SUNKET -ESS

# SKTESS215-100K

## All-in-one

## Air Cooling Commercial & Industrial Energy Storage System


## User Manual V2.0

## Copyright



## Notice

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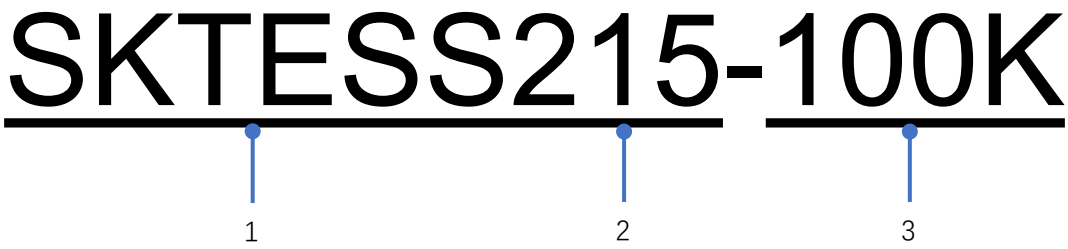
## Overview

This document describes how to install, connect, commission, and troubleshoot our new SKTESS215-100K Battery Energy Storage System (hereinafter called '**BESS**'). Please read this manual carefully to get familiar with the safety instructions and functions, and features of BESS before installing and using the energy storage system.

### Model description




| No. | Definition | Description |
|---|---|---|
| 1 | Product name | SKTESS: Battery energy storage system produced by Sunket |
| 2 | Battery capacity | 215: Indicate that the battery nominal capacity is 215kWh |
| 3 | Power | 100K: Indicate that the rate power of the PCS is 100kW |

## Target Audience

This manual is intended for operators and engineers in power plants.

## Symbol Conventions

In this document, the following symbols that may exist herein mean as below.

| Symbol | Description |
|---|---|
| Danger! | A high-risk hazardous situation which, if not avoided, will result in death or serious injury. |
| Warning! | A medium-risk hazardous situation which, if not avoided, could result in death or serious injury. |
| Caution! | A low-risk hazardous situation which, if not avoided, could result in minor or moderate injury. |
| Notice! | Provides tips for the optimal operation of the product. |

# Revision History

The revision history summarizes descriptions of each document update. The latest issue of the document contains all changes made in previous issues.

**Version 1.0　(2025-08-11)**

Initial release.

**Version 2.0　(2025-11-21)**

Add EMS Screen.

# Table of Contents

## 1.1 General Safety

Before transporting, storing, installing, operating, using and/or maintaining the device, please carefully read and understand this document, and strictly follow the instructions and safety precautions given herein, as well as symbols affixed on the device. The safety instructions herein are only supplements to local laws and regulations.

The operator should not only abide by all safety precautions provided in the document, including but not limited to the 'Danger!', 'Warning!', 'Caution!', and 'Notice!' signs, but also comply with relevant international, national and local laws, regulations, standards, guidelines and industry rules in the process of transportation, storage, installation, operation, and maintenance. **Sunket** will not assume any responsibilities for the loss caused by improper operation, or violation of safety standards for design, production and equipment suitability.

**Sunket** will not be liable for maintenance for possible device failure, device malfunction, or parts damage, nor will the company assume any liability to pay compensation for the possible physical and property damage resulting from the installation environment that does not meet the design requirements.

The device is well designed and tested to meet all applicable state and international safety standards. However, like all electrical and electronic equipment, safety precautions must be observed and followed during the installation of the device to reduce the risk of personal injury and to ensure a safe installation.

**Sunket** will not assume any responsibilities if any of the following circumstances occur, including but not limited to:

- Device damage due to force majeure, such as earthquake, flooding, thunderstorm, lightning, fire hazard, volcanic eruption, war, typhoon, tornado, etc.
- Device damage due to human cause.
- Device used or operated against local policy or regulations.
- Failure to follow the operation instructions and safety precautions on the product and in this document.
- Installation and use under improper environment or electrical condition.
- Unauthorized modifications to the product or software.
- Device damage caused during transportation by the customer or the third party.
- Storage conditions that do not meet the requirements specified in this document.
- Use of incompatible devices.
- Installation and commissioning operated by unauthorized personnel who are not licensed and /or satisfy state and local jurisdiction regulations.

## 1.2 Personal Safety

Only qualified personnel can operate the equipment, including transportation, transfer, installation, cable connection, and maintenance. Wear personal protective equipment that meets local safety protection requirements while operating the equipment.

Operators must receive the relevant training and pass the examinations of the Company and have professional knowledge of the energy storage system.

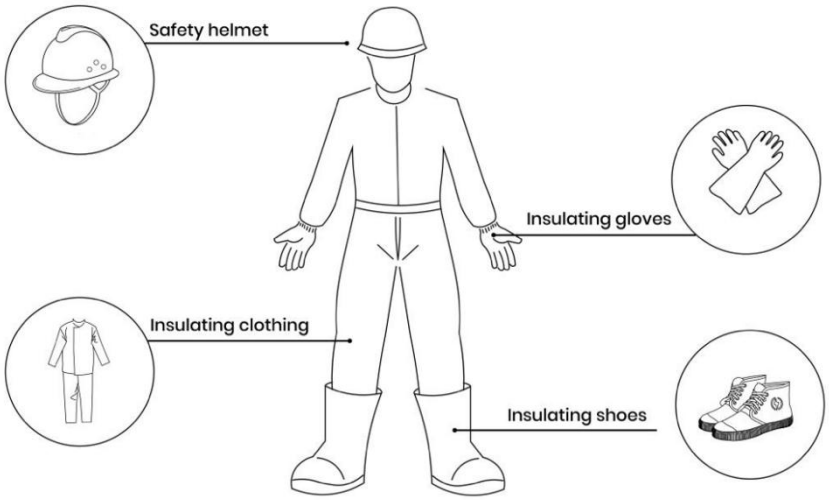



**Figure 1-1** Wearing method of PPE

For qualification requirements, refer to your local laws and regulations and industrial standards.

Do not wear conductive objects such as watches, bracelets, rings, and necklaces during installation, operation, and maintenance to avoid burn injury due to electric shock.

Transport, transfer, install, connect, and maintain the system in strict accordance with the laws, regulations, and related standards of your country or region.

Keep familiar with the compositions and working principles of the energy storage system and operate the equipment according to the User Manual.

## 1.3 Electrical Safety

| **Danger!** |
| --- |
| • Please make sure that the unit is free from any damage before the electrical connection.<br>• Do not modify, change, or dismantle the device, do not change the power-on and power-off sequences and the installation procedure written in the document, and please properly and correctly operate it.<br>• Do not power on the device during installation. Otherwise, it may cause a fire, personal injury, or device damage.<br>• Must remove earrings, rings, bracelets, watches, and any other metal jewelry before operation, to avoid electrical shock, burns, or even death.<br>• During operation, special insulated tools must be used to avoid electric shock or short circuit failure. The insulated tools' voltage ratings must exceed the system voltage ratings. |

**Warning!**

- Please wear PPE, such as, protective clothing, insulating shoes, goggles, safety helmets, insulating gloves, etc., when conducting electrical wiring.
- Do not touch the power supply equipment directly, or through conductors or damp objects.
- Do not touch the parts of the equipment of which warning signs are attached, to avoid personal injury or device damage.

**Caution!**

- Do not power on the device until it has been installed and confirmed by professionals.
- In the event of a fire, evacuate immediately and call the local fire services.

**Notice!**

- Please operate according to the safety code for power station.
- Before installation, it is necessary to set up temporary safety fences or warning lines and hang warning signs in the operation area, to prohibit non-staff from entering here.
- Please make sure that the equipment and its associated switches are off before connecting and disconnecting power cables.

- Please check whether the protective housing and insulating sleeve for an electrical component have been installed correctly after finishing installation, to avoid electric shock.
- Must turn off the output switch of the power supply equipment when maintaining its electrical terminal device and power distribution device.
- If the device is required to be powered off during troubleshooting and diagnosis, please do as the following procedure: power off > electricity testing > connecting grounding cable > hanging warning signs and setting up guardrails.
- Must hang up “Do Not Switch On” warning signs on the relevant switches or circuit breakers before completing maintenance, to prevent power connection. Do not switch on before the fault is solved.
- Do not use water, alcohol, oil, or other solvents when cleaning electrical components inside and outside the device.

**Grounding Requirements:**

- The device's grounding impedance shall meet the requirements of local electrical safety standards.
- The equipment shall be permanently connected to a grounding wire within the building’s electrical system. Please check whether the device is reliably grounded before operation. The grounding cable should be removed last while dismantling and maintaining the device.
- Do not start the device if it is not fitted with a grounding conductor.
- All acts against the grounding conductor are prohibited.
- If the device is equipped with a three-pronged socket, make sure that the ground prong is reliably grounded.
- For the device that may generate large contact currents, please make sure that the grounding terminal on the housing has been grounded before powering on, to avoid electric shock.

**Cable Requirements:**

- When deciding the wire diameter, and connecting or wiring cables, follow the local laws, regulations, and codes to ensure safety.
- When external conditions (e.g., placement method, ambient temperature, etc.) change, the cable type must be verified according to IEC-60364-5-52 or local laws, regulations and

standards.

- Before connecting power cables, please make sure that the cable labels are correctly labelled and the cable terminals are well insulated.
- Do not loop and twist cables while conducting electrical wiring. If the length of the power cable is not enough, please replace it instead of joining or welding. Ensure that all the cables of the correct type and size are fully connected and well insulated, and the edges of cable slots and crossing holes are smooth.

- Please use fireproof mud to seal the threading openings immediately after finishing wiring, to avoid the entry of water vapor or small animals.
- Cables should be kept away from heaters or other heat sources, because a high temperature environment may result in aging and damage to cable insulation.

## 2.1 System Description

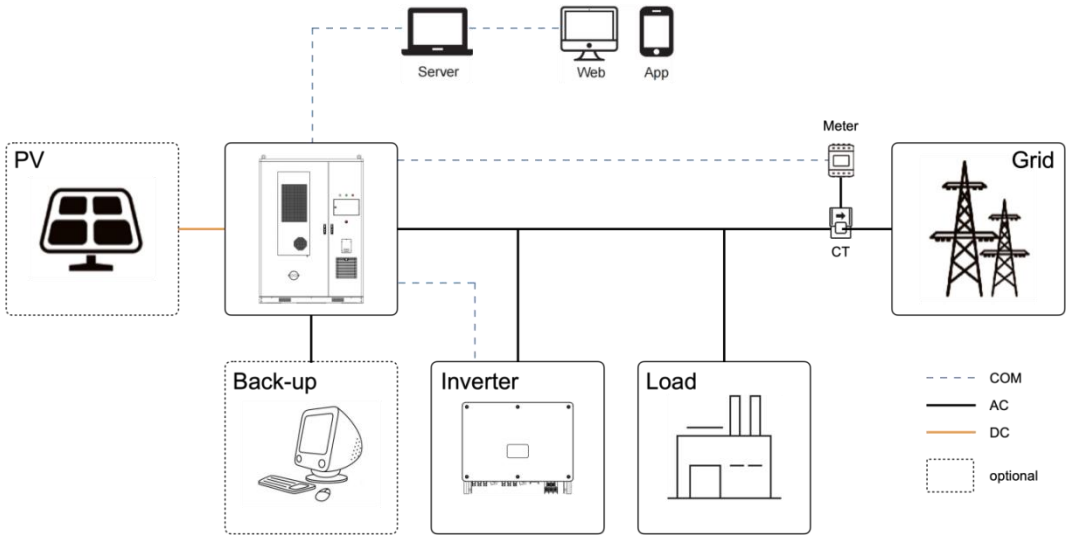



**Figure 2-1** System overview diagram

**Notice!**

- The DCDC module efficiently connects solar panels to the DC bus, support PV in DC Coupled Hybrid.
- When the utility power is interrupted, the STS automatically disconnects and notifies the PCS of the power outage. The PCS provides power to the back-up load within 20ms.

**Table 2-1** System item description

| Item | Description |
|---|---|
| BESS | SKTESS215-100K is an "ALL-IN-ONE" intelligent outdoor energy storage system. |
| Meter/CT | The meter/CT is used for import / export or consumption readings, and manages the battery charge / discharge accordingly for smart energy management applications. |
| Grid | 400 V / 230 V and 380 V / 220 V grid are supported. |
| PV (optional) | Add DCDC modules, converts the direct current (DC) generated by solar panels into alternating current (AC), or boost PV strings for battery charge. |
| Back-up (optional) | Add STS module, system will support on/off grid switching. |
| Server | EMS is an intelligent, multifunctional monitoring platform that can be accessed either remotely or through a hard-wired connection. With the EMS, the operators and installers can always view key and up-to-date data. |

## 2.2 Product Introduction

The product is an outdoor all-in-one battery energy storage system cabinet, including PACK, BMS, PCS, EMS, fire protection system, air conditioning system and so on. It can be widely used in charging stations, buildings, manufacturing, and C&I scenarios.

## 2.3 System Appearance

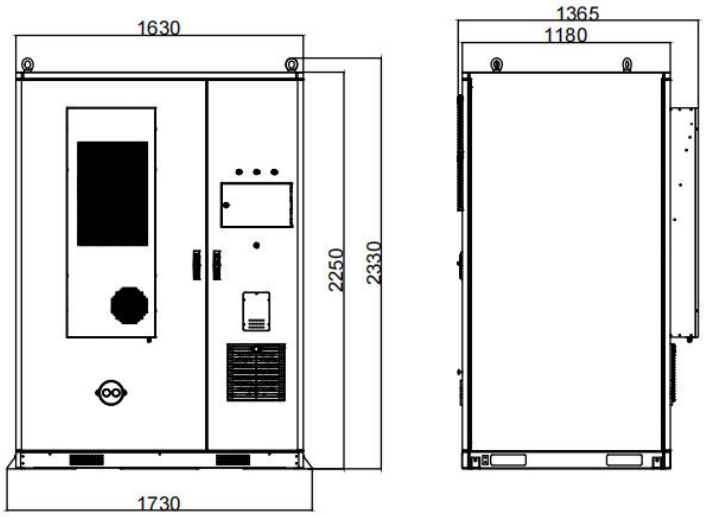



**Figure 2-2** Appearance and dimensions

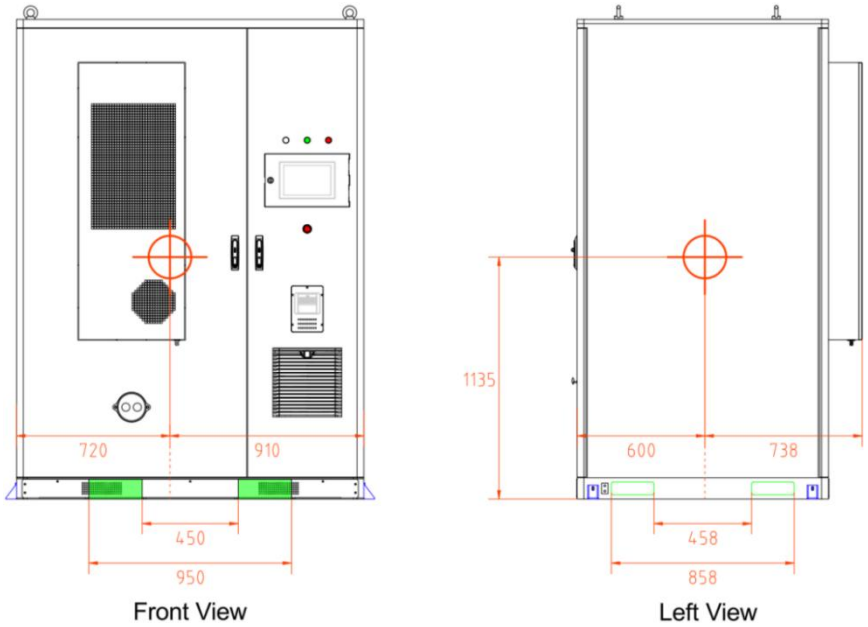



**Figure 2-3** Fork position dimensions

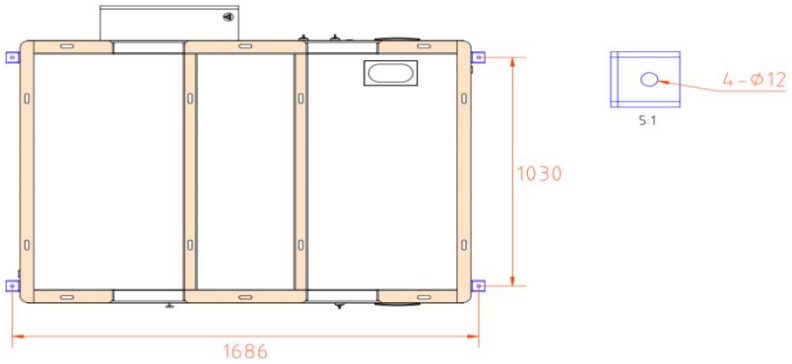



**Figure 2-4** Angle supports position dimensions

## 2.4 Part Description

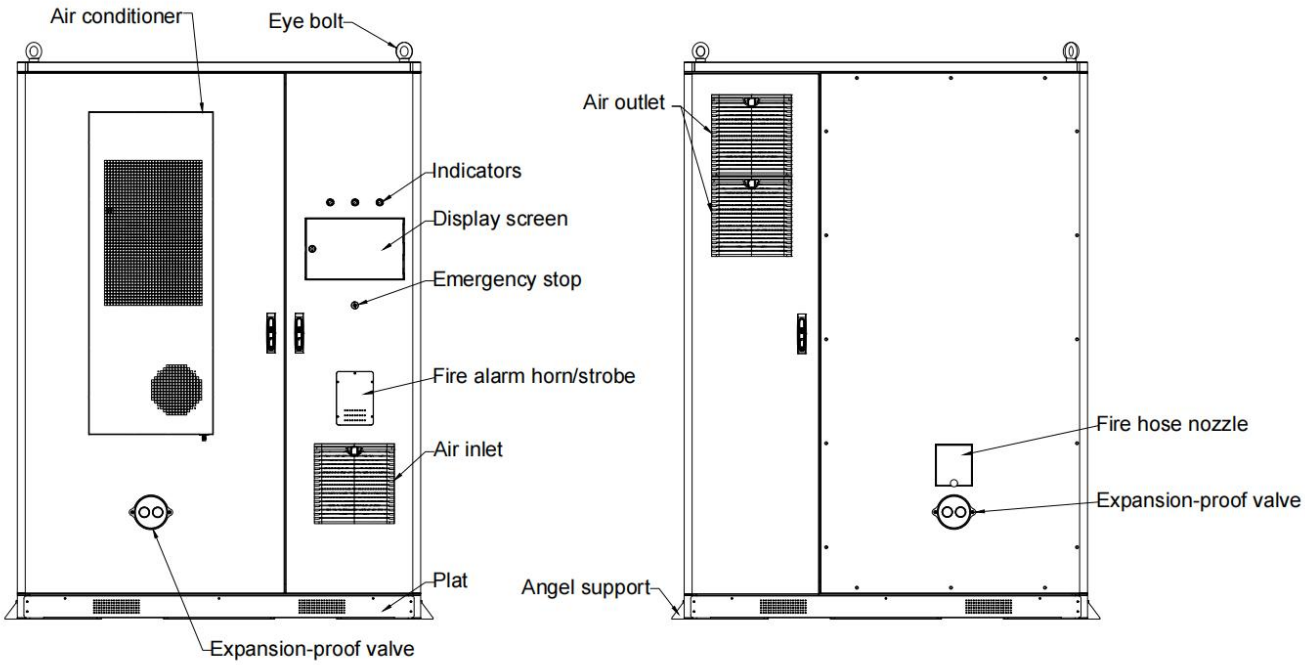



**Figure 2-5** Parts description (in the closed state)

**Table 2-2** Parts description

| Item | Qty | Description |
|---|---|---|
| Air conditioner | 1 | Energy storage system air conditioner. |
| Expansion-proof valve | 1 | To exhaust the combustible gas out of the cabinet. |
| Eye bolt | 4 | Material lifting applications. |
| Indicators | 3 | To display status information of all processes running on the system. |
| Display screen | 1 | To display information of the whole system. |
| Emergency stop | 1 | To shut down the system in emergency circumstances. |
| Fire alarm horn/strobe | 1 | Generates alarms for internal devices when abnormal temperature or smoke occurs. |

| | | |
|---|---|---|
| Air inlet | 1 | Dust-filtering ventilation louver with rainproof design. |
| Plat | 2 | Baffle. |
| Air outlet | 2 | To exhaust the hot gas out of the cabinet. |
| Angel support | 4 | To support the cabinet. |
| Fire hose nozzle | 1 | To connect the water supply sources. |
| Expansion-proof valve | 1 | Allow fresh air to enter the cabinet. |

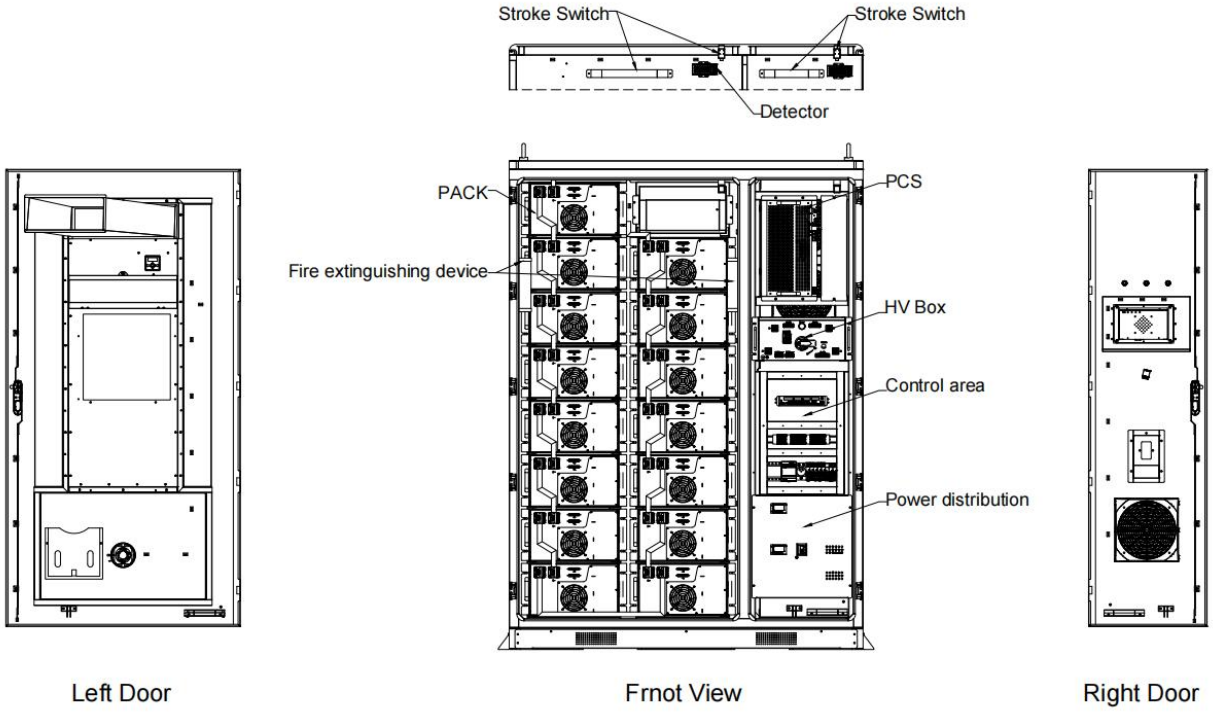



**Figure 2-6** Parts description (front opened state)

**Table 2-3** Parts description

| Item | Qty | Description |
|---|---|---|
| PACK | 15 | Battery pack. |
| PCS | 1 | Power Conversion System. |
| HV Box | 1 | Control the charge and discharge of packs. |
| Control area | 1 | Including IO module, EMS, etc. |
| Power distribution | 1 | To distribute AC power for the energy storage system. |
| Fire extinguishing device | 2 | To control or suppress the spread of fire. |
| Stroke Switch | 1 | Lighting when door opened. |
| Stroke Switch | 1 | Lighting when door opened. |
| Detector | 1 | To detect smoke, temperature, CO, VOC. |

## 2.5 Main Modules

### 2.5.1 Pack

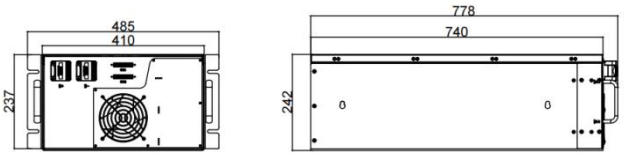



**Figure 2-7** Pack appearance and dimensions

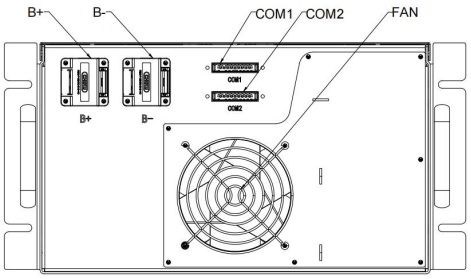



**Figure 2-8** Part description

**Table 2-3** Part description

| Item | Description |
|---|---|
| B+ | To connect positive terminal of high-voltage box or battery pack. |
| B- | To connect negative terminal of high-voltage box or battery pack. |
| COM1 | To connect communication cable. |
| COM2 | To connect communication cable. |
| FAN | To keep components cooling in the cabinet. |

**Table 2-4** Technical Specification

| Technical Specification | Pack |
|---|---|
| Cell capacity | 3.2V / 280Ah |
| Cell material | Lithium iron phosphate |
| Cell string | 1P16S |
| Rated voltage | 51.2V |
| Operating voltage range | 45~57V |
| Nominal capacity | 14.336kWh |
| Charge and discharge rate | <0.5C |
| Cooling mode | Forced air cooling |
| IP rating | IP20 |
| Balancing mode | Passive cell balancing |
| Dimensions (H x W x D) | 242 x 485 x 778mm |
| Weight | <110kg |

### 2.5.2 High-voltage Box

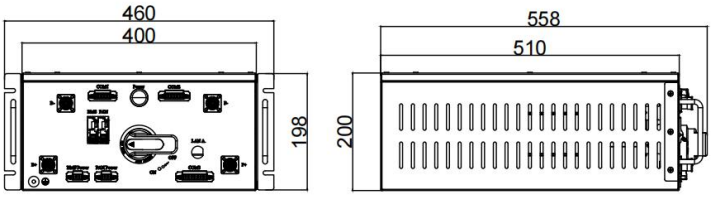



**Figure 2-9** High-voltage box dimensions

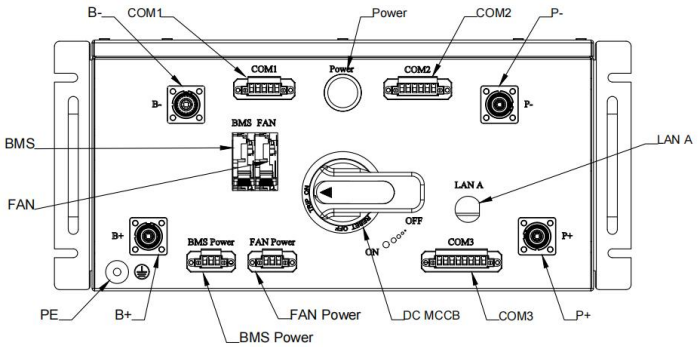



**Figure 2-10** Part description

**Table 2-5** Description of front panel

| No. | Item | Description |
|---|---|---|
| 1 | PE | Ground connection point. |
| 2 | B+ | To connect battery pack’s positive terminal. |
| 3 | B- | To connect battery pack's negative terminal. |
| 4 | BMS Power | To connect AC/DC power supply for BMS. |
| 5 | BMS | AC power breaker of BMS. |
| 6 | FAN Power | To connect AC/DC power supply for fans. |
| 7 | FAN | AC power breaker of pack fans. |
| 8 | DC MCCB | A switch for DC side. |
| 9 | COM1 | To connect BMUs' communication port. |
| 10 | COM2 | To connect packs' fans port. |
| 11 | COM3 | To connect PCS's communication port. |
| 12 | LAN A | To connect EMS's communication port. |
| 13 | P+ | To connect PCS's positive terminal. |
| 14 | P- | To connect PCS's negative terminal. |
| 15 | Power | To display the power status of BMS. |

**Table 2-6** Technical Specification

| Item | Technical Specification |
|---|---|
| Rated voltage | 1000V |
| Rated current | 250A |
| IP rating | IP20 |

### 2.5.3 PCS

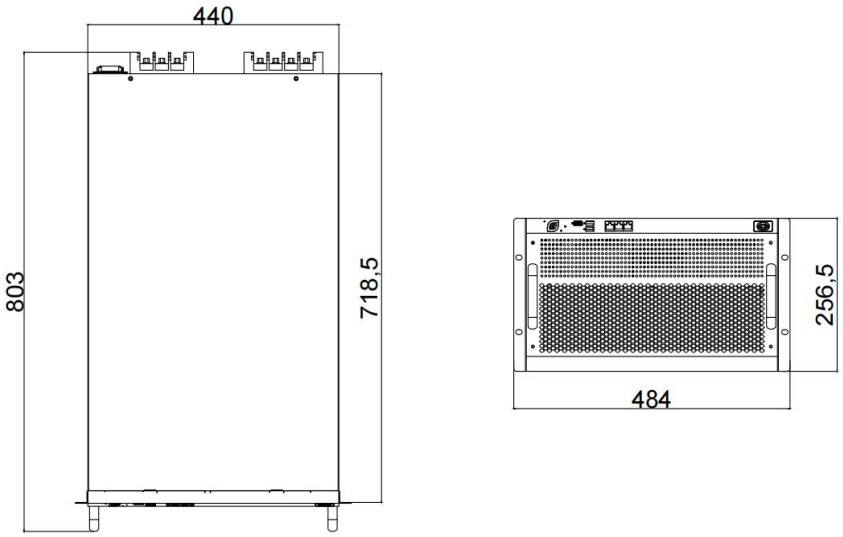



**Figure 2-11** PCS appearance

**Table 2-7** Technical Specification

| Item | Technical Specification |
|---|---|
| Rated power | 105kW |
| Max. apparent power | 115kVA |
| DC operating voltage range | 650~950V |
| Max. DC current | 170A |
| Rated AC voltage | 400V±10% |
| Rated frequency | 50/60Hz±5 |
| Rated AC current | 151A |
| Overload capacity | 110% long-term |
| AC voltage harmonics | <3% (linear load) |
| Altitude | <4000m (>2000m derating) |
| Operating temperature | -20~55 ˚C (>45˚C derating) |
| Cooling mode | Forced air cooling |
| IP rating | IP20 |
| Dimensions (H x W x D) | 255 x 485 x 705mm |
| Weight | <50kg |

### 2.5.4 Controller

Controller is a energy storage battery management system. It collects real-time data and fault information on the battery pack and implements fault protection and pick-up control. It also collects real-time operation data of the PCS and implements power control and fault protection. Controller can be used with a HVAC unit and a firefighting unit, and you can configure multiple control policies to guarantee the stable operation of the system.

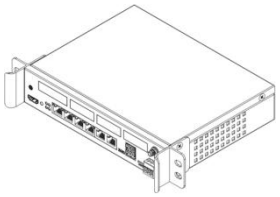


**Figure 2-12** Controller appearance

### 2.5.5 Air conditioner

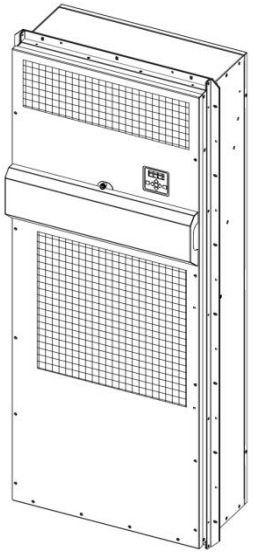


**Figure 2-13** Air conditioner appearance

**Table 2-8** Technical Specification

| Item | Technical Specification |
|---|---|
| Power specifications | AC 220V±15%, 50/60Hz |
| Sensible cooling capacity (L35 L35) | 3000W |
| Heating capacity | 2000W |
| Rated power | 1100W |
| Air volume | 700$m^3$/h |
| Refrigerant | R134a |
| Operating temperature range | -30~55˚C |
| IP rating | IP55 |
| Dimensions (H x W x D) | 550 x 250 x 1350mm |
| Weight | 66kg |

### 2.5.6 Fire extinguishing device

Aerosol fire extinguishing device adopts temperature-triggered startup mode. The combustion of the heat-sensitive wire activates the aerosol generating agent in the device. The heat released by the redox reaction of the agent decomposes the chemical coolant, enable the agent and the coolant to participate in fire extinguishing.

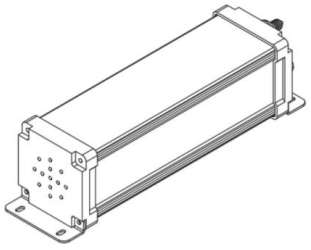


**Figure 2-14** Fire extinguishing device appearance

### 2.5.7 Detector

The detector integrates smoke, temperature, CO, and VOC measurement parameters in a highly integrated manner. It has a wide range of applications and can comprehensively detect and analyze the thermal runaway characteristics of lithium batteries.

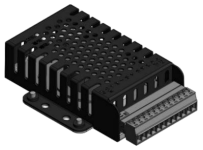


**Figure 2-15** Detector appearance

### 2.5.8 Expansion-proof valve

Pressure-activated venting system which can automatically releases internal gas/smoke upon detecting overpressure or smoke, preventing explosions in energy storage enclosures.

**Figure 2-16** Valve appearance

### 2.5.9 Fan

**Figure 2-17** Fan appearance

**Table 2-9** Technical Specification

| Item | Technical Specification |
|---|---|
| Power specifications | AC 220V+10%, 50/60Hz |
| Power Consumption | 120W±10% |
| Speed | 2550RPM±10% |
| Max. air flow | 1098CFM±10% |
| Dimensions (H x W x D) | 280 x 280 x 80mm |
| Weight | 2.8kg |

### 2.5.10 Adjustable Temperature Control Switch

When the temperature reaches the preset threshold, the switch automatically connects the circuit, enabling the cooling fan to start.

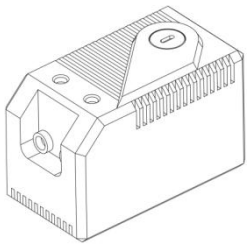


**Figure 2-18** Switch appearance

## 2.6 Operating Principle

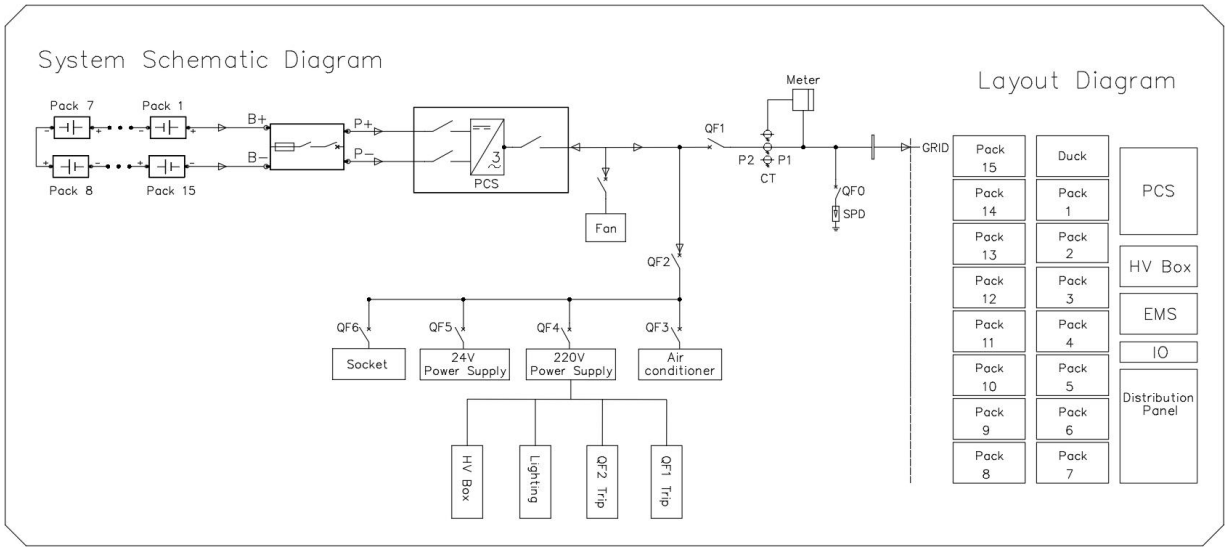



**Figure 2-19** Electrical Block Diagram

**Notice!**

- In an off-grid situation, the current will vary due to the types of electrical loads. The common electrical load can be classified into following types, resistive load, inductive load, capacitive load, half-wave load, etc. Therefore, the types of electrical loads shall be fully considered when designing and configuring a system. In the case of an uncertain electrical load, please contact the supplier for evaluation of output supply to special loads.

## 2.7 Work States

There are five states for the energy storage system including running, shutdown, fault, standby, and offline.

**Table 2-10** Five States

| State | Description |
|---|---|
| Running | The energy storage system stores external direct current into battery or discharges electric energy to outside units. |
| Shutdown | The energy storage system stops charging and discharging and powers off battery packs. |
| Fault | The equipment is faulty when a fault is detected. |
| Standby | The equipment is in standby mode. |
| Offline | The EMS is disconnected from the display screen. |

## 2.8 Symbols

**Table 2-11** Symbol description

| Symbol | Description |
|---|---|
|  | CE mark of conformity. |
|  | Protective grounding point. |
|  | Grounding point. |
|  | Caution, hot surface.<br>The enclosure temperature may be high while running. Therefore, do not contact to avoid scalding. |
|  | Danger, electric shock.<br>Do not touch the device after it is powered on. Otherwise, an electric shock may occur. |
|  | Danger.<br>Due to possible risks, do not touch the device after it is powered on. |
|  | Observe enclosed documentation. |
|  | The device cannot be disposed together with the household waste. |

| | |
|---|---|
|  | Do not operate the system until it is isolated from mains and battery. |
|  | Danger of high voltage.<br>Do not touch live parts for 15 minutes after disconnection from the power sources. |
|  | The battery system must be disposed of at a proper facility for environmentally safe recycling. |
|  | The battery module may explode.<br>The rechargeable battery can become hot during operation. Avoid touch during operation. |
|  | Keep the device away from children. |
|  | Keep the device from open flames or ignition sources. |

## 3.1 Transportation Requirements

**Danger!**

- Please be careful to avoid physical collisions during transportation. Do not place the equipment upside down, be exposed to water, etc., which may result in equipment damage, or even a fire or an explosion.

**Notice!**

- Please strictly comply with the transportation requirements of the warning signs on the packaging and equipment.
- The tilt angle of the cabinet should be ≤10° while transporting and moving it.
- To reduce product damage caused by shocking, tilting or impacting during transportation, it is recommended to consider sea or road (with better conditions) transport instead of rail and air transports.
- Relevant qualifications for the transport of dangerous goods must be obtained by the forwarding agent engaged in such businesses, and they must strictly abide by the local regulations for the transport of dangerous goods. Please check the battery before transportation. If a battery leaks, smells, or is damaged, do refuse to transport it.

### 3.1.1 Forklift

- Please confirm that the forklift's load-bearing capacity shall be ≥ 3 t before using it.
- The forklift should meet the following requirements: length of fork blade > 1.2 m, width of fork blade between 60 cm and 160 cm, and thickness of fork blade between 25 cm and 70 cm.
- Before moving the device, please pay attention to the center of gravity position of the load, and fully secure the load on the forklift by securing measures, such as ropes or bindings. In addition, please designate a person to supervise for safety concerns during transportation.
- Before unpacking, please accurately insert the fork blade into the fork holes on the carton when moving the device.
- The equipment can only be transported by forklift before unpacking.

### 3.1.2 Hoisting

- A hoist operator with good operational skills and safety awareness, who must be trained and certified, shall be operated according to the local laws and regulations.
- After unpacking, the following requirements must be met when working with cranes and lifting ropes: crane hoisting capacity ≥ 5t, hoisting operating radius ≥2 m.
- Before hoisting, please check:

  » Lifting tools are complete, tested and fully secured.

  » The device door is closed and locked to avoid accidental opening.

» The lifting rope's quality must meet standards, and it shall be fully secured, to avoid falling and fraying.

- Do not hoist outdoors in rain, snow, wind and other bad weather.
- It is recommended to hoist devices in sequence and to ensure that the hoist moves in the same direction.

## 3.2 Storage Requirements

### 3.2.1 Cabinet Storage

- For long-term storage, do not remove the original packaging and check the packaging regularly.
- Please strictly comply with the storage requirements of the warning signs and other information on the packaging to avoid device damage.
- Storage temperature: -20°C ~ +60°C.
- Relative humidity for device storage: 5% ~ 95%.

**Notice!**

- Since the batteries have been installed in the cabinet in the factory, the storage requirements for the battery must also be abided by when storing the cabinet.

### 3.2.2 Battery Storage

**Danger!**

- The battery must be stored indoors, which the environment should meet the following requirements:
  1. Avoiding direct sunlight and keeping out of rain.
  2. Dry and well-ventilated.
  3. Keeping away from heat and fire sources.
  4. Keeping away from radiation.
  5. Keeping away from chemicals.
  6. Keeping away from dust and metal conductive dust.
  7. Being equipped with fire facilities.
- Batteries must be stored in accordance with the requirements of the warning signs and other information on the packaging.
- Do not store with any other electronic equipment, chemicals, or other items that may cause interference or danger.
- Please pay attention to the height when stacking batteries to avoid deforming or damaging the battery at the bottom.

**Notice!**

- Do not store the batteries for a long time. If long periods of storage are unavoidable, please recharge it periodically to avoid battery damage.

- Regarding with the storage information, see the following table:

**Table 3-1** Storage information

| Storage temperature range | Storage time |
|---|---|
| 50°C to 60°C | 3 months |
| 30°C to 50°C | 6 months |
| -20°C to 30°C | 12 months |

- Relative humidity for device storage: 5% ~ 95%.
- If the battery has been stored for more than 1 year, it must be checked and tested by professionals before use.

## 4.1 Installation Site Selection

The installation site is critical to the safety, service life, and performance of the device, and it should be convenient for electrical connections, operation, and maintenance. Therefore, the installation site should be selected according to the *NFPA 855 Standard for the Installation of Stationary Energy Storage Systems* and the local laws and regulations.

Type of foundation material: 1. Non-combustible materials such as solid bricks or concrete; 2. Steel.

The bottom of the foundation pit must be strengthened and filled. The surface of the foundation shall be solid, flat and level (horizontal error ≤ 3mm, tilt angle ≤ 5°).

The foundation's bearing capacity shall exceed 5 t.

A qualified drainage facility, of which the drainage capacity meets the requirements of the heaviest rain records in local history, shall be established according to the local geological conditions and municipal drainage standards.

Reserve a trench or cable entry hole during the design phase.

## 4.2 Tools Requirement

The tools used include but are not limited to the recommended tools below. Please use other auxiliary tools according to the site requirements. Please note that the tools used must comply with local regulations.


**Figure 4-1** Tools List

## 4.3 Additionally Required Materials

The following is a recommended list of equipment required for installation of the system.

**Table 4-1** Additionally required materials

| Required Material | Picture | Type |
|---|---|---|
| Grounding plate |  | Galvanized iron plate<br>Width: 40 mm<br>Depth: 4mm |
| Grid wire |  | Five-core copper cable<br>YJV 50 mm² * 4 + 25 mm² * 1 |
| Additional PE wire |  | Conventional yellow and green wire<br>BVR 50 mm² |
| Ethernet cable |  | Category-6 |

## 5.1 General

Only a qualified electrical engineer can operate related electrical connection. Please comply with the requirements given in "Safety Instructions" in this manual and we shall not be liable for casualties or property loss caused by neglect of safety instructions.

**Danger!**

- Do not touch the live parts!
- Ensure both AC and DC sides are not energized before installation. All electrical connections must be operated under de-energized condition.
- Check the polarity of all input cables to ensure that each input polarity is correct before wiring.
- Do not place the equipment on surfaces that are flammable.

**Warning!**

- The ingress of sand and moisture may damage the electrical equipment inside the ESS cabinet or affect the performance of the equipment!
- During sandstorm seasons or when the relative environmental humidity exceeds 95%, electrical connection work should be avoided.
- Wait until there are no sandstorms and the weather is clear and dry before starting any connection work.
- Avoid pulling or tugging on cables or wires forcefully to prevent damage to their insulation performance during electrical installation.

**Caution!**

- All cables and wires should be ensured to have a certain amount of bending space.
- Necessary auxiliary measures should be taken to reduce the stress on cables or wires.
- After completing each step of the wiring operation, careful inspection is required to ensure correct and secure connections.
- All electrical connections must be strictly in accordance with the wiring diagram.

## 5.2 Clearance Requirement

This equipment has multiple installation methods:

Single cabinet (see Figure 5-1)

Multiple cabinets (see Figure 5-2)

The minimum space to be reserved around the cabinet must meet the following standards.

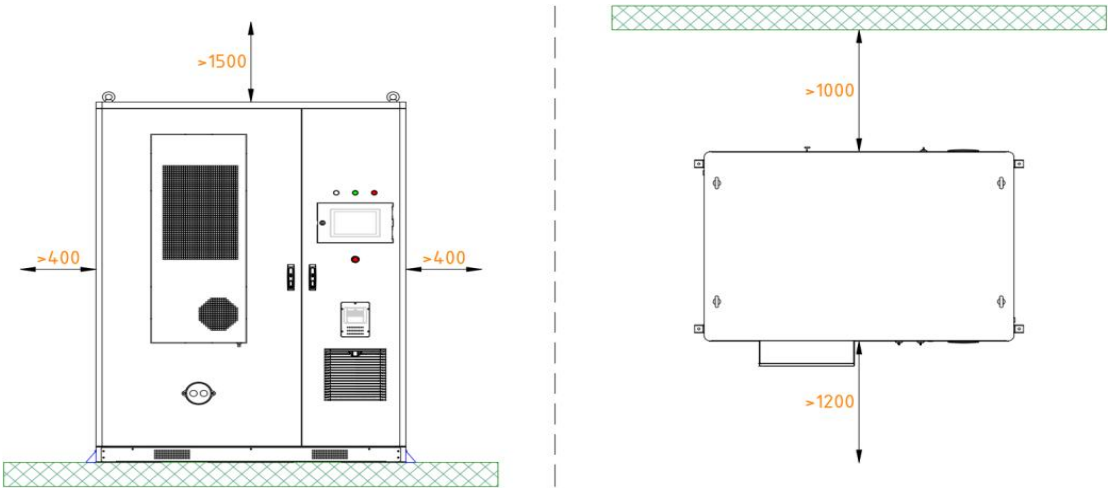



**Figure 5-1** Single cabinet

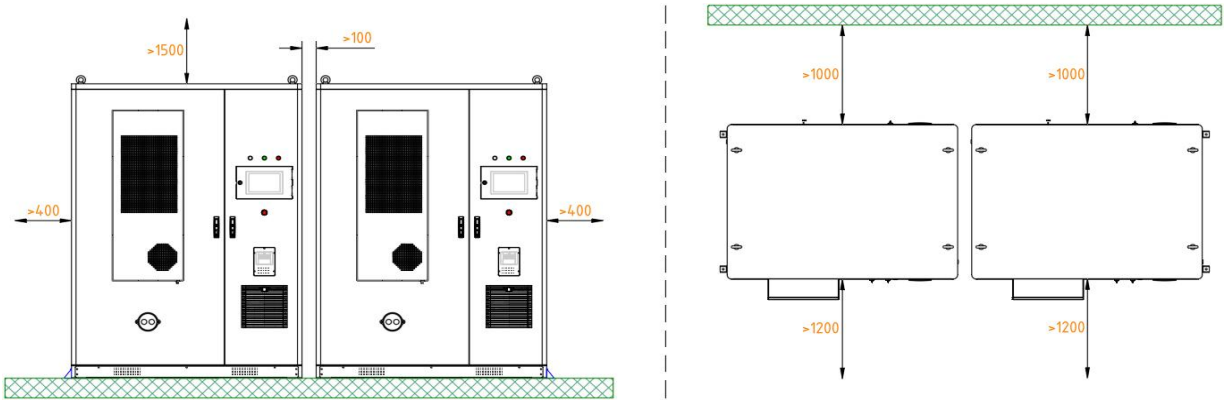



**Figure 5-2** Two and more cabinets

## 5.3 Mechanical Installation

After determining the installation site, please take out the required underground cables.

| **Warning!** |
| --- |
| • Avoid installing, operating and maintaining the device or cables outdoors under severe weather conditions such as lightning, rain or snow.<br>• The device must be installed by professionals in accordance with local regulations and standards.<br>• Before drilling, please check and ensure that the area is free of pipes, light switches, sockets, and wires, and safe to drill into.<br>• Please wear PPE, and take steps to cover the device to prevent debris from entering it while drilling holes.<br>• After drilling, clean up the site in time. |
| **Notice!** |
| • There are two ways to move a cabinet: using a crane or a forklift. |

### 5.3.1 Crane Handling

| Notice! |
| --- |
| • Temporary warning signs or fences should be set up in the hoisting area, and only the qualified persons can access it.<br>• Never stand and walk under or near the device being lifted or lowered.<br>• For safety reasons, avoid long-distance hoisting operations.<br>• Please be careful when hoisting and placing the device, and do not remove the ropes before it is seated on the foundation. Please make sure that the boom lift moves level and the cabinet's tile angle is ≤ 5° during hoisting.<br>• The angle in both the diagonal ropes shall be ≤60°.<br>• Do not lift the next one before the previous cabinet has been installed on the foundation. |

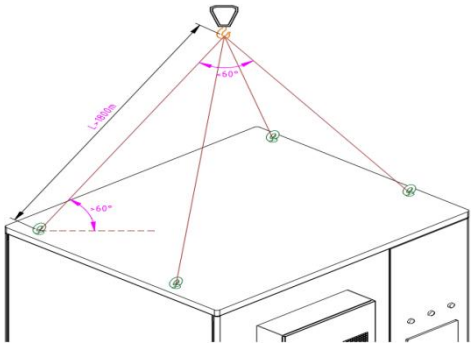


**Figure 5-3** Proper way of hoisting

### 5.3.2 Fork Hole Position

| Notice! |
| --- |
| • When using a forklift to move the cabinet, please secure it according to the actual situation to ensure that the cabinet does not pose a risk of tipping over. |

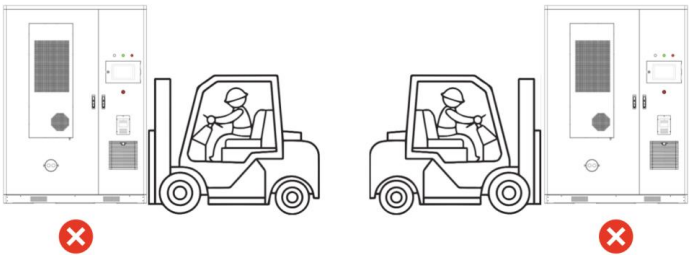


**Figure 5-4** Wrong positions

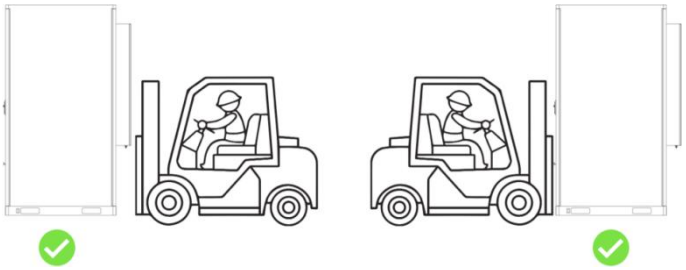


**Figure 5-5** Right positions

## 5.4 Electrical Connection

| Notice! |
| --- |
| • Before wiring, operators are required to learn which parts need to be conducted wiring. |

### 5.4.1 Grounding Connection

The equipment supports grounding plate connection and PE connection.

| Notice! |
| --- |
| • There are two GND ports on the cabinet. Either of them can be connected.<br>• The grounding plate or the PE wire, and bolts are prepared by the user self.<br>• Cross-section of the grounding plate recommends 40x4mm.<br>• Cross-section of the PE wire recommends Ø50mm$^2$. |

Insert and tighten M10 screw to secure grounding plate or PE wire (torque: 25±2 N·m).

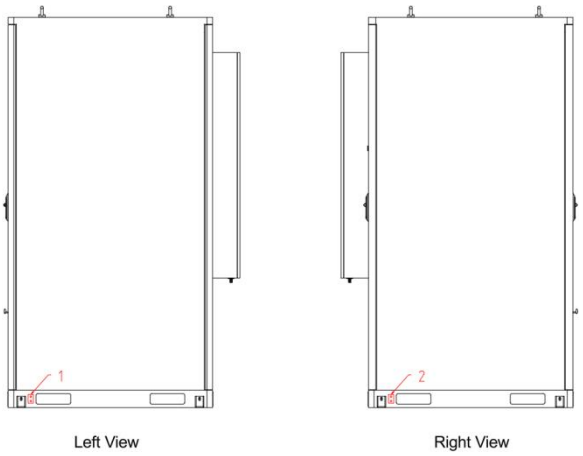



**Figure 5-6** Tightening M10 screw

### 5.4.2 Installing Battery Pack Cables

| Notice! |
| --- |
| • One ends of the battery rack output power cables are preinstalled before delivery.<br>• There are two types of copper cables delivered with the product: A (13 pcs) and B (1 pc).<br>• When installing a nut, manually insert the nut into the screw plate, and then use a socket wrench to completely secure the nut in place. This prevents the screw thread from being stuck or stripped due to the deviation of the nut position.<br>• Preinstall nuts according to the recommended torque of 6 N·m.<br>• Verify the torque of the installed nuts using a torque socket wrench set to 6 N·m.<br>• Mark the nuts whose torque has been verified using a marker. |

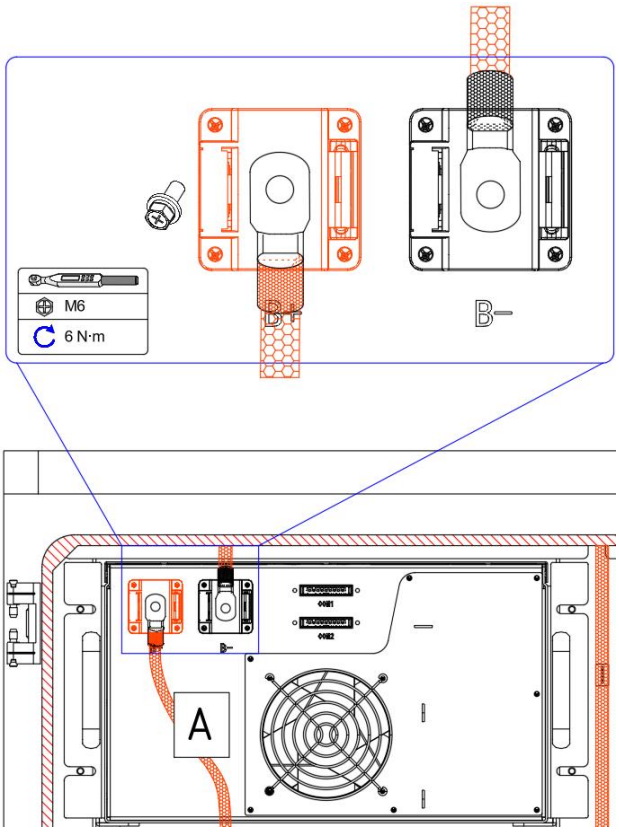



**Figure 5-7** Tightening M6 screw

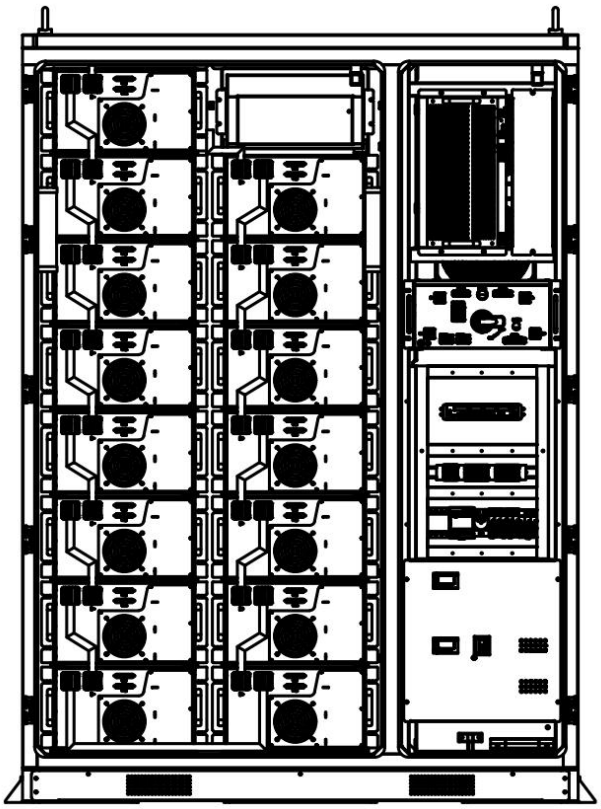


**Figure 5-8** Tightening M6 screw of rack

### 5.4.3 Grid Connection

**Step 1:** Unscrew M6 bolts to remove the cover.

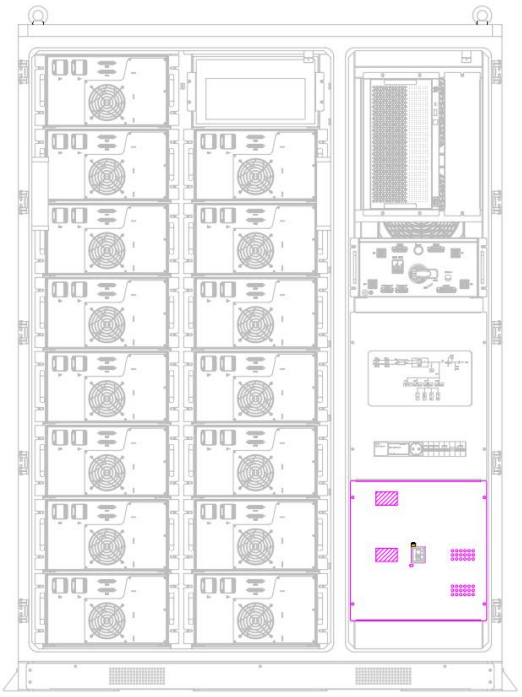


**Figure 5-9** Removing cover

**Step 2:** Insert M8 bolts to secure and connect the assembled A/B/C/N wires to the wire interface, and then tighten them.

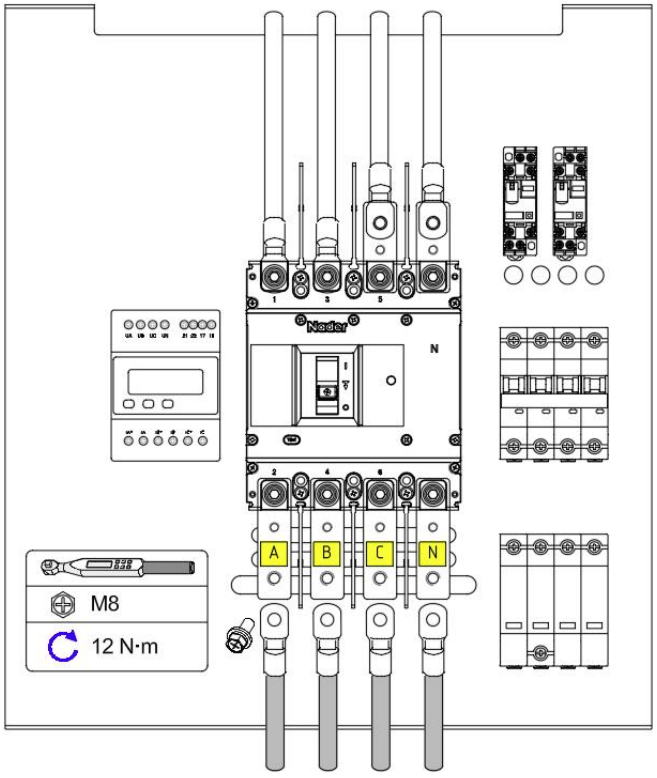



**Figure 5-10** Connect AC Cables

**Step 3:** Connect CTs and meter.

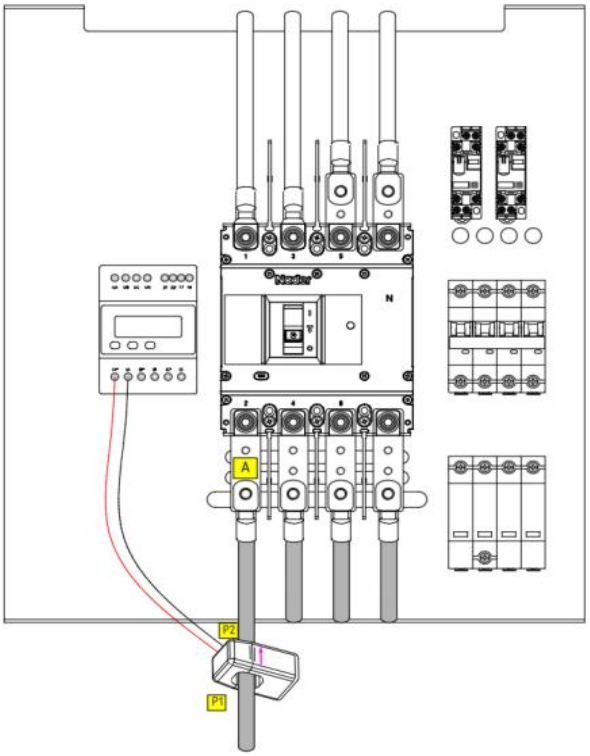



**Figure 5-11** Connect CTs and meter Cables of A phase

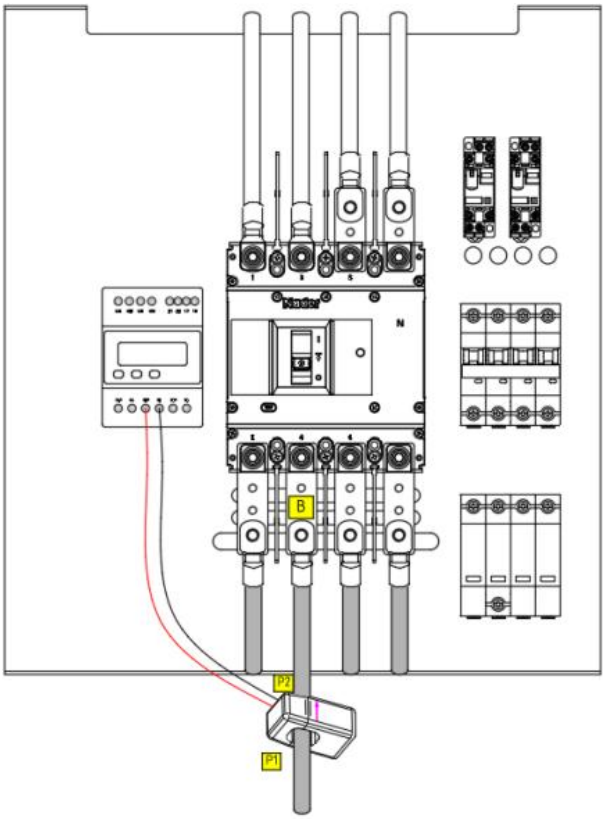



**Figure 5-12** Connect CTs and meter Cables of B phase

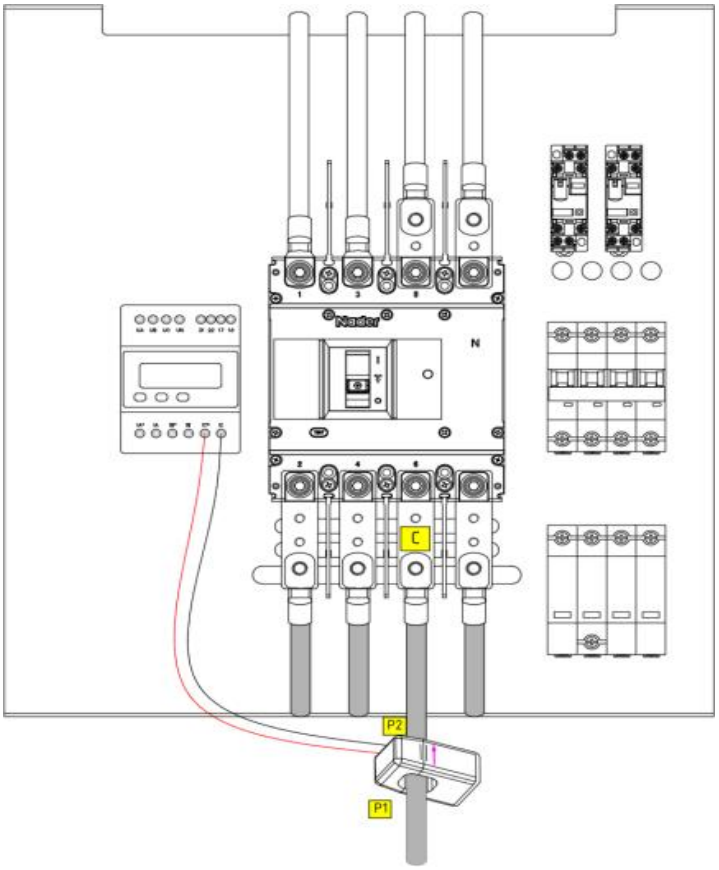



**Figure 5-13** Connect CTs and meter Cables of C phase

## 6.1 Check before Power On

Ensure that all the cables connecting to the BESS and distribution box (grid side) are wired and securely fastened.

## 6.2 Power On

| Notice! |
| --- |
| • Please check that the emergency stop button remains in the closed position before powering on. |

**Step 1:** Start the distribution box.

Flip up the ‘QF 1’ AC MCCB breaker.

Flip up the ‘QF 2’ AC MCB breaker.

Flip up the ‘QF 3’ HVAC MCB breaker.

Flip up the ‘QF 4’ AC power supply MCB breaker.

Flip up the ‘QF 5’ DC power supply MCB breaker.

Flip up the BMS and FAN MCB breaker.

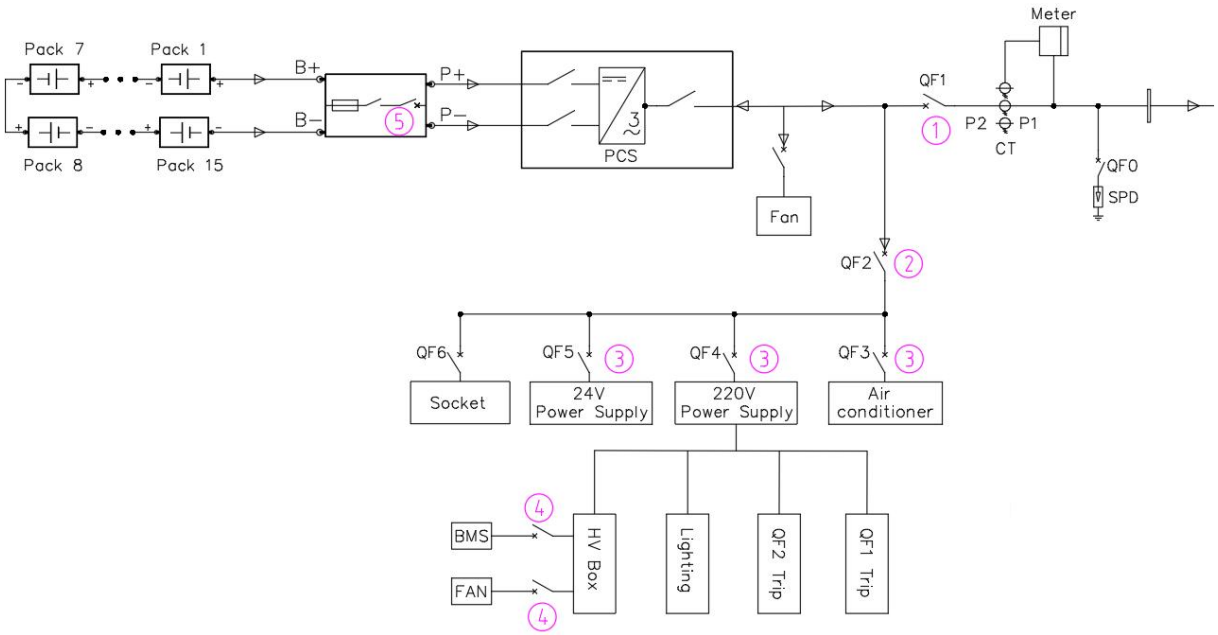



**Figure 6-1** Power On Procedure

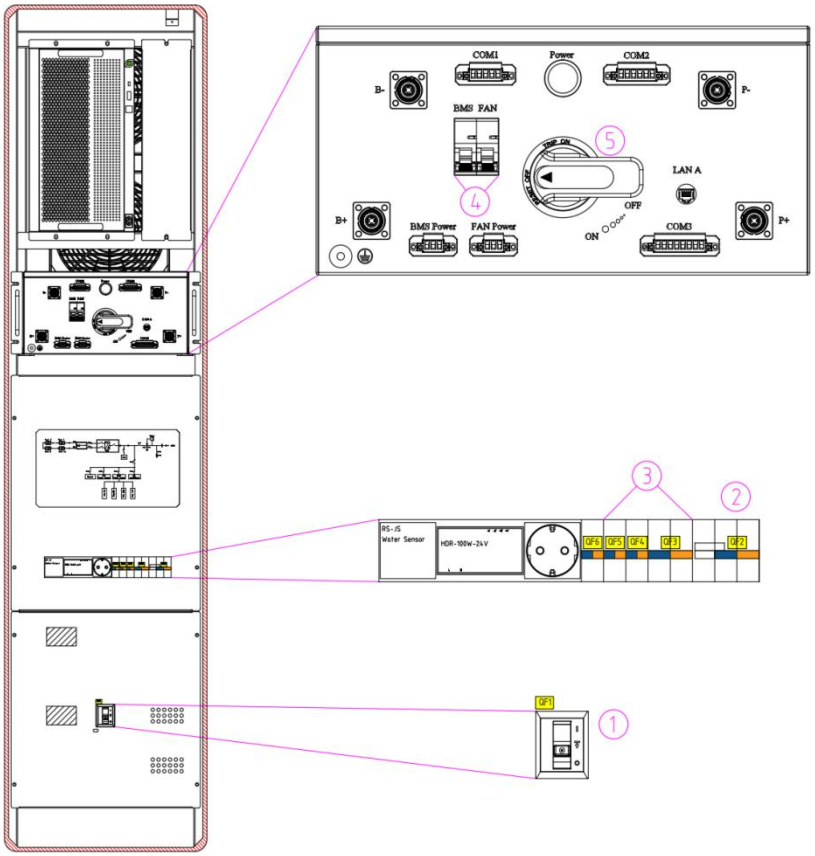



**Figure 6-2** Power On diagram

## 6.3 System Login

After successful commissioning, the operator can set up the EMS.

Gently and correctly guide the key into the keyhole, and then turn it clockwise to unlock the screen door.

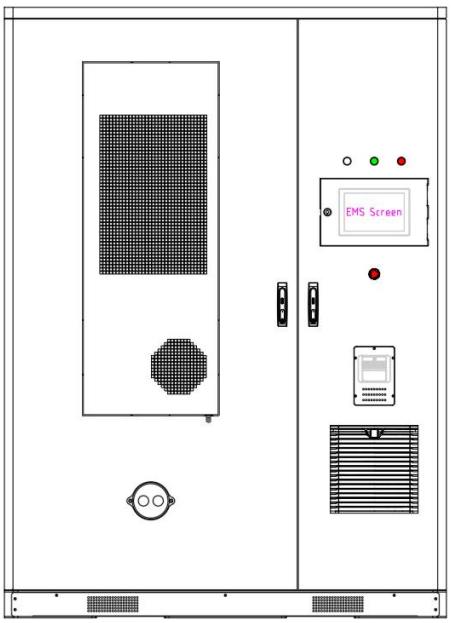


**Figure 6-3** EMS screen door

Users can view the voltage, current, power, and battery information of the energy storage system by clicking on Overview module in the left panel area to instantly grasp the latest status of the energy storage system.

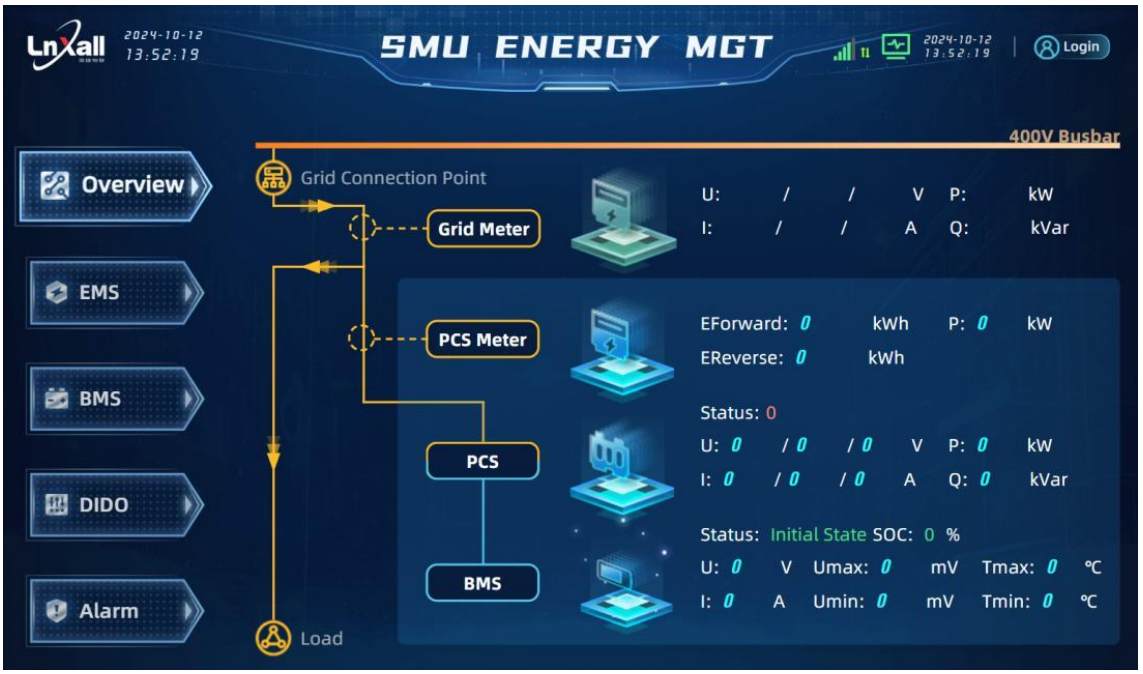



**Figure 6-4** Overview page

Users can check the important status of the controller for the current energy storage equipment, such as number of alarms, charge prohibition protection, and discharge prohibition protection, by clicking on EMS module in the left panel area.


**Figure 6-5** EMS page

Users can view the management data of the current energy storage cabinet by clicking on BMS module in the left panel area.

Users can view the information such as the highest single cell voltage, highest single cell voltage number, lowest single cell voltage, and lowest single cell voltage number of the corresponding battery cluster.


**Figure 6-6** BMS page

Users can check the status of DIDO within the corresponding energy storage cabinet by clicking on DIDO module in the left panel area.


**Figure 6-7** DIDO page

Users can check the current alarm data of the energy storage equipment by clicking on Alarm module in the left panel area.


**Figure 6-8** Alarm page

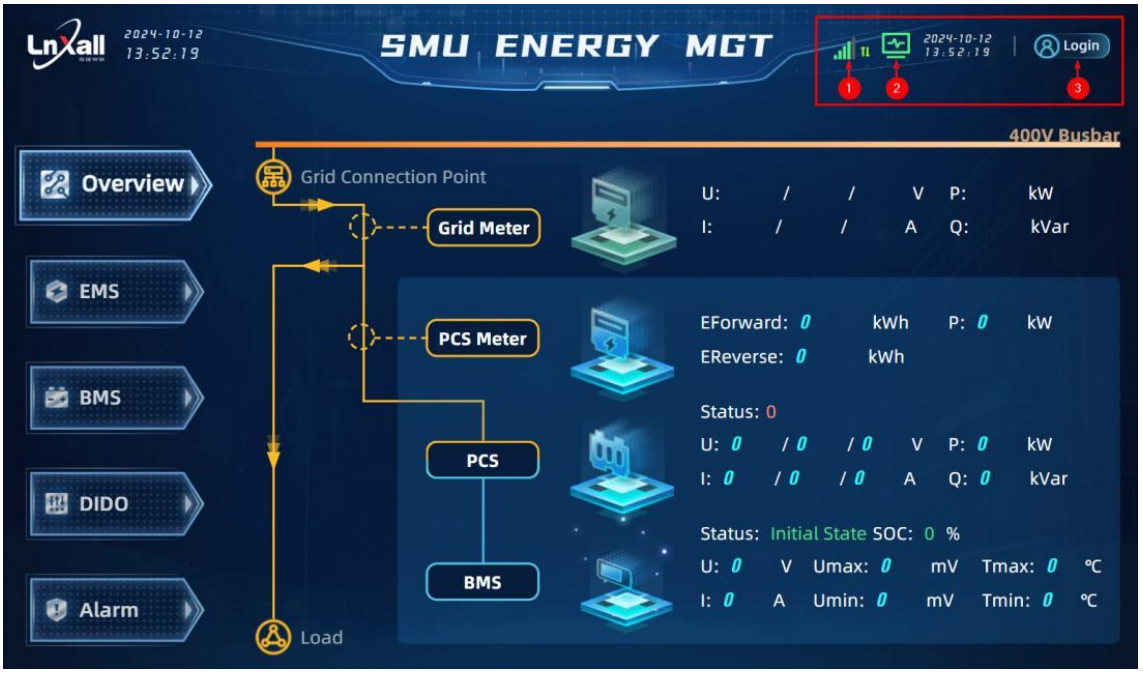



**Figure 6-9** Top right corner of the screen

Network icon: indicates the current wireless network connection status of the system. Green indicates that the connection is established, indicating an online status; red indicates that the wireless network is disconnected.

Clock area: displays the connection status and refresh time with the backend of the energy storage system. It turns red and displays the disconnection time when the connection is interrupted.

Login icon: Users can click on this icon to log in to the SMU screen control system

On the login screen, enter your username and password, and then click Login.

• Username: admin

• Password: 123456


**Figure 6-10** log in page


**Figure 6-11** functional module page

The central area of the SMU Energy Management Screen Control System main interface displays the following functional modules:

**Monitoring:** for real-time monitoring of the energy storage system operation status, key parameters, and providing fault alarms to ensure the safe and stable operation of the energy storage system.

**Energy MGT:** for optimizing the operation strategy of the energy storage system, achieving efficient utilization and management of energy through intelligent scheduling and strategy execution to enhance the overall performance of the energy storage system.

**Device Data:** for connecting all southbound devices, serving as the entry point for low-level data read and write operations, providing functions such as information collection and parameter setting for each southbound connected device.

**System:** for users to modify energy storage system parameters, providing functions such as user management, customized configurations, and connection management.

## 6.4 Power Off

**Warning!**

- Check whether the system is still running before power off. Do not power off if the device is "under load".

There are two circumstances: 1. Normal power off; 2. Emergency power off.

Normal power off

**Step 1:** Emergency power off

**Warning!**

- Do not press the emergency stop button except for emergencies.
- Some modules inside the cabinet may still have power after pressing the emergency stop button, therefore, non-professionals are not allowed to operate them.

**Notice!**

- If it has been pressed, the emergency stop button must be reset before starting the equipment.

**Table 6-1** Checklist

| No. | Item | Description |
|---|---|---|
| 1 | Equipment appearance | Galvanized iron plate Width: 40 mm Depth: 4mm |
| 2 | Cable appearance | Five-core copper cable<br>YJV 50 mm² * 4 + 25 mm² * 1 |
| 3 | Cable connection | Conventional yellow and green wire<br>BVR 50 mm² |
| 4 | Wiring | Category-6 |
| 5 | Copper bars in the pack | |
| 6 | Button/Switch | |

| LED indicator | Statue | | Definition |
|---|---|---|---|
|  | OOOOO | Light on | PCS on-grid operation |
| | OOOOO | Blinking<br>(Fast, 0.5S) | 0kW<br>standby |
| | OOOOO | Blinking<br>(Slow, 1.0S) | off |
| | OOOOO | Light on | Fault |

**Figure 6-12** Statue of PCS

## 7.1 Troubleshooting

This section lists the possible problems with the equipment, and provides information and procedures for identifying and resolving them. In case of any errors, check for the warnings or error messages on the system control panel or App, and then refer to the suggestions below.

For further assistance, contact our Customer Service. Please provide the model and SN of the cabinet, and be prepared to describe the system installation details.

**Table 7-1** Troubleshooting list

| Fault | Description and Diagnosis |
|---|---|
| UCellH_3 | Single Cell Overvoltage Category Level 3<br>• Do not power on, and the charging current is limited to 0 A. If the relay does not receive a power-off instruction from the PCS, it will be turned off forcefully after 3 seconds. |
| UCellL_3 | Single Cell Undervoltage Category Level 3<br>• Do not power on, and the charging current is limited to 0 A. If the relay does not receive a power-off instruction from the PCS, it will be turned off forcefully after 3 seconds. |
| UCellDiff | Voltage difference fault<br>• Contact Sunket for help. |
| HVBOver_3 | Overvoltage category Level 3 of total voltage<br>• The charging current is limited to 0 A. If the relay does not receive a power-off instruction from the PCS, it will be turned off forcefully after 3 seconds. |
| HVBLow_3 | Undervoltage category Level 3 of total voltage<br>• The charging current is limited to 0 A. If the relay does not receive a power-off instruction from the PCS, it will be turned off forcefully after 1 second. |
| PosRlyAdh | Sticking contacts of main positive relay<br>• The charging current is limited to 0 A. If the relay does not receive a power-off instruction from the PCS, it will be turned off forcefully after 1 second. |
| NegRlyAdh | Sticking contacts of main negative relay<br>• Restart the device |
| TempHigh | Overtemperature fault<br>• The charging current is limited to 0 A. If the relay does not receive a power-off instruction from the PCS, it will be turned off forcefully after 1 second. |
| TempLow | Low-temperature fault<br>• The charging current is limited to 0 A. If the relay does not receive a power-off instruction from the PCS, it will be turned off forcefully after 1 second. |
| DsgOver_3 | Discharge overcurrent fault Level 3 |

| | |
|---|---|
| | • The charging current is limited to 0 A. If the relay does not receive a power-off instruction from the PCS, it will be turned off forcefully after 3 seconds. |
| ChgOver_3 | Charge overcurrent fault Level 3<br>• The charging current is limited to 0 A. If the relay does not receive a power-off instruction from the PCS, it will be turned off forcefully after 3 seconds. |
| COMFault | Communication fault<br>• Do not power on, and the charging current is limited to 0 A. If the relay does not receive a power-off instruction from the PCS, it will be turned off forcefully after 1 second. |
| InsFlt | Insulation fault<br>• The charging current is limited to 0 A. If the relay does not receive a power-off instruction from the PCS, it will be turned off forcefully after 1 second. |
| SOCLowFlt | Low SOC<br>• Check if the device is running out of power. |
| DCSwitch | DC switch fault<br>• Contact **Sunket** for help. |

## 7.2 Maintenance

Regular maintenance is required for the device. The table below lists the operational maintenance for expressing the optimum device performance.

More frequent maintenance service is needed in the worse work environment. Please make records of the maintenance.

| **Warning!** |
|---|
| • Only qualified person can perform the maintenance for the device.<br>• Only use the spare parts and accessories for maintenance. |

**Table 7-2** Maintenance routine list

| Check Item | Description | Interval Time |
|---|---|---|
| The operating status and environment of the system | • Check whether there is any damage to the distributed energy system, and the equipment is deformed.<br>• Check whether there are any abnormal noise in the running system.<br>• Check whether the parameter is correct shown in the screen.<br>• Check whether there is any damage to the main components.<br>• Check whether the temperature of the equipment shell is normal. Meanwhile, it is suggested to use a thermal imager or any other monitoring systems to identify signs of heat. | Every 6 months |

| | | |
|---|---|---|
| | • Check whether the surrounding is at normal humidity level, and there is any damage to the dust and air filters.<br>➢ Must ensure that the air intake is well ventilated. Otherwise, the battery pack failure will be caused due to overheating.<br>➢ Please gently open the door to prevent raising dust from the filter cotton. Otherwise, the smoke detector will alarm and give a command to the fire sprinkler to spray gas. | |
| System cleaning | • Check whether the circuit boards and components are clean.<br>• If necessary, clean the modules by air compressor.<br>➢ The system must be shut down before cleaning.<br>➢ The maintenance period shall be shortened if the cabinet is installed in heavily polluted environments. | Every 6 months |
| Electrical connection | • Check whether the power cables are fastened securely. If not, please tighten them again according to the torque written in the document.<br>• Check there is any damage to the cables, especially the cable jacket connecting with the metal parts.<br>• Check whether the electrical insulation tape is in good condition and no peeling. | The check shall be scheduled within one month after the first commissioning, and then can be scheduled every 6 months |
| Terminal and block connection | • Check whether the screws are fastened securely. If not, please tighten them again according to the torque written in the document.<br>• Check whether there is any fading to the screws and copper bars.<br>• Check whether the wiring arrangement is reasonable.<br>• Check whether the loop terminals are in good condition, and the temperature of the screws is normal. | The check shall be scheduled within one month after the first commissioning, and then can be scheduled every 6 months |
| Relay maintenance | • Do a routine inspection for the corrosion of all metal components.<br>• Do an annual inspection for the connectors to make sure that the equipment is in good running condition.<br>• Check whether the parameter is correct. | Every 6 months |
| Aerosol inspection | • Check whether the aerosol is in good condition, and wiring are fastened securely. | Every 6 months |
| Safety function | • Check whether the emergency stop button is in good working condition.<br>• Check the stopping signal and communication by simulating the shutdown operation.<br>• Check whether there are any damages to warning signs and other labels pasted on the equipment. If so, please replace them in time. | Every 6 months |

**Table 7-3** Maintenance of Pack

| Circumstance | Measure |
|---|---|
| If the ambient temperature for storage is between 30°C and 50°C | Recharge the battery packs at least once every 6 months |
| If the ambient temperature for storage is between -20°C and 30°C | Recharge the battery packs at least once every 12 months. |
| In the first installation | The interval among manufacture dates of battery packs shall not be exceed 3 months. |
| If a battery pack is replaced or added for capacity expansion | Each battery's SOC should be consistent. The max. SOC difference should be ±5%. |
| If users want to increase their battery system capacity | Ensure that the SOC of the existing system capacity is about 40%. The manufacture date of the new battery pack shall not exceed 6 months. If the manufacture date of the new one exceeds 6 months, please charge it to around 40%. |
| **Warning!** | |
| • Only qualified person can perform the maintenance for the device. | |

**SKTESS215-100K**

Battery (DC Side)

| | |
|---|---|
| Battery type | LiFePO4 |
| Cell capacity | 280Ah |
| Battery capacity | 215kWh |
| Rated voltage | 768V |
| Voltage range | 672~876V |
| Discharge depth | 90% |
| Rated charge/discharge current | 140A |

PCS (AC Side)

| | |
|---|---|
| Rated power | 105kW |
| Rated current | 151A |
| Max. apparent power | 115kVA |
| Nominal grid voltage | 400V±15% |
| Nominal grid frequency | 50/60Hz |
| Adjustable power factor range | 0.99 leading~0.99 lagging |
| THDi (Rated power) | <3% |
| Max. efficiency | 98% |
| Topology | Non-isolated |

General Parameter

| | |
|---|---|
| Dimensions (W x H x D) | 1500 x 2200 x 1350mm |
| Weight | 2500kg |
| Operating temperature range | -20~50°C |
| Relative humidity | 5~95% RH (non-condensing) |
| Altitude | 2000m |
| Cooling concept | Smart air cooling |
| Ingress protection | IP54 |
| Fire protection | Aerosol/Water |
| Certificates | IEC 62619, IEC 50549, IEC 61000, UN 38.3 |

## A.1 Terminal Requirements

For different types of cables, select proper terminals and additional components for connection.

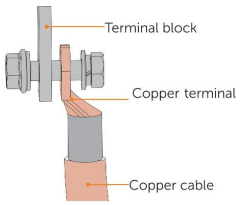
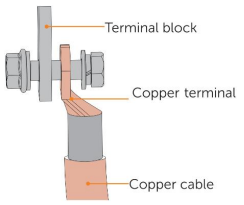
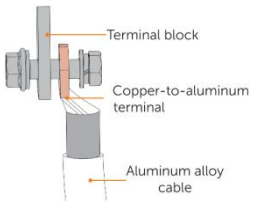
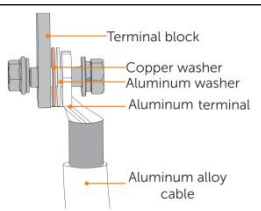
**Caution!**

- Do not connect the aluminum wiring terminal directly to the terminal block or copper bar in case of electrochemical corrosion, which might affect the reliability of cable connection.
- While using an aluminum wiring terminal, copper washer, and aluminum washer, pay special attention to the position of the two washers. The copper washer shall contact the terminal block, and the aluminum washer shall contact the aluminum wiring terminal.

**Notice!**

- The copper-to-aluminum wiring terminal used in scenario 3, and aluminum wiring terminal, copper washer, and aluminum washer used in scenario 4 must comply with the requirements in IEC61238-1.

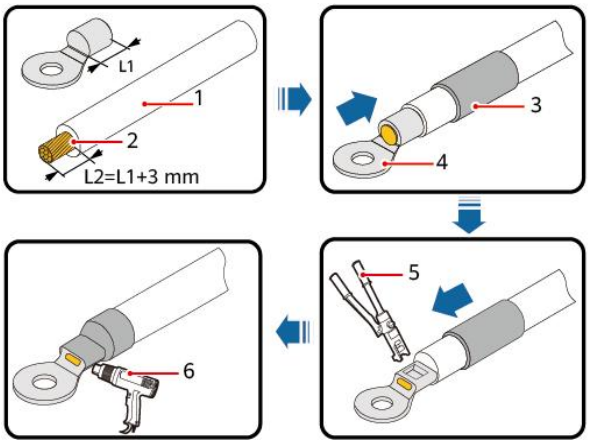
**Table A-1** Terminal requirements for different types of cables

| Scenario | Cable Type | Terminal Type | Figure |
|---|---|---|---|
| 1 | Cooper cable | Cooper terminal |  |
| 2 | Copper-clad aluminum cable | Cooper terminal |  |
| 3 | Aluminum alloy cable | Copper-to-aluminum terminal |  |
| 4 | Aluminum alloy cable | Aluminum terminal |  |

## A.2 Crimping an OT or DT Terminal

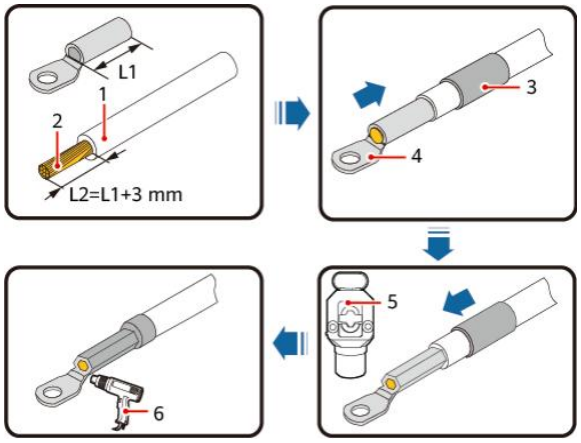
**Notice!**

- Avoid scratching the core wire when stripping a cable.
- The cavity formed after the conductor crimp strip of the OT or DT terminal has been crimped must wrap around the core wire completely. The core wire must make close contact with the OT or DT terminal.
- Wrap the wire crimping area with heat shrink tubing or insulation tape. The heat shrink tubing is used as an example.
- Use a heat gun carefully to avoid heat damage to the equipment.




1) Cable 2) Core wire 3) Heating shrink tubing
4) OT terminal 5) Hydraulic pliers 6) Heat gun

**Figure A-1** Crimping an OT terminal




1) Cable 2) Core wire 3) Heating shrink tubing
4) DT terminal 5) Hydraulic pliers 6) Heat gun

**Figure A-2** Crimping a DT terminal

# B How to Repaint the Cabinet

The equipment appearance should be intact. If paint has flaked off, repair paint damage immediately.

| Warning! |
| --- |
| • If the cabinet is installed outdoors without shield, do not repaint it in rainy, snowy, windy, or stormy days. |

Check the paint damage on the surface of the cabinet, with details below:

- For light scratches or small areas of stubborn stains, please see 'B.1 Light Scratches and Small Areas of Stubborn Stains' to treat them.
- If the deep scratches or large areas of stubborn stains can be treated by users, please refer to 'B.2 Deep Scratches and Large Areas of Stubborn Stains'.
- If the damaged area is too large and cannot be treated, please contact the after-sale personnel for assistance.

| Notice! |
| --- |
| • Use paint of RAL 7035 color.<br>• For light scratches and small areas of stubborn stains, spray paint and hairbrush are recommended.<br>• For deep scratches or large areas of stubborn stains, oil paint and paint sprayer are recommended. |

## B.1 Light Scratches and Small Areas of Stubborn Stains

This solution applies to light scratches without reaching the steel substrate and stubborn stains on the surface.

Prepare tools and enough materials according to actual conditions.

**Table B-1** Tools and materials

| No. | Tool/Material |
| --- | --- |
| 1 | Spray/oil paint |
| 2 | Fine sandpaper |
| 3 | Anhydrous ethanol |
| 4 | Cotton cloth |
| 5 | Hairbrush |

## Repainting Procedure

**Step 1:** Gently sand the scratched area with a fine sandpaper to remove rust and stains on the surface.

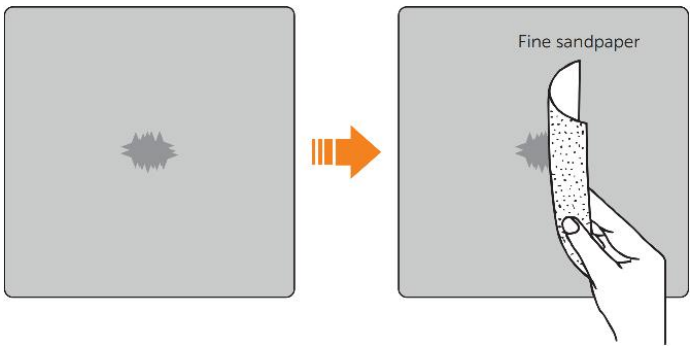



**Figure B-1** Sanding the scratched area

**Step 2:** Moisten a cotton cloth with anhydrous ethanol, wipe the scratched area with it to remove dust and dirt, and then use a dry cotton cloth to wipe the area dry.

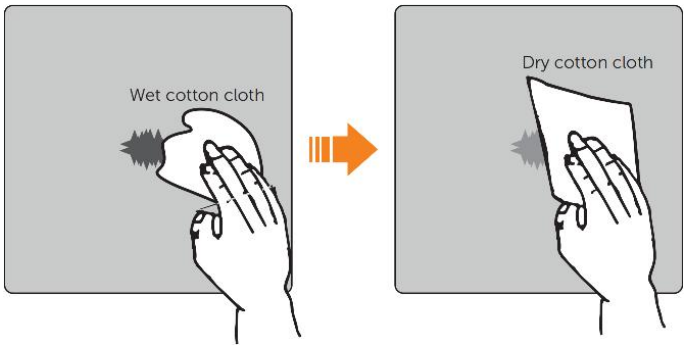



**Figure B-2** Cleaning the scratched area

**Step 3:** Use hairbrush or spray paint to apply paint to the surface of the scratched area until it is fully and evenly covered.

| Notice! |
| --- |
| • While applying paint, make sure the newly applied paint is thin and even, so that the scratched area can appear consistent and smooth on the surface.<br>• If there is color difference between the scratched area and the surroundings, cover the surrounding area with tape or paper in case of color contamination. |

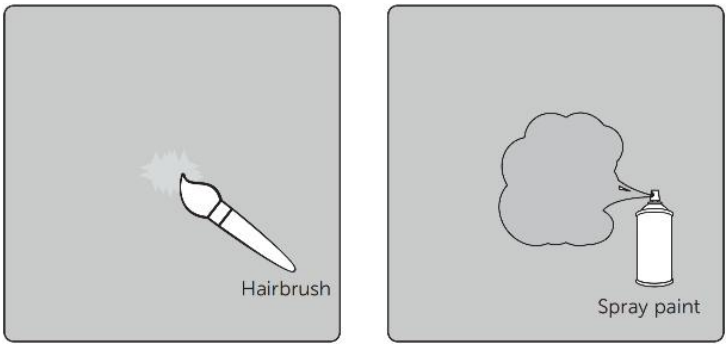



**Figure B-3** Applying paint

**Step 4:** After completing applying the paint, wait for around 30 minutes for the paint to get dry, and then check whether the repaired area meets the requirements.

| Notice! |
| --- |
| • The color of the repaired area shall be consistent with the surrounding area.<br>• For spray painting, we recommend painting for at least 3 times before pausing to check the effect, and then repeat spray painting and observing until it meets the requirements. |

## B.2 Deep Scratches and Large Areas of Stubborn Stains

This solution applies to deep scratches where the primer has been damaged and reach the steel substrate.

Prepare tools and enough materials according to actual conditions.

**Table B-2** Tools and materials

| No. | Tool/Material |
| --- | --- |
| 1 | Spray/oil paint |
| 2 | Zinc-rich primer |
| 3 | Fine sandpaper |
| 4 | Anhydrous ethanol |
| 5 | Cotton cloth |
| 6 | Paint sprayer |

### Repainting Procedure

**Step 1:** Gently sand the scratched area with a fine sandpaper to remove rust and stains on the surface.

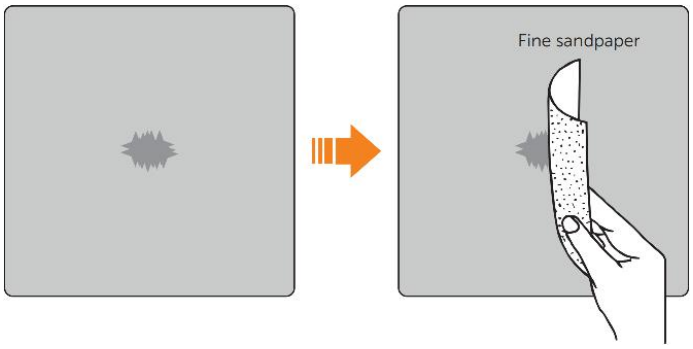



**Figure B-4** Sanding the scratched area

**Step 2:** Moisten a cotton cloth with anhydrous ethanol, wipe the scratched area with it to remove dust and dirt, and then use a dry cotton cloth to wipe the area dry.

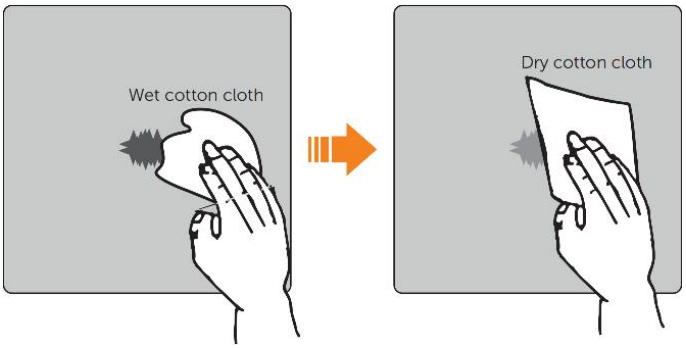



**Figure B-5** Cleaning the scratched area

**Step 3:** Use a paint spray to apply the zinc-rich primer to the scratched area.

| Notice! |
| --- |
| • If the steel substrate is visible on the scratched area, the zinc-rich primer must be applied first to entirely cover the substrate.<br>• Wait for the primer to get dry before applying the topcoat to the scratched area. |

**Step 4:** Use a paint spray to apply paint to the surface of the scratched area until it is fully and evenly covered.

| Notice! |
| --- |
| • While applying paint, make sure the newly applied paint is thin and even, so that the scratched can appear consistent and smooth on the surface.<br>• If there is color different between the scratched area and the surroundings, cover the surrounding area with tape or paper in case of color contamination. |

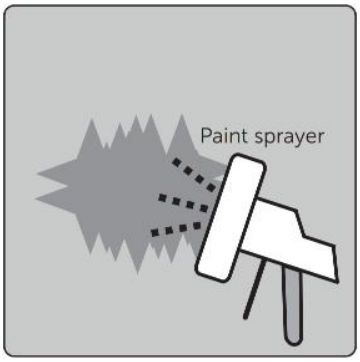



**Figure B-6** Applying paint

**Step 5:** After completing applying the paint, wait for around 30 minutes for the paint to get dry, and then check whether the repaired area meets the requirements.

| Notice! |
| --- |
| • The color of the repaired area shall be consistent with the surrounding area.<br>• For spray painting, we recommend painting for at least 3 times before pausing to check the effect, and then repeat spray painting and observing until it meets the requirements. |