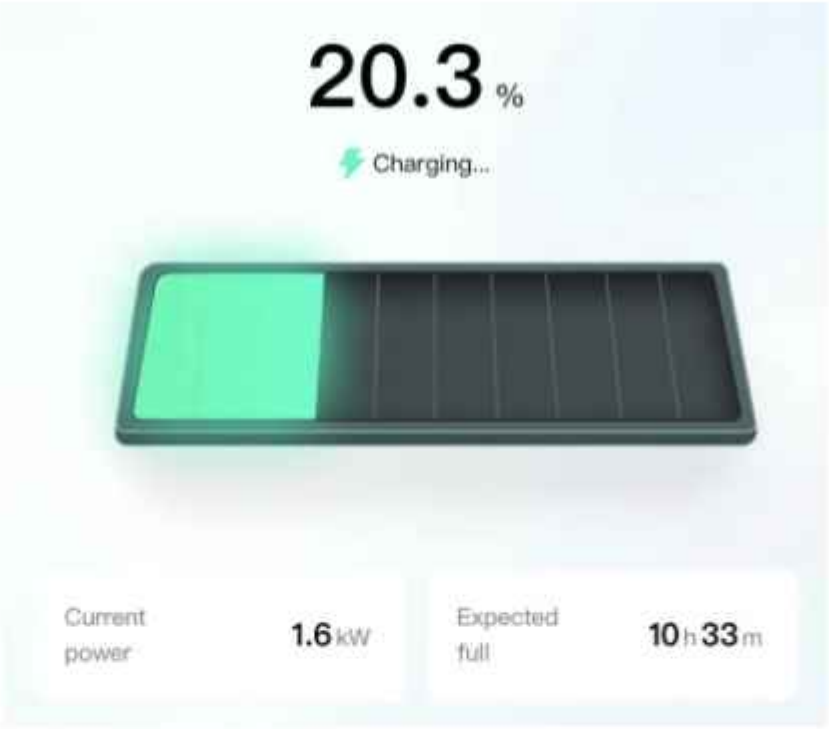
7.4.1 Equipment

The device homepage is used to display the currently managed device information.

- The top area displays the device name, battery energy, and message entry.



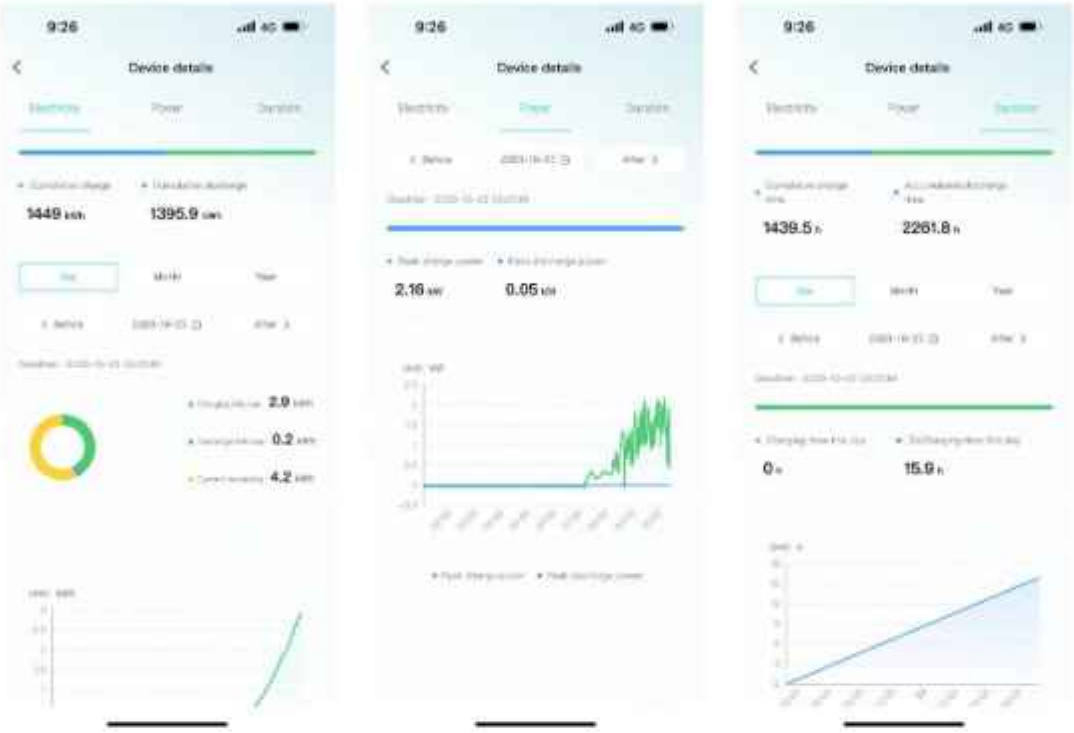
- Middle area: Displays the current battery charging and discharging status, battery percentage, current power, and estimated full time.



- The bottom area: Displays the device battery, charging time, and health check overview data of the day in the form of a card. You can click the corresponding card to view the details.

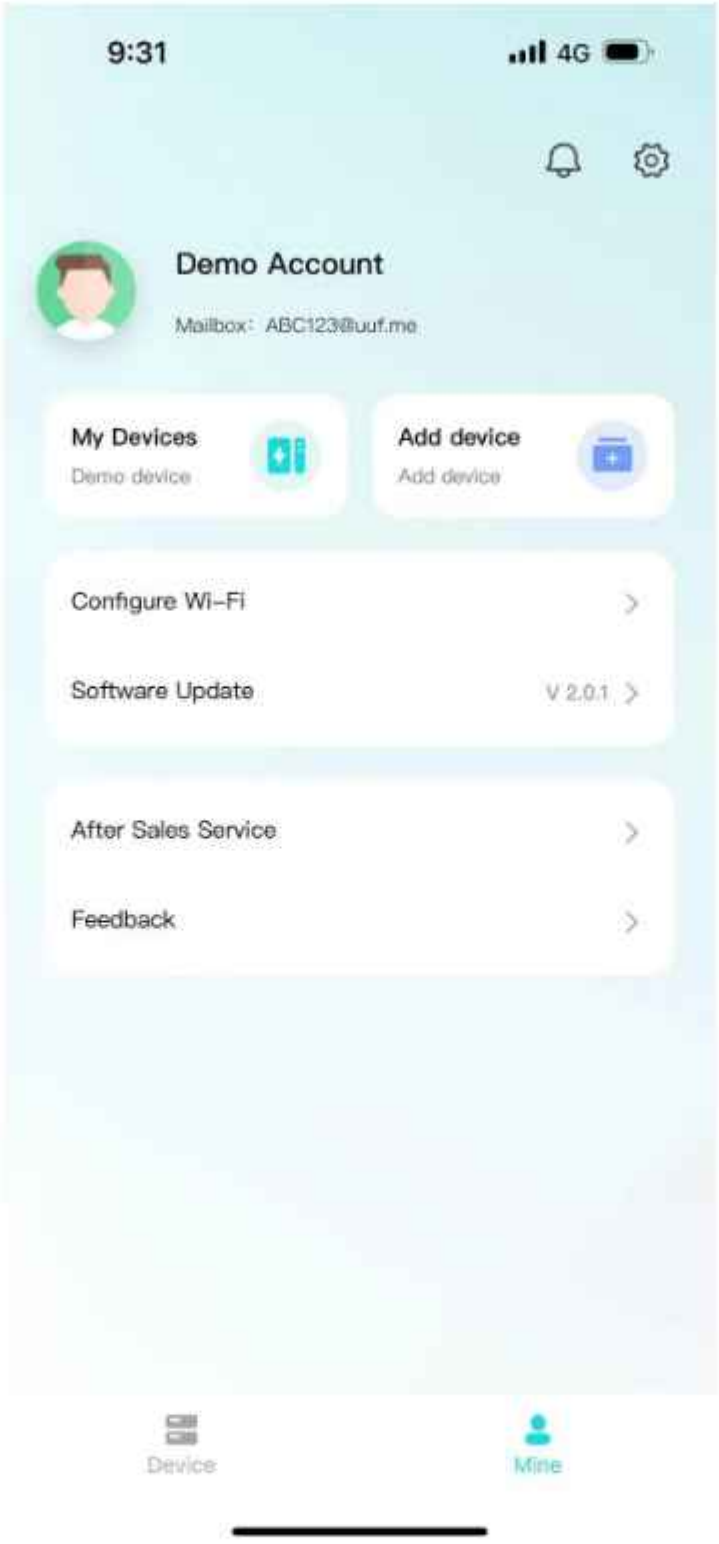
7.4.2 Data details

Display the data details of the current device, and view the battery, charging and discharging power, and charging and discharging time data separately, and support time filtering.



7.4.3 Mine

My page allows users to view **my devices, add devices, configure WiFi, software updates, after-sales services, problem feedback, app settings** .

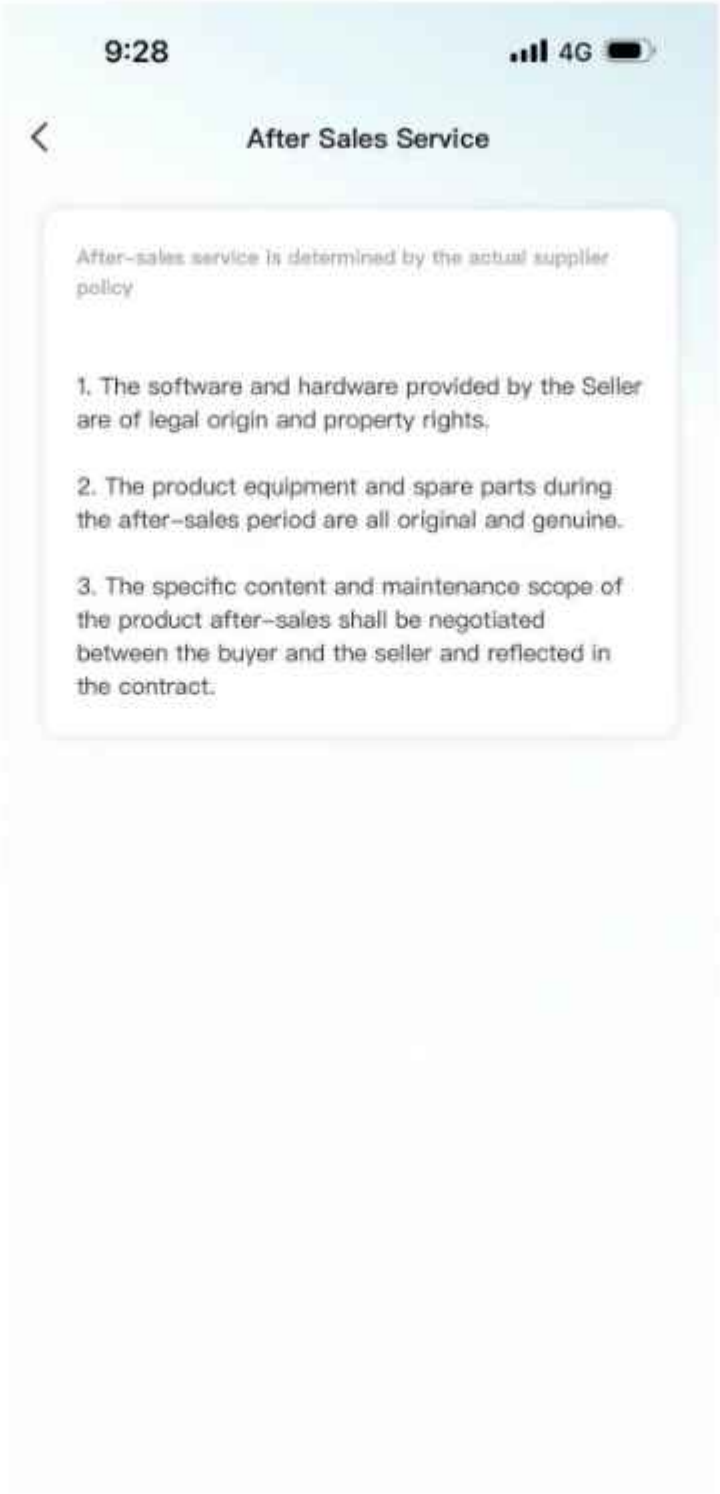


- Click "My Devices" to enter Facility Management. You can view all devices managed under the current account, switch devices displayed on the homepage, unbind devices, and other operations.

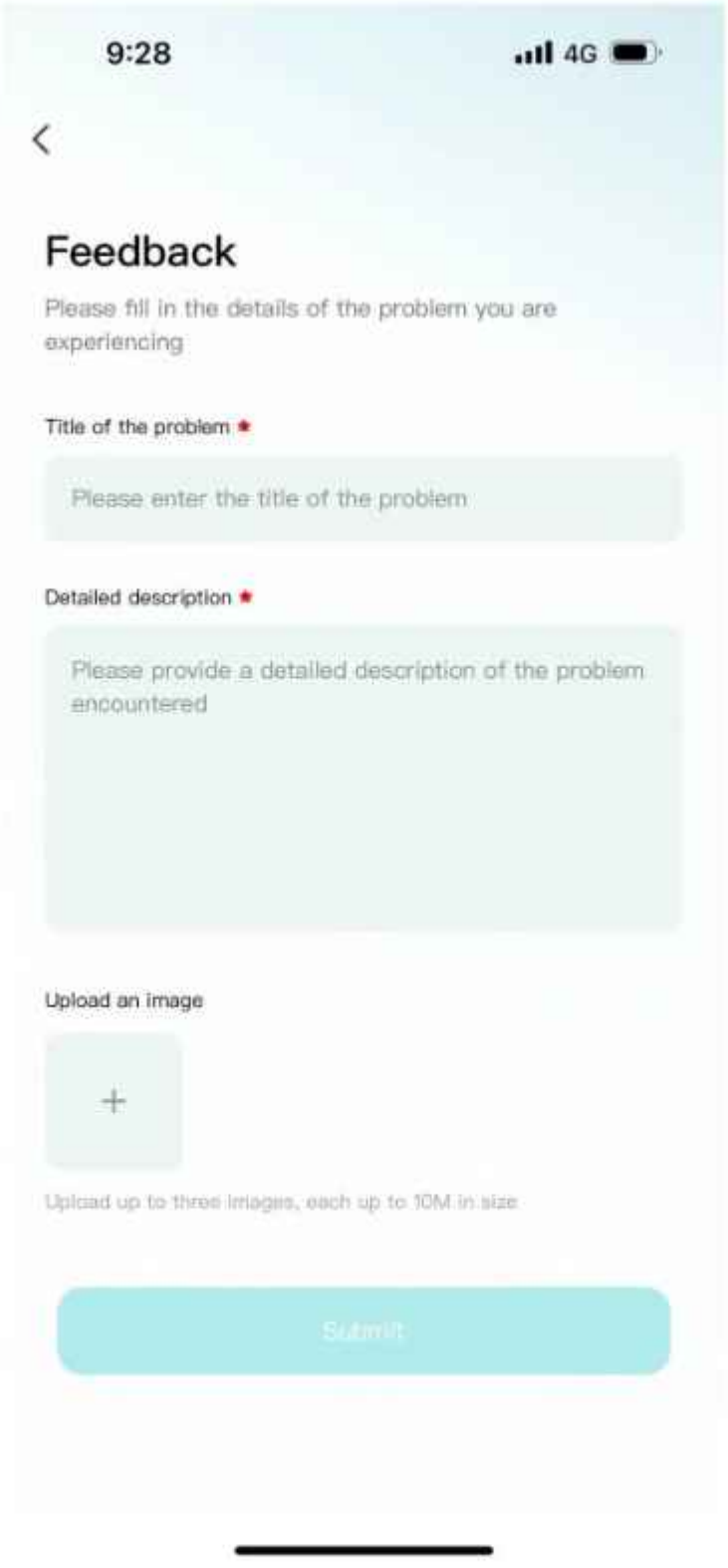
- Click "Add Device" to enter the code scanning page.
- Click "Equipment Distribution Network" to enter the equipment distribution network process.

- After clicking "software update", it will enter the version detection. If there is a new version, it will be updated.

- Click "after-sales services" and enter the after-sales services page to display the after-sales services declaration of the current supplier.



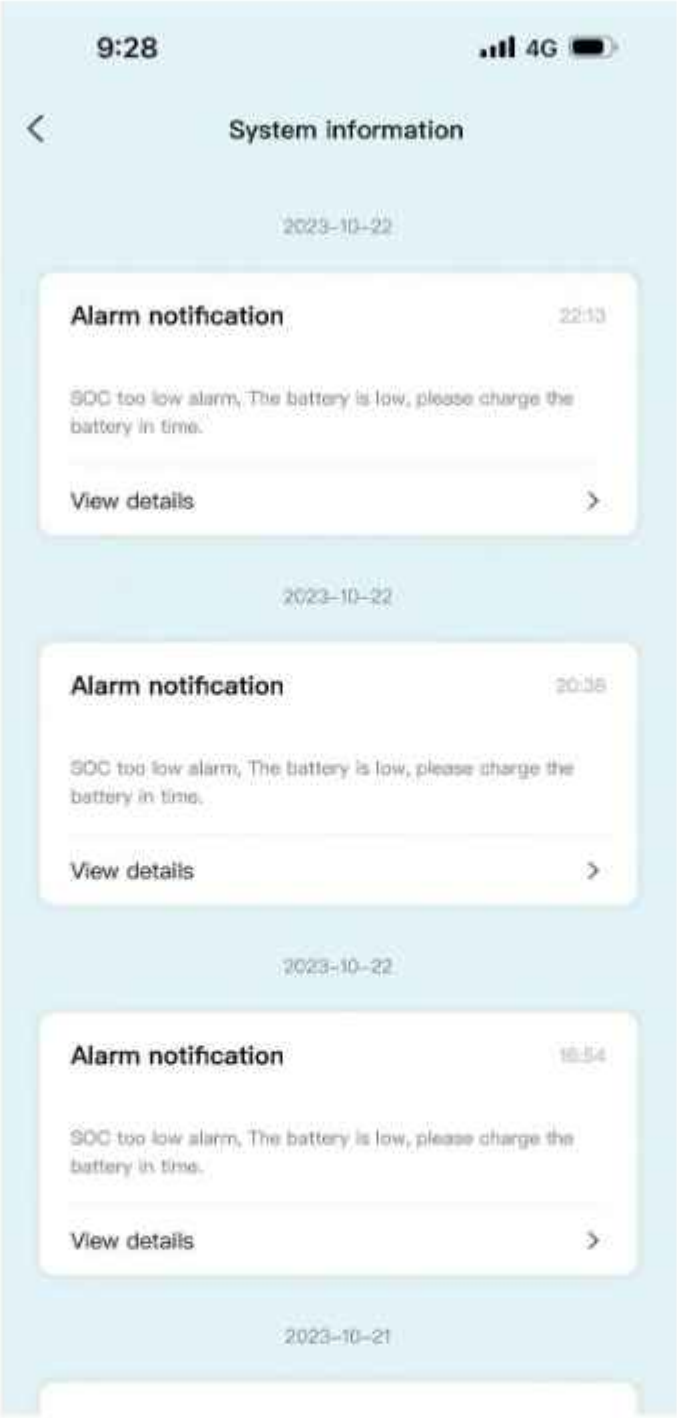
- Click "Feedback" to enter the feedback page. You can enter the current problem that needs feedback and submit it.



7.4.4 Message

Click on the device or my page, the message icon above, you can enter the inbox page to view

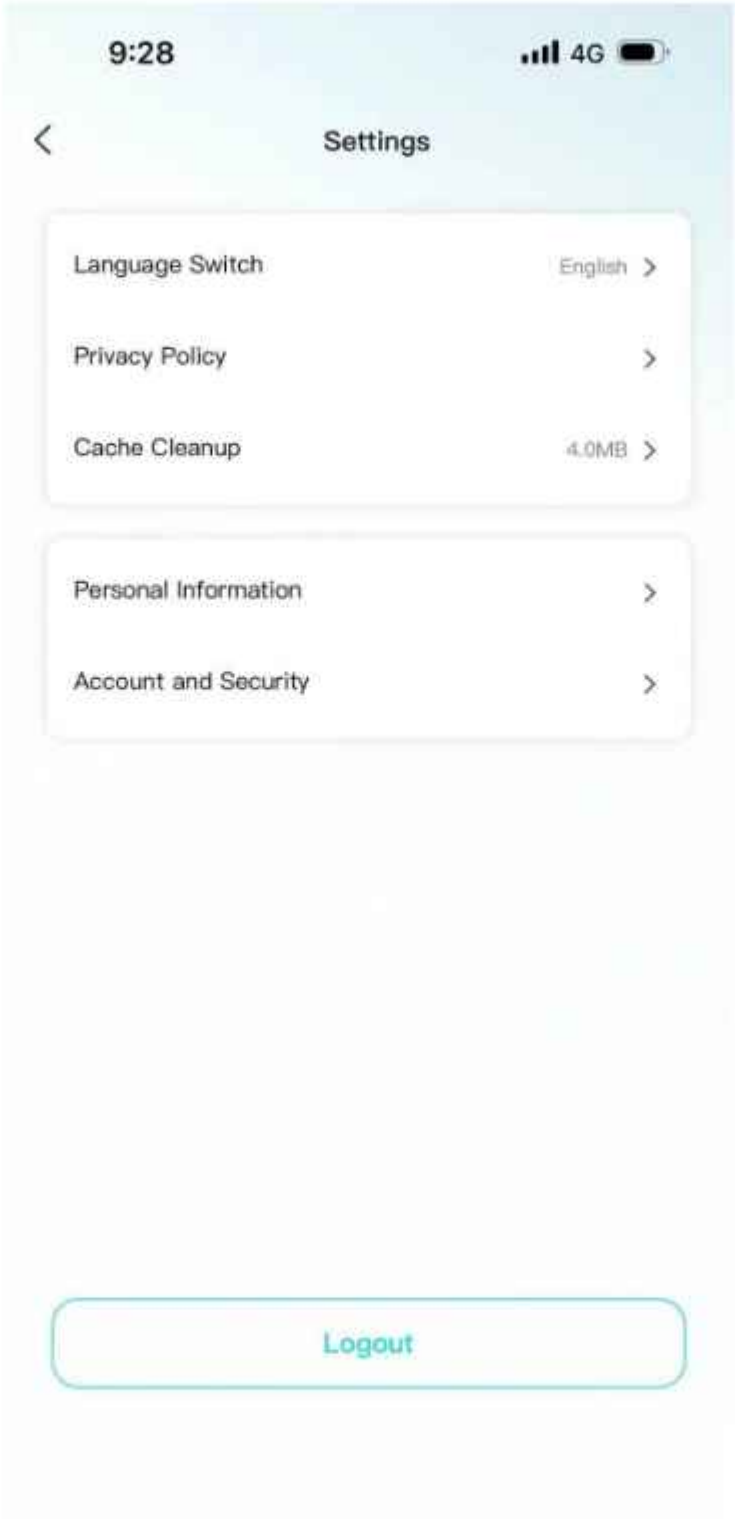
the current notification or chat history.



7.4.5 App settings

- Click My Pages - Settings icon in the upper-right corner to enter the App Settings page.

- Settings page support: language switching, Privacy Policy, cache cleaning, personal information, account and security.



8 Maintenance

8.1 Maintenance Guide

Correct maintenance is the key to keep the energy storage system running in optimum condition and it will ensure a long service life for the energy storage system.

8.1.1Safety Precautions

DANGER

* Before checking or maintenance, if the DC and AC sides have just been disconnected, it is necessary to wait 10 minutes to ensure the device fully discharged. Measure with a voltmeter to ensure that the power supply is switched off and in a safe condition before maintenance.

* At least 2 persons must be present at the same time during maintenance or troubleshooting.

NOTE

When the cover plate of DC breaker or AC breaker needs to be removed, you can measure the voltage at the lower end of the DC breaker or the voltage at the upper end of AC breaker to judge the discharge condition. If the measured voltage is close to 0V, that means the energy storage system is completely discharged.

In order to perform the maintenance of the energy storage system safely and successfully, it is important to observe the relevant safety precautions, to use the necessary tools and test equipment, and to operate by qualified maintenance personnel. Always observe the following safety procedures:

* Ensure that the energy storage system will not be reconnected accidentally.

* When operating, DO NOT wear any easily conductive object, such as rings, watches, etc. when operating the energy storage system.

* When operating, cover the electrical components close to the operation area by insulating cloth.

* Inspection is required at the end of maintenance to ensure that the screws of maintained parts have been tightened and without tools left inside the energy storage system.

* Users do not need to operate the MSD under normal circumstances. When there is a possibility that the upper terminals or cable of DC breaker maybe touched, it is recommended to remove the MSD on the battery pack to ensure that the upper end of the DC breaker is disconnected from the power supply.

8.1.2 Safety Precautions

To improve the efficiency and reliability of the energy storage system, perform the following preventive maintenance operations periodically.

Before maintenance, first of all, it is necessary to shut down the energy storage system and disconnect the breaker of DC side and AC side. The external power supply should be operated in the following cases.

External Power Supply Requires to be Powered Down

Check item	Check method	Cycle
System cleaning	1. Check the cleanliness of the electric cabin and battery cabin of the energy storage system, and clean them in time. 2. Check the temperature of the heat sink as well as the surrounding dust. If necessary, clean the heat sink by dust collector to avoid affecting the normal operation of the heat sink.	Once every three months/half year/one year depending on the used environment.
Terminals and cables connection	1. Check whether the terminal of main circuit is in poor connection and whether the screws is overheating. 2. Check whether the screws of control end are loose, if so, tighten them with a screwdriver. 3. Check whether there is any color change of the wiring copper bar or screw. 4. Check whether there is scratch on the cable in contact withthe metal surface, if so, please maintain it in time. 5. Check whether the insulating wrapping tape of the cable terminals is off, if so, please tie it up in time. 6. Check whether the cable connection is loose, and tighten it again according to the specified torque.	Every three months once
Component maintenance	1. Check the corrosion condition of all metal components. 2. Annual inspection for contactors (auxiliary switches, breakers and micro breakers). Ensure them with good mechanical operation. 3. Check the operating parameters.	Every half to one year once

External Power Supply Without Power-down Requirement

Check item	Check method	Cycle
System cleaning	Check the filter mesh and filter cotton of each part and clean or replace it in time.	Once every three months/half year/one year depending on the used environment.
System operating condition and environment	1. Listen to the operation sound of the energy storage system to see if it is abnormal. 2. Check whether the operation parameters of the energy storage system are normal, for detailed operation, 3. Observe whether the air inlet and outlet are normal and whether there is any abnormal noise. 4. Check whether the heat generated by the cover of the energy storage system is normal and monitor the heat generated by the system, and the maximum temperature should not exceed the maximum use ambient temperature of the energy storage system. 5. Check whether the key components are normal, such as dehumidifier, liquid cooling unit, etc., you can check whether there is alarm of them on APP. 6. Check whether filtration functions of all air inlet are normal. 7. Check whether the humidity and dust of the environment around the energy storage system are normal. 8. Check whether the temperature of the surrounding environment meets the operation of the energy storage system. Note: Ventilation of the air inlets must be checked. Otherwise, the module may not be cooled efficiently, and causing the energy storage system fault due to overheating.	Every half year once
Cabinet maintenance	Observe the energy storage system for damage or deformation. Check the warning signs and other device markings on the cabinet and replace them n time if they are blurred or damaged.	Every half year once
Safety Function	Simulate the halt operation and check whether the halt signal communication is normal.	Every half to one year once
Software maintenance	Check whether the parameter setting of each device on APP is normal and is the same as the initial setting.	Every half year once

Door lock maintenance	Check whether the door locks etc. of each door panel of the energy storage system are normal and in good condition. If necessary, lubricate the door lock holes appropriately.	Every half year once
Liquid cooling unit maintenance	Check whether the power cables and communication cables are loose, and whether the operation and communication are abnormal. Check whether there is no abnormality in appearance, fastening and grounding. Check whether the fan and condenser work normally, whether there is any foreign matter blocked at the air outlet, whether there is any abnormal vibration during normal operation. 4. Check whether there is leakage in the water circuit system; whether there is leakage in the connectors and whether there is cracking and deformation in the hoses. 5. Check whether the balloon of the expansion tank is damaged (press the thimble at the inflatable place by hand, if the water continues to come out, then it is damaged), and the balloon needs to be replaced. 6. 1) Acidity and alkalinity test: check the PH value of the coolant, need to prepare PH test paper to test the PH value of the coolant, if the PH value is lower than 7, then the coolant needs to be replaced; (recommended to test once a year). 2) When the service life of the coolant reaches 10 years, it also needs to be replaced. The above 1) and 2) replacement conditions are based on the conditions achieved first. Please contact the manufacturer for coolant recharge or replacement. Note: If there is any abnormality in the fan, it needs to be replaced in time to avoid temperature problems, which may lead to failure of the energy storage system. There is no need to power down the liquid cooling unit when communicating, replacing the coolant, or replenishing the coolant.	Every three months to six months once

NOTE

* The table above is only the recommended routine maintenance cycle, the actual product should be maintained based on the specific installation and use environment. The size of the power plant, the location, and the site environment and other factors will affect the product's routine maintenance cycle.

* If the energy storage system is installed in a harsh environment with heavy wind and sand or dense dust, please shorten the maintenance cycle and increase the frequency of maintenance.

8.2 Key Components Maintenance

⚠ CAUTION

Do not use any solvents, abrasives or corrosive materials to clean the energy storage system.

8.2.1 Battery Maintenance

Safety Precautions for Battery Maintenance

* The battery should be away from fire and all electrical equipment that is easy to cause sparks, so as not to cause explosion.
* Do not short circuit the battery terminals. Short-circuiting the battery will cause burning.
* Do not open the battery to prevent the electrolyte from harming the human body.

Battery Maintenance

Regular maintenance should be performed to ensure the service life of the battery.

Check item	Check method	Cycle
Battery cycle maintenance	The battery system should be fully charged and discharged periodically to ensure the battery performance.	Once every three months
Battery maintenance for long term storage	If the battery system is not used for more than 6 months, the battery must be replenished to 40%~50% of SOC to ensure the battery performance.	Once every six months
Maintenance in case of system failure or half	During the use of the system, if there is a halt for fault, and the halt time is more than 1 month, you need to confirm the SOC status of the battery system in advance. Ensure that the SOC is maintained at 40% ~ 50% state to avoid the battery in a low SOC state for long-term storage, and resulting in battery over-discharge.	Once every month

Maintenance for battery pack	1. Check the battery case and cover for bulging, liquid leakage and damage. 2. Check the connecting cables, terminals, etc. for corrosion and rust, and the fastening bolts and nuts for looseness. 3. Check the surface temperature of the battery terminals and battery case with thermal imager or other tools, which should be below 45℃ . 4. For the temporarily unused battery pack, regular recharge it within three months. 5. Batteries that have been in a charging status for a long time should be forcibly discharged once every month. 6. Battery packs equipped with BMS should pay special attention to whether the cell’ s voltage difference, cell temperature difference is too large, and whether the insulation resistance is normal. 7. Regularly check whether the battery temperature, voltage, current, SOC and other information are normal via APP.	Once every three to six months

NOTE

When the battery voltage or SOC is in the following conditions, it is necessary to charge the energy storage system in time according to the following recommended time, it is recommended to be charged to 40%~50% SOC, the capacity loss caused by not replenishing the battery within the recommended time is not covered by the warranty:

* 5%< battery SOC<10%: within 20 days .
* Battery SOC is 0 % or minimum cell voltage below 2.7V: within 5 days .
* The minimum cell voltage is less than 2.6V: within 2 days .

CAUTION

When the cell voltage is less than 2.5V, the recharge operation must be carried out by a professional with skillful training, please contact the manufacturer to carryout the operation in time.

Battery Replacement Announcements

* For battery replacement, please consult a professional engineer.
* The replaced battery must be with the same capacity, type and manufacturer of the energy storage system.
* The replaced old batteries should not be discarded at will, they should be disposed by professional recycling organization.

9 Maintenance

Warning! Improper decommissioning may cause damage to the equipment and/or battery inverter.

Before maintenance, ensure that OHL-233 is decommissioned according to relevant provisions.

Note: All maintenance work shall comply with local applicable regulations and standards.

The USB-CAN port of OHL has the functions of upgrading firmware and recording battery data, which can be used as an auxiliary tool.

To ensure safe operation, all plug connections must be checked. If necessary, relevant operators shall press them back into place at least once a year.

The following inspection or maintenance must be carried out once a year:

- General visual inspection
- Check all tightened electrical connections. Check the tightening torque according to the values in the following table. Loose connections must be retightened to the specified torque.

Connection mode	Tightening torque
high-voltage BMS box grounding	4.5Nm
Fixing the lug of the high-voltage BMS box	1.2Nm
Fixing the lug of the battery module	1.2Nm

- Using the monitoring software, check whether the SoC, SoH, battery voltage and temperature of the battery module are abnormal.
- Shut down and restart OHL-233 once a year.

Note: If the system is installed in a polluted environment, maintenance and cleaning must be carried out at short intervals.

Note: Clean the battery rack with a dry-cleaning cloth. Ensure that no moisture comes into contact with the battery connections. Do not use solvents.

Attention:

1. Do not dispose of batteries and rechargeable batteries as domestic waste! You are legally obliged to return used batteries and rechargeable batteries.

2. Waste batteries may contain pollutants that can damage the environment or your health if improperly stored or handled.

3. Batteries also contain iron, lithium and other important raw materials, which can be recycled.

Do not dispose of batteries as household waste!

Legal Statement