

WEEE Number: 80133970

INSTRUCTION MANUAL

RECHARGEABLE LI - ION BATTERY SYSTEM





| 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 Please scan the OR sed

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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.





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.



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. | |



| A | 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



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.

M 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



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.



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



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





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



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 in Table 1-1.

Table1-1 Symbol illustration

| Symbol | Illustration |
|-------------|---|
| | Observe the user manual. |
| A | There is dangerous voltage which may endanger human safety, be care of electric shock. |
| AC) | 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. |
| \triangle | 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.



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.



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.

MANGER

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.

M 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.



DO NOT use the battery modules with different type together.





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.



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

MARNING

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.

M 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° C as far as possible and then start to discharge.

1.2.1.4 Grounding Requirements



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.



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.



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



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



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



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



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



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.

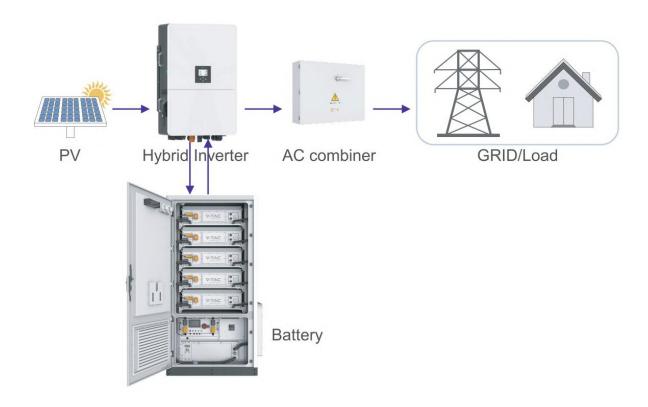


Figure 2-1 Energy storage system constitution



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

| Tablez-T | |
|---|---|
| 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) |



| Communication | 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



Figure 2-2 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 Figure 2-3, corresponding component illustration is shown in Table 2-2.

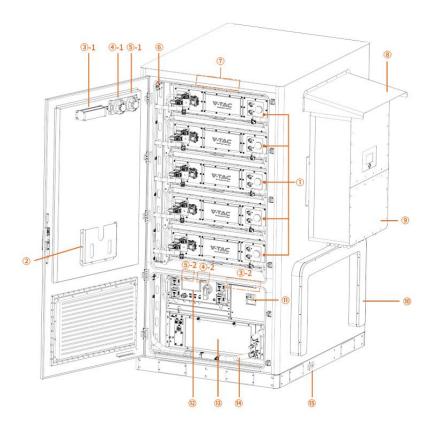


Figure2-3 Structure layout (open the front door)

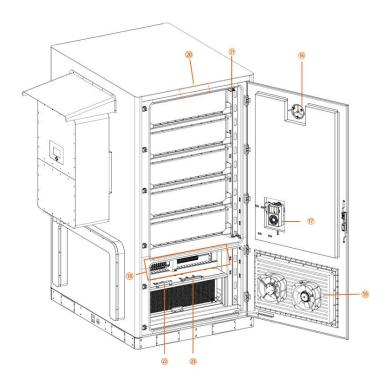


Figure2-4 Structure layout (Open the back door)



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

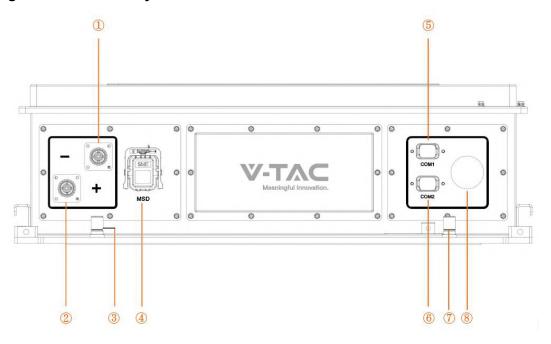


Figure2-5 Structure layout

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 | 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 communication and 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

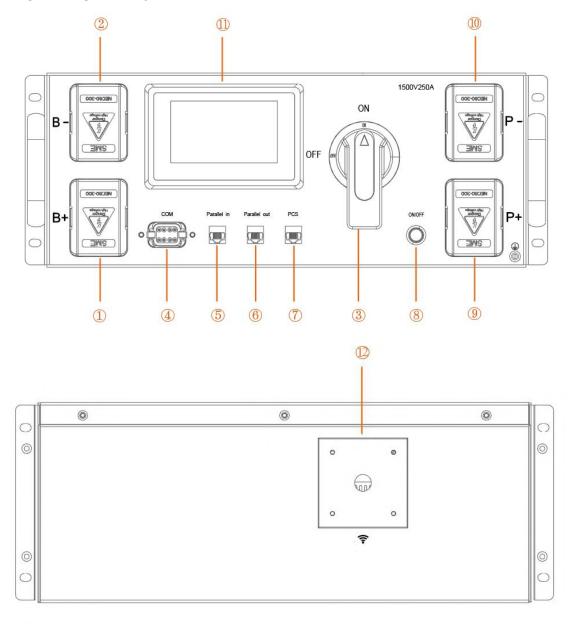


Figure 2-6 Structure layout



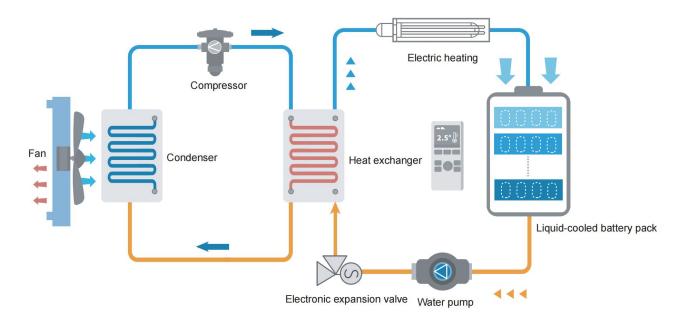
Table2-4 Structure layout illustration

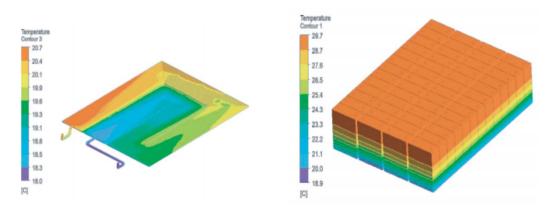
| NO. | Name | Description. | Position |
|------|----------------------------------|--|----------|
| 1 | B+ | High voltage box module positive pole (orange) | Front |
| 2 | B- | High voltage boxmodule negative pole (black). | Front |
| 3 | Air switch | Used to manually control the connection between the batteryrack and external devices. | Front |
| 4 | СОМ | 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 | |
| 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

Figure 2-7 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) | 245×700×900 |



| Weight(without coolant) | kg | 75 |
|---------------------------------------|----------------------|--------------------------------|
| Installation Method | | Horizontal Embedded |
| Application | | Outdoor |
| Inlet and Outlet Connection | | DN20 Quick Connector |
| nvironmental Protection & Performance | | |
| Working Temperature Range | °C | -30~+55 |
| Storage Temperature Range | °C | -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 |
| Cool | ling/Heating Capacit | у |
| Cooling Capacity@W18/L35 | kW | 5.0 |
| Heating Capacity@Tu=10 $^{\circ}$ C | kW | 2.0 |
| Outlet Coolant Temperature | °C | 18 |
| Para | meter Determinatio | n |
| | | 10~35 |
| Outlet Temperature Setting Range | °C | (Heating Point≤ Cooling Point) |
| Default Cooling Set Point | °C | 18 |
| Default Heating Set Point | °C | 15 |
| Communication Protocol | | RS485/CAN |
| | Recycled Flow | |
| Rated Circulating Flow | L/Min | 46.5@60kpa |
| Po | ower 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 | А | 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/dm ³ |
| 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/dm ³ |
| Sulfide | < 0.01 mg/dm ³ |
| Chloride | < 50 mg/dm ³ |
| Sulfate | < 250 mg/dm³ |
| Nitrate | < 25 mg/dm ³ |
| Nitrite | < 0.1 mg/m³ |
| CSB | < 7 mg/dm³ |
| NH4 | < 0.05 mg/dm ³ |
| Fe | < 0.1 mg/dm ³ |
| Mn | < 0.1 mg/dm ³ |
| Cu | < 0.1 mg/dm |



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 demand (%) = (actual control |
| | Refrigeration demand ≥ 50%: the refrigeration is started. | 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 |
| Refrigeration | | (18°C-3°C*50%=16.5°C). |
| | Refrigeration demand ≤ -50%: the refrigeration is stopped. | When the outlet coolant temperature is used as the actual control temperature: |
| | | I When the outlet coolant temperature is ≥ 19.5 °C, the chiller will start |
| | | cooling. |
| | | I When the outlet coolant temperature is $\leq 16.5^{\circ}$ C, the chiller stops cooling. |
| | 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). |
| Heating | | When the outlet coolant temperature is used as the actual control |
| | Heating demand ≤ 0%, the | temperature: |
| | | I When the outlet coolant temperature is ≤ 12°C, the chiller will turn on the |
| | heating is stopped. | electrical heaters. |
| | | I When the outlet coolant temperature is ≥ 15°C, the chiller will stop the |
| | | electrical heaters. |

☐ 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

Figure 2-9 Temperature and humidity sensor

Table 2-8 Technical parameters

| | Table 2 o Teelimear parameters | | | | | | | |
|------------------------|--|----------------------------|---|--|--|--|--|--|
| input specification | 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 | intelecto | Temperature: \pm 0.5°C (10°C -50°C), \pm 1°C (0°C -100°C) | | | | | |
| Output specifications | 1 passive relay output, 250VAC / 3A or 30VDC / 3A | intrinsic error | Humidity: ± 3%RH (10%RH-90%RH), ± 5%RH (0%RH-99%RH) | | | | | |

Table 2-9 Parameter setting menu:

| order | Parame | Parameter | Paramete | Explain | |
|--------|----------|---------------------------|----------|---|--|
| number | ter code | name | r range | | |
| 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 $^{\circ}$ C 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 $^{\circ}$ C. |
|---|-----|----------------------------------|--------------|---|
| 4 | F04 | Humidity control value | 0-100%R H | 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 , \langle Smart Dehumidifier User Manual \rangle

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 $30\,^\circ\!\!\!\!\!^\circ$, the fan will start to operate to cool down the interior of the cabinet.

When the internal temperature of the cabinet drops to 25°C, 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 | |
| 05 | Rated Current | 0.30/0.34 A | ±10% | b. 25℃ | |
| 06 | Rated Power | 65/75 W | ±10% | c. 65%RH | |
| 07 | Rated Speed | 2530/2800 RPM | ±10% | d. Measured after 5 Mins | |
| 08 | Max.Airflow | 637 CFM 1080 m³/H | 1 | a. Rated Voltageb. Rated Current | |
| 09 | Max.Static Pressure | 197 Pa 0.79 InchH ₂ O | | c. P&Q d. Stand:AMCA | |
| 10 | No.of Blade | 9 | | | |
| 11 | Noise Level | 59 dB(A) | | a. Rated Voltageb. Non-Echo Chamberc. Distance:1.0M | |
| 12 | Life Expectancy | 60000Hrs at 25°C | | a. Rated Voltageb. 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.





Figure 2-10 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 \pm 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: $-10 \sim 50^{\circ}$ 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 Figure 2-10.

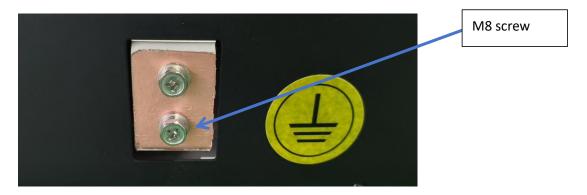


Figure2-11 Cabinet grounding terminals diagram

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.

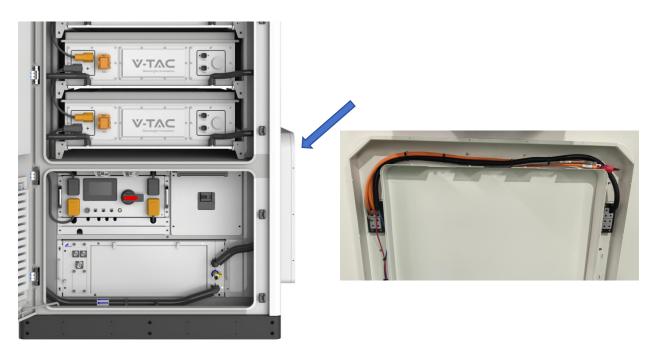


Figure 2-12 Inside the wire trough



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.

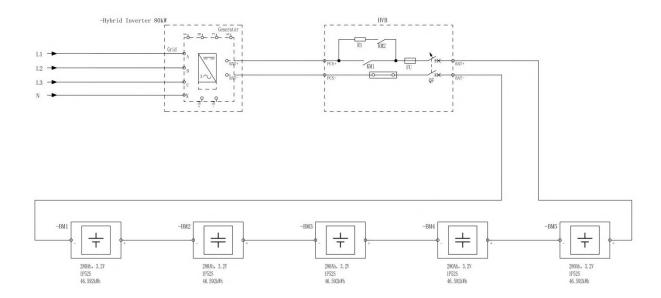


Figure 2-13 Electrical schematic diagram



3.Installation

3.1 Installation Process

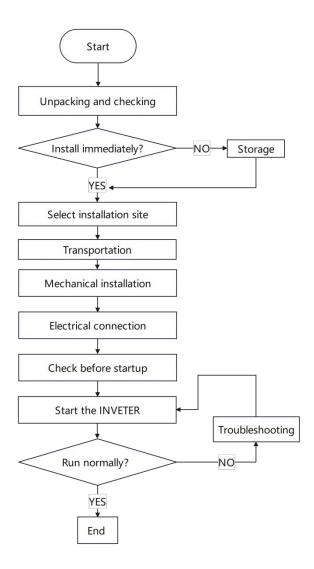


Figure3-1 Installation process



3.2 Unpacking and Checking

M 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 Figure 3-2), 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.

M 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.

M 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.



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: $-20\sim45$ °C (for long term storage, the temperature should be within the range of $0\sim35$ °C, if the energy storage system is stored out of temperature range for long time, it will affect the performance and service life of battery.

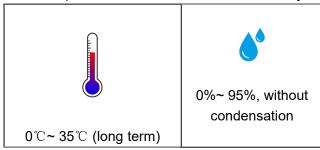


Figure 3-4 Storage temperature and humidity

- * 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.

* 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.

M 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.

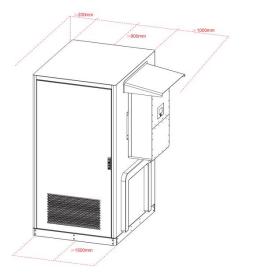
- * Environment temperature: -20°C~+55°C.
- * Relative humidity: 0%RH~95%RH, non-condensing.
- * Altitude: 0m~3000m.
- * Ensure that the installation site is well ventilated and free from excessive dust, acid, alkali, corrosive and explosive particles and gases.

M 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 Figure 3-5) 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.



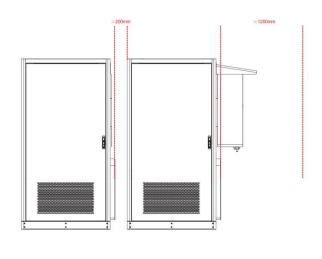


Figure 3-5 Installation space (unit: mm)

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.



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



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 Figure 3-6.

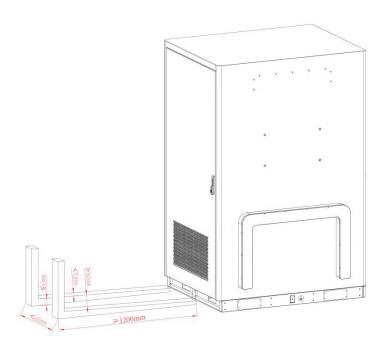


Figure 3-6 Forklift transportation diagram (unit: mm)



- * 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.

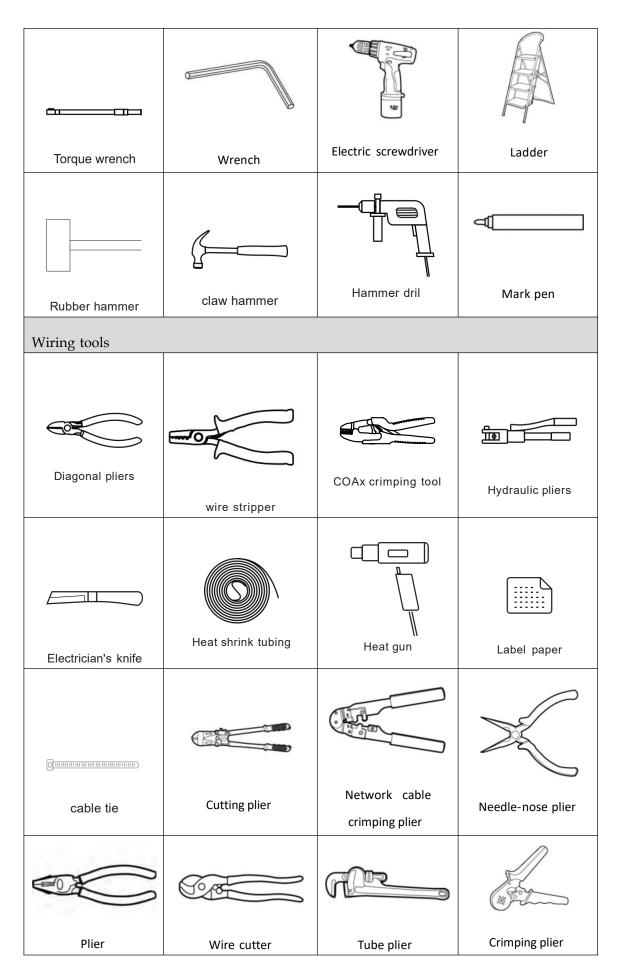
3.5 Installation Preparation



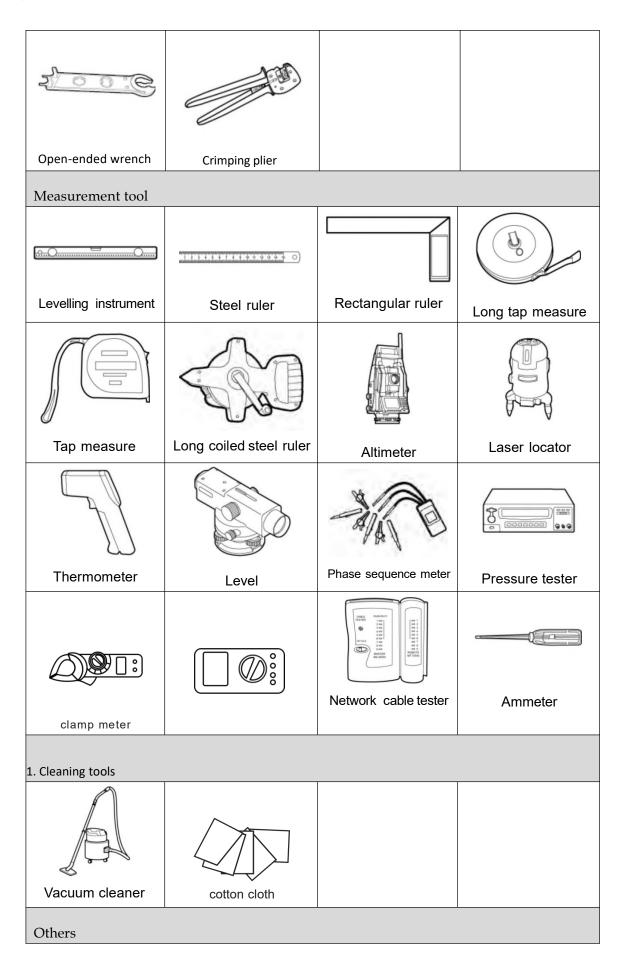
3.5.1 Tools

| 12 10010 | | | |
|----------------------|----------------------|-----------------|-------------------|
| Personal protection | | | |
| | | CELLER . | |
| 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 |

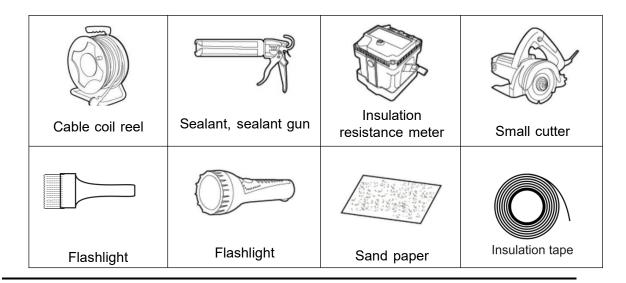








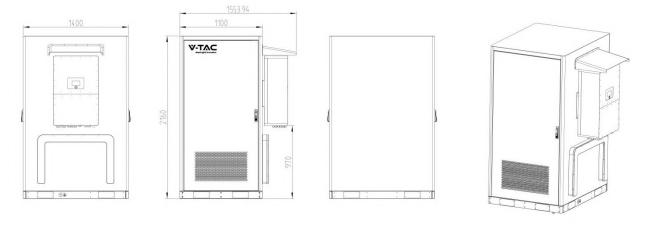






The installation tools need to be insulated to avoid electric shock.

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.



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



* 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.



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.

M 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.



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

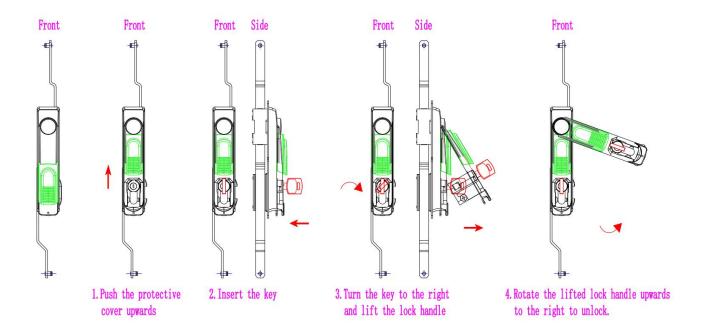
4.1.1 push plate

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



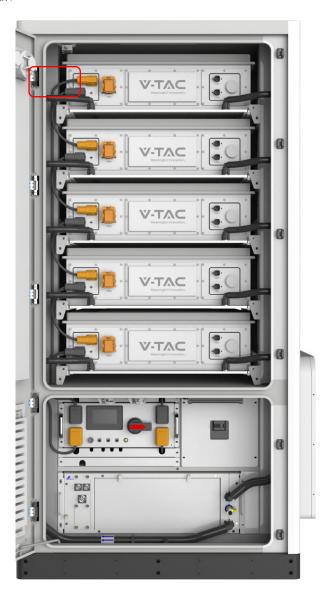
4.1.3Battery MSD installation



44

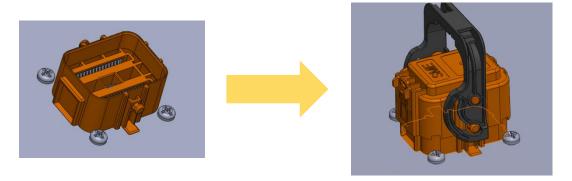


- * The cable connections between the batteries inside the energy storage system have been completed. The connections shown in the figure are for illustration only.
- * The MSD on the energy storage system PACK is in an uninstalled state to ensure safe transportation.
- Step 1: Before connecting the 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.)

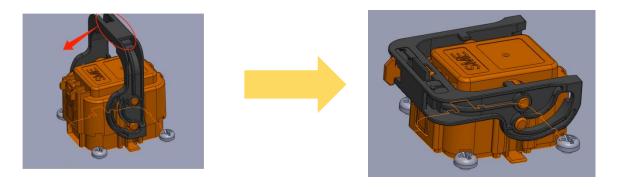




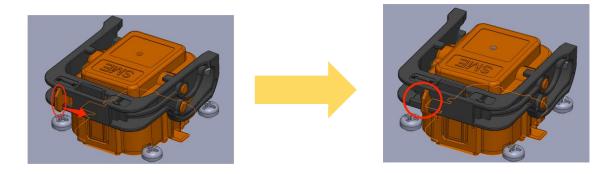
(1) Pre-install the plug on the base.



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



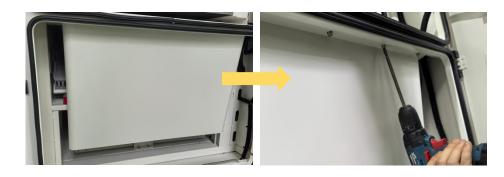
(3) Push the button to the locked position.



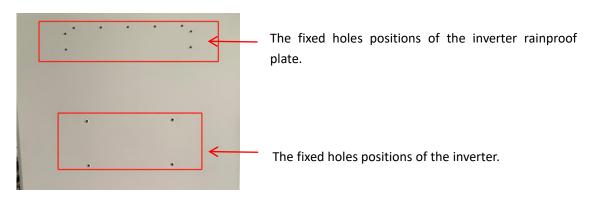
4.2 Wiring

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.





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+, BAT2+, 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



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. |

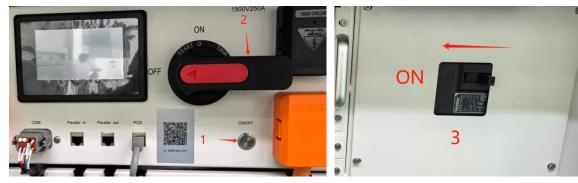
5.2 The system is turned on

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.

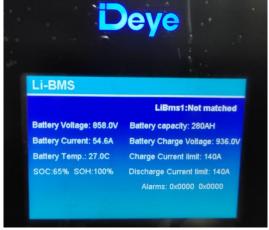
- Step 2:Rotate the selection handle ON the high-voltage control box to ON.
- Step 3:Turn the DC circuit breaker ON.
- Step 4:Turn on the inverter and check the operating data.

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



- * 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 | | | Stop charging and find |
| | Over-current | Over-current during slow charging | 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

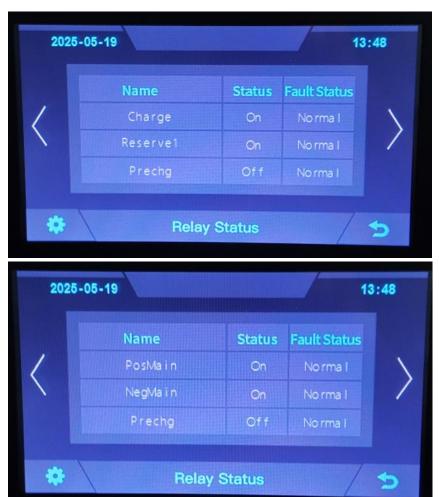




6.5 Heating Temperature

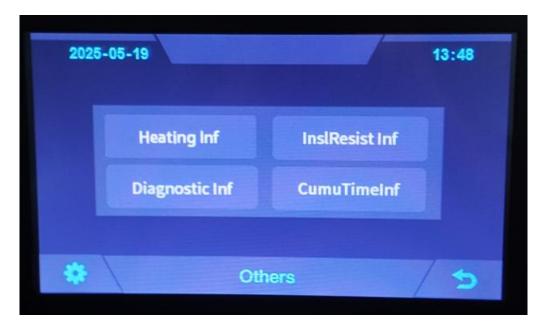


6.6 Relay Status





6.7 Other



6.7.1 Heating Information

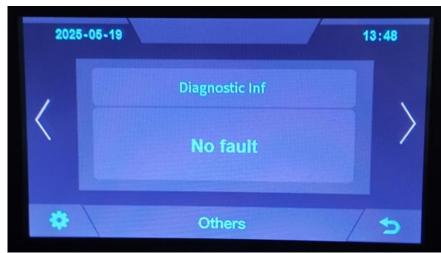


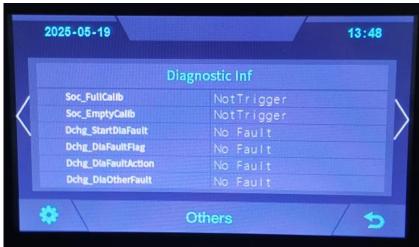


6.7.2 Insulation Resistense



6.7.3 Diagnostic Information

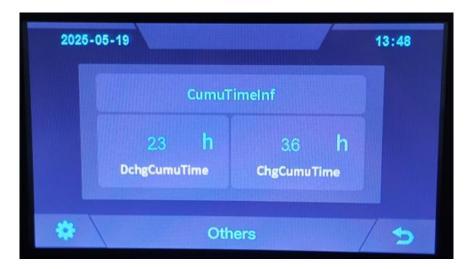








6.7.4 Cumulative Time Information



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: Hmi_V5.0.3

HDW:

SN : CPU0DEVICEID

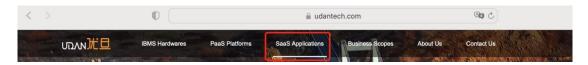


7. Xiaodan Energy Storage App

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

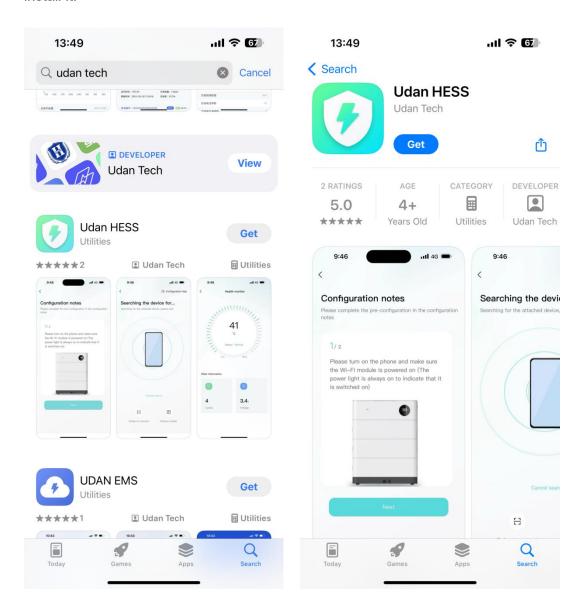


APP download



7.1.2 iOS version

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

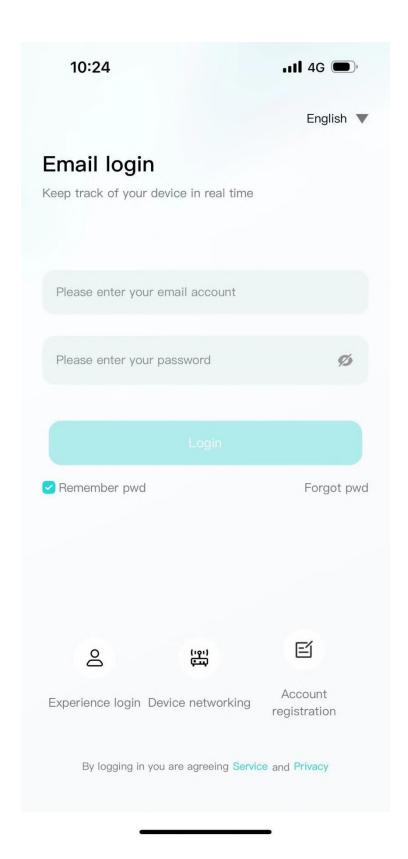


7.2. Log in and register

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



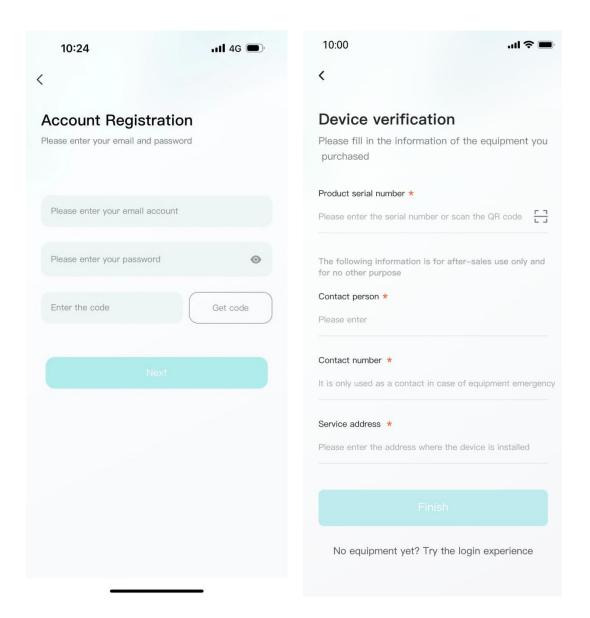


7.2.2 Register

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



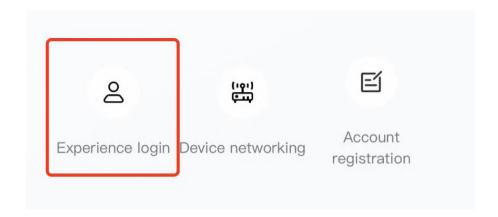
• Currently, you can register with an email account. After registration, you need to go through the device verification process and enter the device SN code or device QR code for identification.



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.



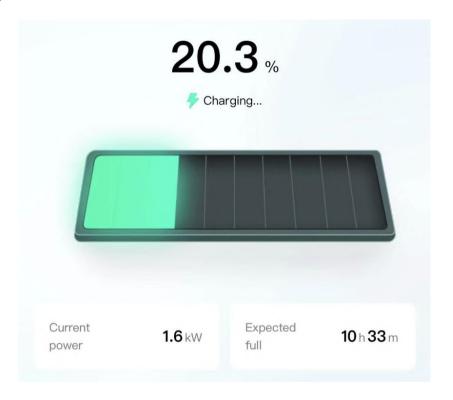


• The top area displays the device name, battery energy, and message entry.





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



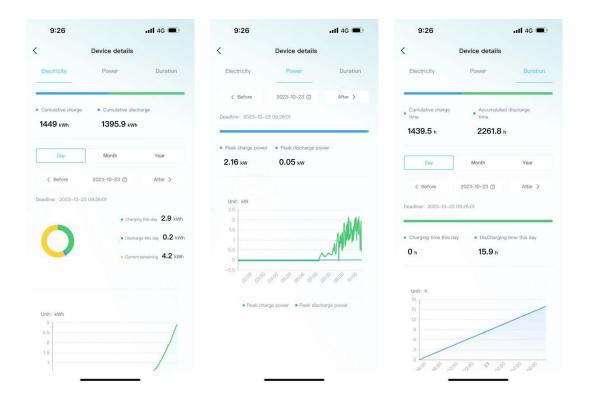
• The bottom area: Displays the device battery, charging time, and health check overview data of the day in the form of a card. You can click the corresponding card to view the details.





7.4.2 Data details

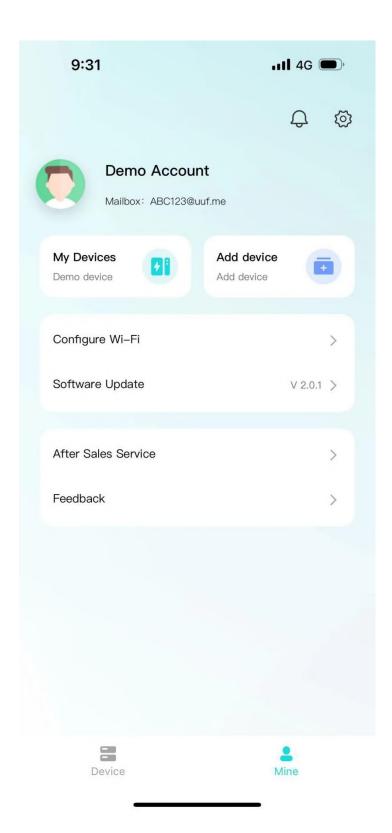
Display the data details of the current device, and view the battery, charging and discharging power, and charging and discharging time data separately, and support time filtering.



7.4.3 Mine

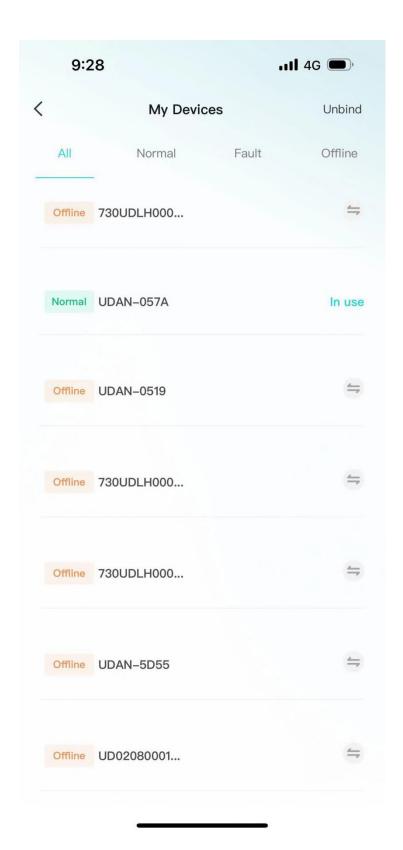
My page allows users to view my devices, add devices, configure WiFi, software updates, after-sales services, problem feedback, app settings.





• 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.

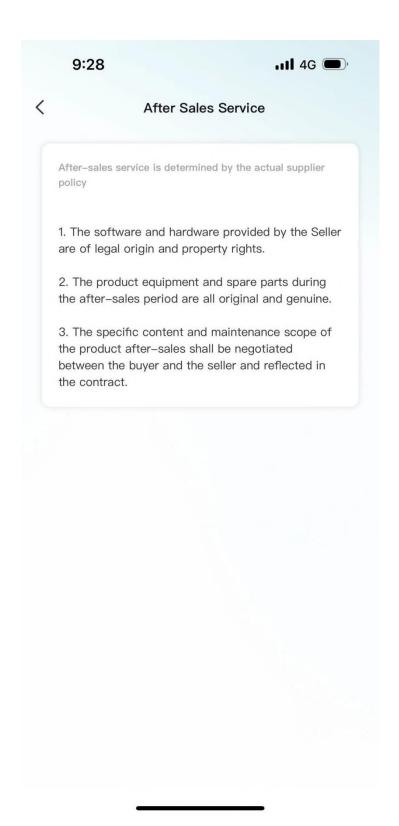






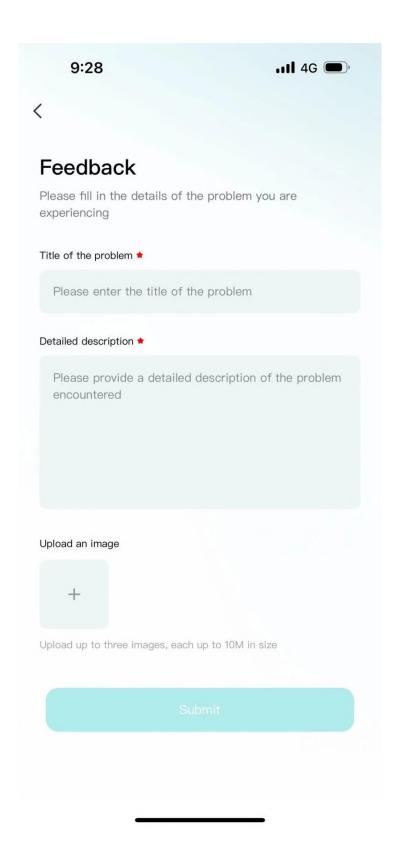
- After clicking "software update", it will enter the version detection. If there is a new version, it will be updated.
- Click "after-sales services" and enter the after-sales services page to display the after-sales services declaration of the current supplier.





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



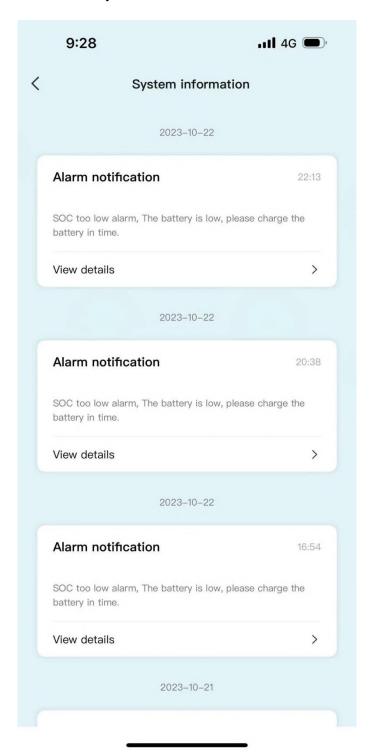


7.4.4 Message

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.

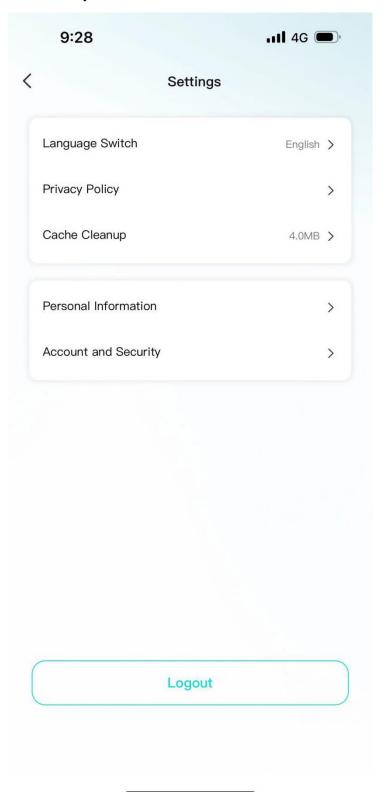


7.4.5 App settings

• 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



- * 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.

M 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 | Check the cleanliness of the electric cabin and battery cabin of the energy storage system, and clean them in time. 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 | Check whether the terminal of main circuit is in poor connection and whether the screws is overheating. Check whether the screws of control end are loose, if so, tighten them with a screwdriver. Check whether there is any color change of the wiring copper bar or screw. Check whether there is scratch on the cable in contact withthe metal surface, if so, please maintain it in time. Check whether the insulating wrapping tape of the cable terminals is off, if so, please tie it up in time. Check whether the cable connection is loose, and tighten it again according to the specified torque. | Every three months once |
| Component maintenance | Check the corrosion condition of all metal components. Annual inspection for contactors (auxiliary switches, breakers and micro breakers). Ensure them with good mechanical operation. 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. |
| | 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 |



| Chack whather the door | locks etc. of each door panel of the energy | |
|---|--|---------------------------------------|
| Door lock | nal and in good condition. If necessary, | Every half year once |
| loose, and whether the Check whether there is grounding. Check whether the fan a is any foreign matter bloabnormal vibration duri 4. Check whether there whether there is leakage cracking and deformations. Check whether the base (press the thimble at the continues to come out, be replaced. Liquid cooling unit 6. 1) Acidity and alkalini need to prepare PH test the PH value is lower the (recommended to test of year). 2) When the service life to be replaced. The above 1) and 2) repronditions achieved first coolant recharge or replaced. If there is any abnotime to avoid temperature energy storage system. There is no need to power. | is leakage in the water circuit system; in the connectors and whether there is in the hoses. Illoon of the expansion tank is damaged inflatable place by hand, if the water then it is damaged), and the balloon needs to be test: check the PH value of the coolant, if an 7, then the coolant needs to be replaced; ince a of the coolant reaches 10 years, it also needs accement conditions are based on the please contact the manufacturer for | 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



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 |



| | 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 | |
| Maintenance for | 45 ℃ . | |
| | 4. For the temporarily unused battery pack, regular recharge it within | Once every three |
| battery | three months. | to six months |
| pack | 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. | |

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 $40\%\sim50\%$ 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.



1 Attention

 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!







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