

INSTALLATION, OPERATION &  
MAINTENANCE MANUAL

***E4KT/ E5KT/E6KT/E8KT/E10KT/  
E10KTBE/E12KT-D22 Series***

***ENERGY STORAGE SYSTEM***

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# Legal Statement

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Reverse engineering, decompiling, disassembling, adapting, implanting, or other derivative operations on the equipment are prohibited, as are researching the design and implementation of the equipment, obtaining the source code, infringing on intellectual property rights in any way, and disclosing the results of any performance tests.

## Disclaimer

Before transporting, storing, installing, using, and/or maintaining the equipment, read this manual, adhere strictly to its prescriptions, and pay attention to the labels on the equipment.

In this manual,

- “Equipment” refers to the hardware products, firmware, software, components, spare parts,
- And /or services to which this manual relates.
- “You” or “your” refers to an individual or a legal entity transporting, storing, installing, using, and/or maintaining the equipment.

In addition to paying proper attention to content in this manual labelled DANGER, WARNING, CAUTION, and NOTICE, you shall comply with relevant international, national, or regional standards, and industry practices. KSTAR New Energy shall not be liable for any damages resulting from violations of safety requirements or safety standards for the design, manufacturing, and use of the equipment.

KSTAR New Energy is not responsible for damage, personal injuries, death, and/or loss of or damage to property caused by use outside the scope of the conditions, technical specifications, or instructions provided in this manual.

Transport, storage, installation, use, maintenance, and all other operations shall comply with applicable laws and regulations, standards, and specifications.

KSTAR New Energy shall bear no liability in any of the following circumstances:

- The equipment is damaged due to earthquakes, floods, volcanic eruptions, mudslides, lightning strikes, fires, wars or armed conflicts, typhoons, hurricanes, tornadoes, extreme weather, or other force majeure events.
- The equipment is used outside the scope of the conditions, technical specifications, or instructions provided in this manual.
- Installation and/or use do not comply with relevant international, national, or regional standards or regulations.
- The equipment is installed or operated by unqualified personnel.
- The equipment is operated in a manner not in accordance with the prescriptions of the instruction manual and safety labels.
- The equipment and/or software code is disassembled and/or modified without the permission of KSTAR New Energy.
- The equipment is damaged while being transported by you or a third party commissioned by you.
- The equipment is stored in conditions that do not meet the standards specified in this manual.
- In the course of operating or maintaining the equipment, you use your own materials and tools that do not meet the requirements of local laws, regulations, and standards.
- Damage is caused by you or a third party through negligence, willful misconduct, gross negligence, or mishandling, or for other reasons not attributable to KSTAR New Energy.

# **1 About This Manual**

This manual contains important information on the transport, storage, installation, use, and maintenance of the equipment. Read this manual carefully before operation. You must use the equipment strictly in accordance with the instructions in this manual to prevent damage or loss to the equipment, persons, and/or property. Keep this manual for future reference.

## **1.1 Purpose**

This manual is intended as:

- An introduction to a three -phase hybrid inverter (the E4KT/E5KT/E6KT/E8KT/E10KT/ E10KTBE/E12KT-D22),and the BP48100P (F)1A-G2 lithium-ion battery pack.
- An installation and maintenance guide for qualified personnel and technicians working with the hybrid inverters.
- An operating guide for qualified personnel, technicians, and users of the energy management system (EMS) integrated in the hybrid inverter.

This manual does not include information on all the components in a photovoltaic system. For more information, visit [www.KSTAR.com](http://www.KSTAR.com) or the websites of the component manufacturers.

## **1.2 Intended Audience**

The intended audience of this manual is:

- The qualified professional personnel and technicians who install, operate, and maintain residential photovoltaic energy storage systems that include an E4KT/E5KT/E6KT/E8KT/E10KT/ E10KTBE/E12KT-D22 hybrid inverter, and/or the BP48100P (F)A-G2 battery pack.
- Users who need to view inverter parameters.
- System integration solution providers.

## 1.3 Conventions

The following symbols are used in this manual to highlight important information.

|                                                                                                  |                                                                                                                                                                     |
|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <b>DANGER</b>  | Indicates a hazardous situation that, if not avoided, will result in death or severe injury.                                                                        |
|  <b>WARNING</b> | Indicates a hazardous situation that, if not avoided, could result in death or severe injury.                                                                       |
|  <b>CAUTION</b> | Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.                                                                     |
| <b>NOTICE</b>                                                                                    | Indicates information that is considered important but is not hazard related, typically used for activities that result in property damage, but no personal injury. |
|                 | Indicates an important tip that leads to the best results, but not safety or damage related.                                                                        |

## 1.4 Change History

Here is the change history of this manual.

| Version | Date    | Changes                                                                           |
|---------|---------|-----------------------------------------------------------------------------------|
| 1.0     | 2026-03 | • Initial release.                                                                |
| 1.1     | 2026-05 | • Graphics optimization                                                           |
| 1.2     | 2026-07 | • Add dual-tower installation solution and battery capacity expansion information |

## 2 Safety Instructions

All the safety instructions in this section help you transport, store, install, use, and maintain the equipment safely, so be sure to read and follow them. In addition to these safety instructions, you must comply with the requirements of international, national, or regional standards and regulations, and you are encouraged to follow industry best practices.

The equipment must be transported, installed, and maintained by trained professionals who fully understand how the equipment works, have sufficient training and experience in operating the equipment, and know the possible dangers and their levels. Trained personnel are those who have received relevant technical and safety training and have relevant experience. They know the possible dangers they may face when operating the equipment and how to take steps to minimize the dangers to themselves and others.

### 2.1 Limitation of Liability

KSTAR New Energy is not responsible, directly or indirectly, for any damage to the equipment or loss of property caused by the following:

- Disassembling and/or modifying the equipment, replacing parts, or modifying the software code without the permission of the manufacturer.
- Altering, repairing, and erasing serial numbers or seals by technicians not certified by the manufacturer.
- Installation and/or operation of the equipment by unqualified personnel.
- Installing the inverter in any way that does not comply with standards or regulations.
- Failure to comply with local safety regulations. For example, in Germany, equipment must comply with VDE certification and in Australia it must comply with SAA certification.
- Operation of the equipment in an environment with insufficient ventilation.
- Use not in accordance with the instruction manual, technical specifications, and/or any other instruction provided.
- Use of your own materials and tools that do not meet the requirements of local laws, regulations, and standards.
- Failure to follow standard maintenance procedures.
- Earthquakes, floods, volcanic eruptions, mudslides, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, extreme weather, or other force majeure events.

Additionally, KSTAR New Energy is not responsible, directly or indirectly, for:

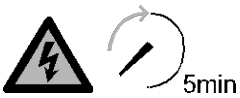
- Damage sustained during transportation, including paint scratches caused by friction inside the package during transportation, and damage sustained while being transported by you or a third party commissioned by you. You must file claims with the shipping or insurance company when the container and/or the package is unloaded and the damage is confirmed.
- Any other damage caused by you or a third party through negligence, willful

misconduct, or mishandling, or for other reasons not attributable to KSTAR New Energy.

## 2.2 Warning Signs

The warning signs and nameplates attached to the equipment contain important information to guide you in safe use of the equipment. DO NOT remove, obscure, or damage these signs. Make sure that these signs are always intact and fixed in their correct positions. If a warning sign is damaged, contact the manufacturer and have it replaced immediately by certified technicians.

You can see these warning signs attached to the equipment.

|                                                                                     |                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | Indicates a hazardous situation that, if not avoided, can result in death or severe injury!                                                                                        |
|    | Indicates that the inverter should NOT be touched or used for at least five minutes after it is turned off or disconnected, in order to prevent electric shock or personal injury. |
|    | Indicates a hot surface. Contact can cause burns.                                                                                                                                  |
|  | Indicates that you should read the user manual for instructions.                                                                                                                   |
|  | Operate the equipment properly to avoid explosion                                                                                                                                  |
|  | Batteries contain flammable materials, beware of fire.                                                                                                                             |
|  | Grounding point                                                                                                                                                                    |
|  | Keep away from children                                                                                                                                                            |
|  | Do not dispose of the System as household waste. Deal with it in compliance with local laws and regulations, or send it back to the manufacturer.                                  |
|  | CE Mark                                                                                                                                                                            |
|  | TUV Mark                                                                                                                                                                           |
|  | RCM Mark                                                                                                                                                                           |

## **WARNING**

After the equipment is unpacked,

- Check all the warning signs and nameplates on the equipment.
- If you find any damages to the warning signs and/or nameplates on the equipment, contact the manufacturer immediately and DO NOT install the equipment.

## **WARNING**

Before disposal, make sure that all warning signs and nameplates are clearly visible and are not removed or obscured.

## **WARNING**

When you instruct others in use of the equipment, and maintain and/or repair the equipment, follow these instructions to prevent inappropriate use or accidents caused by uninvolved persons:

- Place clear signs at the front and rear-level switches to prevent accidents caused by inappropriate switching.
- Place a warning sign or safety caution tape around the operating area.

## **2.3 Battery Safety**

A rechargeable lithium-ion phosphate battery is used in the equipment. The battery complies with the provisions of “United Nations Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, Part III, Section 38.3”.

### **KSTAR New Energy shall not be responsible for:**

- Damages to the battery caused by earthquakes, floods, volcanic eruptions, mudslides, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, extreme weather, or other force majeure events.
- Direct damage caused by operation of the equipment in environments other than the intended operating environment. Indicators of inappropriate environments include, but are not limited to, excessively high or low operating temperatures, instability of the power grid, and frequent power outages.
- Damage, leakage, and/or rupture caused by inappropriate operation or failure to connect the battery pack in accordance with requirements.
- Damage caused by over-discharge of the battery due to the failure of operating personnel to promptly power up the battery after it has been connected to the system.
- Damage caused by your failure to accept the battery in time after installation.
- Damage caused by inappropriate parameters that you set.
- Accelerated battery capacity degradation caused by mixing of batteries, including, but not limited to, the mixing of batteries of different brands and mixing of batteries

with different rated capacities.

- Battery damage caused by storing the battery in an unintended environment, such as in a humid, rain-prone environment.
- Loss of capacity or irreversible damage to the battery caused over-storage without recharging the battery in a timely manner.
- Damage caused by your or a third party's failure to follow the requirements specified by the manufacturer, including, but not limited to, unauthorized relocation and installation of the battery packs.

**KSTAR New Energy shall not be responsible for damage caused by:**

- Frequent over-discharge of batteries caused by your inappropriate maintenance, on-site expansion, or long-term failure to fully charge.
- Lack of appropriate maintenance in accordance with the operating manual. Such battery maintenance should include, but is not limited to, regular checks of the battery terminal screws to verify tightness.
- Changing the battery usage scenario without the approval of the manufacturer.
- Unapproved connection of additional loads to the battery.
- Batteries exceeding the maximum storage life.
- Batteries exceeding the warranty period. Such batteries can pose hazards and it is not recommended that you continue to use them.

### 2.3.1 General Instructions

The chemical substances inside the battery are well sealed, so there is no physical danger of fire or explosion or chemical danger of hazardous material leakage at normal temperatures and pressure levels during handling. If the battery pack is exposed to fire, mechanical shock, decomposition, or increased electrical stress due to misuse, then leakage, release of harmful substances, and/or explosion can occur. The released substances can irritate the eyes, skin, and throat.



#### **DANGER**

- Only trained professionals are permitted to handle leaking batteries.
- When handling leaking batteries, personnel must wear goggles, rubber gloves, gas masks, and protective clothing.
- When handling leaking batteries, personnel must first disconnect the equipment and then remove the leaking batteries.
- Batteries should be protected from the following:
  - Short circuit caused by live line maintenance or by shorting the positive and negative terminals of the battery.
  - Exposure to high temperature or heating equipment, such as direct sunlight, ignition sources, transformers, heaters.
  - Squeezing by an external force or immersion in water or other liquids.
  - Over-charging or forced over-discharging.
  - Exposing battery terminals to other metal objects.
  - The use of incorrect battery types.



#### **WARNING**

- Batteries should be protected from the following:
- Malfunctions or short circuits caused by liquid entering the battery. Therefore, DO NOT install the battery pack under air conditioning outlets, ventilation vents, machine room outlet windows, water pipes, and other locations prone to water leakage.
  - Inverted, sideways, tilted, or stacked placement.
  - False connection of fastening screws of the copper row and/or the cable, which can cause excessive voltage drop or the generation of a large amount of heat at higher current, which could burn the battery.
-

### 2.3.2 Maintenance of Battery Packs

---

 **DANGER**

- DO NOT perform live line maintenance on the batteries to prevent short circuit.
  - Use the specified type of battery during replacement.
- 

 **WARNING**

- Do a regular check on the fastening screws of copper rows and/or cables. Make sure that they are tightened and free of rust, corrosion, or other foreign objects. If they are not, clean them.

### 2.3.3 Disposal of Battery Packs

---

 **WARNING**

- Before disposal, completely discharge the battery and consume the lithium metal inside the battery.
  - DO NOT treat unwanted batteries as ordinary waste.
  - DO NOT throw the battery pack into fire or place them in high temperature.
  - DO NOT dissect, pierce, or crush the batteries.
  - If a battery pack is deformed, broken, or leaking, discard it immediately regardless of how long it has been in storage.
-

## 2.4 Before Installation

---

### **DANGER**

- Follow the safety instructions in this manual to prevent personal injury and/or property damage.
- During transportation, a certified ABC fire extinguisher with a capacity of at least 2 kg must be with the equipment.
- Smoking is not permitted on or near the vehicle while loading or unloading.
- Before installation, make sure that the equipment is free of any electrical connections.
- Make sure that no water pipes are inside the wall on which the system is to be mounted.
- To prevent possible electric shock, make sure that the inverter is not damaged and that the inverter and all switches connected to it are set to the “OFF” position.
- Before installation, use a properly calibrated voltage meter to test the inverter to prevent personal injury or damage caused by a life-threatening voltage.
- The PV string exposed to sunlight can generate high voltage. Do these to prevent personal injury:
  - The operator must wear personal protective equipment before electrical connection.
  - Before touching DC cables, use a measuring device to make sure that the cables are not energized.
  - Read the safety instructions attached to the PV string and its manuals.
  - DO NOT connect the inverter to a PV string that requires positive or negative grounding.



## WARNING

- DO NOT transport equipment in severe weather such as lightning, rain, snow, or winds of force 6 or higher.
- If there is a fire, evacuate the building or equipment area and ring the fire alarm. DO NOT enter a burning building or equipment area.
- Choose an appropriate and safe place to install the equipment. This place must meet these requirements:
  - Temperature: For the inverter and battery pack. See Specifications.
  - Relative humidity: 0–95% (No condensation).
  - NO flammable or explosive materials.
  - NOT accessible to children.
  - NO salt hazards.
  - Sheltered from direct sunlight or severe weather.
  - NOT subject to strong vibration or electromagnetic fields.
  - Well ventilated
  - NOT a living area.
- A distance of at least 30 mm must be maintained between the cable and a heat generating device or the periphery of a heat source area to prevent deterioration and/or breakage of the cable insulation caused by high temperature.
- DO NOT install the equipment that is infiltrated by moisture.
- DO NOT install the equipment with damaged enclosure and exposed to moisture.



## CAUTION

- Only qualified personnel are permitted to transport the equipment.
- Loading, unloading, installation, removal, and transportation of inverters and battery packs must be accomplished by two or more persons to prevent personal injury caused by accidental falling equipment.
- If lifting tools are used to lift the equipment, make sure that no one passes or stays under the equipment.

---

## NOTICE

- Before installation, do a regular check and maintenance on the tools.
-

## 2.5 Installation Safety

---

### **DANGER**

- To avoid personal injury caused by the high voltage inside the equipment:
    - Use special insulated tools for wiring.
    - Read the warning signs on the equipment and follow their instructions.
    - Follow the safety instructions in this manual and other documents provided.
  - Only trained professionals are permitted to install the equipment.
  - Only qualified personnel are permitted to disassemble the safety features and to service the equipment.
  - Only the personnel who have the special operation qualification required by national or local authorities are permitted to work in special scenarios such as electrical operation, work at heights, and operation of special equipment.
  - Only KSTAR-approved professional personnel are permitted to replace the equipment or spare parts (including software).
  - DO NOT power up the equipment before the installation is completed and confirmed by trained professionals.
  - Avoid direct contact with the power supply equipment, as well as indirect contact through wet objects. Prevent other conductors from coming into contact with the power supply equipment. Measure the voltage at the point of contact before you touch any conductor surface or terminal, so as to avoid electric shock.
  - Use appropriate measuring tools to make sure that the electrical parameters of the equipment meet the requirements. To prevent electric arcs or shocks, make sure that the connection and use of the equipment comply with the specifications.
-



## WARNING

- DO NOT install equipment in severe weather such as lightning, rain, snow, or winds of force 6 or higher.
- If there is a fire, evacuate the building or equipment area and ring the fire alarm, or call the emergency services. DO NOT enter a burning building or equipment area.
- It is recommended that you install the inverter vertically, not inverted, horizontal, tilted forward or backward, excessively tilted, or tilted sideways.
- When tightening screws or bolts on products or terminals with tools, tighten to the specified torque to prevent damage to the equipment. The manufacturer shall not be responsible for such damage.
- DO NOT touch the equipment surface when the equipment is in operation. The housing gets hot, and touching it can result in burns.
- The cables used in the PV system must be of the right size, firmly connected, and well insulated.
- Before connecting the DC connector to the inverter, check the positive and negative terminals of the PV string and make sure that no error occurs before inserting the DC connector into the DC terminal.
- During the installation of the inverter, make sure that neither the positive nor the negative terminal of the PV string is shorted to ground, to prevent damage caused by AC/DC short circuit of the inverter.



## CAUTION

- To prevent uninvolved persons from approaching the equipment, place highly visible warning signs or set up safety caution tape around the equipment.
- DO NOT remove the equipment protection.
- DO NOT ignore the danger, warning, caution, and notice text in the manuals and on the equipment.

---

## NOTICE

- The wiring process must follow the regulations of the local grid and the safety instructions for the PV string.
-

## 2.6 Operation Safety



### DANGER

- Follow the safety instructions in this manual to prevent personal injury and/or property damage.
- The person who operates the equipment must have necessary knowledge of the equipment, including the equipment components and how they work.
- The person who operates the equipment must have necessary knowledge of this manual.
- Only qualified personnel are permitted to disassemble the safety features and to service the equipment.
- Keep persons other than those operating the equipment away from the equipment.
- DO NOT operate the equipment in an environment where explosions can occur, or where the relative humidity is high.
- When the equipment is in operation,
  - DO NOT open the inverter and the battery packs.
  - DO NOT wipe the equipment with a wet cloth.
  - DO NOT touch the housing of the equipment.
  - DO NOT plug or unplug connectors on the inverter.
  - To avoid electric shock, DO NOT touch any terminals of the inverter.
  - To avoid electric shock, DO NOT disassemble any parts of the inverter.
  - To avoid burns, DO NOT touch any hot parts of the inverter, such as radiator.
  - To avoid electric shock, DO NOT connect or disconnect a PV string or a component of a PV string.
- To avoid fatal electric shock, DO NOT touch the DC conductors or energized electrical parts of the inverter. When PV arrays are exposed to sunlight, they can generate life-threatening DC voltage. This voltage can be present in DC conductors and in the energized electrical parts of the inverter.
- To avoid electric shocks and burns caused by possible arcs, DO NOT disconnect the DC connector from the inverter under load.
- Before operating the inverter or the battery packs, disconnect the inverter from all voltage sources as described in this manual.
- DO NOT touch uninsulated cable ends.

- 
- To prevent chemical burns caused by leakage of electrolyte or toxic gases from a damaged battery, operate the battery packs in accordance with the standard procedure. When the battery packs are operated in a standard manner, no leakage of electrolyte or generation of toxic gases can occur. However, if the battery packs are damaged or malfunction, it can leak electrolyte or generate toxic gases.



## **WARNING**

- DO NOT operate equipment in severe weather such as lightning, rain, snow, or winds of force 6 or higher.
- DO NOT touch the equipment with wet hands.
- DO NOT put any heavy objects on the top of the equipment.
- DO NOT damage the equipment with sharp objects.



## **WARNING**

External protective earthing terminal shall meet at least one of the following requirements:

- When the cross-sectional area of the earthing cable is  $\geq 10\text{mm}^2$  (copper) or  $\geq 16\text{mm}^2$  (aluminum), it is recommended that both the external protective earthing terminal and the AC side earthing terminal are grounded.
- When the cross-sectional area of the earthing cable is  $< 10\text{mm}^2$  (copper) or  $< 16\text{mm}^2$  (aluminum), \*\*ensure that\*\* both the external protective earthing terminal and the AC side earthing terminal are grounded.

If alternative earthing methods comply with local standards and relevant safety regulations, the connection may be performed according to such standards and regulations. Our company shall not be held liable for any consequences that may arise therefrom.

---



## CAUTION

- To prevent uninvolved persons from approaching the equipment, place highly visible warning signs or set up safety caution tape around the equipment.
- DO NOT move the inverter when it is connected to the battery packs.
- Secure the inverter to prevent tilting.
- During the operation of the equipment, if any risks are found that may lead to personal injury or equipment damage, stop the operation immediately, report to the person in charge, and take effective steps.
- During the operation of the inverter, make sure that neither the positive nor the negative terminal of the PV string is shorted to ground, to prevent damage caused by AC/DC short circuit of the inverter.

---

## NOTICE

- In the event of exposure to the electrolyte, immediately flush the affected area with water and seek immediate medical attention.
-

## 2.7 Maintenance Safety

---



### DANGER

- Follow the safety instructions in this manual to prevent personal injury and/or property damage.
- Only trained professionals are permitted to maintain the equipment.
- Only qualified personnel are permitted to disassemble the safety features and to service the equipment.
- Keep persons other than those operating the equipment away from the equipment.
- Wear personal protective equipment (PPE), including protective gloves and protective shoes.
- DO NOT begin maintenance work on the equipment until it is turned off and fully discharged.
- Before maintenance, disconnect the AC circuit breaker from the grid and check the inverter status. If all the inverter indicator lights are off, do nothing and disconnect the DC switch at night. If the inverter indicator is on, disconnect the DC switch directly.
- After the inverter is powered down for five minutes, use testing equipment to check the voltage of the bus capacitor and of the capacitors in the battery terminal input and make sure that there is no voltage.
- To avoid burns, DO NOT operate the equipment immediately after shutdown. After the equipment cools down, wear protective gloves to operate the equipment.



### WARNING

DO NOT maintain equipment in severe weather such as lightning, rain, snow, or winds of force 6 or higher.

- To avoid electric shock, DO NOT touch the power grid or the contacts and terminals inside the equipment that are connected to the grid.
- Use a standard voltmeter to check the grid. DO NOT touch the grid before you make sure that there is not voltage.
- To prevent or to minimize potential damage caused by moisture, DO NOT repair or maintain the equipment in a wet environment.



### CAUTION

- To prevent uninvolved persons from approaching the equipment, place highly visible warning signs or set up safety caution tape around the equipment.

---

## NOTICE

- If the paint on the inverter housing falls off or rust appears, repair it in a timely manner. Otherwise, the use of the inverter may be affected.
  - To avoid damaging the inverter, DO NOT use cleaning agents to clean the inverter. The manufacturer shall not be responsible for such damages.
  - DO NOT open the inverter (excluding the cable box) and replace the components inside without the permission of the manufacturer.
- 

## 2.8 Disposal Safety

---



### DANGER

- Only trained professionals are permitted to discard the equipment.
- 



### WARNING

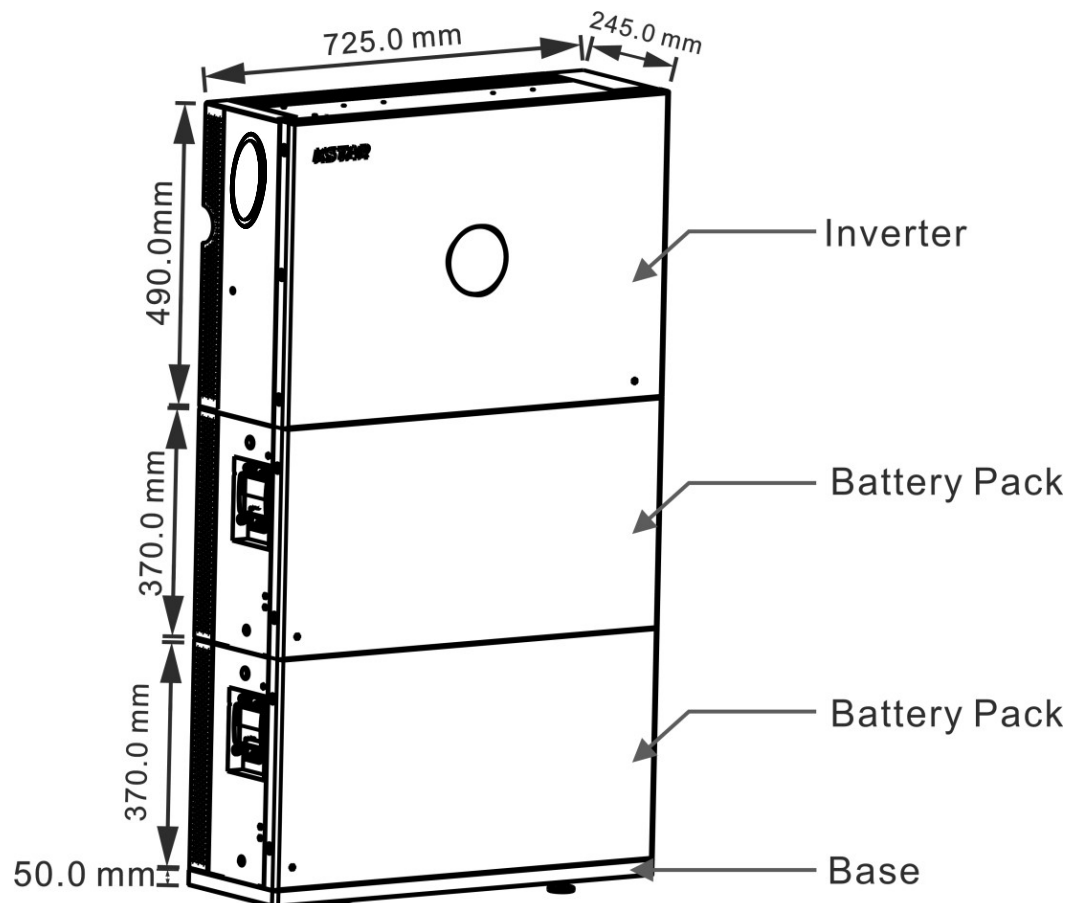
- Before disposal, make sure that all warning signs and nameplates are clearly visible and have not been removed or obscured.
  - To prevent property damage and personal injury, dispose of equipment in accordance with local regulations and standards.
-

## 3 System Introduction

### 3.1 Product Overview

The integrated residential storage solution combines Inverter, Battery, Smart Meter, and smart dongle to convert solar energy into electricity within a photovoltaic system, meeting household power demands. Energy IoT devices in the system monitor overall power conditions and manage electrical loads, enabling intelligent control of electricity for direct use, storage in Battery, or export to Utility grid.

1. Space-saving: The vertical stack design occupies less floor space compared to traditional equipment. It can be mounted close to the wall, making full use of corners or narrow aisles, saving approximately 20%-30% of floor space compared to conventional all-in-one units.
2. Modular expansion: Users can start with a basic capacity configuration based on current power needs, just like building with blocks. In the future, when additional loads are added to the household, the capacity can be linearly increased by simply adding stacked battery modules—without replacing the entire system. This effectively reduces initial investment and upgrade costs.
3. Easy installation: Standardized interfaces between modules enable plug-and-play operation, eliminating complex external wiring. This makes the installation process very fast, significantly reducing installation difficulty and labor costs.



## Battery Capacity Description

The ESS supports capacity expansion. A maximum of eight Energy Storage Modules can be installed.

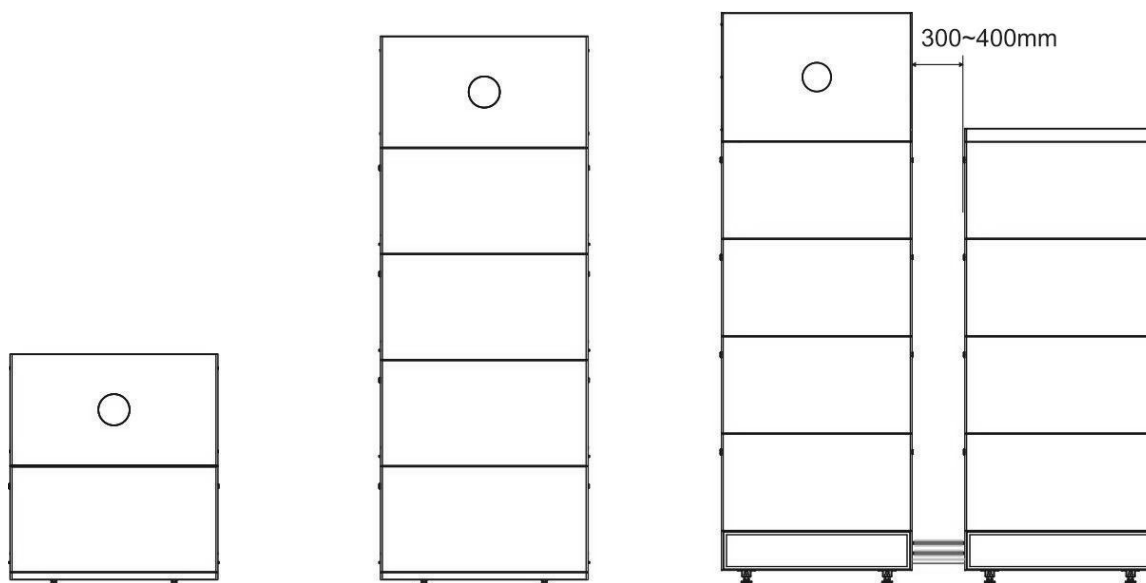


Figure 3-2 Capacity expansion with Energy Storage Modules

## 3.2 Model

### 3.2.1 Inverter Model

The hybrid inverter model is E4KT/E5KT/E6KT/E8KT/E10KT/E10KTBE/E12KT-D22.

E xK T - D 2 2

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|

- 1 “E” means “energy storage system”.
- 2 “xK” indicates the rated output of the system. “8K” means 8 kW, “10K” means 10 kW, and “12K” means 12 kW.
- 3 “T” means “three-phase inverter”.
- 4 “D” means “Per MPPT current  $\geq 20A$ ”
- 5 “2” means “2 MPPT”
- 6 “2” means “Generation 2”

### 3.2.2 Battery Pack Model

BP 48 100 P F 1A - G2

|   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|

- 1 “BP” means the label “BATTERY PACK”.
- 2 “48” means the voltage of the battery pack 48V.
- 3 “100” means the battery capacity is 100Ah.
- 4 “P” means the battery packs are connected in parallel for multiple battery packs.
- 5 “F” means with a heating film.
- 6 “1A” means with EVE 3U cells and circuit breaker.
- 7 “G2” means the 2nd generation residential battery pack of KSTAR.

### 3.3 System Topology

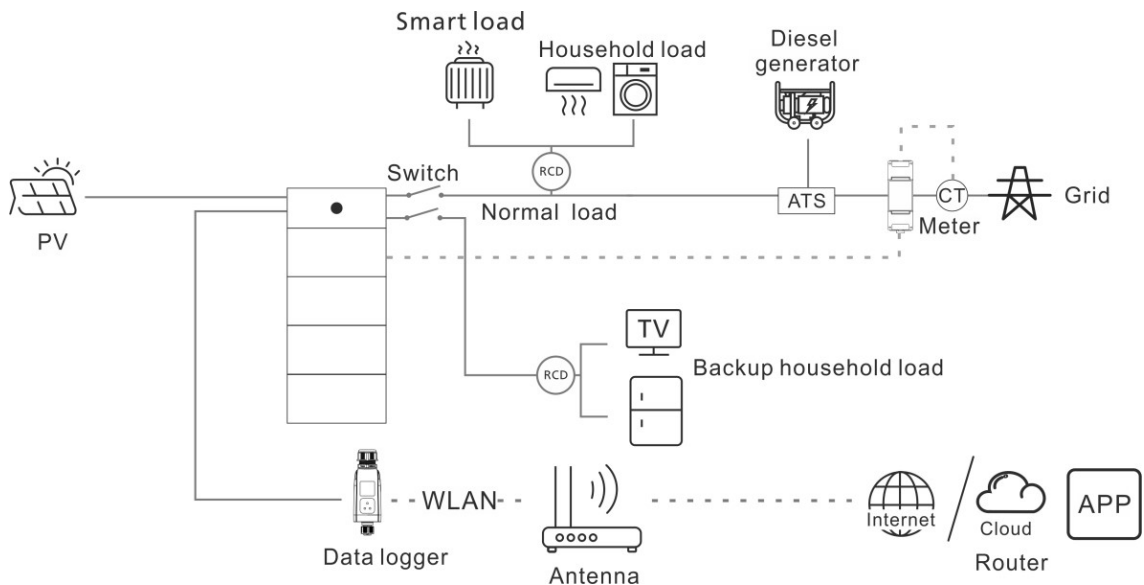
BlueSpark Series can be used for Home Hybrid Inverter. The Home energy Hybrid Inverter consists of photovoltaic panels[1], inverters, battery packs, switches, loads, power grids, etc.

The main function of Home Hybrid Inverter is to store the direct current generated by photovoltaic panels into battery packs. Or alternatively, the electricity in the photovoltaic system and the battery pack can be converted into alternating current for use by the load or incorporated into the grid.



[1]: PV panels with functional grounding cable connected cannot be used.

Under backup power networking, the duration of off-grid operation of the backup power load is related to the power supply capacity of the PV storage system. If there is an abnormality in the power supply of the PV storage system during off-grid operation (including but not limited to abnormal PV power generation, insufficient battery power, and abnormal power supplies to the diesel generator), the backup power load will still be unable to operate.





- No more than 8 battery pack units can be cascaded.
- If backup household loads and normal loads experiences leakage, it may pose a risk of electric shock. In order to avoid this hazard, a residual current device (RCD) must be installed between the PCS and the backup household loads.
- As a backup energy source for long-term off-grid applications, the diesel generator can work in tandem with the ATS to provide a smooth transition between PV, storage and diesel power generation.
- All the power equipment in the owner's home can be connected as smart loads. To ensure that this product maximizes the benefits to users, it is recommended that the high-power equipment be connected as smart loads (heat pumps, pool heaters, clothes dryers, immersion heaters, etc.), which can be cut off when the Hybrid Inverter has low power. Other low-power equipment are connected as home loads (lights, routers, etc.)

## 3.4 Operating Modes

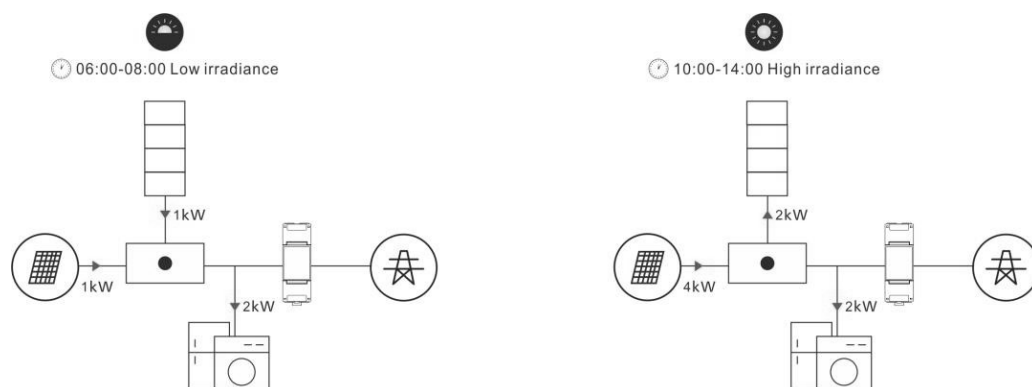
### Self-Consumption mode

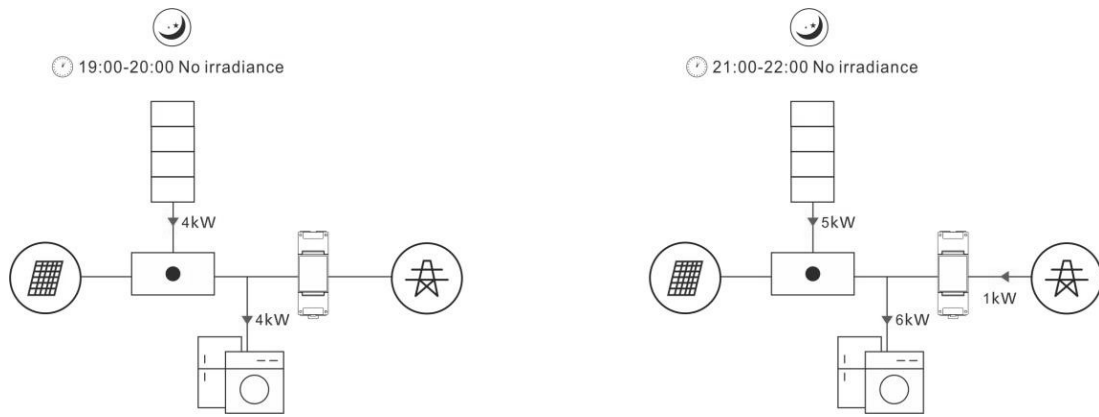
- Self-Consumption mode is the basic working mode of the system.
- The power generated by the PV system supply the loads in priority; the excess power will charge the batteries, and then the remaining power will be sold to the utility grid. When the power generated in the PV system is insufficient, the battery will supply the loads in priority. If the battery power is insufficient, the load will be powered by the utility grid.

Example:

System configuration: one 5KW inverter, equipped with the 20.48 kWh ESS. The ESS works in the self-consumption mode.

- PV energy usage priority: Powering loads > charging the ESS > Fed to grid
- Load power supply priority: PV power > ESS discharging > Grid





## Peak-shift

- This mode applies to scenarios where the price difference is large between peak and off-peak hours. When the electricity price is low during off-peak hours, the grid supplies power to charge the ESS. When the electricity price is high during peak hours, the ESS discharges to supply power to household loads.
- In some countries, the grid is not allowed to charge the ESS. In such case, this mode cannot be used.
- In this mode, at least one charge time segment or one discharge time segment is required. During the charge time segment, the grid is allowed to charge the ESS. During the discharge time segment, the ESS can supply power to the loads. In other time segments that are not set, the ESS does not discharge, and the PV system and grid supply power to the loads. (in on/off.grid mode, if the grid fails, the ESS can discharge at any time.)

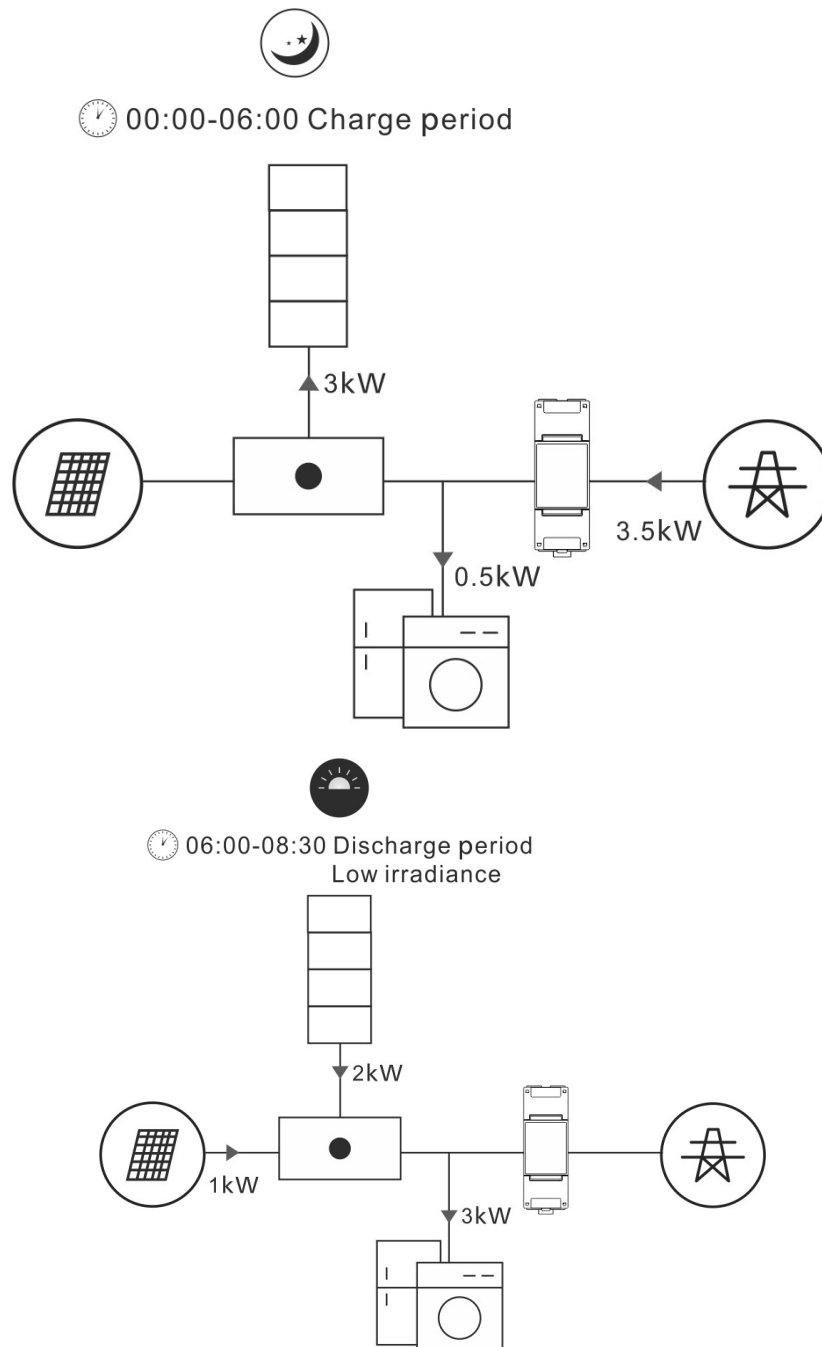
### Example:

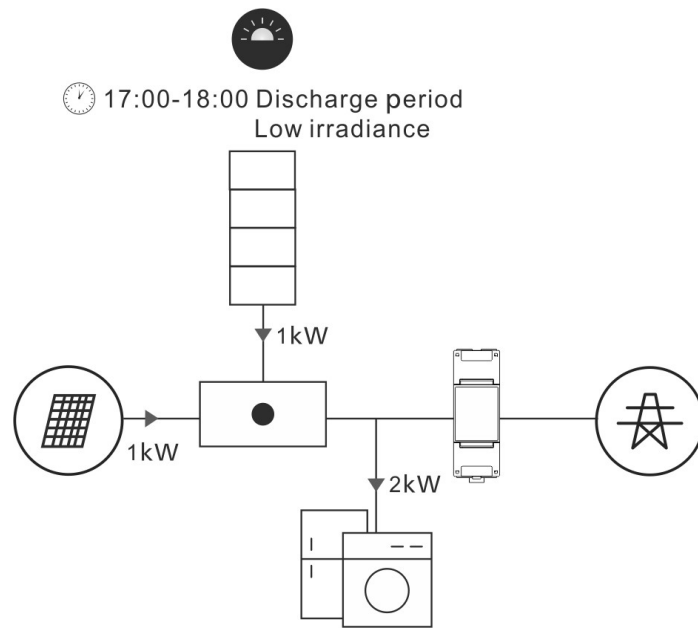
00:00-06:00 is the low-price period, and 06:00-24:00 is the high-price period. Households usually use electricity in the high-price period.

System configuration: one 5KW inverter, equipped with the 20.48 kWh ESS. Set the ESS working mode to Peak-shift mode.

Set parameters as follows: Set 00:00-06:00 as the charge time segment and 06:00-24:00 as the discharge time segment.

- PV energy usage priority: Powering loads > Charging the ESS > Fed to grid
- Load power supply priority: PV power > ESS discharging > Grid.



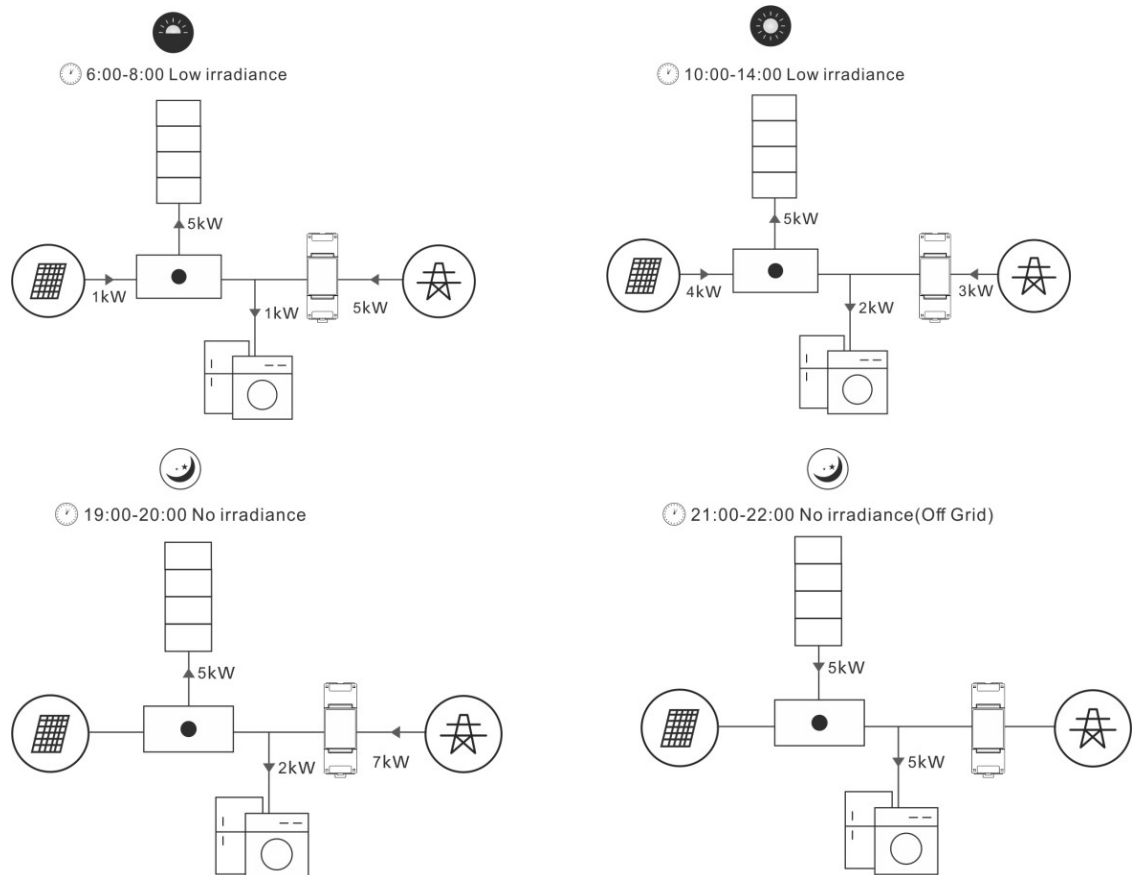


### **Bat Priority mode:**

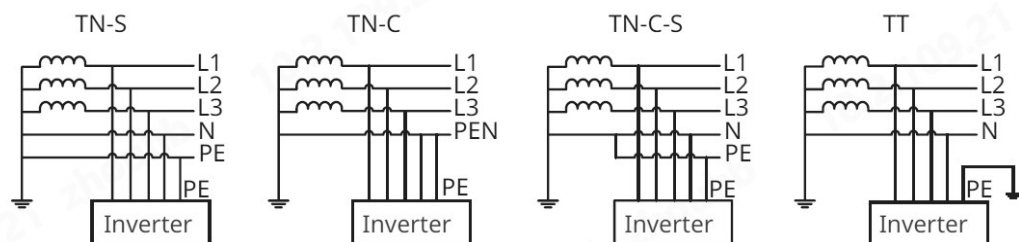
- The Bat Priority mode is mainly applied to the scenario where the grid is unstable.
- When the grid is disconnected, the inverter turns to off-grid mode and the battery will supply power to the EPS loads; when the grid is restored, the inverter switches to on-grid mode.
- To ensure that the battery SOC is sufficient to maintain normal operation of the system when it is off grid, the battery will be charged to the backup power SOC using PV or grid power during on-grid operation. If you need to purchase electricity from the power grid to charge the battery, please confirm compliance with local power grid laws and regulations.

### Example:

- System configuration: one 5KW inverter, equipped with the 20.48 kWh ESS. The ESS works in the Bat Priority mode.
- PV energy usage priority: charging the ESS > Powering loads > Fed to grid
- Load power supply priority: PV power > Grid > ESS discharging



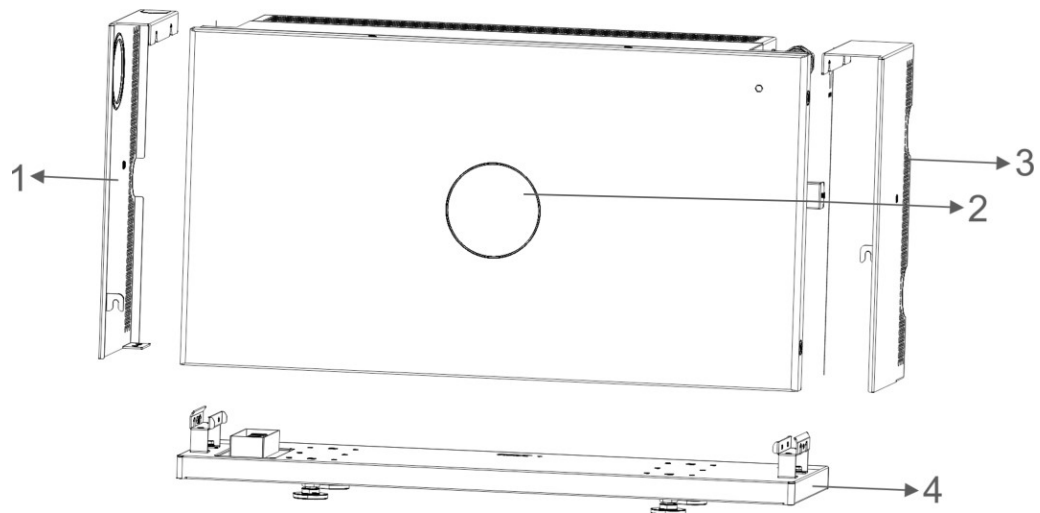
## 3.5 Supported Grid Types



The grid supply methods supported include TN-S, TN-C, TN-C-S, and TT

When TT is used as the power supply technique for the power grid, the voltage between N and PE is required to be < 10 V.

## 4 Inverter Appearance



| Item | Describe               | Item | Describe            |
|------|------------------------|------|---------------------|
| 1    | Left decorative panel  | 2    | LED display panel   |
| 3    | Right decorative panel | 4    | Floor stand support |

Figure 4-1 the main components exploded diagram in the inverter packaging box

### 4.1 External ports on the inverter

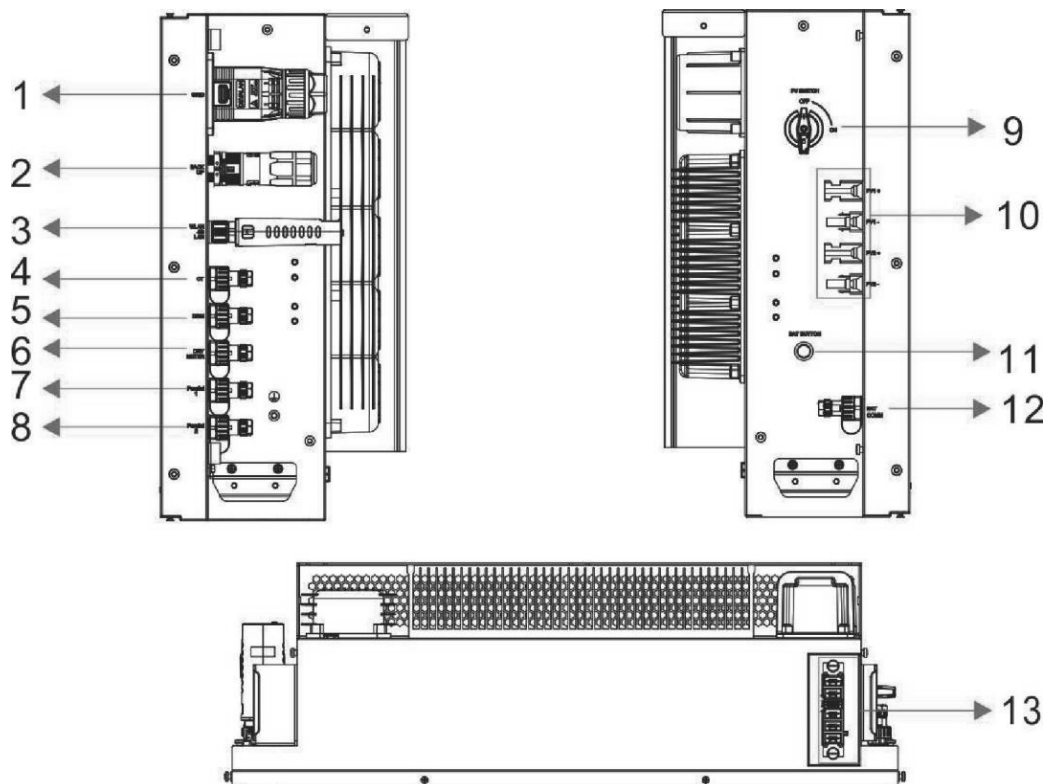


Figure 4-2 External Interface

| Item | Describe            | Item | Describe          |
|------|---------------------|------|-------------------|
| 1    | GRID (DVC C)        | 2    | BACK UP (DVC C)   |
| 3    | WLAN/4G/LAN (DVC A) | 4    | CT (DVC A)        |
| 5    | DRM (DVC A)         | 6    | DRY&METER (DVC A) |
| 7    | Parallel1 (DVC A)   | 8    | Parallel2 (DVC A) |
| 9    | PV SWITCH (DVC C)   | 10   | PV1/PV2 (DVC C)   |
| 11   | BAT BUTTON (DVC A)  | 12   | BAT COMM (DVC A)  |
| 13   | BAT connect (DVC A) |      |                   |



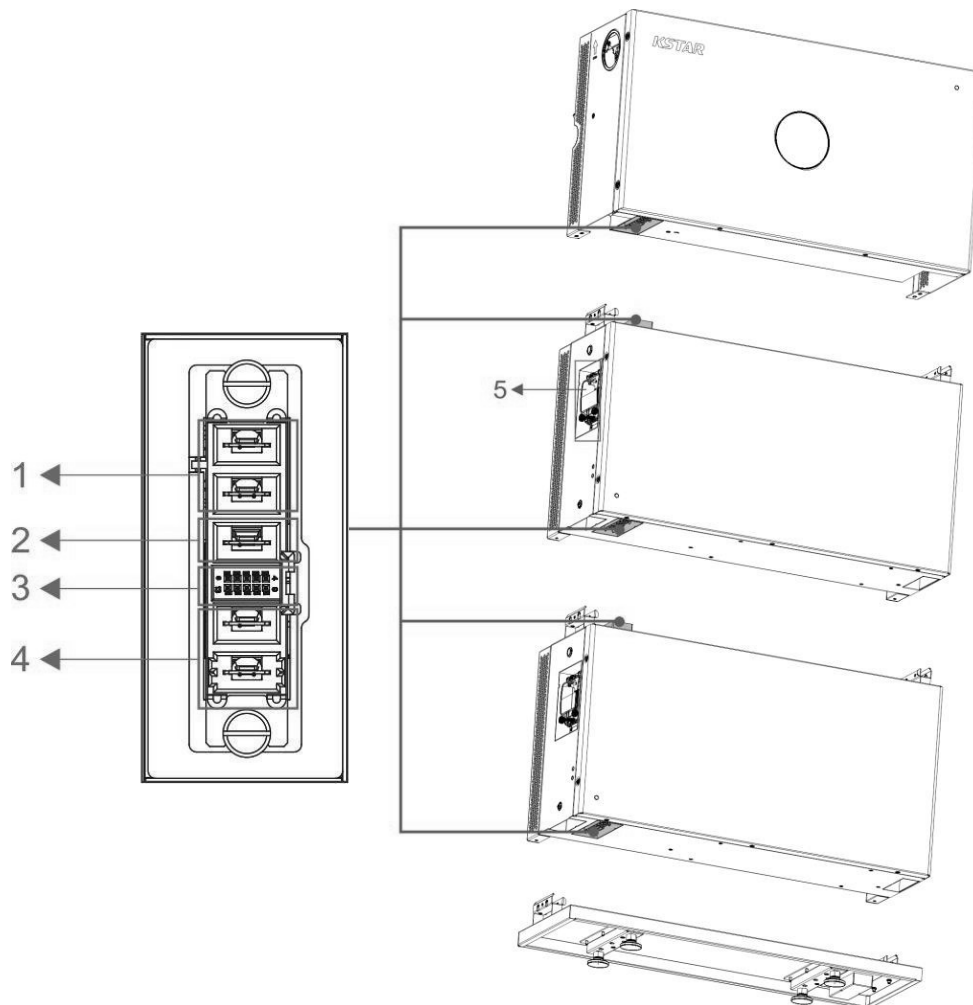
Decisive voltage classification (DVC) identifies the minimum necessary level of protection for the circuit. For more information on the DVC of each port, see Appendix: Definition of DVC.

## 4.2 Battery Pack Appearance

### BP48100PF1A-G2:

Battery system can store and release electrical energy according to the requirements of the photovoltaic Hybrid Inverter. The input and output port of this Hybrid Inverter are both low-voltage direct current.

#### 4.2.1 Battery port information



The battery power and signal connectors are in blind-inserted mode, so the communication was automatically connected after the battery packs and the inverter were assemble. BMS communication between Battery and Inverter through CANH & CANL terminals which integrated below interface.

| Code | Describe                |
|------|-------------------------|
| 1    | Battery-                |
| 2    | Chassis ground          |
| 3    | Communication interface |
| 4    | Battery+                |
| 5    | Battery switch          |

## 4.3 LED Indicators



The inverter can be in six states shown in Table 4-3.

Table 4-3 Inverter States

| Icons                                                                               | Implication                                      | Color | Status                                                                              | Describe                                                                           |
|-------------------------------------------------------------------------------------|--------------------------------------------------|-------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|    | PV Indicator                                     | Green | On                                                                                  | PV operating normally                                                              |
|                                                                                     |                                                  |       | Flashing                                                                            | PV connected but not operating                                                     |
|                                                                                     |                                                  |       | Off                                                                                 | PV not connected                                                                   |
|    | Communication Indicator                          | Green | On                                                                                  | Monitoring backend connected and communication normal                              |
|                                                                                     |                                                  |       | Off                                                                                 | Monitoring module not connected or communication abnormal                          |
|  | Grid Indicator                                   | Green | On                                                                                  | System in On-grid operation mode                                                   |
|                                                                                     |                                                  |       | Flashing                                                                            | System in bypass mode                                                              |
|                                                                                     |                                                  |       | Off                                                                                 | System in initialization, standby, off-grid, fault, commissioning, or upgrade mode |
|  | Off-Grid Indicator                               | Green | On                                                                                  | System in off-grid PV charging mode                                                |
|                                                                                     |                                                  |       | Off                                                                                 | PV off-grid charging not in progress                                               |
|  | Fault Indicator                                  | Red   | On                                                                                  | System fault                                                                       |
|                                                                                     |                                                  |       | Off                                                                                 |                                                                                    |
|  | Battery Indicator                                | Green | On                                                                                  | Battery operating normally                                                         |
|                                                                                     |                                                  |       | Flashing                                                                            | Battery abnormal (alarm or BMS communication abnormal)                             |
|                                                                                     |                                                  |       | Off                                                                                 | Battery shutdown or battery disconnected                                           |
|  | Battery SOC Indicator (Flashing during charging) | Green |  | ≥80%                                                                               |
|                                                                                     |                                                  |       |  | ≥60%                                                                               |
|                                                                                     |                                                  |       |  | ≥40%                                                                               |
|                                                                                     |                                                  |       |  | ≥20%                                                                               |
|                                                                                     |                                                  |       |  | ≥5%                                                                                |
|                                                                                     |                                                  |       |  | <5%                                                                                |

## 4.4 Packing List

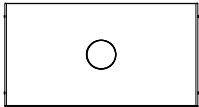
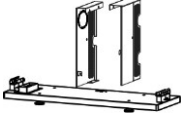
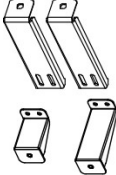
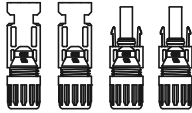
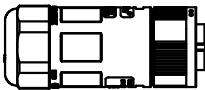
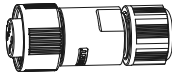
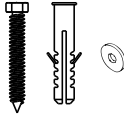
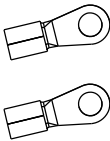
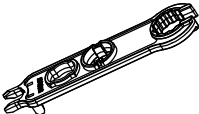
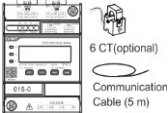
### Checking Deliverables

After unpacking the ESS, check that the deliverables are intact and complete, and free from any obvious damage. If any item is missing or damaged, contact your vendor.

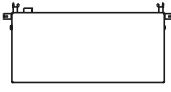
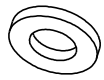
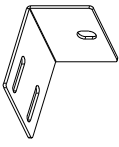
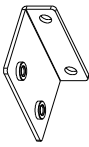
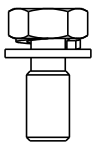
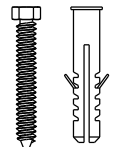
### NOTICE

For details about the number of deliverables, see the Packing List in the packing case.

#### 4.4.1 Inverter Deliverables

|                                                                                                                                    |                                                                                                                                                         |                                                                                                                                 |                                                                                                                                   |
|------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
|  <p>Inverter (packed and assembled with base)</p> |  <p>Base and Decorative Covers</p>                                     |  <p>Mounting bracket</p>                      |  <p>PV terminals: 2x positive, 2x negative</p> |
|  <p>M4x12 Bolt (6 sets)</p>                       |  <p>2 Countersunk screw</p>                                            |  <p>1 AC Backup connector</p>                 |  <p>AC grid connector</p>                      |
|  <p>WIFI Connector</p>                          |  <p>2 screws, 2 rubber sleeves, 2 gasket (base and wall bracket)</p> |  <p>3xRJ45 Connector</p>                    |  <p>OT terminals</p>                         |
|  <p>PV connector tool</p>                       |  <p>Quick Installation Guide</p>                                     |  <p>Positional Punch card</p>               |  <p>RS485 Communication Cable (10 m)</p>     |
|  <p>2xCT&amp;Meter Connector</p>                |  <p>Data Logger (WiFi)</p>                                           |  <p>DTSU666-Smart Power Meter(Optional)</p> |                                                                                                                                   |

#### 4.4.1.2 Battery pack Components

|                                                                                                          |                                                                                                             |                                                                                                   |                                                                                                               |
|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| <br>1×Battery pack      | <br>2×Mechanical cover     | <br>2×M6 Gasket | <br>2×M4*12                |
| <br>2×Wall Mounting Kit | <br>2×Battery Mounting Kit | <br>8×M5*12     | <br>2×ST6.3*50<br>2×D10*50 |

## 4.5 Storage Requirements

### 4.5.1 Storage Environment Requirements

It is recommended that you begin using the battery soon after delivery rather than store the battery pack for a long time. The maximum storage life of a battery pack is three years.

The intended storage environment of the battery pack should meet these requirements:

- Ambient temperature: 0°C to 35°C.
- Recommended storage temperature: 20°C to 30°C.
- Relative humidity: 0–95% (No condensation).
- Dry, ventilated, and clean area.
- No contact with corrosive organic solvents, gases, and other substances.
- No direct sunlight.
- More than two meters from any heat source.

### **WARNING**

When storing a battery in its packaging, make sure that the packaging box is intact and that the battery is appropriately placed and stacked, and the above mentioned requirements are met.

## 4.5.2 Interval for Recharging Batteries

While in storage, batteries must be recharged at specified intervals.

Table 4.4 Recharge Batteries at Specified Intervals during Storage

| Actual Storage Temperature                           | Interval  |
|------------------------------------------------------|-----------|
| $-10^{\circ}\text{C} \leq T \leq 30^{\circ}\text{C}$ | 12 months |
| $30^{\circ}\text{C} < T \leq 45^{\circ}\text{C}$     | 8 months  |

For example, whether the battery is recharged every 8 months or every 12 months, it can only be recharged a maximum of three times within three years. If the battery has not been recharged within three years, it is recommended that the battery pack be discarded.

Lithium-ion batteries lose capacity during storage. After 12 months of storage at the intended storage temperature, the capacity generally falls irreversibly by 3–10%. Batteries with less than 100% capacity after storage cannot pass the discharge testing and acceptance testing.

## 4.5.3 Recharging a Battery

If a battery has not been charged for two weeks or more after a deep discharge, or the SOC of a battery is less than 50% after a long period of storage, the battery must be charged to 50%.

### WARNING

Before charging the battery, check it for deformation, case damage, or leakage, and if you find any of these things, do not charge the battery.



If the SOC of a battery pack is not less than 50% after more than 12 months of storage, it is not necessary to recharge the battery.

### NOTES

Prepare a cross screwdriver and insulated rubber gloves.

### CAUTION

When you connect the power wires, wear insulated rubber gloves.

## PROCEDURE

**Step 1.** Connect power cables to the battery charger correctly. The maximum number of battery pack connected parallel is 4.

**Step 2.** Press the battery “start key” for 2~3 seconds to start the battery pack. Check the LED on the battery “start key” is on.

**Step 3.** Turn on the battery charger.

**Step 4.** Set charging parameter on the battery charger.

**Case #1**, One battery pack is charged. Set the charge limited voltage 57.6V; Set the charge limited current 50A;

**Case #2**, Two ~ Four battery packs are charged. Set the charge limited voltage 57.6V; Set the charge limited current 100A;

**Step 5.** After the battery is charged, switch off the battery charger and press the battery “start key” for 2~3 seconds to switch off the battery pack.

## 5 Mechanical Installation

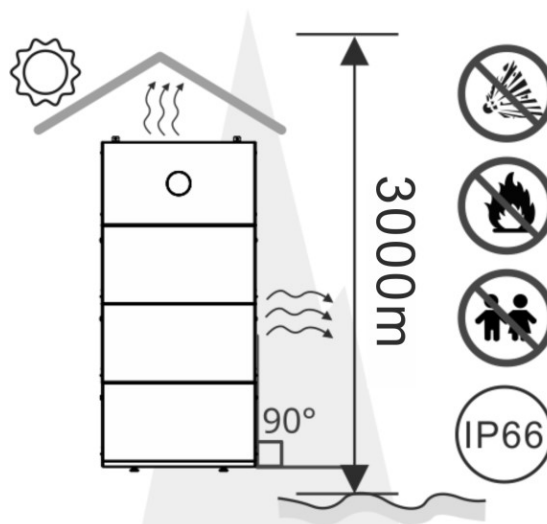
### WARNING

Respect all local standards and requirements during mechanical installation.

### 5.1 Location Requirements

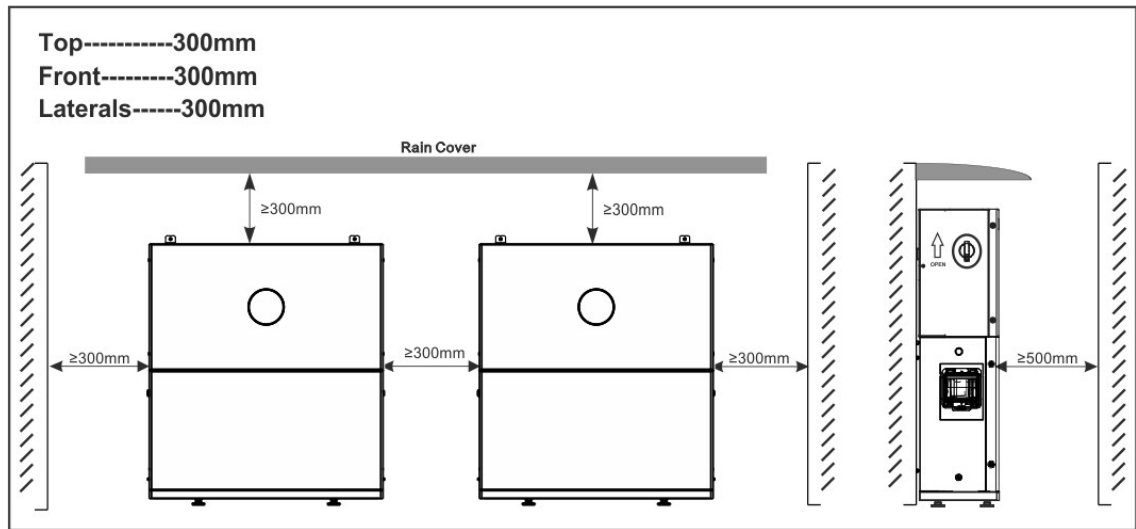
#### 5.1.1 Installation Environment Requirements

1. Do not install the equipment in a place near flammable, explosive, or corrosive materials.
2. The temperature and humidity at the installation site should be kept within the appropriate range.
3. Keep away from children.
4. High temperatures may exist on the surface of the equipment during operation to prevent burns.
5. Install the equipment in a sheltered place to avoid direct sunlight, rain, and snow.  
Build a sunshade if it is needed.
6. The place to install the equipment shall be well-ventilated for heat radiation and large enough for operations.
7. Check the protection rating of the equipment and ensure that the installation environment meets the requirements. The inverter, battery system, and smart dongle can be installed both indoors and outdoors, but the smart meter can only be installed indoors.
8. Install the equipment at a height that is convenient for operation and maintenance, electrical connections, and checking indicators and labels.
9. The altitude to install the inverter shall be lower than the maximum working altitude of the system.



### 5.1.2 Installation Clearance Requirements

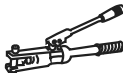
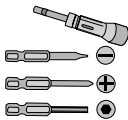
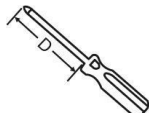
During installation, ensure that there is no other equipment (except related KSTAR equipment and awnings) or flammable or explosive materials around the ESS. Reserve sufficient space for heat dissipation and safety isolation.



## 5.2 Installation Tools & Required Cables



The following tools and cables are recommended when installing the equipment. Use other auxiliary tools and cables on site if necessary.

|                                                                                                                                                                  |                                                                                                                              |                                                                                                                                |                                                                                                                                                                                         |                                                                                                                                                                             |                                                                                                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| <br>Protective Goggles                                                          | <br>Protective Gloves<br>Protective Shoes & | <br>Protective Mask                           | <br>Wire Clamp                                                                                        | <br>Torque wrench<br>(M2/M3/<br>M4/M5/<br>M6)                                            | <br>Leveling Instrument                              |
| <br>Cable Crimper                                                              | <br>Φ10mm<br>Power Drill                   | <br>Φ 8mm<br>Flat-head<br>Screwdriver        | <br>Multi-meter                                                                                     | <br>Rubber Mallet                                                                       | <br>Tape Measure                                    |
| <br>Marker Pen                                                                | <br>Wire Stripper                         | <br>M4(D ≥<br>40mm)<br>Cross<br>Screwdriver | <br>5-Core AC<br>Cable<br>(Cross<br>section: 4~<br>6 mm² for<br>8~12KW; 2<br>.5~6 mm²<br>for 4-6KW) | <br>PV<br>Cable<br>(Cross<br>section: 2<br>.5~4<br>mm²,<br>max.<br>Voltage<br>1,000 V) | <br>PE<br>Cable (Cr<br>oss<br>section: 4<br>~6mm²) |
| <br>Meter<br>Voltage<br>Sampling<br>Cable (Cross<br>section: 0.5~<br>1.5 mm²) | <br>Torque wrench                         |                                                                                                                                |                                                                                                                                                                                         |                                                                                                                                                                             |                                                                                                                                         |

## 5.3 Handling of Equipment

### CAUTION

Operations such as transportation, turnover, installation and so on must meet the requirements of the laws and regulations of the country or region where inverters are installed.

Move the equipment to the site before installation. Follow the instructions below to avoid personal injury or equipment damage.

1. Consider the weight of the equipment before moving it. Assign enough personnel to move the equipment to avoid personal injury.

2. Wear safety gloves to avoid personal injury.

3. Keep balance to avoid falling down when moving the equipment.

4. The battery system can be transported to the installation site by crane.

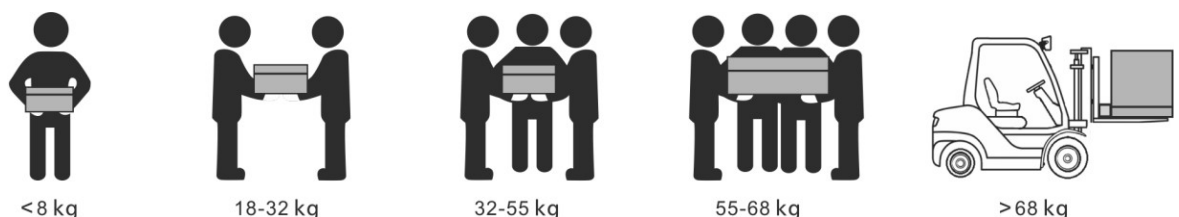
5. When moving equipment using a hoisting method, please use flexible slings or straps. The load-bearing capacity of a single strap must meet the following requirements:

(E4KT/E5KT/E6KT/E8KT/E10KT/ E10KTBE/E12KT-D22)  $\geq 43\text{KG}$ ;

(BP48100PF1A-G2)  $\geq 52\text{KG}$ ;

### 5.3.1 Moving Heavy objects

Be cautious to prevent injury when moving heavy objects.



1 If multiple persons need to move a heavy object together, determine the manpower and work division with consideration of height and other conditions to ensure that the weight is equally distributed.

2 If two persons or more move a heavy object together, ensure that the object is lifted and landed simultaneously and moved at a uniform pace under the supervision of one person.

3 Wear personal protective gears such as protective gloves and shoes when manually moving the equipment.

4 To move an object by hand, approach to the object, squat down, and then lift the object gently and stably by the force of the legs instead of your back. Do not lift it suddenly or turn your body around.

5 Do not quickly lift a heavy object above your waist. Place the object on a workbench that is half-waist high or any other appropriate place, adjust the positions of your palms, and then lift it.

6 Move a heavy object stably with balanced force at an even and low speed. Put down the object stably and slowly to prevent any collision or drop from scratching the surface of the equipment or damaging the components and cables.

7 When moving a heavy object, be aware of the workbench, slope, staircase, and slippery places. When moving a heavy object through a door, ensure that the door is wide enough to move the object and avoid bumping or injury.

8 When transferring a heavy object, move your feet instead of turning your waist around. When lifting and transferring a heavy object, ensure that your feet point to the target direction of movement.

9 When transporting the equipment using a pallet truck or forklift, ensure that the tynes are properly positioned so that the equipment does not topple. Before moving the equipment, secure it to the pallet truck or forklift using ropes. When moving the equipment, assign dedicated personnel to take care of it.

10 Choose sea or roads in good conditions for transportation. Do not transport the equipment by railway or air. Avoid tilt or jolt during transportation.

## 5.4 Mechanical Installation

### DANGER

When drilling, ensure the hole position avoids water pipes, cables, etc. inside the wall to prevent DANGER.

When drilling, wear goggles and a dust mask to prevent dust from inhalation entering the respiratory tract or falling into the eyes.

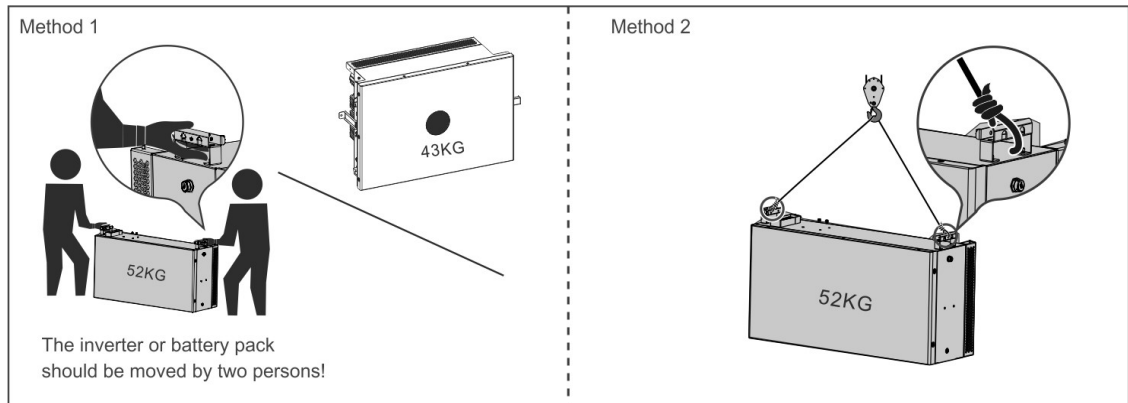
Inverter is located above Battery. Do not place Battery Installation above Inverter. When Battery system Installation, ensure the Installation is level and secure.

When placing the Battery Base, Battery, and Inverter, confirm that the holes on the upper and lower layers are aligned. The locking bracket should be vertically flush with the ground, wall, or Battery system surface.

When using hammer drill for punching, do not remove the dust-proof film on the connector above the battery pack first, to prevent foreign objects from entering the device and causing damage.

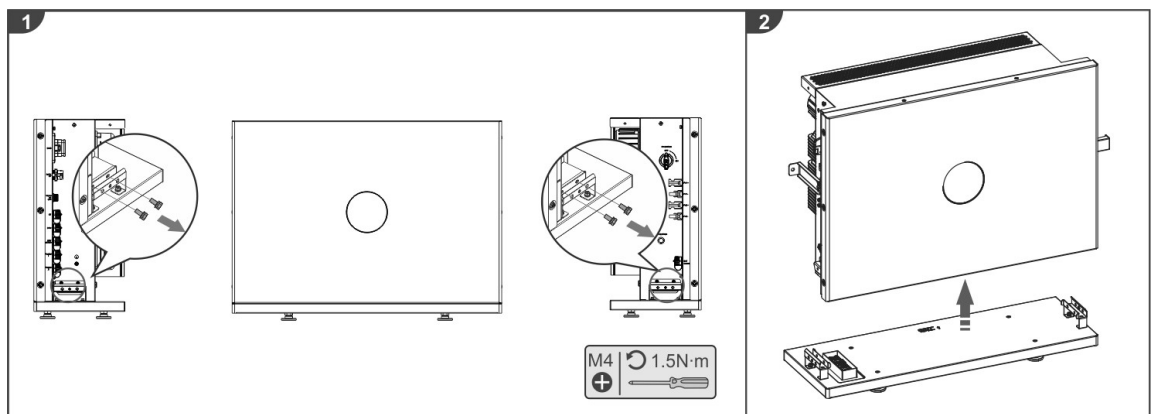
When mounting on a wall Installation, ensure the wall's load-bearing capacity is assessed to protect your life and property.

### 5.4.1 Handling of Equipment



- 1、 Use a Phillips screwdriver to remove the screws on the decorative covers on both sides of the inverter.
- 2、 Lift upward to remove the decorative covers on both sides of the inverter, then use a Phillips screwdriver to remove the screws securing the inverter to the base. Lift the inverter upward to separate it from the base, and lay the inverter flat on the ground.

### 5.4.2 Remove the Base

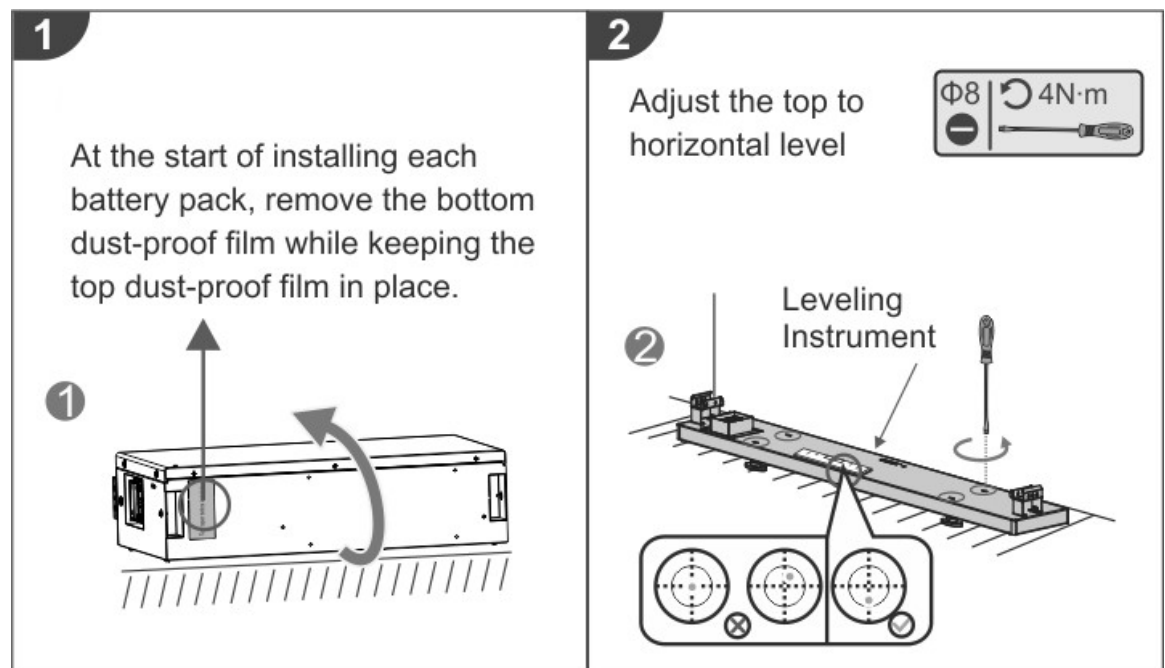


### 5.4.3 Install the Battery Pack

- 1、 Lay the battery flat on the ground. In this step, only remove the dust film on the bottom of each battery pack, leaving the dust film on the top intact.
- 2、 Place the base horizontally on the ground at the pre-installation location. Position a level in the center of the base and check whether the bubble inside the level is centered. If not, use a flathead screwdriver to adjust the screws on top of the base.
- 3、 Lift the battery pack and stack it onto the base. Pay attention to the stacking direction between the base and the battery pack: the end with the protruding connector on the base must align with the end with the protruding connector on the top of the battery pack.
- 4、 Use M4 hex socket screws to secure the base and the battery pack at the lower sides of the battery pack, then install two battery brackets on the back of

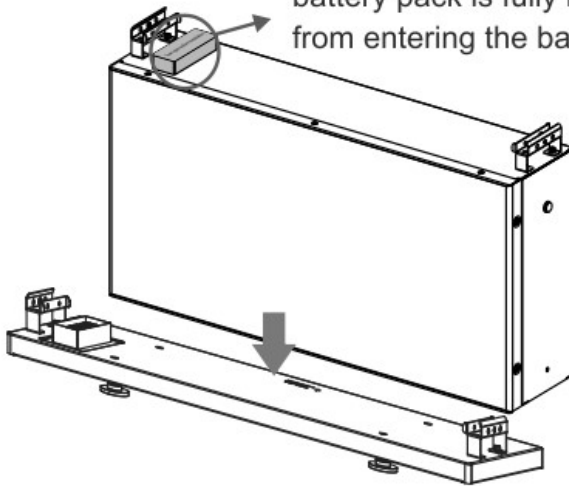
the battery pack.

- 5、 Position the battery pack 0–20 mm away from the wall. The distance from the wall can be adjusted according to the actual flatness of the wall.
- 6、 Place the wall-mounting bracket onto the battery bracket. After ensuring the center holes of the two brackets are aligned, horizontally adjust the wall-mounting bracket toward the wall. Use a marker to mark the center hole of the wall-mounting bracket, then remove the bracket.
- 7、 Use a power drill to drill a hole at the marked point. After cleaning the dust from the hole, use a hammer to tap an expansion tube into the hole.
- 8、 Install the decorative covers on both sides of the battery pack.
- 9、 Secure the wall-mounting bracket to the battery bracket with screws, then use a Phillips screwdriver to fix the wall-mounting bracket to the wall. Finally, remove the dust film from the top of the battery pack.
- 10、 Before stacking the next battery pack, remove the dust film from the bottom of the battery pack, then repeat steps 6–9.



3

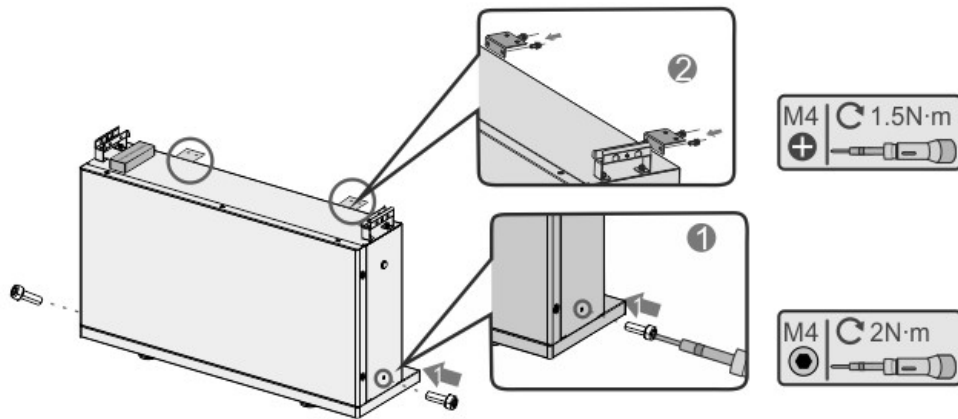
Remove the top dust-proof film only after each battery pack is fully installed. This prevents dust from entering the battery connector.

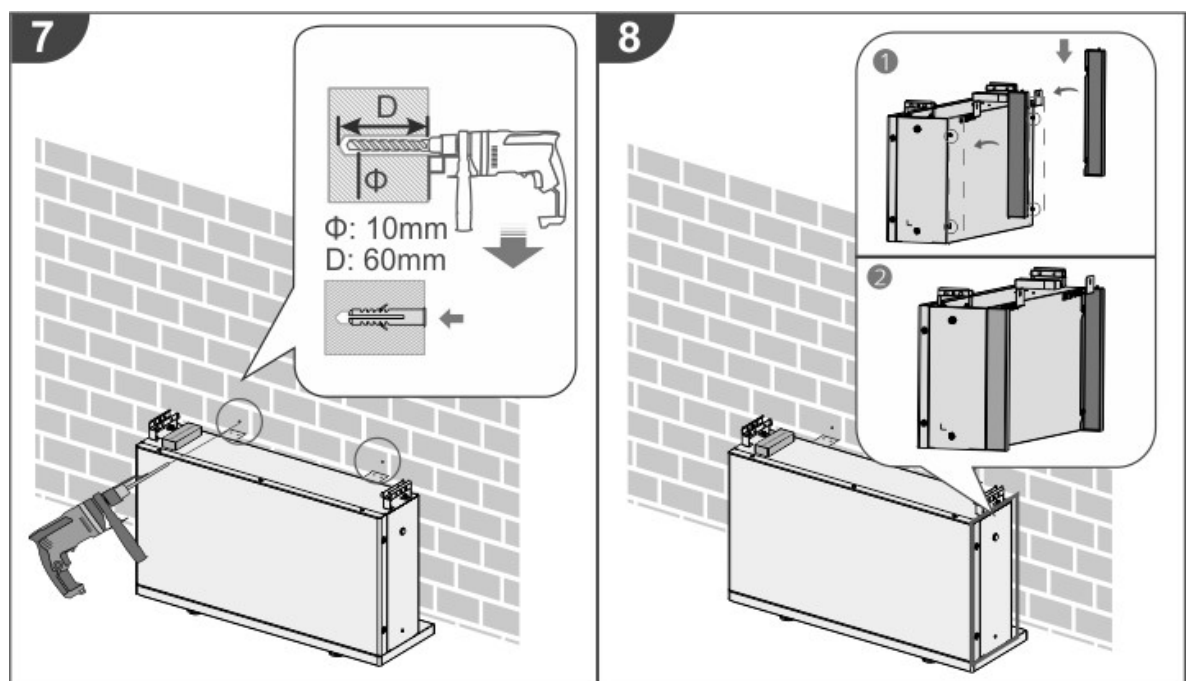
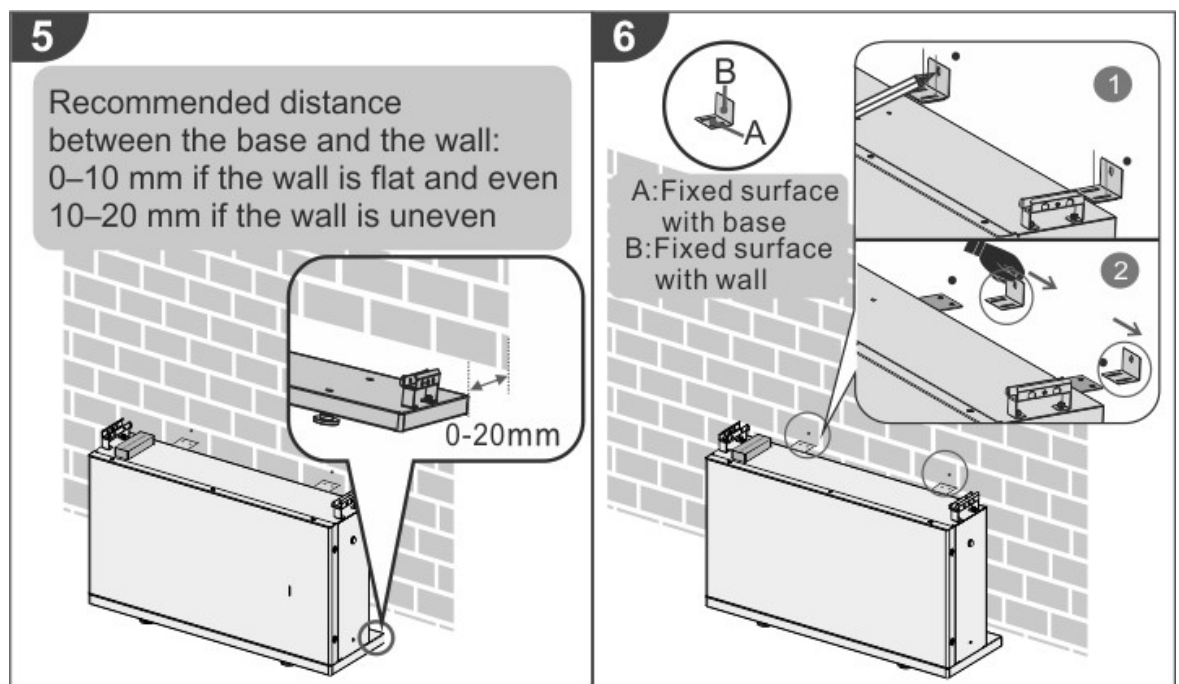


**⚠ DANGER**

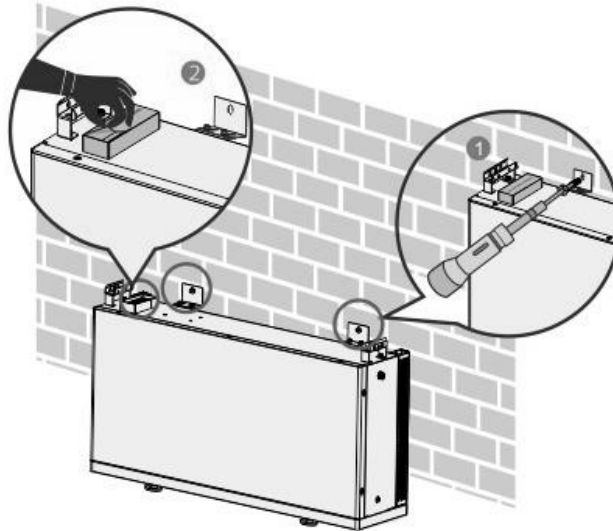
Failure to install the base may result in electric shock hazard. Operation without the base is strictly prohibited.

4

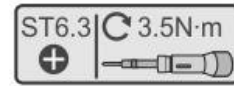




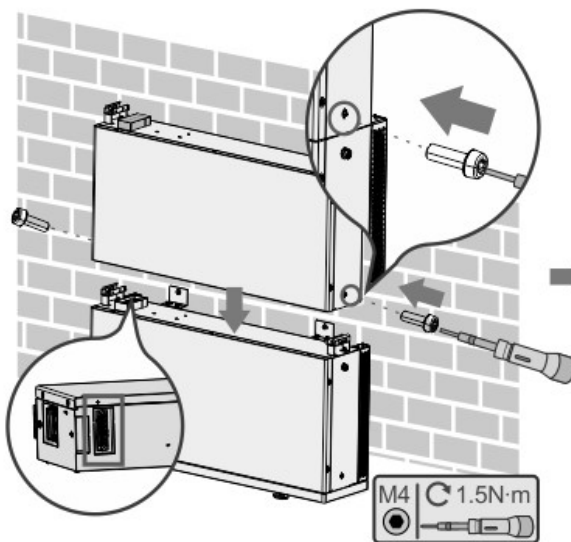
9



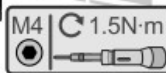
After drilling, remove the protective film to prevent dust from entering the connector.



10

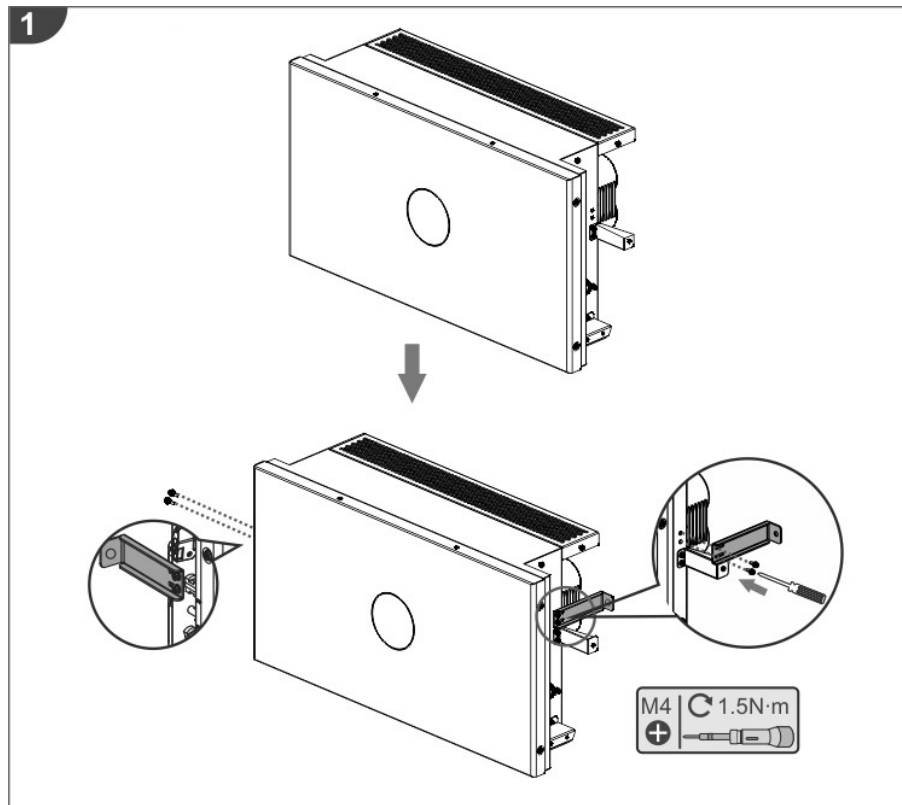


Install next battery packs and repeat steps 6-9.

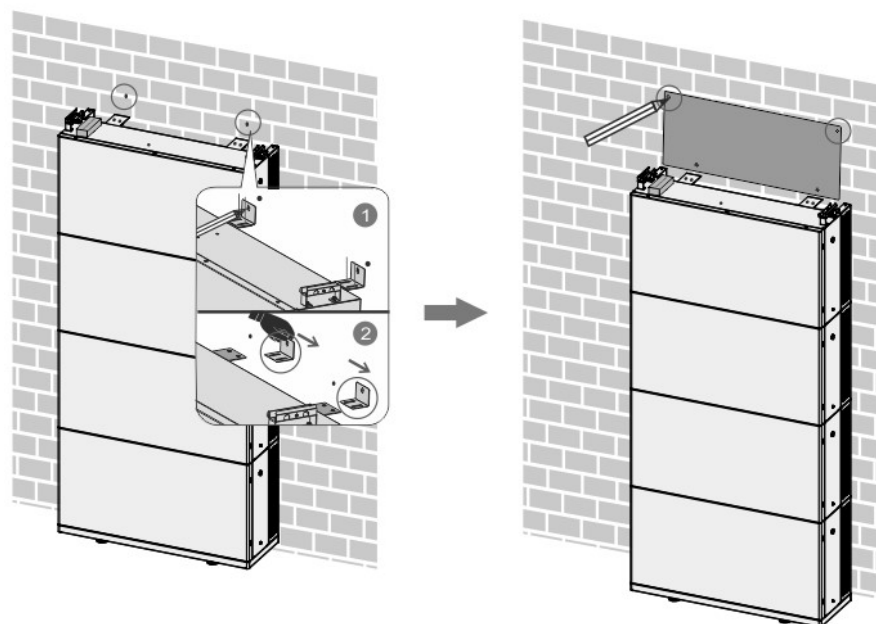


#### 5.4.4 Install the Hybrid Inverter

1. Install the brackets on both sides of the inverter.
2. Place the wall-mounting bracket onto the battery bracket. After ensuring the center holes of the two brackets are aligned, horizontally adjust the wall-mounting bracket toward the wall. Use a marker to mark the center hole of the wall-mounting bracket, then remove the bracket.
3. Align the two lower holes of the positioning paper card with the marked points, then use the marker to mark the positions of the two upper holes. After that, use a power drill to drill holes at these four points.
4. First, secure the wall-mounting bracket to the battery bracket using M4 screws, then fix the wall-mounting bracket to the wall using self-tapping screws.
5. First, remove the dust film from the top of the battery pack, then stack the inverter onto the battery pack. Use a torque socket wrench to secure the inverter mounting brackets to the wall with self-tapping screws.

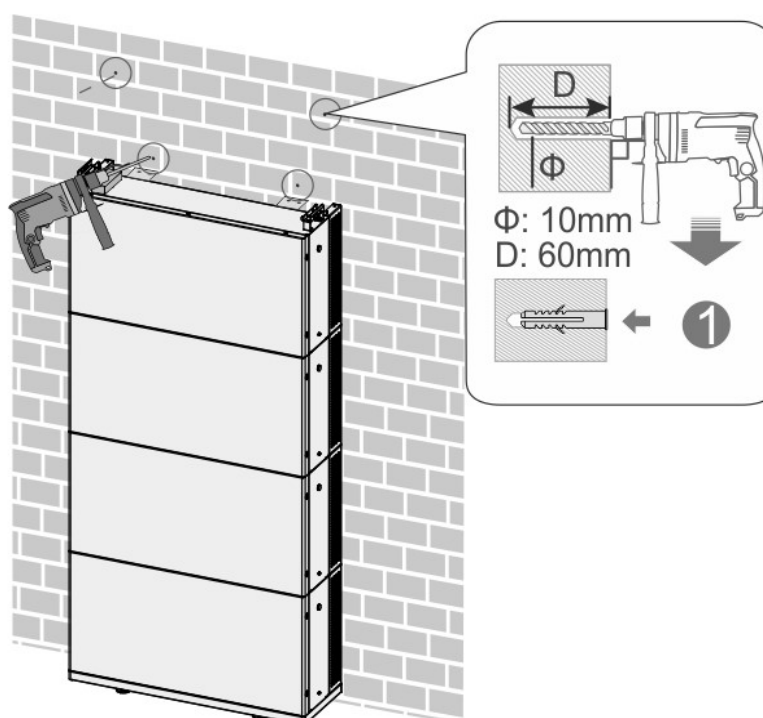


2

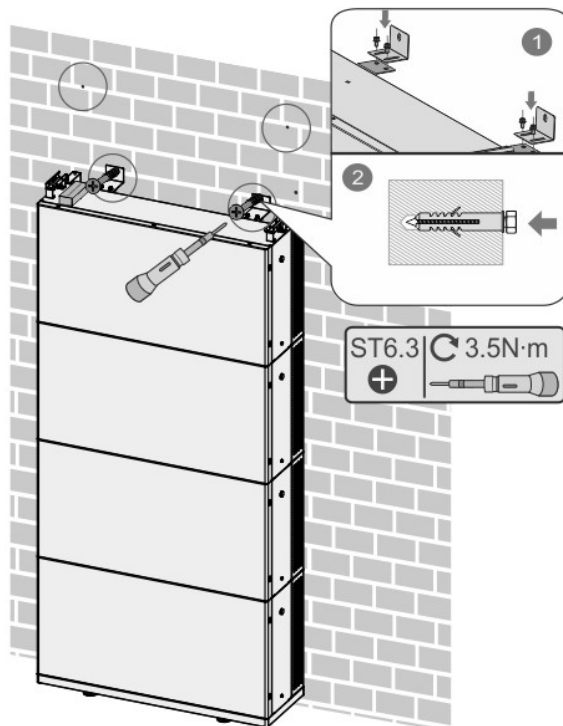


Position the cardboard template so that its bottom two holes align with the two marked points below. Then, mark the two points at the top of the cardboard.

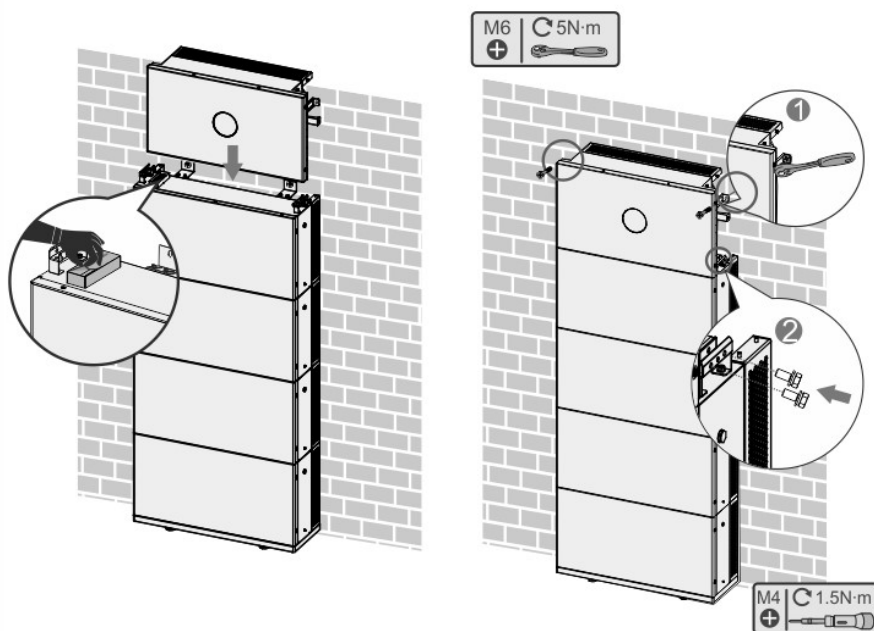
3



4



5



## 6 System Wirings

### **WARNING**

- The installation, routing, and connection of cables must comply with local laws, regulations, and standard requirements.
- All operations during electrical connections, as well as the specifications of cables and components used, must comply with local laws and regulations.
- Before performing electrical connections, please disconnect the DC switch and AC output switch of the device to ensure it is powered off, Live operation is strictly prohibited, otherwise it may lead to DANGER such as electric shock.
- Cables of the same type should be bundled together and arranged separately from different types of cables. Intertwining or cross-arrangement is prohibited.
- If the cable is subjected to excessive tension, it may lead to poor connections. When wiring, please leave a certain length of cable before connecting to the inverter terminal ports.
- When crimping terminals, ensure that the conductor part of the cable is in full contact with the terminal. Do not crimp the cable insulation together with the terminal, otherwise it may cause the device to fail to operate, or after operation, due to unreliable connections leading to heating and other conditions that damage the inverter terminal block.
- The inverter is not tested to AS/NZS 4777.2:2020 for combinations and/or multiple phase inverter combinations so that combinations should not be used.
- For unused cable holes and ports (including communication ports), please use the dedicated terminals or plugs provided in the accessory box to reliably seal them. Otherwise, it may cause the following risks:
- DANGER of electric shock: Open electrical ports may cause direct contact with live parts, leading to electric shock accidents.
- Failure of protection: Open ports may allow dust, moisture, or foreign objects to intrude, which may lead to short circuits, fires, or equipment failures.



When performing electrical connections, wear personal protective equipment such as safety shoes, protective gloves, and insulated gloves as required.

Only qualified personnel are permitted to perform electrical connection-related operations.

The cable colors in the diagrams are for reference only; specific cable specifications must comply with local regulations.

## 6.1 Electrical Connection

### NOTICE

- Depending on regional regulatory requirements, the wiring methods for the N and PE lines at the inverter's ON-GRID and EPS ports differ. Please follow local regulations.
- CT accuracy will decrease when the connection length to the inverter exceeds 20m. For higher accuracy requirements, an external smart meter can be connected.
- The inverter's ON-GRID AC port has a built-in relay. When the inverter is in off-grid mode, the built-in ON-GRID relay is open; when the inverter is in grid-tied operation mode, the built-in ON-GRID relay is closed.
- When the inverter is powered on, the EPS AC port is live. If maintenance is required on the EPS Loads, please power down the inverter to avoid electric shock.
- In a whole-house backup scenario, if the total power of connected loads exceeds the inverter's rated power, the inverter will stop output due to overload protection after a grid outage. In this case, please turn off some non-essential loads to ensure the total load power is less than the inverter's power.



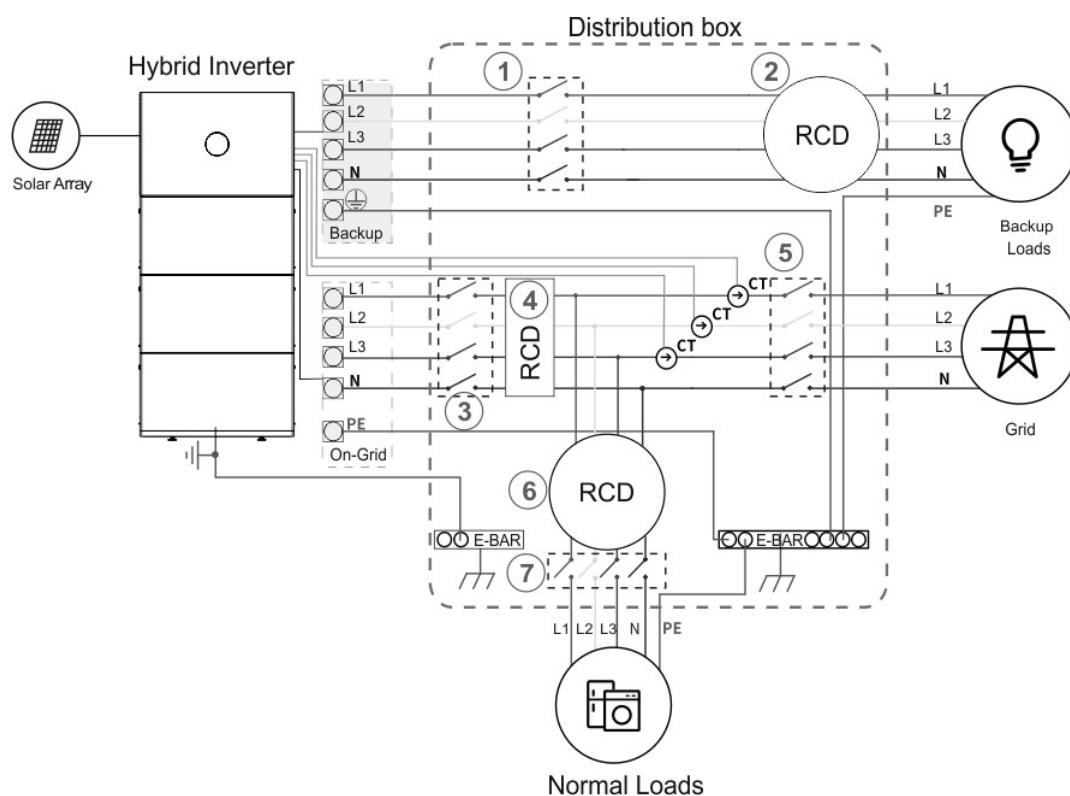
- The type A or B RCD ( $\geq 300$  mA) must be installed on the EPS port of the system according to local regulations.
- The type A or B RCD ( $\geq 300$  mA) is supposed to be installed on the ON-Grid port of the system accordingly based on the local regulations.

N and PE wires are separated in the distribution box.

### NOTICE

Ensure the protective grounding wire for the EPS is correctly and securely connected. Otherwise, the EPS function may malfunction in the event of a grid fault.

The following wiring method applies to regions other than Australia, New Zealand, etc.



|     |                                                  |
|-----|--------------------------------------------------|
| ① ⑦ | Depends on loads                                 |
| ② ⑥ | 300mA RCD(comply with local regulation)          |
| ③   | 40-63A/400V Type B AC breaker                    |
| ④   | 300mA RCD(comply with local regulation)          |
| ⑤   | Depends on household loads and inverter capacity |

## 6.2 PE Cable Connection

### WARNING

The Protection grounding of the chassis enclosure cannot replace the PE cable of the AC output port. when wiring, ensure that the PE cable at both locations is reliably connected.

To improve the corrosion resistance of terminal, it is recommended to apply silica gel or paint on the exterior of Grounding terminal for protection after completing the connection of Installation to PE cable.

When Installation equipment, the PE cable must be Installation first; when dismantle equipment, the PE cable must be dismantle last.

The grounding is integrated into the blind-mate connector and connected to the Inverter. The system is uniformly grounded through the Inverter, eliminating the need for separate grounding operations on the Battery during Installation.

## EARTH FUALT INTRODUCTION

Earth faults caused by insulation failure or accidental contact between live parts and ground that creates a low-resistance path for current to flow to earth, represent significant risks that require proper understanding and protective measures to mitigate their potentially dangerous effects.

## EARTH FUALT ALARM

In the event of an earth fault, the inverter will display a fault code and push an alarm notification via the KSTAR Sync App.

### 6.2.1 Procedure

Step 1 Crimp an OT terminal.



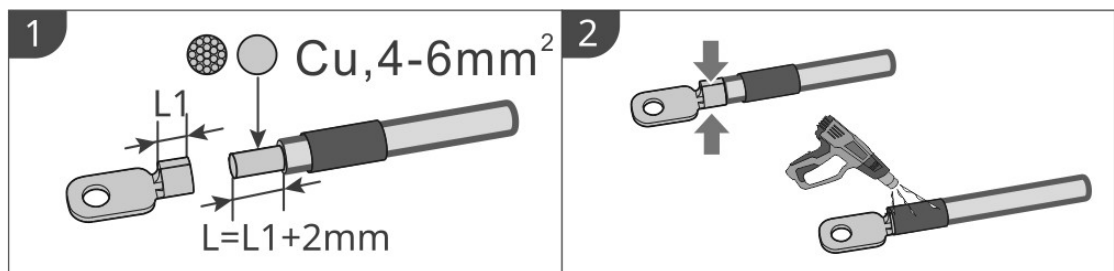
Avoid scratching the core wire when stripping a cable.

The cavity formed after the conductor crimp strip of the OT terminal is crimped must wrap the core wire completely. The core wire must make close contact with the OT 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.

Step 2 Connect the ground point of the Energy Storage Control Unit to the external ground point.





### 6.3 DC (MPPT) connection



Do not connect the same PV string to multiple inverters, as this may cause inverter damage.

Before connecting the PV string to the inverter, confirm the following information. Failure to do so may cause permanent inverter damage, and in severe cases, may lead to fire resulting in personal injury or property loss.

1. Ensure the maximum short-circuit current and Max, Input Voltage for each MPPT are within the inverter's allowable range.
2. Ensure the positive pole of the PV string is connected to the inverter's PV+, and the negative pole of the PV string is connected to the inverter's PV-.

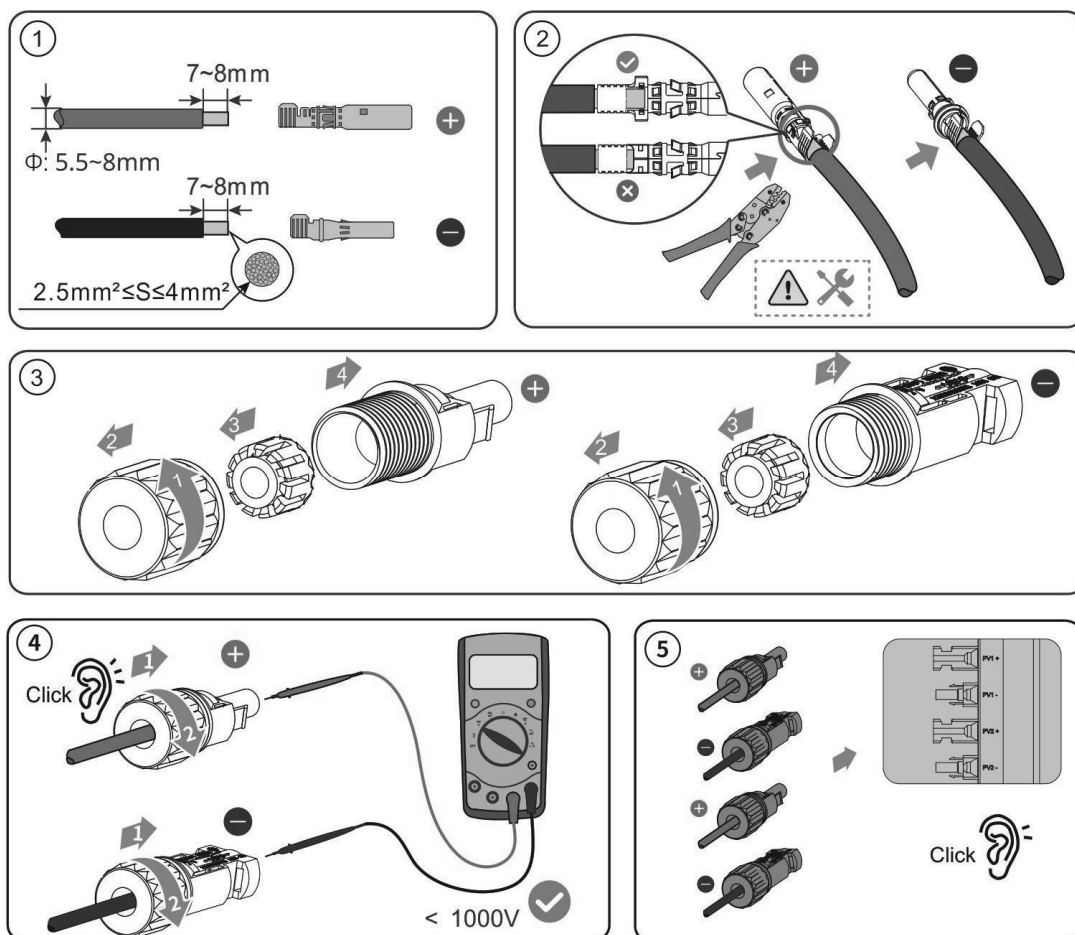


PV string output does not support grounding. Before connecting the PV string to the inverter, ensure the minimum insulation resistance to ground of the PV string meets the minimum insulation impedance requirement ( $R = \text{Max. Input Voltage} / 30\text{mA}$ ).

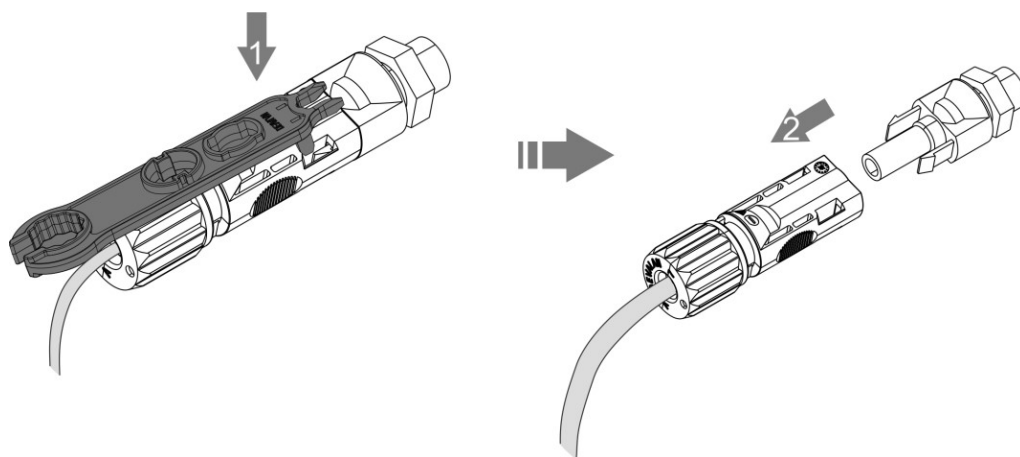
After completing the DC cable connection, ensure the cable connections are secure and not loose.

Use a multimeter to measure the positive and negative poles of the DC cable to ensure correct polarity (no reverse connection) and that the voltage is within the allowable range.

Use the Staubli MC4 positive and negative metal terminals and Dc connectors delivered with the product. Using other positive and negative metal terminals and DC connectors may result in serious consequences, such as cable overheating, burning, and module damage. The resulting device damage is not covered by the product warranty.

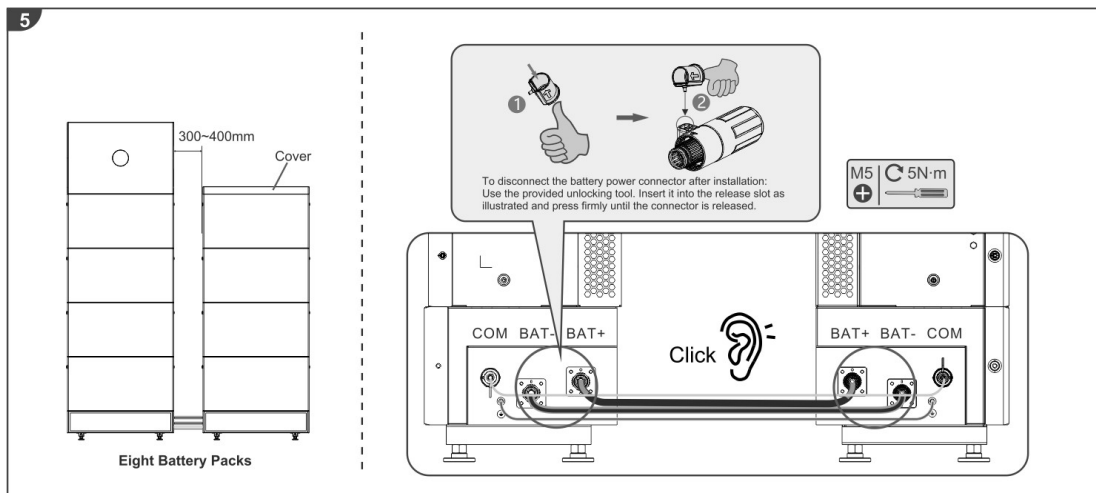
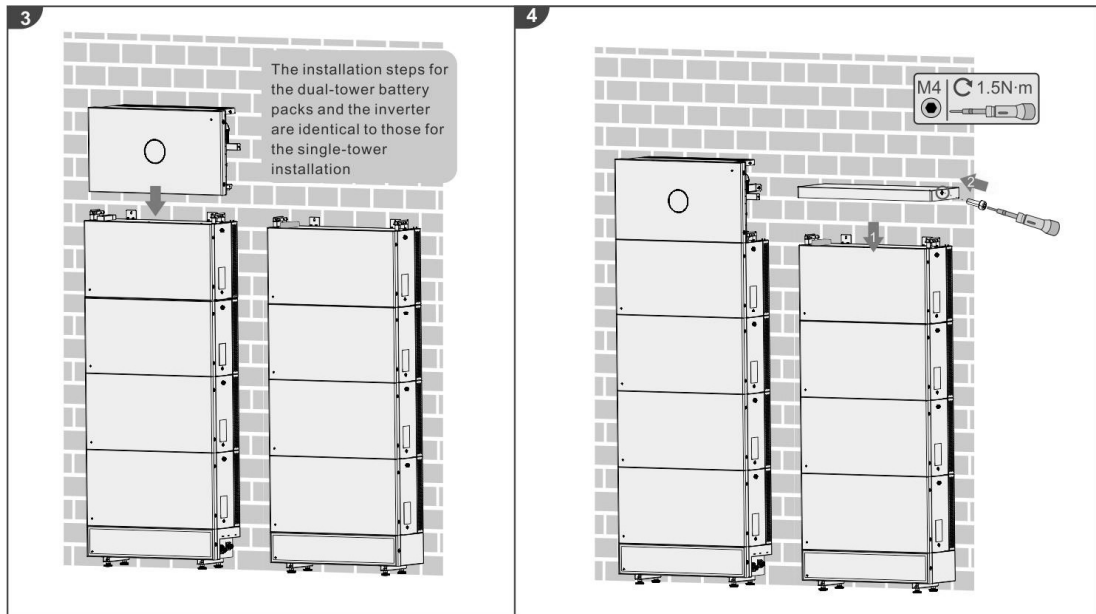
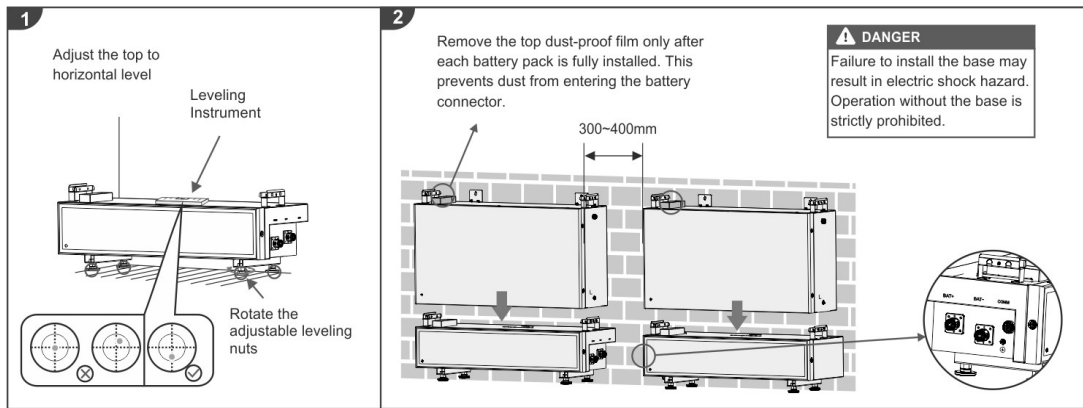


If you need to disassemble the PV terminal, please refer to the steps below:



## 6.4 Energy storage system Expansion Overview:

|                                                                                                                                                                                                    |                          |                                                                                                               |                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------|
| <p><b>NOTE:</b></p> <p>⚠ When 5 to 8 battery packs are used, the following additional accessories must be installed as a set.<br/>The unlocking tool is used for connector release operations.</p> |                          |                                                                                                               |                       |
| <p>Expansion Base</p>                                                                                                                                                                              | <p>Battery Top Cover</p> | <p>Cables: 1 × Communication cable<br/>Power cables (1 × Black + 1 × Orange)<br/>1 × PE cable (Grounding)</p> | <p>Unlocking tool</p> |



## 6.5 AC Connection (Grid & Backup)

### WARNING

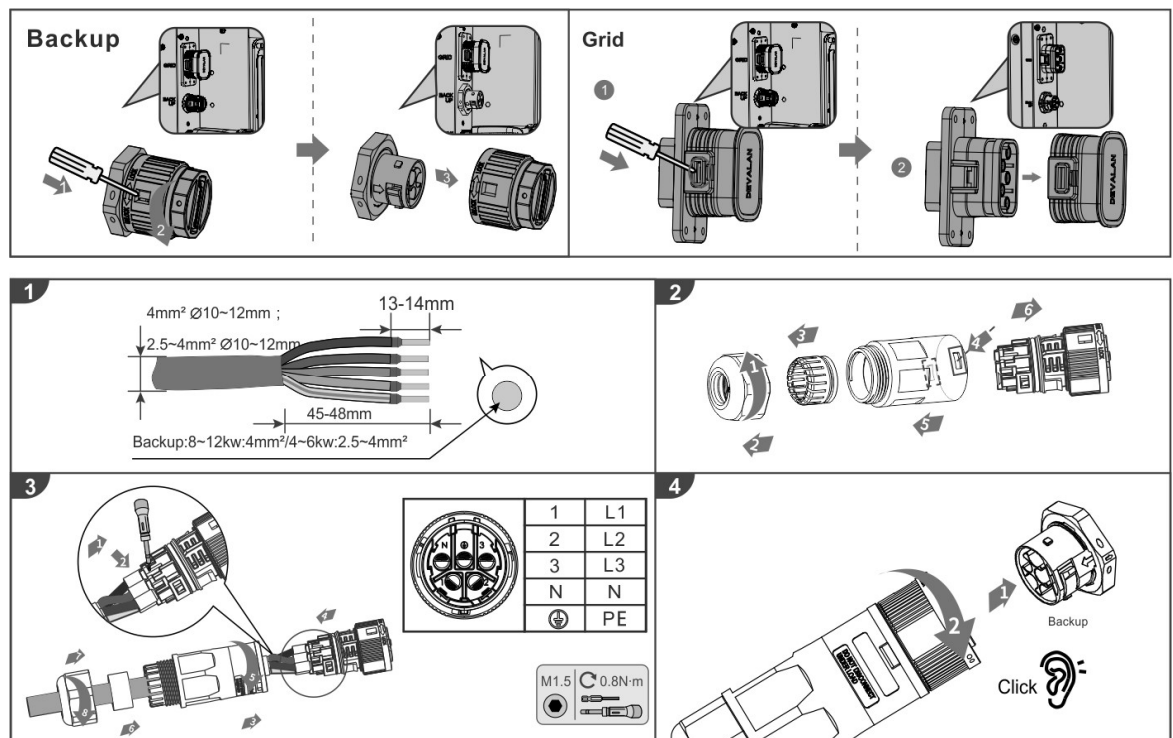
The inverter integrates a Residual Current Monitoring Unit (RCMU) internally to prevent the residual current from exceeding the specified value. When the inverter detects a leakage current greater than the permissible value, it will rapidly disconnect from the grid.

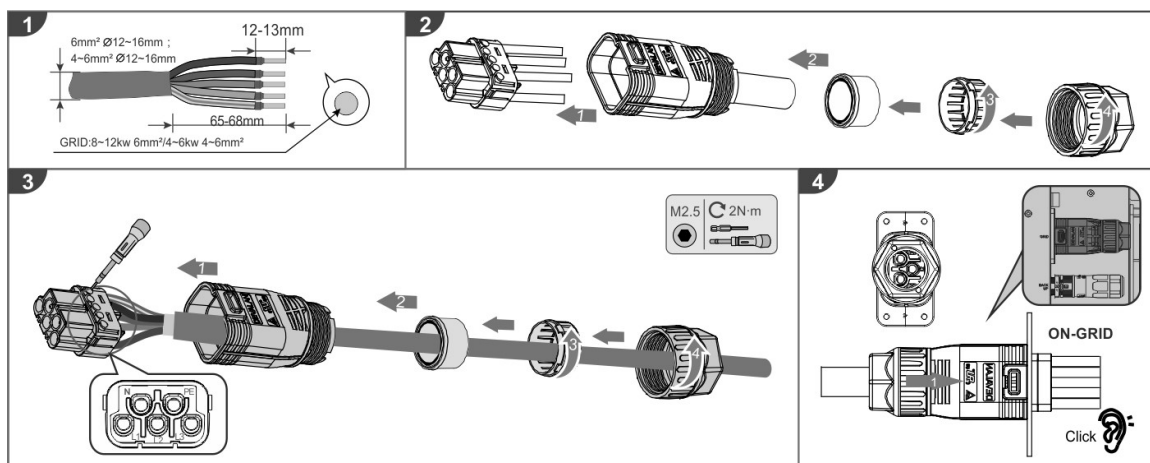
During wiring, ensure the Ac cables fully match the "Backup " and "ON-GRID" grounding terminals of the AC terminal block, Incorrect cable connection will cause equipment damage.

Ensure the wire cores are fully inserted into the terminal connection holes with no exposed parts.

Ensure the insulation plate at the AC terminal block is securely fastened and not Loose.

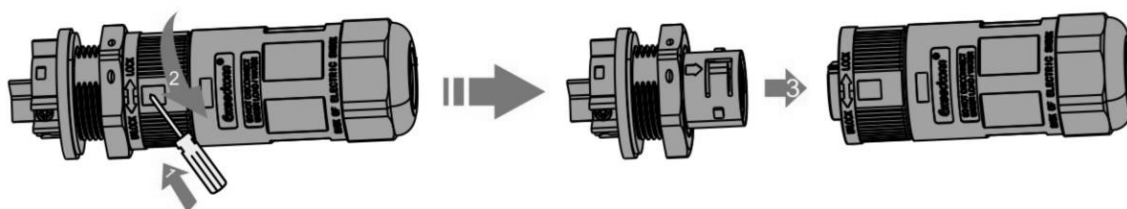
Ensure all cable connections are tight, Otherwise, overheating of the terminals during equipment operation may cause equipment damage.



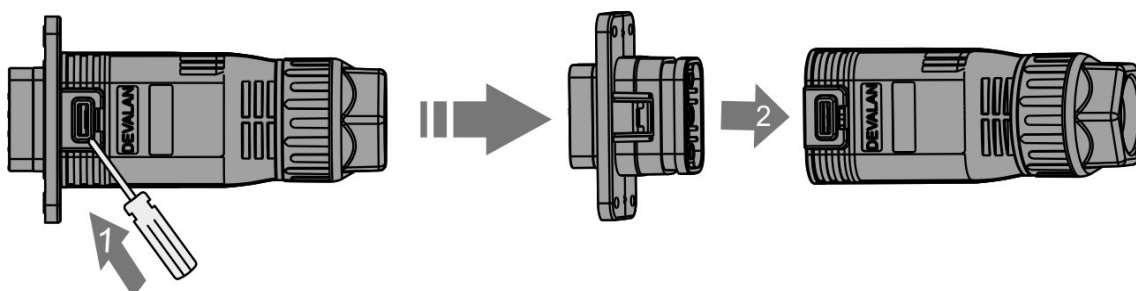


To disassemble the AC terminal, please refer to the following steps:

Backup



Grid



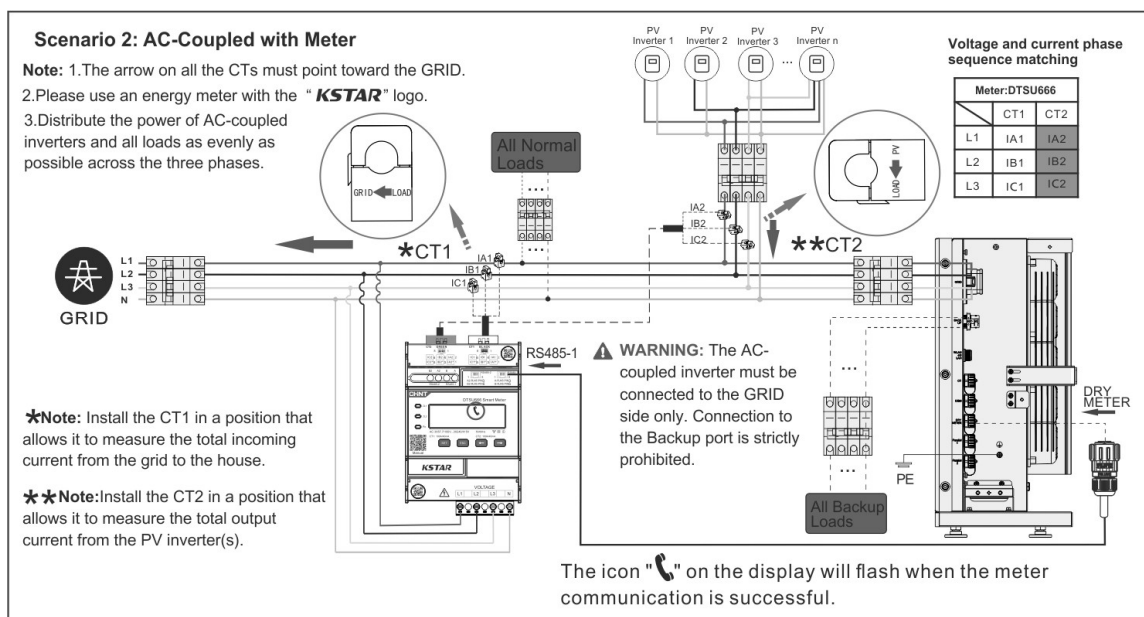
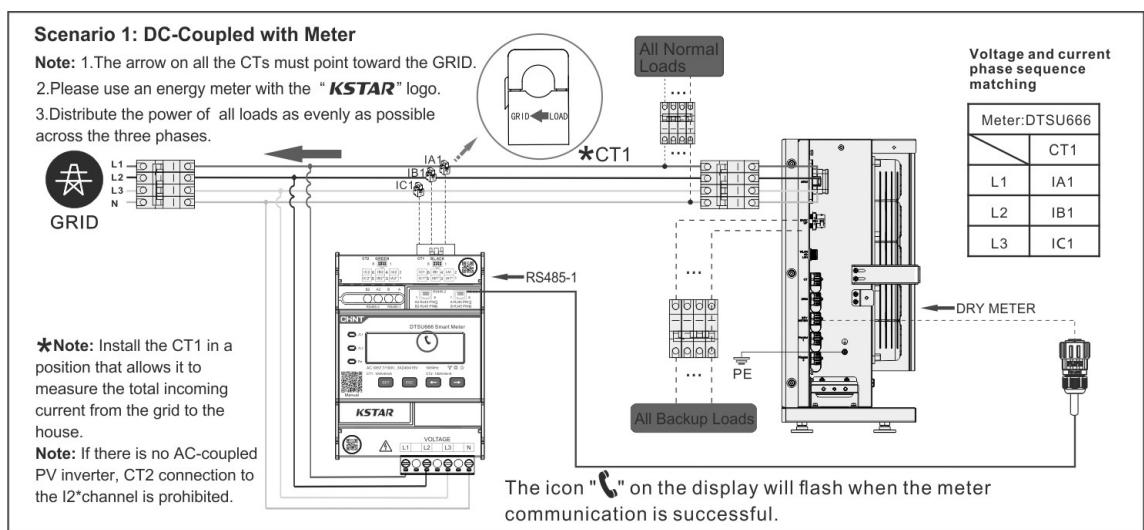
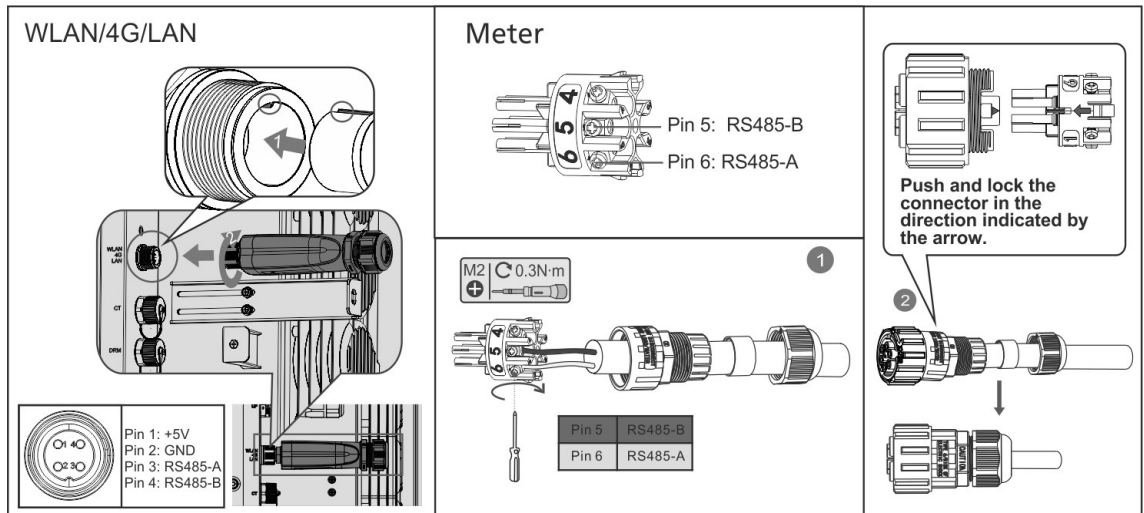
## 6.6 WLAN/4G/LAN&Meter Connection



Please ensure the CT connection direction is correct and the phase is accurate; otherwise, it may lead to incorrect monitoring data.

Ensure all cable connections are correct, secure, and free from looseness. Improper wiring may cause poor contact or damage to the meter.

The outer diameter of the AC power line must be smaller than the CT aperture to ensure the AC power line can pass through the CT.





Supports connection to third-party monitoring platforms via the Modbus communication protocol. Users can implement the VPP function by connecting PIN5 and PIN6 in the DRY/METER.

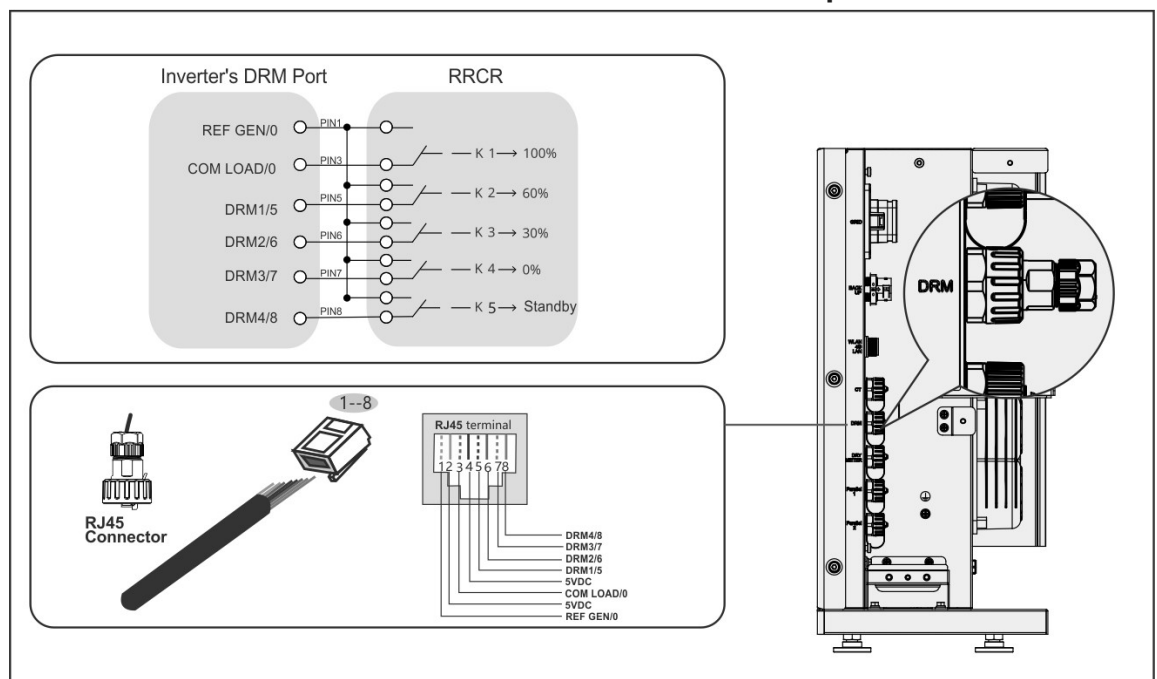
## 6.7 DRM Connection



For use if required DRM Remote Shutdown function, please ensure the wiring is completed before proceeding. Sync App Enable this function.

If Not connected DRM not operate equipment or Remote Shutdown equipment while Sync App Enable this function, otherwise the Inverter cannot On-Grid operate.

**Table-DRM Connector Pin Descriptions**



In the “PIN x” columns, “0” means the corresponding relay is closed and “1” means the corresponding relay is opened.

| <b>PIN8</b> | <b>PIN7</b> | <b>PIN6</b> | <b>PIN5</b> | <b>PIN3</b> | <b>Active Power</b> | <b>Cos(Q)</b> |
|-------------|-------------|-------------|-------------|-------------|---------------------|---------------|
| 1           | 0           | 1           | 1           | 1           | 0%                  | 1             |
| 1           | 1           | 0           | 1           | 1           | 30%                 | 1             |
| 1           | 1           | 1           | 0           | 1           | 60%                 | 1             |
| 1           | 1           | 1           | 1           | 0           | 100%                | 1             |
| 1           | 1           | 1           | 1           | 1           | 100%                | 1             |
| 0           | X           | X           | X           | X           | Standby             | 1             |

## 7 System Commissioning

### 7.1 Pre-power Check

Check the following items before starting the inverter:

.All equipment has been reliably installed.

DC switch and AC circuit breaker are in the "OFF" position.

. The ground cable is properly and reliably connected.

. The AC cable is properly and reliably connected.

The DC cable is properly and reliably connected.

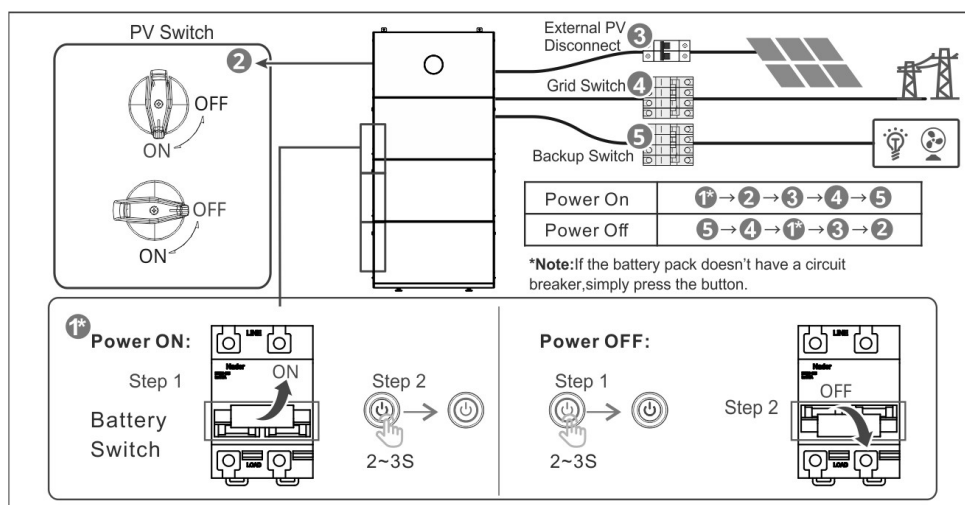
.The communication cable is properly and reliably connected.

\*The unused terminals are sealed

The AC circuit breaker is selected in accordance with the requirements of this manual and local standards.

All warning signs & labels are intact and legible.

### 7.2 Power ON Procedure



## **DANGER**

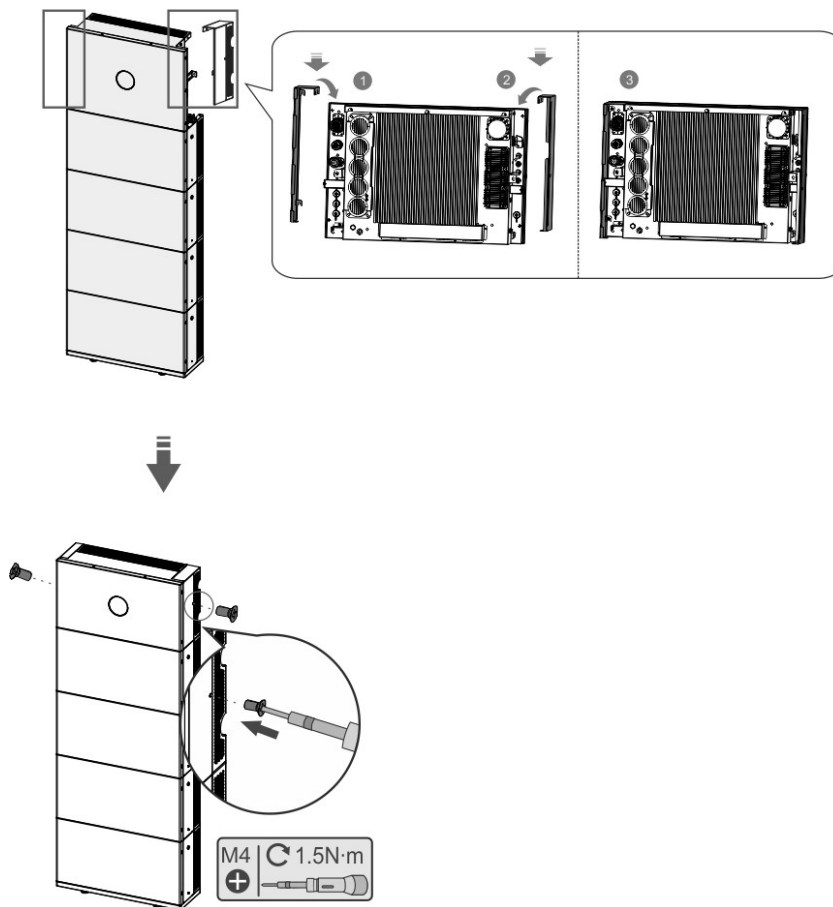
- When performing operation and maintenance on equipment in the system, please ensure the Power OFF the System is properly handled. Operating live equipment may cause equipment damage or electric shock DANGER.
- After the equipment is POWER OFF, the internal components Discharge require a certain amount of time. Please wait until the equipment is fully Discharge according to the time indicated on the label.
- Restart Battery should be performed using the circuit breaker power on method.
- When closing Battery system, strictly adhere to the Battery system power off requirements to prevent damage to Battery system.

- First, flip the battery breakers of all battery packs upward to the ON position. Then, press and hold the battery button for 2-3 seconds until the battery button shows green and remains constantly lit.
- Rotate the PV switch of the inverter to "ON" position.
- Turn on the AC switch between the inverter and the power grid
- Turn on the EPS breaker

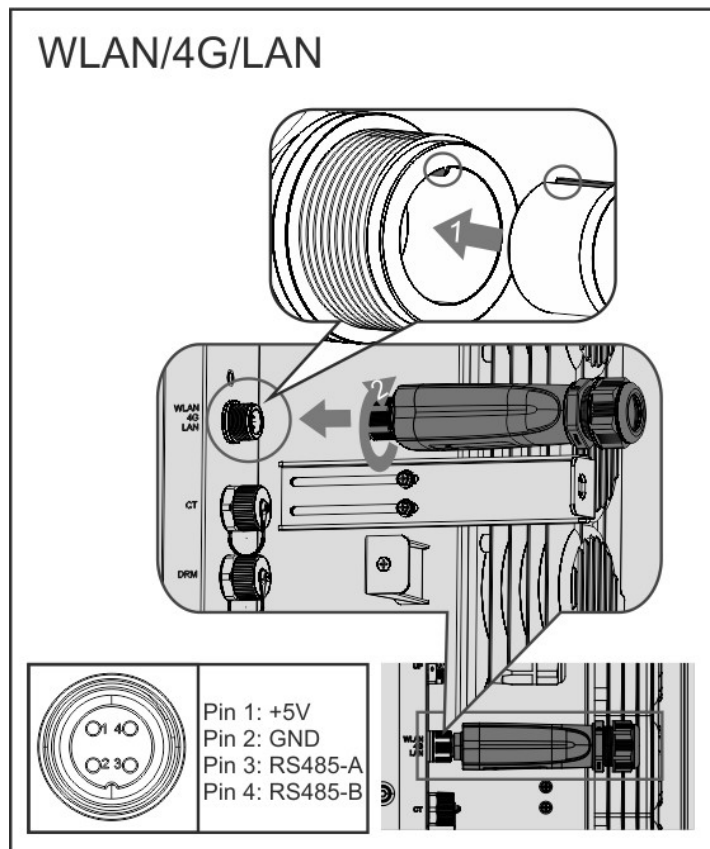
#### **System Power-Off:**

- Turn off the EPS breaker.
- Turn off the AC switch between the inverter and the power grid.
- Turn all battery pack circuit breakers downward to the OFF position. Then, press and hold the battery button for 2–3 seconds until the button LED light goes out from green. Rotate the PV switch of the inverter to "OFF" position.
- Rotate the PV switch of the inverter to OFF" position.

## **7.3 Install Protective Covers**



## 7.4 App Commissioning



## 7.5 Download APP

1. Android: Visit Google Play Store, search and download KSTAR Sync.
2. iOS: Visit App Store, search and download KSTAR Sync.
3. QR Code: Scan the QR code below to download KSTAR Sync.



## 7.6 Registration and Login

### 7.6.1 Registration

- Click the [Sign up] button on the login page to enter the registration page.
- Fill in the login account, password, verification email and other information according to APP requirements, and finally click the [OK] button to successfully register an end user account.

09:48

< Sign Up

End User Installer

Account Name \*  
Please enter...

Nickname \*  
Please enter...

Password \*  
Please enter...

Confirm Password \*  
Please enter...

State \*  
Select..

Country \*  
Select..

Email \*  
Please enter...

Verification Code \*  
Please enter...

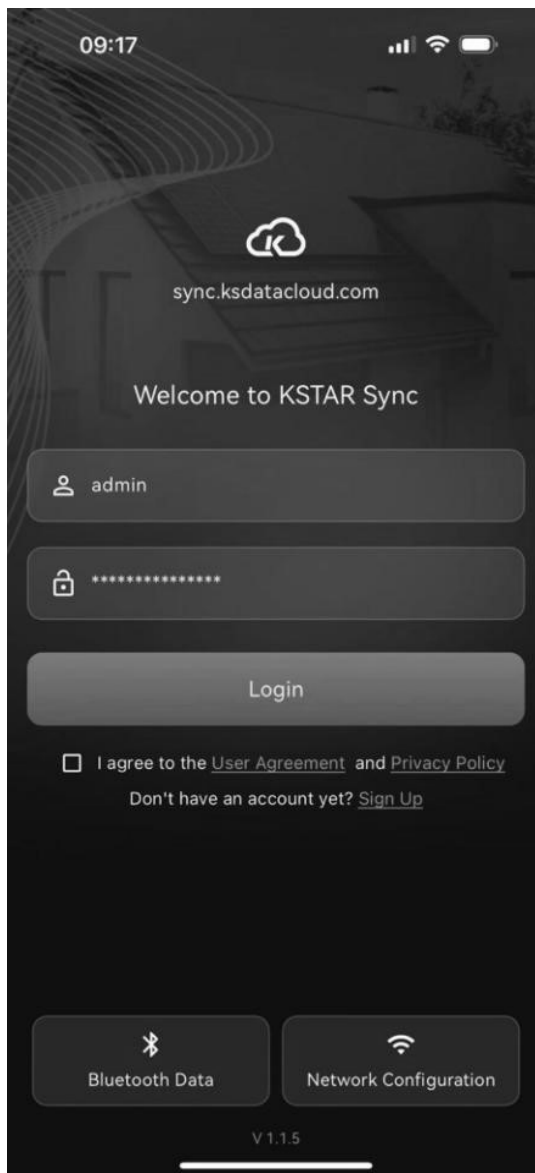
Send

Contact Information  
Please enter...

OK

### 7.6.2 Login

- Enter KSTAR Sync APP
- Enter account and password in the user login box
- Check to agree to the user agreement and privacy agreement, click the login button to successfully enter the APP.



## **7.7 Binding End User - Operator User Account**

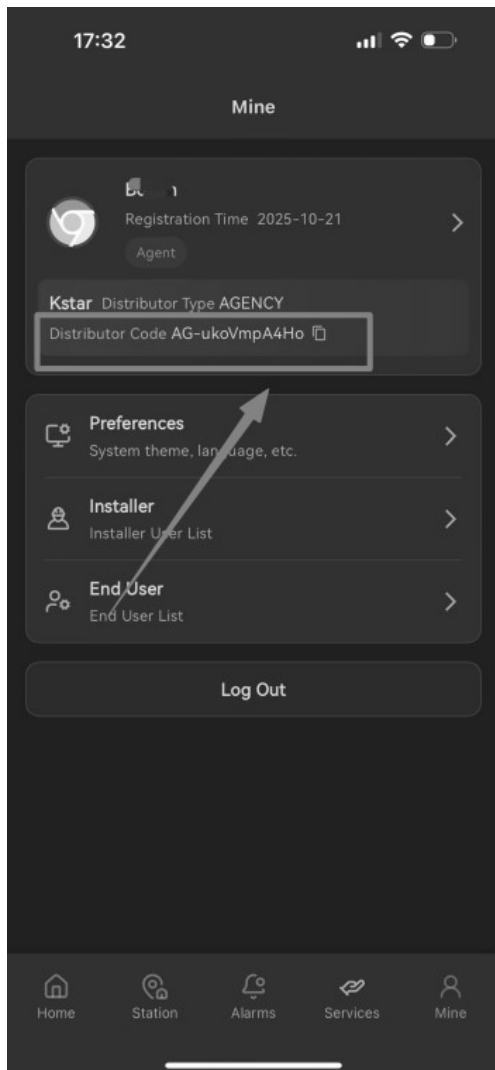
### **7.7.1 Precautions Before Binding Account**

The account registered by the end user independently is an independent account and is not supervised by the operator. If the operator needs to view the end user's power station, the end user needs to bind the operator.

The account opened by the operator for the end user after logging into KSTAR Sync already has a binding relationship and does not require additional operations to bind the operator function.

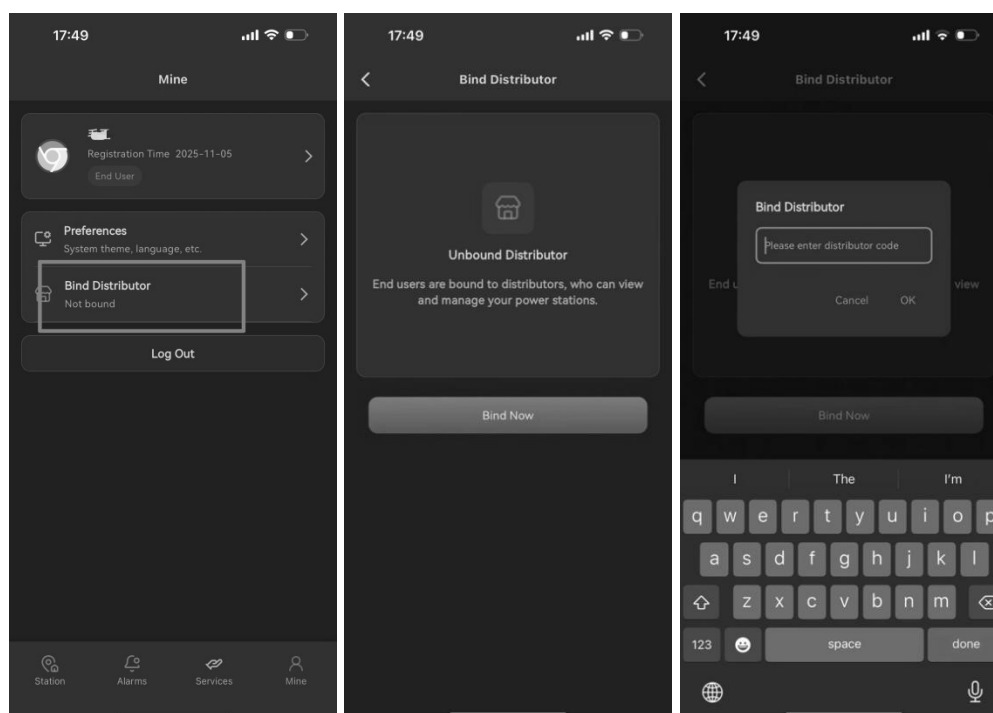
### 7.7.2 Finding Operator Code

After the operator logs into KSTAR Sync APP, enter the [Mine] page, the code displayed in the upper left corner of the page is the operator code, and the operator can copy the code.



### 7.7.3 End User Binding Operator Code

After the end user logs into KSTAR Sync APP, enter the [Mine] page, click [Bind Operator] - [Bind Now], enter the operator code, and click the [OK] button to successfully bind the operator account.



## 7.8 Create Power Station

### 7.8.1 Configuration Navigation for Creating Power Station

After logging in to the account, enter the [Station] page, click the [+] button in the upper left corner of the page to enter the new power station details page, and follow the system prompts to complete the power station information to successfully add a new power station.

**Basic Information:** Power station name, construction time, power station time zone, region/country, power station location, address, latitude and longitude (generated according to Google Maps selection or manually filled in), among which items marked with asterisks are required, while the more complete the other information is filled in, the more beneficial it is for you to manage the power station.

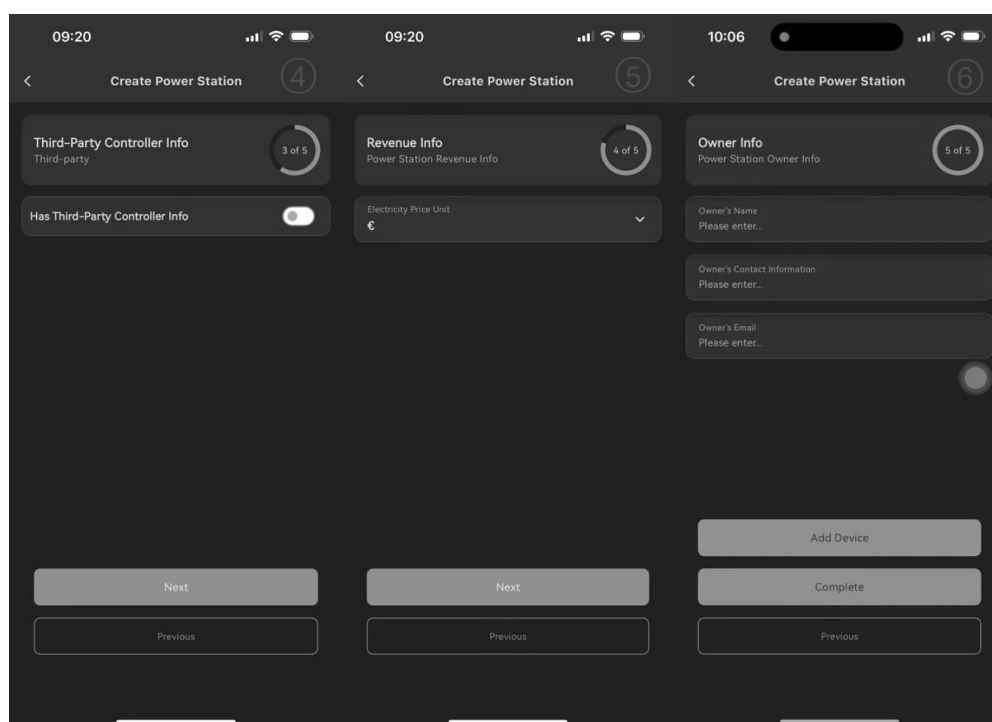
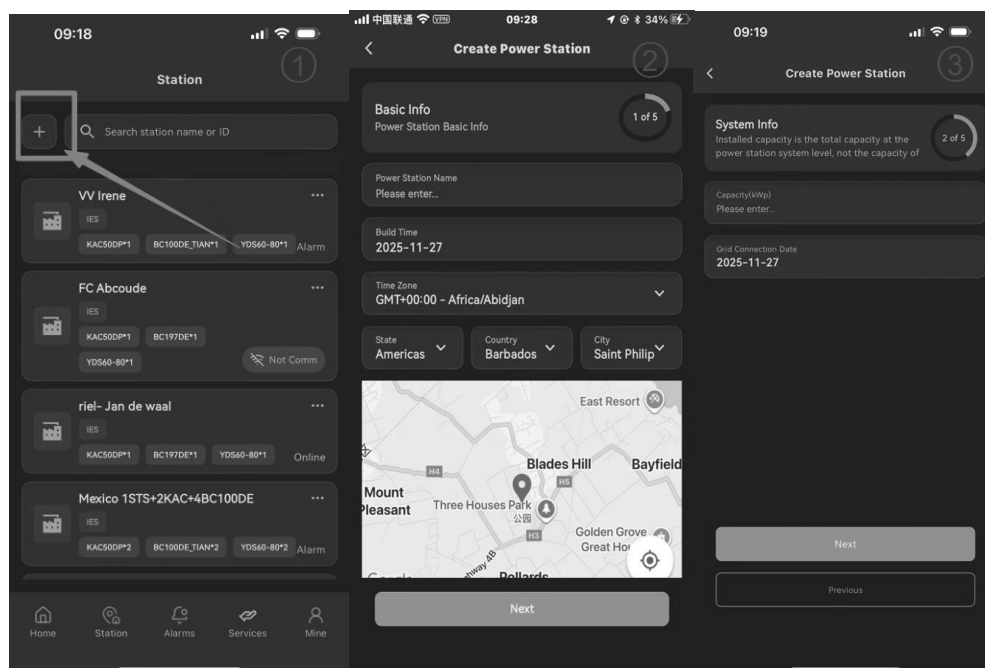
**System Information:** Installed capacity (kWp), grid connection date

**Third-party Controller Information:** Whether there is a third-party controller, third-party manufacturer name, contact person, contact person email.

**Revenue Information:** Electricity price unit.

**Owner Information:** Owner name, owner contact phone, owner email.

After filling in the information, click the [Complete] button to successfully create the power station. This marks the end of the power station creation process. To add a collector afterward, you will need to go to the power station page and click [Add Device] to continue with the operation.



By clicking the [Add Device] button, you will be able to proceed to the next step.

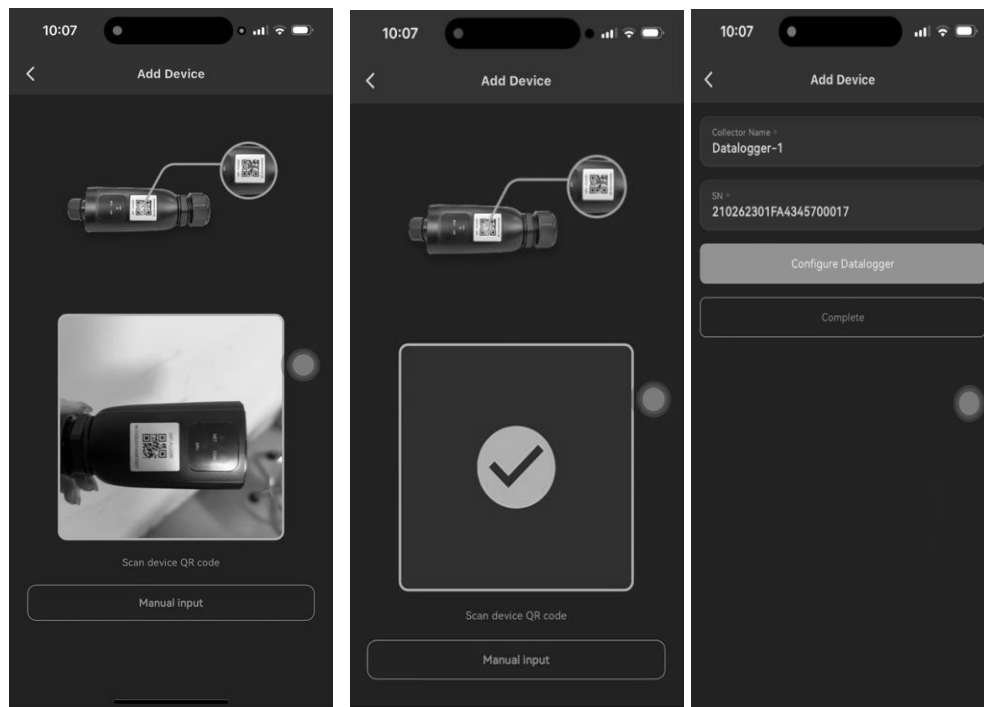
## 7.9 Add Device

Use your phone to scan the QR code on the collector. Once the scan is successful, a success indicator will appear on the screen, and the collector's SN will be automatically recognized. At the same time, you can also modify the collector's name if needed.

After confirming all the information, click [Complete], and the device will be successfully added. At the same time, a one-click power station setup process will be introduced. If users need to configure the collector later on, they will have to

return to the power station page and adjust the settings there.

By tapping the [Configure datalogger] button, users can seamlessly move on to the next stage. There, they can set up the collector's network connection, enabling the device to go online and connect to the KSTAR Sync server without any issues.



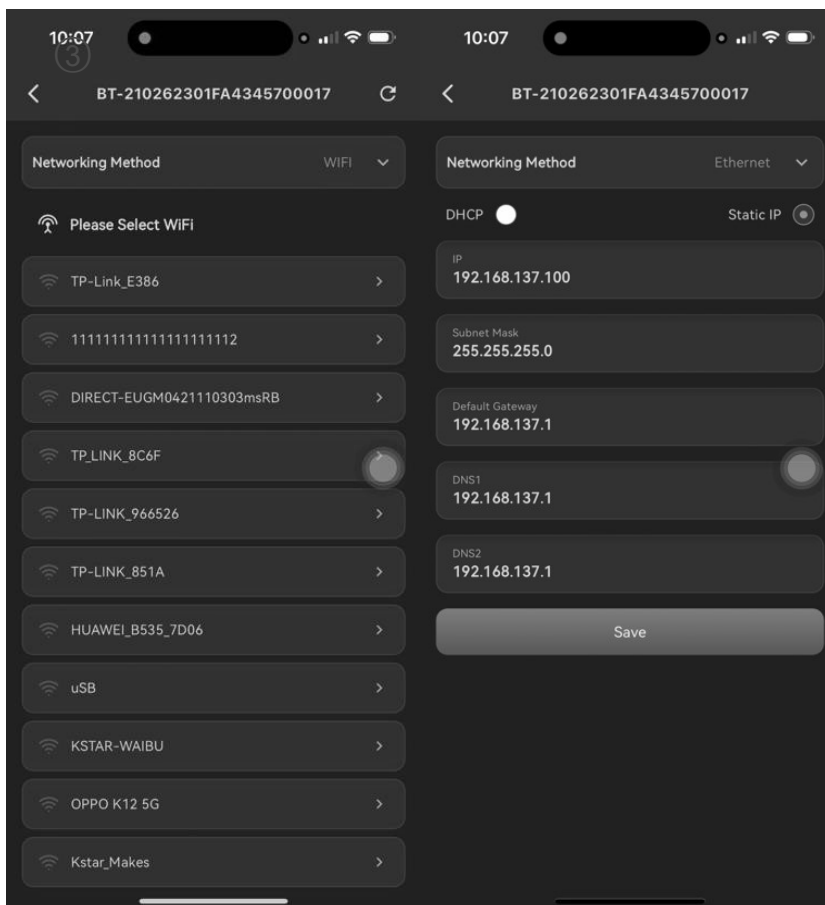
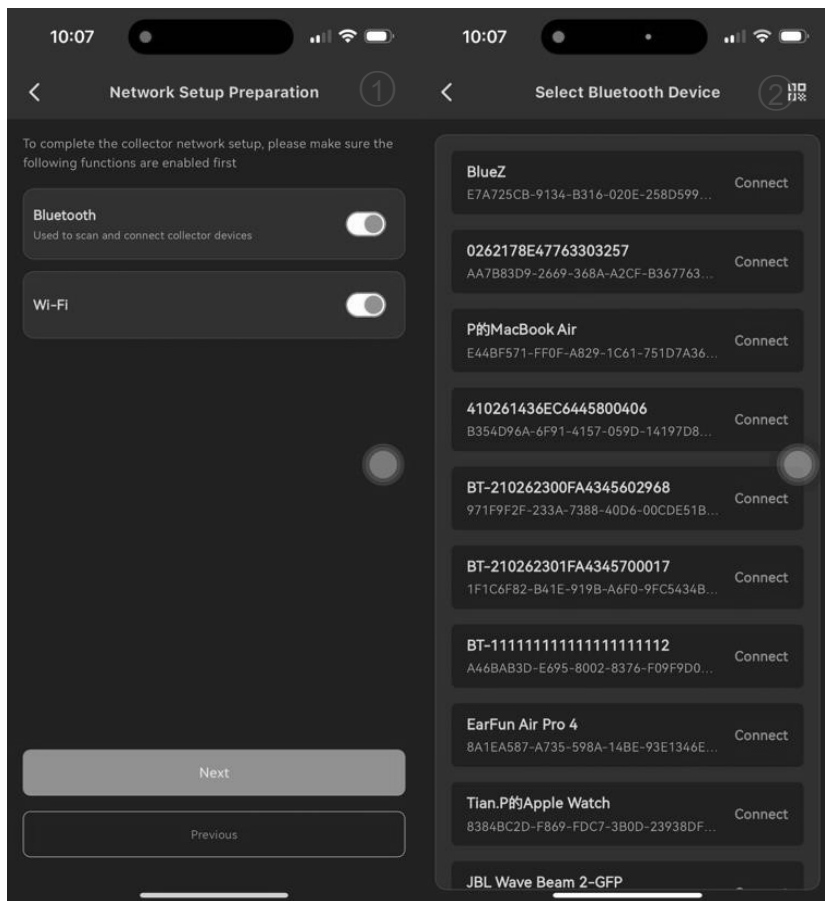
### 7.9.1 Network Setup Preparation

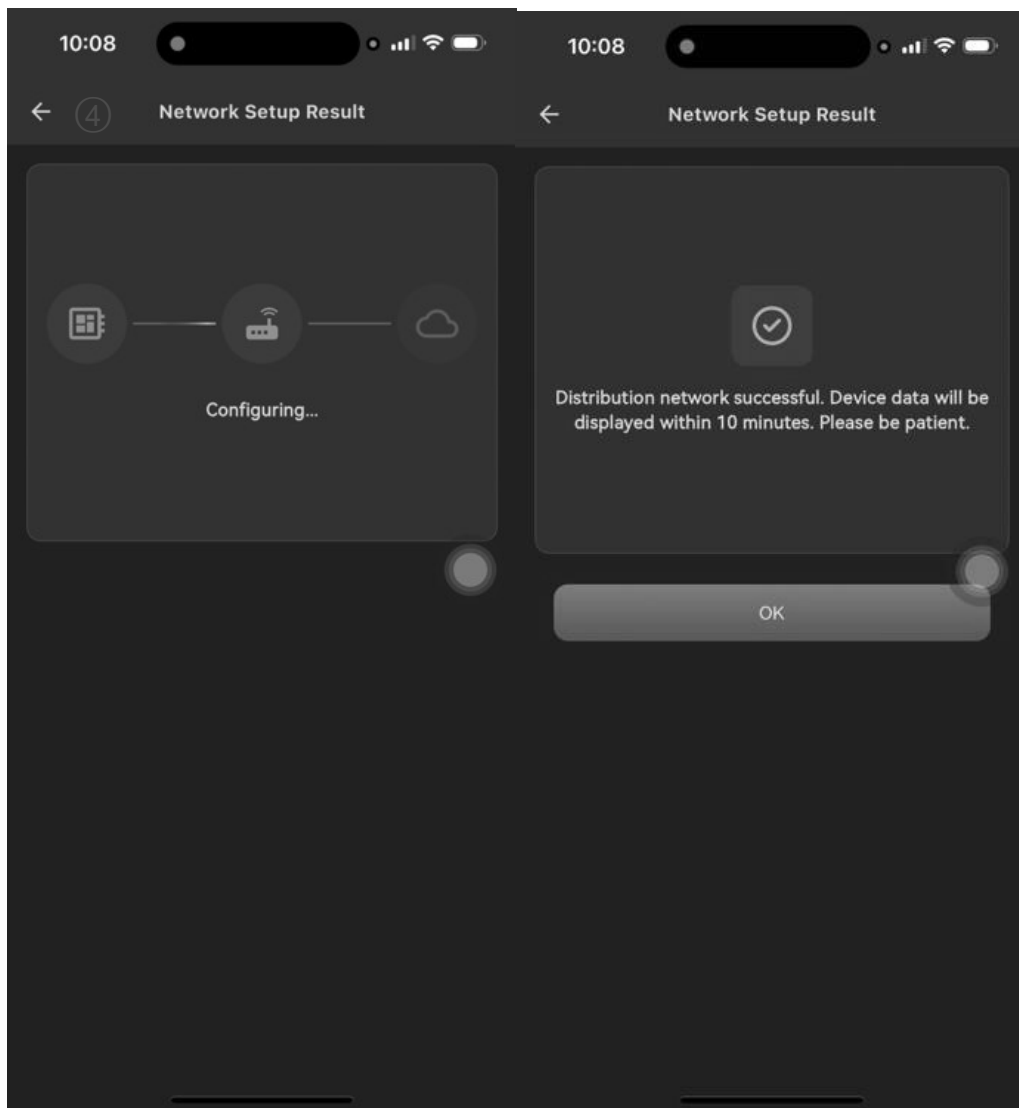
Before configuring the network, users need to first turn on both the Bluetooth and Wi-Fi switches on their phones. This allows the app to successfully detect and connect to the collector via Bluetooth, and also ensures that the device can connect to the Wi-Fi network smoothly when configuring the collector's network settings later on.

Once Bluetooth and Wi-Fi are enabled, click the [Next] button to begin configuring the collector's network.

The app will automatically scan for nearby Bluetooth devices. Users need to locate the Bluetooth device that corresponds to the collector — the Bluetooth name will match the SN printed on the collector. Once found, tap the [Connect] button.

The collector offers two networking options — Ethernet and Wi-Fi. Depending on the available network setup at the installation site, users can select the one that best suits their needs.





- For the Wi-Fi networking method: The app will automatically detect nearby Wi-Fi networks. Users simply need to select their own Wi-Fi name (SSID), enter the password, and the connection will be successfully established.
- For the Ethernet networking method: After physically connecting the network cable, the app will automatically detect network information such as the IP address. Users also have the option to manually enter IP address and other network parameters. Once the network settings are confirmed, simply click the [Save] button, and the collector will successfully connect to the network.

After a successful network connection, the collector will perform a network connectivity check to verify whether it can successfully connect to the internet and establish a connection to the KSTAR Sync server. Once the connection is confirmed, the page will display a success indicator, signaling that the collector configuration is complete. Then, click the [OK] button to proceed to the next step.

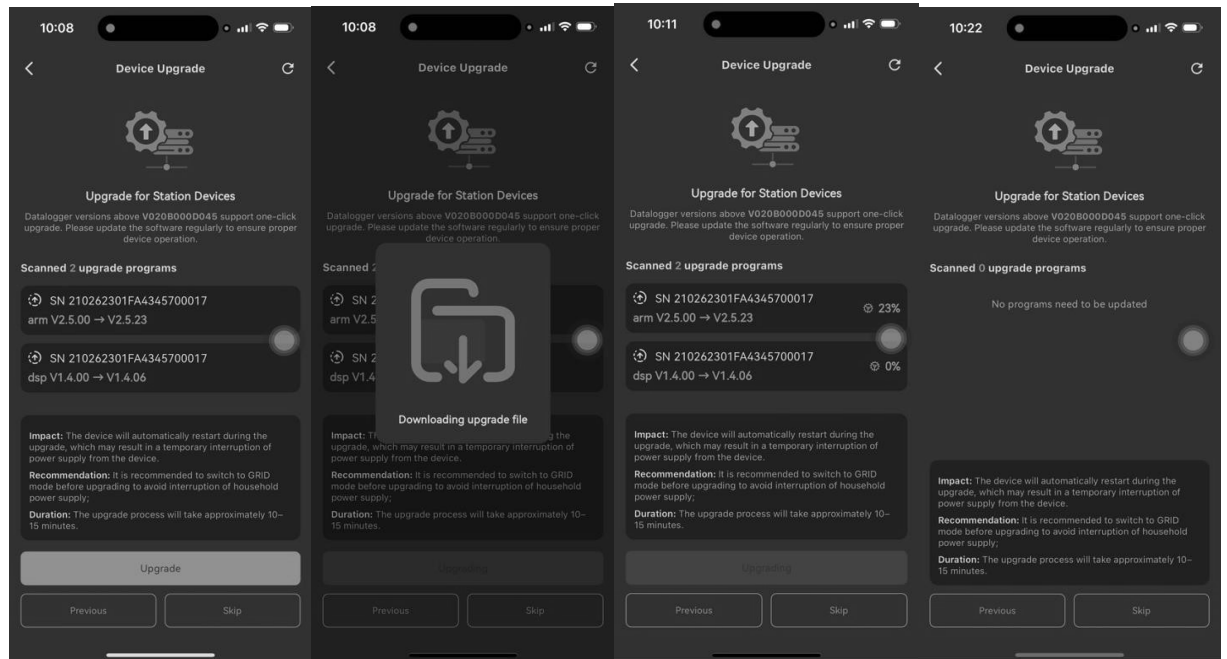
### 7.9.2 Device Upgrade

Once the network configuration is successful, the app will automatically check for available software upgrades, including ARM, DSP, and BMS. Users can perform a one-click upgrade. By tapping the [Upgrade] button at the bottom of the page, the

upgrade process will begin. First, the upgrade file needs to be downloaded, which may take some time — please be patient. After the file is successfully downloaded, the software upgrade will proceed automatically, and users can monitor the upgrade progress.

After the upgrade is successfully completed, users can proceed to the next step.

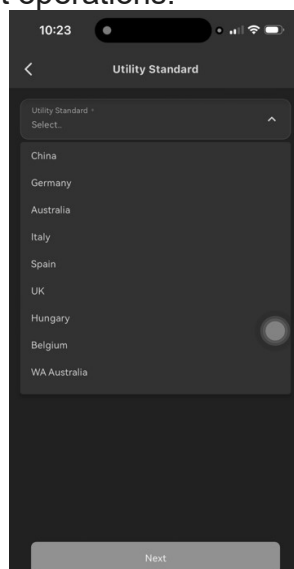
If users prefer not to proceed with the upgrade, they can click the [Skip] button at the bottom of the page to go directly to the next step.



### 7.9.3 Utility Standard

In the Grid Standard Configuration page, users are required to choose the appropriate local grid code or utility standard. This ensures that the device can communicate correctly with the electrical grid while meeting all relevant legal and regulatory requirements.

After selecting the appropriate grid standard, click the [Next] button to proceed with the subsequent operations.

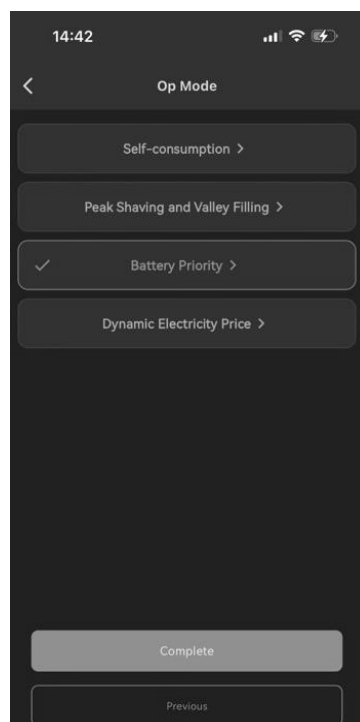


#### 7.9.4 Op Mode

The operational strategy module serves as the intelligent control core of the system, offering four operational modes: Self-consumption, Peak Shaving, Battery Priority and Dynamic Tariff. This enables automated management of power station charging and discharging operations. Users can flexibly select the optimal strategy based on actual electricity demand, pricing policies, and grid requirements, achieving the comprehensive goals of improving economic efficiency, ensuring power supply security, and participating in grid dispatching.

- Self-consumption mode: Prioritizes consuming photovoltaic power generation, excess electricity is stored in battery, when insufficient, battery discharges, maximizing green electricity Self-consumption rate.
- Peak shaving and valley filling mode: Discharges during peak electricity hours to reduce grid demand, charges during load valley periods, smooths electricity curve, reduces capacity electricity fees.
- Battery priority mode: Prioritizes supplying load from battery (discharge), photovoltaic electricity is used for charging; if battery is insufficient, then uses power grid.
- Dynamic Tariff : The Hybrid Inverter will automatically sort all electricity prices for the day based on the high electricity price range and low electricity price range you have set, distinguishing between the high electricity price interval (red interval), low electricity price interval (green interval), and normal electricity price interval (intervals other than red and green). The system will automatically identify whether the current time falls within your preset intervals and operate according to the charge, discharge, or standby strategies you have configured for each interval.

After the operation strategy has been successfully configured, click the [Complete] button to proceed to the next step.



### 7.9.5 System Self-Check

The One-Click Self-Test function is used to automatically check the connection status and operational health of all key system components after equipment installation or maintenance. Before starting the self-test, users need to close the following physical switches:

- PV Switch
- Battery Switch
- Grid Switch
- BACKUP Switch

Once the self-test is completed, the system will detect and report the status of the following 5 core modules:

#### 1. PV Self-Test

- ◆ Checks whether PV voltage and insulation impedance are normal
- ◆ Determines whether PV input is present

#### 2. Battery Connection Status Detection

- ◆ Whether BMS communication is functioning properly
- ◆ Identification of the number of battery packs
- ◆ Whether battery voltage, current, and temperature are within allowable ranges
- ◆ Whether any alarms exist
- ◆ Whether SOC (State of Charge) and SOH (State of Health) readings are normal

#### 3. Grid Self-Test

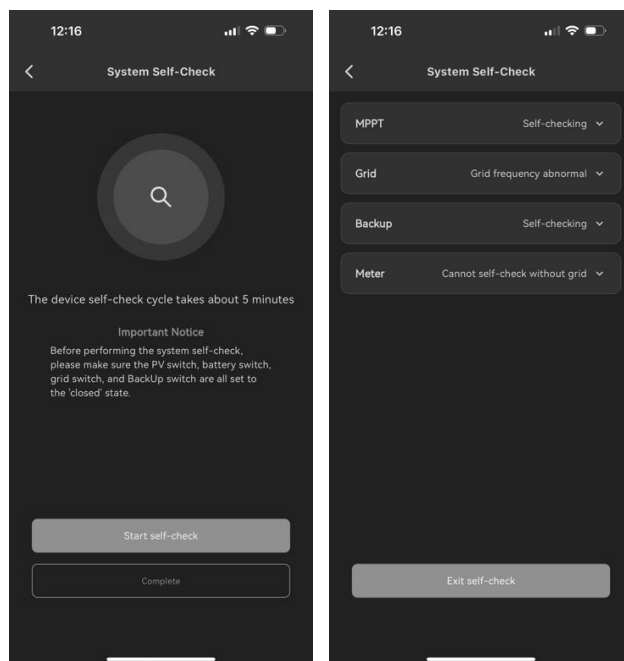
- ◆ Whether grid voltage is within the standard range
- ◆ Whether grid frequency is normal
- ◆ Whether phase sequence is correct
- ◆ Whether any overvoltage, undervoltage, overfrequency, or underfrequency faults exist

#### 4. BACKUP Self-Test

- ◆ Whether output voltage is normal under grid bypass or off-grid mode
- ◆ Whether output current and power are normal (not overloaded)
- ◆ Whether output frequency is stable

#### 5. Meter or CT Self-Test

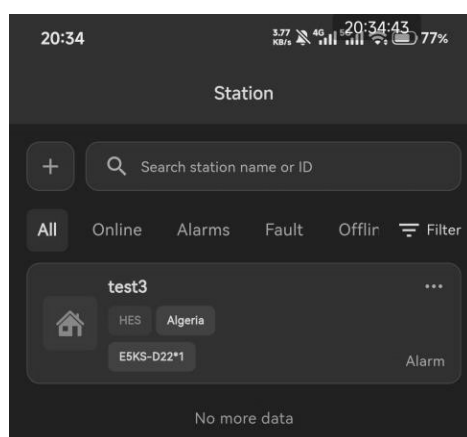
- ◆ Whether meter communication is functioning properly
- ◆ Whether CT wiring direction is correct (automatic correction is available if the direction is wrong)
- ◆ Whether the three-phase CT phase sequence is correct
- ◆ Whether the CT is damaged or not connected
- ◆ Whether charge/discharge power meets the required standard (1KW for single-phase, 3KW for three-phase)
- ◆ Whether power and energy metering data are normal



After the device self-test has finished, the whole station creation process is successfully concluded.

## 7.10 Power Station

The power station list module centrally displays and manages all power station data under your name, supporting adding power stations, querying, and detail viewing.



### 7.10.1 Overview of Power Station List Functions

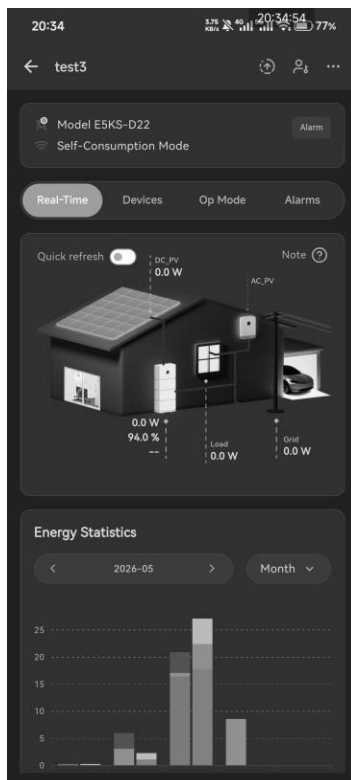
- Power station query: You can input power station name, collector SN to query power station data, the system will perform fuzzy query according to the power station name you input to quickly search corresponding power station information.
- Add power station: Click the [+] button in the upper left corner of the page, jump to the corresponding page, complete the power station information according to the prompts to complete the function operation of creating power station.
- Enter power station details: Click the power station name in the power station list, a new page will open to enter the corresponding power station interface.

### 7.10.2 Station Details

#### 7.10.2.1 Real-time

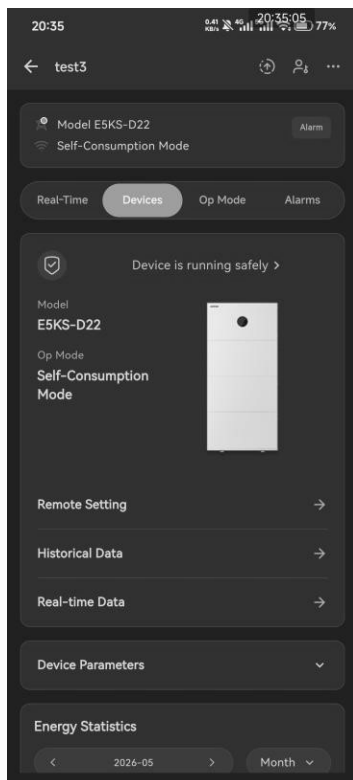
The real-time module provides users with a centralized monitoring view of residential energy storage power stations.

- In the form of system diagram, dynamically displays the real-time operation status of power stations, key functions include:
  - Current path visualization: Dynamically displays energy flow direction between photovoltaic, energy storage, electrical load and power grid.
  - Real-time presentation of key data: Accurately displays key parameters such as instantaneous power of core Device like inverters and batteries.
- Energy statistics are divided into 2 parts: power analysis, this week's energy trend.
  - Power analysis: Through multi-curve comparison chart, synchronously displays the power changes of photovoltaic, power grid, load, battery and battery SOC curve on the current day. Users can flexibly query detailed data of any historical date through date selector.
  - Weekly energy trend: In the form of bar chart or data table, statistics and displays cumulative energy data of the recent 7 days, key indicators include: photovoltaic power generation, grid power purchase, load electricity consumption and battery charge/discharge amount, helping you understand weekly energy consumption patterns.

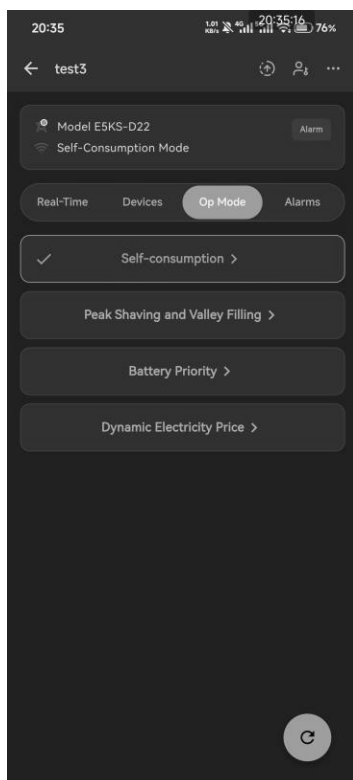


#### 7.10.2.2 Device

- Basic information: Displays Device status, Device model, Device current operation strategy.
- Remote setting: Remote setting provides authorized users with cross-regional, high-efficiency Device control capabilities through cloud platform. This function allows operation and maintenance personnel or system administrators to directly perform parameter configuration, system soft reset and safety protection threshold adjustment operations on various Device in the power station without needing to arrive at the site. With this function, users can uniformly manage energy storage units distributed in different locations, achieving centralized remote monitoring and control from individual Device to power station clusters, effectively improving system operation and maintenance response speed and management precision.
- Real-time data: From 4 dimensions of PV&INV, battery, power grid, load, displays real-time power, photovoltaic power generation, battery charge and discharge amount, electricity consumption and other basic parameters of Device.
- Historical data: Device data is automatically saved to the system at a frequency of 5 minutes/time. Supports query and trend analysis, providing complete, traceable data basis for operation and maintenance optimization and decision-making.



### 7.10.2.3 Operation Strategy



#### Self-consumption

#### Charging Period Operation Strategy

During the charging period, the system executes the "PV Priority Charging" strategy. PV generation is prioritized for battery charging. When the available PV power is lower than the preset charging power limit, the system automatically

supplements power from the grid to ensure charging.

When the demand control function is enabled, the system will supplement power from the grid under the constraint that the sum of load power consumption and battery charging power from the grid does not exceed the demand current setpoint. Meanwhile, the actual battery charging power remains no higher than the preset charging power limit.

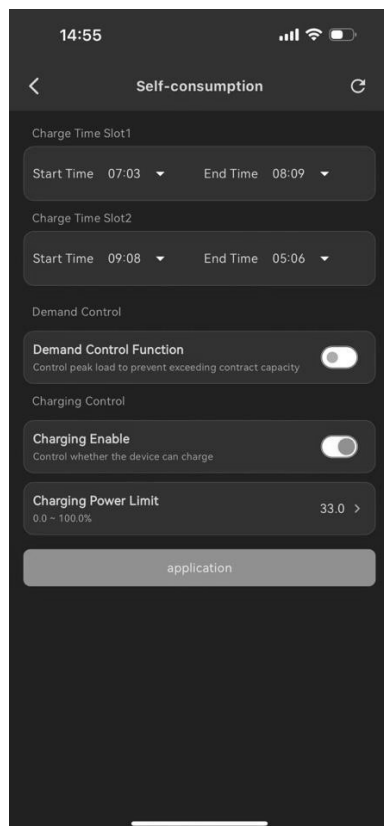
### Non-Charging Period Operation Strategy

During the non-charging period, the system executes the "PV Priority for Load" strategy. PV generation is prioritized for powering loads. When PV power is insufficient to meet load demand, the Hybrid Inverter discharges to compensate. When the combined power of PV and storage is still lower than the load demand, the grid supplies the remaining shortfall.

When there is surplus PV power after meeting load demand, the surplus power is prioritized for battery charging. After the battery is fully charged, the system handles the situation according to the anti-reverse power flow function status:

Anti-reverse power flow function enabled: Limit excess PV output (PV curtailment).

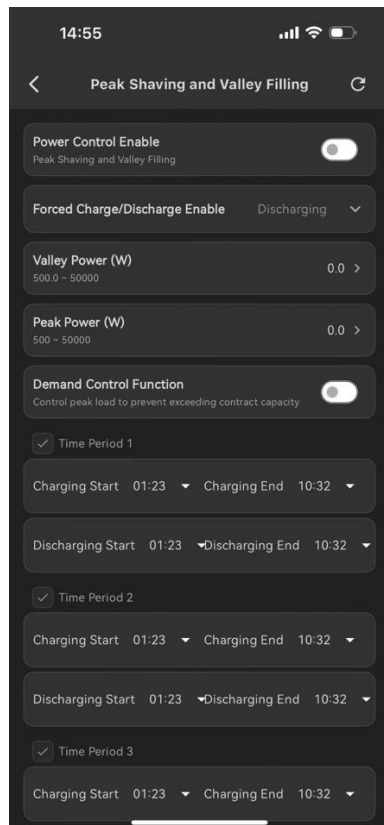
Anti-reverse power flow function disabled: Allow excess PV power to be exported to the grid.



### Peak Shaving

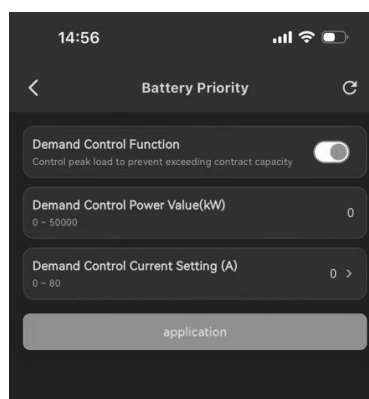
Time-of-Use Control: The battery charges and discharges according to the set time period. If the current time is outside the set period, the battery neither charges nor discharges, and PV power is exported to the grid.

**Peak-Valley Power Control:** When the grid power is between the peak and valley values, the load draws power from the grid, PV is used only for battery charging, excess PV power is curtailed, and the battery is charged to full while PV is curtailed. When the grid power is below the valley value, the battery actively draws power from the grid to maintain the grid power until the grid power reaches the valley value. When the grid power exceeds the peak value, the battery actively discharges to maintain the grid power at the peak value.



## Battery Priority

PV power is prioritized for battery charging. Any remaining energy is then supplied to the load. When PV power is insufficient, power is drawn from the grid to charge the battery.



## Dynamic Tariff

The Hybrid Inverter will automatically sort all electricity prices for the day based on the high electricity price range and low electricity price range you have set,

distinguishing between the high electricity price interval (red interval), low electricity price interval (green interval), and normal electricity price interval (intervals other than red and green). The system will automatically identify whether the current time falls within your preset intervals and operate according to the charge, discharge, or standby strategies you have configured for each interval.

#### High Electricity Price Interval Strategy

##### **If you have set a discharge strategy:**

The Hybrid Inverter will discharge to the grid at maximum power while ensuring that the discharge power does not exceed the Maximum Discharging Power limit you have set, and taking into account anti-reverse power flow conditions. The system will stop discharging and switch to standby when the SOC discharges to the Maximum Discharging Power SOC you have set.

##### **If you have set a charge strategy:**

The Hybrid Inverter will charge from the grid at maximum power while ensuring that the charge power does not exceed the Maximum Charging Power limit you have set, and taking into account demand limits. The system will stop charging and switch to standby when the SOC reaches the Charging SOC Upper Limit you have set.

##### **If you have set a standby strategy:**

The Hybrid Inverter will remain in standby mode.

#### Normal Electricity Price Interval Strategy

##### **If you have set a discharge strategy:**

The Hybrid Inverter will discharge to the grid at maximum power while ensuring that the discharge power does not exceed the Maximum Discharging Power limit you have set, and taking into account anti-reverse power flow conditions. The system will stop discharging and switch to standby when the SOC discharges to the Maximum Discharging Power SOC you have set.

##### **If you have set a charge strategy:**

The Hybrid Inverter will charge from the grid at maximum power while ensuring that the charge power does not exceed the Maximum Charging Power limit you have set, and taking into account demand limits. The system will stop charging and switch to standby when the SOC reaches the Charging SOC Upper Limit you have set.

##### **If you have set a standby strategy:**

The Hybrid Inverter will remain in standby mode.

#### Low Electricity Price Interval Strategy

##### **If you have set a charge strategy:**

The Hybrid Inverter will charge from the grid at maximum power while ensuring

that the charge power does not exceed the Maximum Charging Power limit you have set, and taking into account demand limits. The system will stop charging and switch to standby when the SOC reaches the Charging SOC Upper Limit you have set.

**If you have set a discharge strategy:**

The Hybrid Inverter will discharge to the grid at maximum power while ensuring that the discharge power does not exceed the Maximum Discharging Power limit you have set, and taking into account anti-reverse power flow conditions. The system will stop discharging and switch to standby when the SOC discharges to the Maximum Discharging Power SOC you have set.

**If you have set a standby strategy:**

The Hybrid Inverter will remain in standby mode.

**Negative Electricity Price Interval Strategy**

When the electricity price is negative, the Hybrid Inverter will control the equipment to charge (with charging power not exceeding the customer-set Maximum Allowed Charging Power) while taking into account demand limits, and will suppress PV generation according to the customer-set PV Generation Inhibition Rate. The system will stop charging when the SOC reaches the customer-preset Charging SOC Upper Limit.

Dynamic Tariff Activation: Automatically sets the price threshold based on electricity prices in ascending order (user-defined range).

Customizable charge/discharge strategies for high, medium, and low electricity price tiers.

**Set Dynamic Electricity Price Strategy:**

Enable the Dynamic Tariff module, Operation Steps: Go to the "Operation Strategy" → "Dynamic Tariff" module.

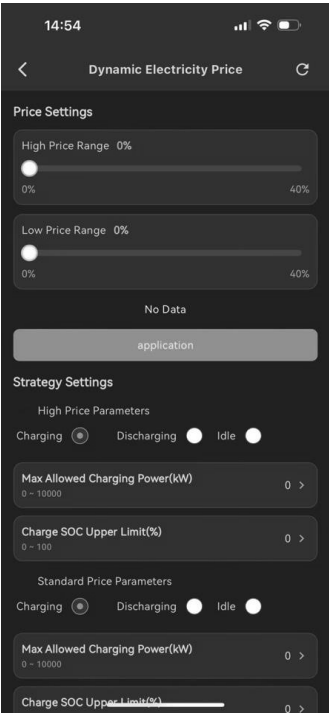
Electricity Price Settings are used to define the high electricity price range and the low electricity price range. When the electricity price falls within the red interval (high electricity price), the system will execute the high-electricity-price strategy; when the electricity price falls within the green interval (low electricity price), the system will execute the low-electricity-price strategy. The system automatically sorts the daily electricity prices in ascending order, with the high-electricity-price interval defaulting to the top 30%, the low-electricity-price interval defaulting to the bottom 30%, and the middle 40% serving as the normal electricity price interval. Users can customize the electricity price thresholds, which will take effect automatically in the future.

We provide configurable parameters for complex electricity pricing. The parameters you can set include: maximum allowable charging power, PV generation percentage limit required for the Hybrid Inverter, and battery SOC upper limit for charging during negative electricity price periods.

You can set the actions the system should take when the electricity price falls

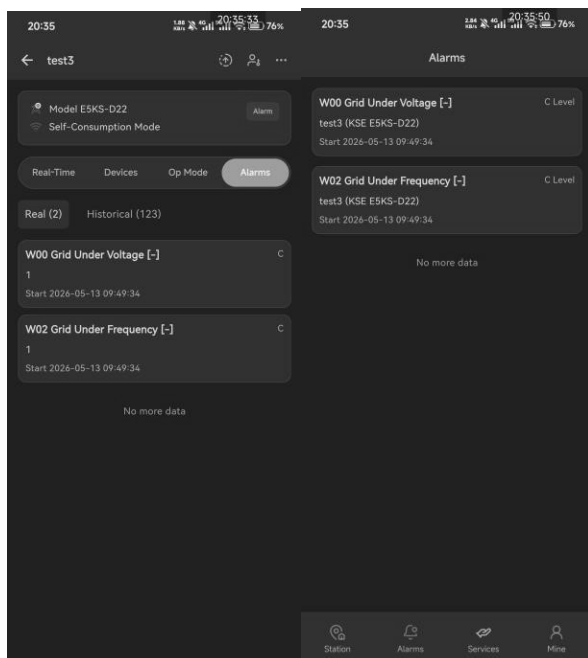
into the high, medium, or low intervals: charge, discharge, or standby. For charge and discharge actions, you need to set the maximum power threshold and the stop SOC threshold.

If you need to suspend dynamic electricity price operation, you can switch to one of the following operating modes: "Self-Consumption", "Peak Shaving", or "Battery Priority".



## 7.11 Alarms

The alarm module centrally displays unrecovered alarm data of Device from all power stations, and provides query, filtering, classification and other functional operations.



### Alarm level description:

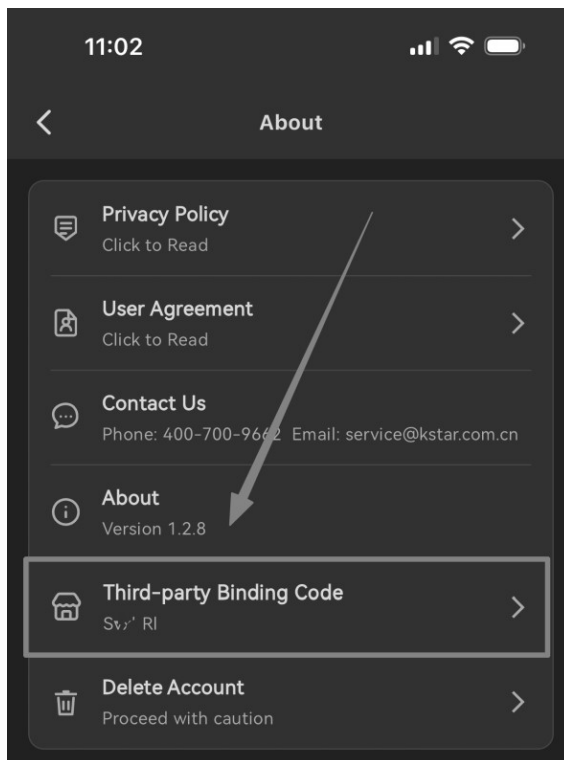
- Level A alarm: Refers to emergency alarms that may involve safety hazards
- Level B alarm: Refers to alarms for machine damage, requiring machine replacement
- Level C alarm: Refers to some faults/or restart requiring manual operation, alarms for restoring machine work
- Level D alarm: Refers to minor alarms that do not affect system operation

## 7.12 Finding Third-party binding code

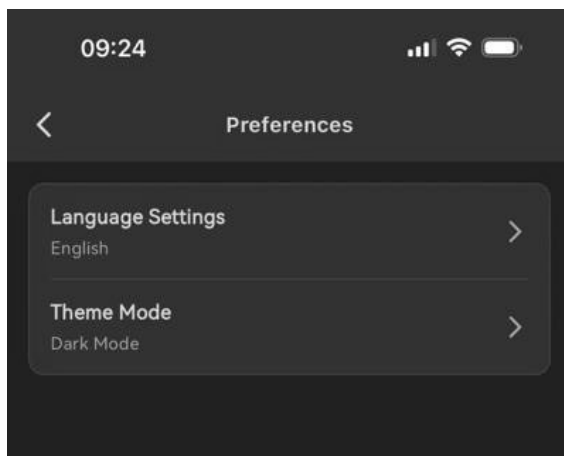
Power stations created in KSTAR Sync can be linked to the Third-party platform.

Users can bind their stations and associated devices to Third-party platform by Third-party binding code

On the **【About】** page that opens, your Third-Party Binding Code is displayed and available for copying.



## 7.13 Preference Settings



### 7.13.1 Language Settings

The system supports Chinese and English dual languages, click the language switching icon in the upper right corner of the page, users can switch the system language.

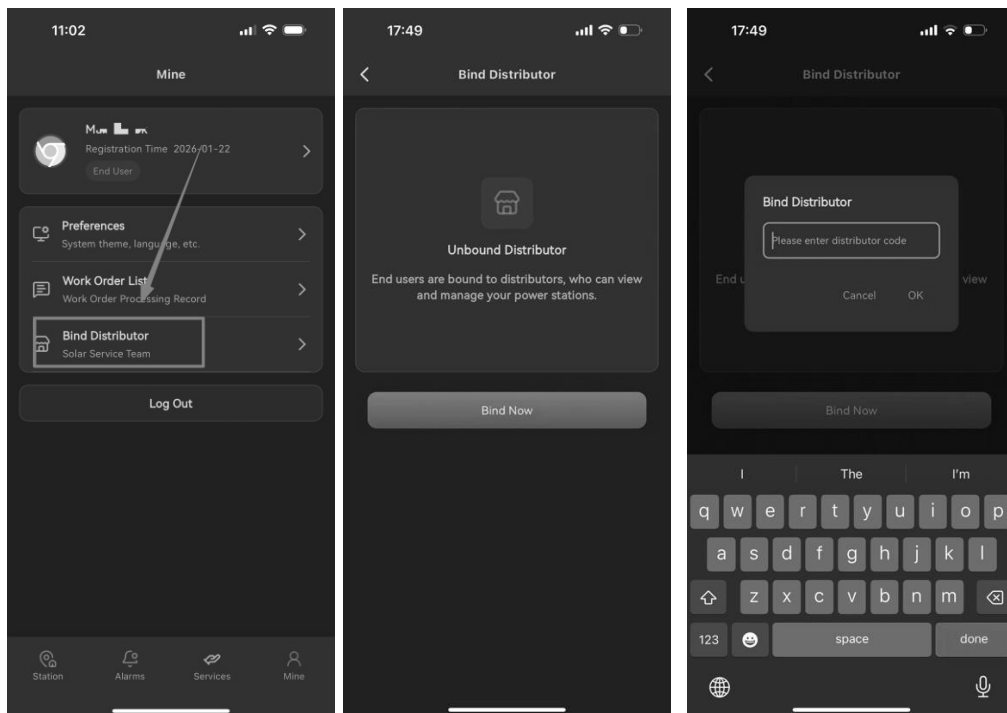
### 7.13.2 Display Theme

The system provides white and black two theme skins, click the theme icon in the upper right corner of the page, users can freely switch according to environmental lighting or personal habits. Light mode is fresh and bright, dark mode protects eyes and saves power.

## 7.14 Bind Distributor

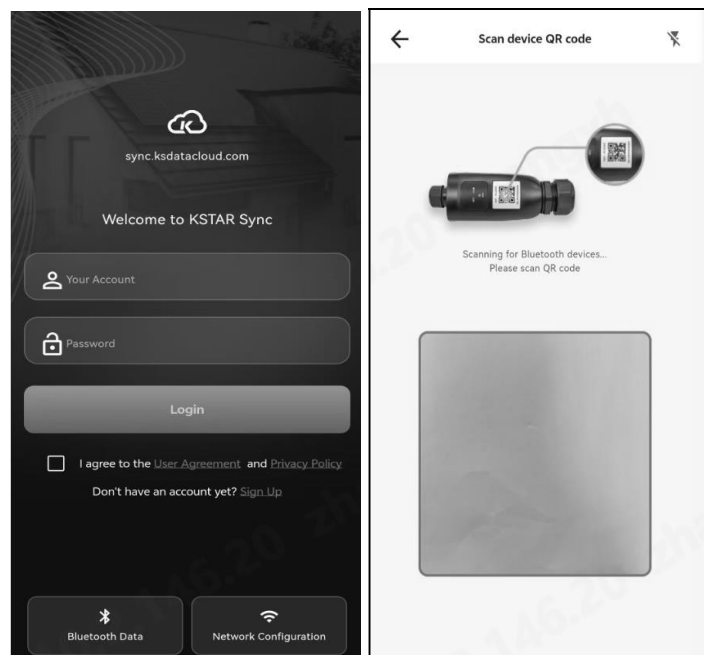
The account registered by end users through KSTAR Sync is an independent account and is not supervised by distributors. If distributors need to view the power stations of end users, the end users must bind with the distributor.

After logging into the KSTAR Sync APP, end users can go to the **【Mine】** page, click **【Bind Distributor】** - **【Bind Now】** , enter the distributor code, and click the **【Confirm】** button to successfully bind with the distributor's account.



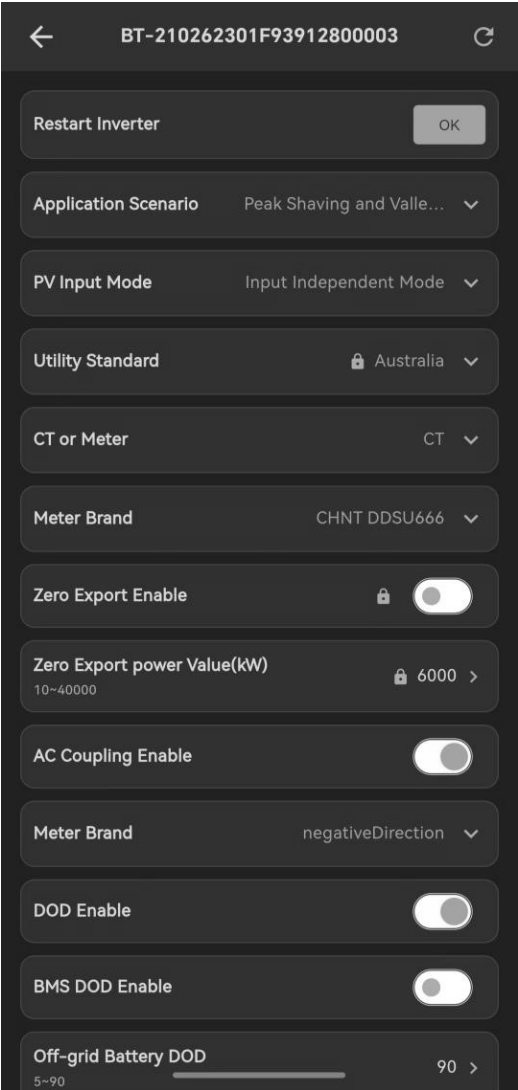
## 7.15 System Operation

Install the Stick Logger and power it on. Turn on Bluetooth on your phone and connect to Wi-Fi. Open the "KSTAR Sync" APP, tap Network Configuration, and proceed to the QR code scanning page as shown in the figure below.



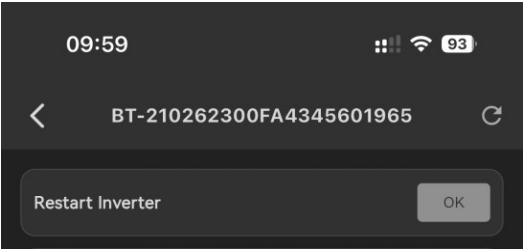
### 7.15.1 Local Mode

Once the communication between the inverter and the app is established, you can access the inverter settings interface.



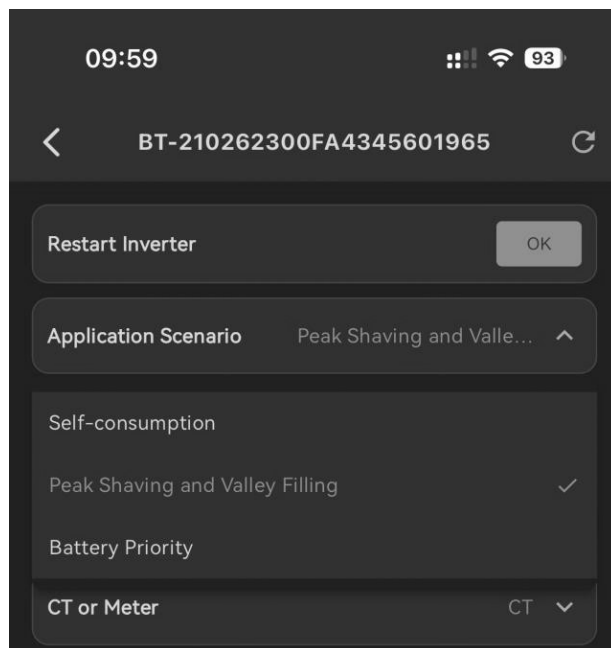
### 7.15.2 Restart Inverter

The command can be issued to restart the inverter.



### 7.15.3 Application Scenario setting

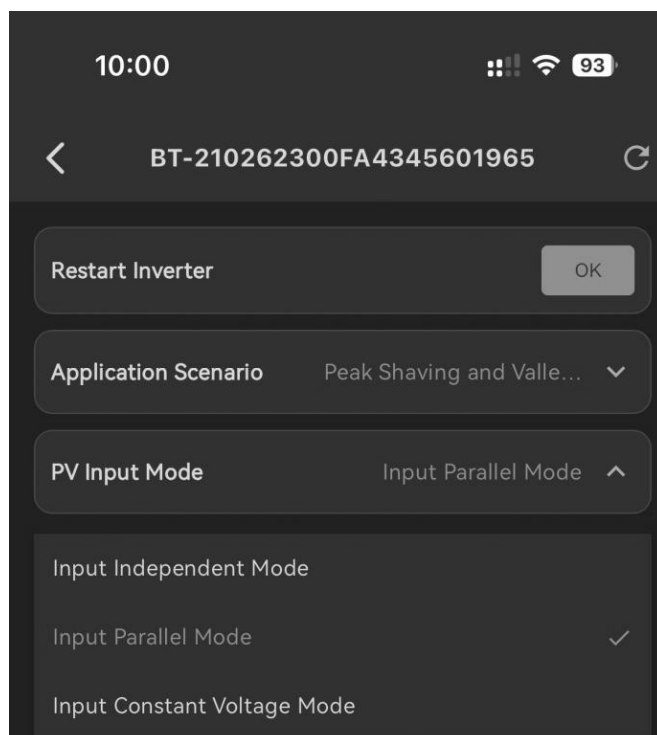
The energy storage system supports three working modes: SELF CONSUME, PEAK SHIFT, and BAT PRIORITY.



### 7.15.4 PV Input Mode

There are three modes for PV inputs: independent, parallel and constant voltage. Set the appropriate PV input mode based on the actual connection of the PV strings.

The default setting is INDEPENDENT. If independent mode is selected when the PV strings are actually connected in parallel, it results in an imbalanced distribution of power in the PV strings.



### 7.15.5 Utility Standard

When you select the grid standard in Utility Standard, these parameters are set automatically. During operation, when the inverter detects that these settings have been reached or exceeded, the inverter stops generating power.



Changing the setting of Utility Standard is not recommended.

Utility Standard are password protected. Please contact your installer or distributor for access.

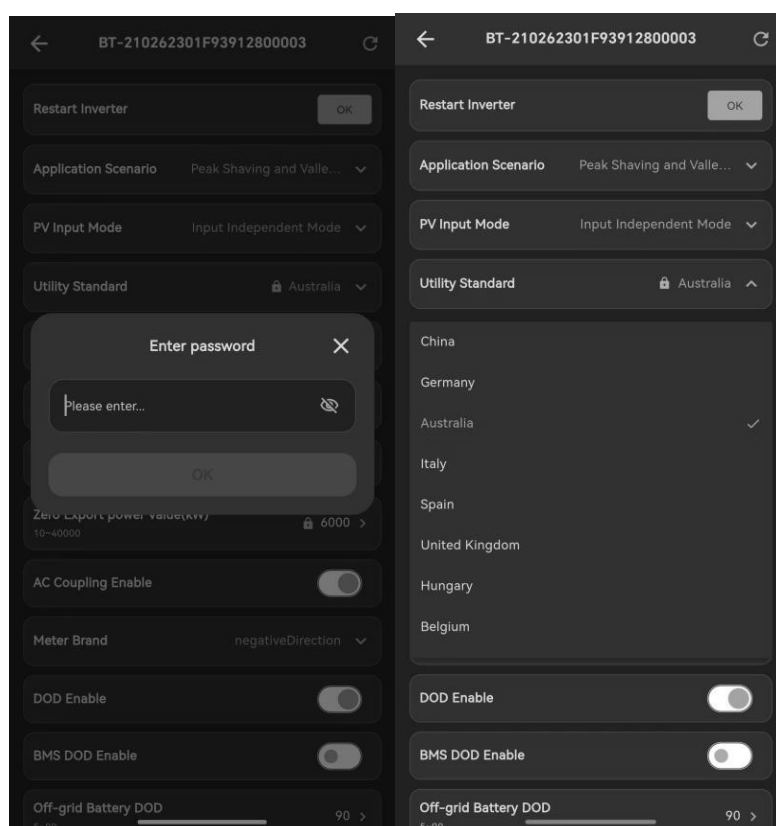


Table 7-1 lists the specifications of different utility standards.

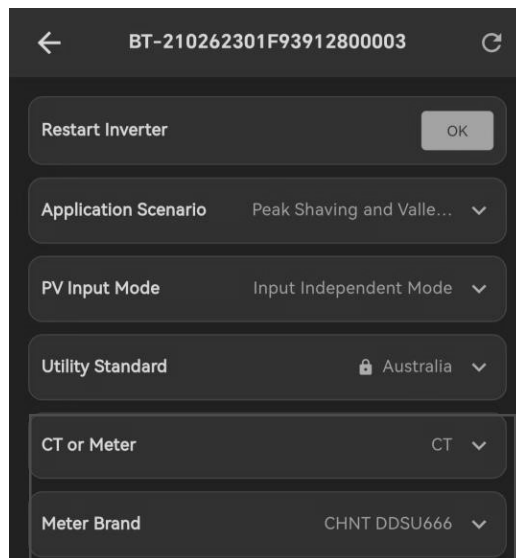
**Table 7-1 Grid Specifications**

| Grid        |         | Output Voltage Range (VAC) | Output Frequency Range (Hz) | Start Delay (s) |
|-------------|---------|----------------------------|-----------------------------|-----------------|
| 1           | China   | 187–252                    | 49.5–50.2                   | 30              |
| 2           | Germany | 184–264                    | 47.5–51.5                   | 60              |
| 3 Australia | AUS-A   | 180–265                    | 47–52                       | 60              |
|             | AUS-B   | 180–265                    | 47–52                       | 60              |
|             | AUS-C   | 180–265                    | 45–55                       | 60              |

|                 |              |             |             |     |
|-----------------|--------------|-------------|-------------|-----|
| <b>4 Italy</b>  | CEI0-21      | 195–264     | 49.8–50.2   | 60  |
|                 | CEI0-21 ACEA | 195–264     | 49.8–50.2   | 60  |
| <b>5</b>        | Spain        | 196–253     | 48–50.5     | 180 |
| <b>6</b>        | U.K.         | 184–264     | 47–52       | 180 |
| <b>7</b>        | Hungary      | 196–253     | 49–51       | 300 |
| <b>8</b>        | Belgium      | 184–264     | 47.5–51.5   | 60  |
| <b>9</b>        | New Zealand  | 180–260     | 45–55       | 60  |
| <b>10</b>       | Greece       | 184–264     | 49.5–50.5   | 180 |
| <b>11</b>       | France       | 184–264     | 47.5–50.4   | 60  |
| <b>12</b>       | Bangkok      | 198–242     | 49–51       | 150 |
| <b>13</b>       | Thailand     | 198–242     | 47–52       | 60  |
| <b>14</b>       | South Africa | 180–260     | 47.0–52     | 60  |
| <b>15</b>       | 50549        | 184–264     | 47.5–51.5   | 60  |
| <b>16</b>       | Brazil       | 184–264     | 59.5–60.5   | 60  |
| <b>17</b>       | 0126         | 184–264     | 47.5–51.5   | 60  |
| <b>18</b>       | Ireland      | 184–264     | 47–52       | 180 |
| <b>19</b>       | Israel       | 195.5–253   | 47.0–51.5   | 60  |
| <b>20</b>       | Poland       | 195.5–253   | 49.00–50.05 | 60  |
| <b>21 Chile</b> | Chile-BT     | 176.0–242   | 47.5–51.5   | 60  |
|                 | Chile-HD     | 198.0–242   | 49–51       | 300 |
|                 | Chile-LD     | 198.0–242   | 49–51       | 300 |
| <b>22</b>       | Local        | 150–280     | 45.0–55     | 30  |
| <b>23</b>       | 60Hz         | 184–264     | 59.5–60.5   | 60  |
| <b>24</b>       | Denmark      | 195.5–253.0 | 47.5–51.5   | 60  |
| <b>25</b>       | Sweden       | 195.5–253.0 | 47.5–51.5   | 60  |
| <b>26</b>       | Austria      | 184–264.5   | 47.5–51.5   | 300 |
| <b>27</b>       | Czech        | 195.5-253   | 47.5-52     | 60  |
| <b>28</b>       | Cyprus       | 184-253     | 47-51.5     | 180 |
| <b>29</b>       | Netherlands  | 184-253     | 48-51       | 60  |
| <b>30</b>       | Switzerland  | 184-276     | 47.5-51.5   | 60  |

#### 7.15.6 CT OR METER

The energy storage system support connecting external CT or a smart meter for measuring the energy consumption.

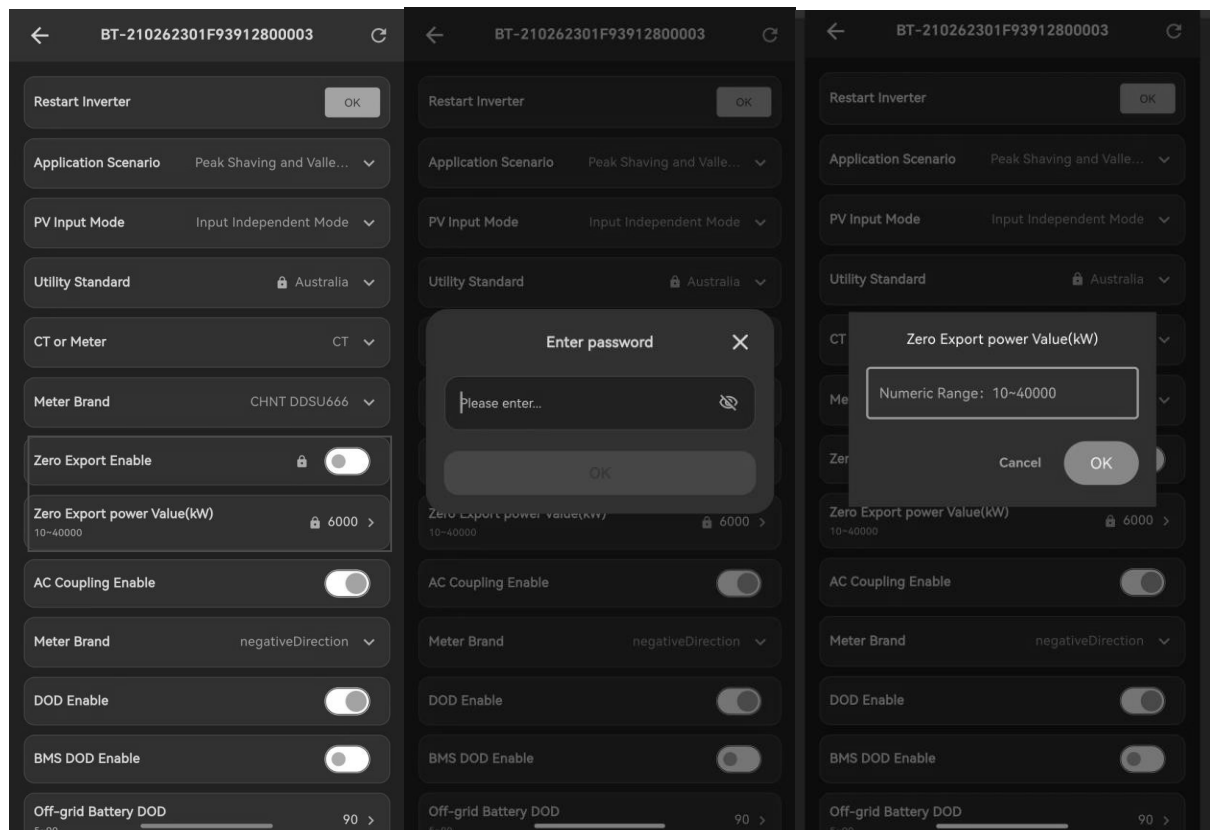


### 7.15.7 Export Limit Control

Export Limit Control feature is available to enable/disable the limitation of power export to grid. And the export power is configurable to certain power capacity for specific installation site.



Export Limit Control Configuration are password protected. Please contact your installer or distributor for access.

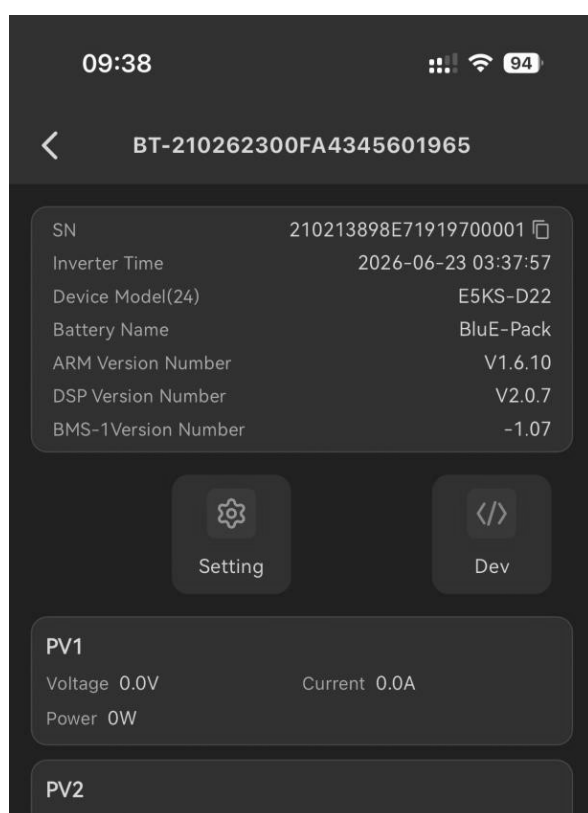


### 7.15.8 AC Coupling

If you want to connect an inverter to your PV panels to build an AC-coupling system, you must enable AC COUPLE. By default, this feature is disabled. For more information, see AC-coupling System

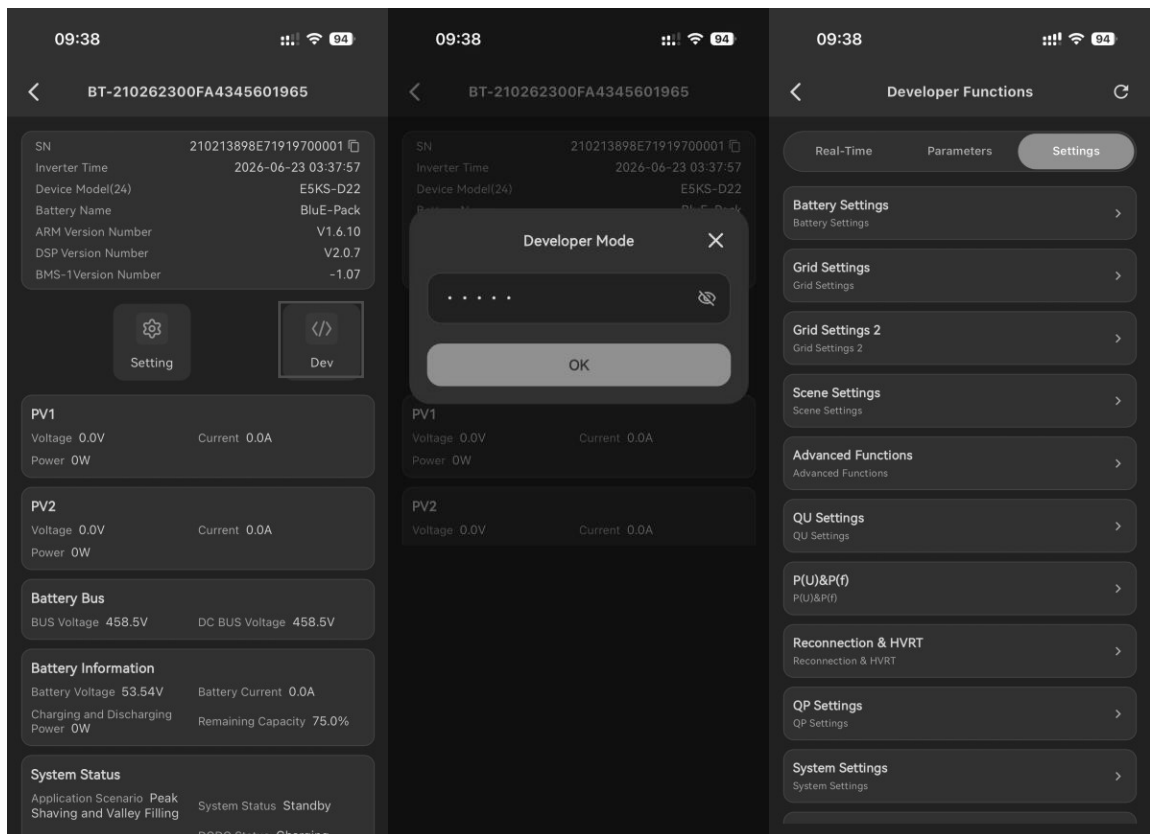
### 7.15.9 Equipment Basic Information

- FIRMWARE: The version of the firmware in ARM and DSP.
- MODEL SN: The serial number of the hybrid inverter in use.
- INV MODEL: The model of the hybrid inverter in use.
- Bat Name: The serial number of the battery in use.
- System Time: The date, and time of the system.



### 7.15.10 Grid Protection Setting and Power Quality Response Mode

Under Developer Functions Tab, and enter the Grid Settings option, will be able to view the Under/Over Voltage and Under/Over Frequency protection value. There are additional options to enable the Over-voltage/ Under-voltage Derating, Over-frequency/ Under-frequency Derating and relevant threshold value.



Enter the Advanced Function Setting, will get the options to view multiple Power Quality Response mode, Q(u), P(u), P(f), PF, Q control, Max\_Power rate, QP control, etc.



Setting for power quality response are password protected. Please contact your installer or distributor for access.

## 8 Operation & Maintenance

Both users and certified professional personnel must maintain the energy storage system to ensure the healthy and safe operation of the system.

In this section, you can find the following:

- The inspection checklist for users of the energy storage system.
- The inspection checklist for professional personnel.
- Error codes, alarm codes, and the possible solutions of the system and the BMS.

## 8.1 Inspection Checklist for Users

| Inspection Activity                                                                                                                                             | Interval             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Check for visible damage to any part of the system.                                                                                                             | Six months           |
| Check the inverter and battery packs for signs of wear and tear, heat damage, discoloration, and unusual smells.                                                | Six months           |
| Check the warning signs and guidance signs on the inverter and the battery pack for signs of wear and damage, and make sure none have been removed or obscured. | Six months           |
| Check whether any part of the system makes an abnormal noise when the system is running.                                                                        | Six months           |
| Monitor the temperature of the battery pack and clean the battery pack if necessary.                                                                            | Six months to a year |
| Make sure that the ground around the system is clean and tidy.                                                                                                  | Six months to a year |
| Check the maintenance access to make sure that it is clear and unobstructed.                                                                                    | Six months to a year |
| When the system is running, check the voltage, temperature, and other parameters of the battery packs.                                                          | Six months           |
| When the system is running, check the parameters of the inverters.                                                                                              | Six months           |
| Check the battery packs for ineffectiveness or damage.                                                                                                          | Six months           |

## 8.2 Inspection Checklist for Professional Personnel

### **WARNING**

- The equipment must be opened only by professional personnel that have been certified by KSTAR New Energy.
- During inspection and maintenance, wear protective personal equipment, including insulated gloves, protective shoes, and anti-noise earplugs.
- Follow local and international safety standards, regulations, and specifications to do the maintenance.
- Contact KSTAR New Energy promptly if you encounter anything not covered in this manual.

### **CAUTION**

Before maintenance, disconnect all the electrical connections. Wait at least five minutes after disconnection, so that the residual voltage of the capacitors falls to a safe voltage. Use a multi-meter to make sure that the equipment is completely discharged.

| Inspection Activities                                                             | Interval             |
|-----------------------------------------------------------------------------------|----------------------|
| Check electrical connections for looseness.                                       | Six months to a year |
| Check cables for deterioration or damage.                                         | Six months to a year |
| Check cable terminal screws for looseness.                                        | Six months to a year |
| Check cable terminals for signs of overheating.                                   | Six months to a year |
| Check the ground connection.                                                      | Six months to a year |
| Check whether the cable tie is attached to the cable.                             | Six months to a year |
| Check the EMS, KSTAR SYNC app, and other related equipment for failure or damage. | Six months to a year |

## 8.3 Troubleshooting

When you see the red alarm light on the inverter, you can find possible solutions in this section. If the problem persists after trying these solutions, please contact KSTAR New Energy or an authorized distributor.

When a problem is successfully solved, after a period of time, the red LED alarm light turns off., but you can always view it in the error records. For more information, see Viewing INQUIRE.

### 8.3.1 Error Codes of the System

| Code       | Description                                                                                | Possible Solutions                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>F00</b> | Soft Time Out: Soft-start timeout.                                                         | Restart the inverter and wait until it runs correctly.<br>If the code is still shown, contact Customer Service.                                                                                                                                                                                                                                                                                                                                                             |
| <b>F01</b> | INV Volt Short: The inverter output is shorted.                                            | <ol style="list-style-type: none"> <li>1. Disconnect all power sources and shut down the inverters and the battery packs.</li> <li>2. Disconnect the load.</li> <li>3. Power on and restart all the inverters and the battery packs.</li> <li>4. If no error is reported, it means the load is shorted. Check the load.</li> </ol> If the code is still shown, contact Customer Service.                                                                                    |
| <b>F02</b> | GFCI Sensor Fault: A failure occurs to the Ground Fault Circuit Interrupter (GFCI) sensor. | <ol style="list-style-type: none"> <li>1. Disconnect all power sources.</li> <li>2. Restart the inverter and wait until it runs correctly.</li> </ol> If the code is still shown, contact Customer Service.                                                                                                                                                                                                                                                                 |
| <b>F04</b> | Bus Volt Low: The bus voltage is low.                                                      | <ol style="list-style-type: none"> <li>1. Check the settings of the input mode.</li> <li>2. Restart the inverter and wait until it runs correctly.</li> </ol> If the code is still shown, contact Customer Service.                                                                                                                                                                                                                                                         |
| <b>F05</b> | Bus Volt High: The bus voltage is high.                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>F06</b> | Bus Short Circuit: The bus is shorted.                                                     | Restart the inverter and wait until it runs correctly.<br>If the code is still shown, contact Customer Service.                                                                                                                                                                                                                                                                                                                                                             |
| <b>F07</b> | PV ISO Under Fault: The insulation resistance of a PV panel is low.                        | <ol style="list-style-type: none"> <li>1. Check the ground connection.</li> <li>2. Check the ground resistance of PV+ and PV-:               <ul style="list-style-type: none"> <li>▪ If the resistance is smaller than 2 MΩ, check the PV string for ground fault or poor ground insulation. If necessary, contact Customer Service.</li> <li>▪ If the resistance is greater than 2 MΩ and the error code is still shown, contact Customer Service.</li> </ul> </li> </ol> |

|            |                                                                                  |                                                                                                                                                                                                                                                                                                   |
|------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>F08</b> | PV Input Short Circuit: The PV input is shorted.                                 | <ol style="list-style-type: none"> <li>1. Check the settings of the input mode.</li> <li>2. Disconnect the PV input.</li> <li>3. Restart the inverter and wait until it runs correctly.</li> </ol> <p>If the code is still shown, contact Customer Service.</p>                                   |
| <b>F09</b> | Bypass Relay Fault: A failure occurred to the bypass relay.                      | <ol style="list-style-type: none"> <li>1. Disconnect the PV input.</li> <li>2. Restart the inverter and wait until it runs correctly.</li> </ol>                                                                                                                                                  |
| <b>F19</b> | EPS Relay Fault: A failure occurred to the EPS relay.                            | If the code is still shown, contact Customer Service.                                                                                                                                                                                                                                             |
| <b>F10</b> | INV Curr Over: The output current on the inverter exceeds the threshold.         | <ol style="list-style-type: none"> <li>1. Wait five minutes for the inverter to restart automatically.</li> <li>2. Check the EPS loads. If the load exceeds the rated output power of the inverter, disconnect some load.</li> </ol> <p>If the code is still shown, contact Customer Service.</p> |
| <b>F11</b> | INV DC Over: The DC component of the output current of the inverter is too high. | <p>Restart the inverter and wait until it runs correctly.</p> <p>If the code is still shown, contact Customer Service.</p>                                                                                                                                                                        |
| <b>F12</b> | Ambient Over Temp: The ambient temperature is too high.                          | <ol style="list-style-type: none"> <li>1. Restart the inverter.</li> <li>2. Let the inverter cool for a few minutes and then restart it.</li> </ol>                                                                                                                                               |
| <b>F13</b> | Sink Over Temp: The temperature of the heat sink is too high.                    | <ol style="list-style-type: none"> <li>3. Observe whether the inverter can run correctly.</li> <li>4. Make sure that the ambient temperature is in the range of -25°C to 60°C.</li> </ol> <p>If the code is still shown, contact Customer Service.</p>                                            |
| <b>F15</b> | DisChg Curr Over: The battery is discharged with over current.                   | <ol style="list-style-type: none"> <li>1. Wait five minutes for the inverter to restart automatically.</li> <li>2. Check the EPS loads. If the load exceeds the rated output power of the inverter, disconnect some load.</li> </ol> <p>If the code is still shown, contact Customer Service.</p> |

| <b>Code</b> | <b>Description</b>                                                                                              | <b>Possible Solutions</b>                                                                                                                                                                                                                                                                                                                            |
|-------------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>F16</b>  | Chg Curr Over: The battery is charging with over current.                                                       | Check the battery wiring port for short circuits.<br>Restart the inverter and the battery packs.<br>If the code is still shown, contact Customer Service.                                                                                                                                                                                            |
| <b>F17</b>  | Current Sensor Fault: A failure occurred to the current sensor.                                                 | Restart the inverter and wait until it runs correctly.<br>If the code is still shown, contact Customer Service.                                                                                                                                                                                                                                      |
| <b>F18</b>  | INV Abnormal: Abnormal output voltage or output frequency of the inverter.                                      | Contact Customer Service.                                                                                                                                                                                                                                                                                                                            |
| <b>F20</b>  | Always Over Load: The EPS load always exceeds the rated output power of the system.                             | Check the EPS loads. If the load is lower than the rated output power of the inverter and the error is still shown, contact Customer Service.                                                                                                                                                                                                        |
| <b>F22</b>  | Parallel Communicate Fault: A failure occurred to the communication between the inverters in a parallel system. | <ol style="list-style-type: none"> <li>1. Check the parallel cable for connection.</li> <li>2. Check the inverter address settings. In a parallel system, the address of the primary inverter must be set to 1, and the addresses of the other inverters must be set to 2, 3, or 4.</li> </ol> If the code is still shown, contact Customer Service. |
| <b>F23</b>  | Parallel Grid Abnormal: In a parallel system, some connections are incorrect.                                   | <ol style="list-style-type: none"> <li>1. Check the wiring at the grid end and make sure the wiring is correct.</li> <li>2. Restart the inverter and wait until it runs correctly.</li> </ol> If the code is still shown, contact Customer Service.                                                                                                  |
| <b>F24</b>  | EPS Air Switch Abnormal: An error occurred to activation of the air switch on the EPS load end.                 | <ol style="list-style-type: none"> <li>1. Turn off all the switches on the EPS load end.</li> <li>2. If the code is still shown, contact Customer Service.</li> </ol>                                                                                                                                                                                |
| <b>F25</b>  | Parallel Power Imbalance: Power imbalance occurs to the parallel system.                                        | <ol style="list-style-type: none"> <li>1. Turn off all the switches on the EPS load end.</li> <li>2. Restart the inverter and wait until it runs correctly.</li> </ol>                                                                                                                                                                               |
| <b>F26</b>  | Parallel Inverter Grid Phase Sequence Abnormal                                                                  | <ol style="list-style-type: none"> <li>1. Make sure that the phase sequence at the grid end of the inverter is consistent.</li> <li>2. If the code is still shown, contact Customer Service.</li> </ol>                                                                                                                                              |

|            |                                                                                  |                                                                                                                 |
|------------|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| <b>F32</b> | DSP ARM SCI Fault:<br>A failure occurs to the communication between DSP and ARM. | Restart the inverter and wait until it runs correctly.<br>If the code is still shown, contact Customer Service. |
|------------|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|

### 8.3.2 Alarm Codes of the System

| Code       | Description                                                                                                           | Possible Solutions                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------|-----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>W00</b> | Grid Volt Low                                                                                                         | <p>Check the local voltage and frequency for their compliance with the inverter specifications:</p> <ul style="list-style-type: none"> <li>• If the voltage and frequency are within the acceptable range, wait two minutes for the inverter to run correctly. If recovery is not possible or the fault repeats, contact Customer Service.</li> <li>• If the voltage and frequency are beyond the range or are unstable, contact the local power company.</li> </ul> |
| <b>W01</b> | Grid Volt High                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>W02</b> | Grid Frequency Low                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>W03</b> | Grid Frequency High                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>W04</b> | Solar Loss: No PV solar panels are connected to the system, or the input voltage from the PV solar panels is too low. | <ol style="list-style-type: none"> <li>1. Check the PV connection.</li> <li>2. Check the PV availability.</li> </ol> <p>If the connections are correct and the alarm code is still shown, contact Customer Service.</p>                                                                                                                                                                                                                                              |
| <b>W05</b> | Bat Loss: No battery packs are connected to the system, or the battery voltage is too low.                            | <ol style="list-style-type: none"> <li>1. Check the battery connection.</li> <li>2. Check the battery wiring port for short circuits.</li> </ol> <p>If the connections are correct and the alarm code is still shown, contact Customer Service.</p>                                                                                                                                                                                                                  |
| <b>W06</b> | Bat Under Volt: Under voltage has occurred in the battery.                                                            | <p>Check the battery packs for their availability. If the battery voltage is lower than the lowest battery terminal input voltage acceptable to the inverter, charge the battery until it reaches the acceptable battery input voltage of the inverter.</p> <p>If the code is still shown, contact Customer Service.</p>                                                                                                                                             |
| <b>W07</b> | Bat Volt Low: The battery voltage is too low.                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Code                                                                                           | Description                                                                                                         | Possible Solutions                                                                                                                                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>W08</b>                                                                                     | Bat Volt High: The battery voltage is higher than 57.5 V and the battery has shut down because of the high voltage. | <ol style="list-style-type: none"> <li>1. Check the battery for its compliance with its pre-settings.</li> <li>2. If the battery complies with the pre- setting, restart it.</li> </ol> <p>If the code is still shown, contact Customer Service.</p>                                                                                      |
| <b>W09</b>                                                                                     | Over Load: An overload has occurred because the connected load exceeds the rated power of the inverter.             | <ol style="list-style-type: none"> <li>1. Wait five minute for the inverter to restart.</li> <li>2. If the EPS loads are higher than the rated output power of the inverter, disconnect some load.</li> </ol>                                                                                                                             |
| <b>W10</b>                                                                                     | GFCI Over: High current leakage has occurred.                                                                       | <ol style="list-style-type: none"> <li>1. Check the PV string for direct or indirect grounding. If such grounding is discovered, correct it.</li> <li>2. Check the peripherals of the inverter for current leakage. If current leakage is discovered, address it.</li> </ol> <p>If the code is still shown, contact Customer Service.</p> |
| <b>W12</b>                                                                                     | Fan Fault: The fan has malfunctioned.                                                                               | <p>Restart the inverter and wait until it runs correctly.</p> <p>If the code is still shown, contact Customer Service.</p>                                                                                                                                                                                                                |
| <b>W13</b>                                                                                     | BAT Power Down: The battery has shut down because the SOC is low.                                                   | <p>Check the SOC. Make sure that the SOC is not lower than the difference between 100% and the set DOD. If it is lower than the difference, charge the battery.</p>                                                                                                                                                                       |
| <b>W14</b><br><b>W15</b><br><b>W16</b><br><b>W17</b><br><b>W18</b><br><b>W21</b><br><b>W22</b> | BMS alarms.                                                                                                         | <p>For more information, see BMS ALARM Warnings.</p>                                                                                                                                                                                                                                                                                      |
| <b>W19</b>                                                                                     | BMS Volt Imbalance: A voltage imbalance has occurred to the battery of the BMS.                                     | <p>Contact Customer Service.</p>                                                                                                                                                                                                                                                                                                          |
| <b>W20</b>                                                                                     | BMS Communicate Fault: The communication between the BMS and the inverter has failed.                               | <p>Make sure that the COM cable between the inverter and the battery pack is in good condition and is connected correctly.</p>                                                                                                                                                                                                            |
| <b>W23</b><br><b>W24</b>                                                                       | BMS protection warning.                                                                                             | <p>For more information, see BMS PROTECTION</p>                                                                                                                                                                                                                                                                                           |

|            |                                                                            | Warnings.                                                                                                       |
|------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Code       | Description                                                                | Possible Solutions                                                                                              |
| <b>W25</b> | BMS Updating: The BMS is updating.                                         | You can ignore this alarm. No action is required.                                                               |
| <b>W26</b> | BMS Program Version Err: The version of the BMS program is incorrect.      | Contact Customer Service.                                                                                       |
| <b>W27</b> | BMS Program Update Fail: The BMS program has failed to update.             | Check the network and try to update the program again.                                                          |
| <b>W29</b> | Grid Volt Lock Fail: The inverter has failed to synchronize with the grid. | Restart the inverter and wait until it runs correctly.<br>If the code is still shown, contact Customer Service. |
| <b>W30</b> | PV Off: The PV string has requested a shutdown.                            | Restart the inverter and wait until it runs correctly.<br>If the code is still shown, contact Customer Service. |
| <b>W31</b> | System Reset: The system is reset.                                         | Restart the inverter and wait until it runs correctly.<br>If the code is still shown, contact Customer Service. |

### 8.3.3 BMS Error codes and troubleshooting

| Code        | Description                      | Possible Solutions                                                                                                                                     |
|-------------|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>BIT0</b> | Battery cell overvoltage alarm   | The warning unit overcharging voltage is 3650mV, where the inverter should stop charging and the BMS should not turn off the charging MOS.             |
| <b>BIT1</b> | Battery cell under-voltage alarm | The warning unit over discharging voltage is 2800mV, where the inverter should stop discharging and the BMS should not turn off the discharging MOS.   |
| <b>BIT2</b> | Battery PACK overvoltage alarm   | The warning overall overcharging voltage is 57.6V, where the inverter should stop charging and the BMS should not turn off the charging MOS.           |
| <b>BIT3</b> | Battery PACK under-voltage alarm | The warning overall over discharging voltage is 44.8V, where the inverter should stop discharging and the BMS should not turn off the discharging MOS. |
| <b>BIT4</b> | Charging overcurrent alarm       | The warning charging overcurrent is 100A, where the inverter should stop                                                                               |

|              |                                                       |                                                                                                                                                                                                                                                         |
|--------------|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                                                       | charging and the BMS should not turn off the charging MOS.                                                                                                                                                                                              |
| <b>BIT5</b>  | Discharging the overcurrent alarm                     | The warning current of discharging overcurrent 1 is 100A where the inverter should stop discharging and the BMS should not turn off the discharging MOS. This alarm will automatically stop after 1min or when the charging current is greater than 1A. |
| <b>BIT8</b>  | Charging high temperature alarm (cell temperature)    | The protective limit of charging high temperature is 57°C where the BMS should forcibly turn off the charging MOS.                                                                                                                                      |
| <b>BIT9</b>  | Discharging high temperature alarm (cell temperature) | The warning discharging high temperature is 55°C, where the inverter should stop discharging and the BMS should not turn off the discharging MOS.                                                                                                       |
| <b>BIT10</b> | Charging low temperature alarm (cell temperature)     | The warning charging low temperature is 2°C, where the inverter should stop charging and the BMS should not turn off the charging MOS.                                                                                                                  |
| <b>BIT11</b> | Discharging low temperature alarm (cell temperature)  | The warning discharging low temperature is -18°C, where the inverter should stop discharging and the BMS should not turn off the discharging MOS.                                                                                                       |
| <b>BIT12</b> | High ambient temperature alarm                        | The warning high ambient temperature is 65°C, where the inverter should stop charging and discharging and the BMS should forcibly turn off the charging and discharging MOS.                                                                            |
| <b>BIT13</b> | Low ambient temperature alarm                         | The warning low ambient temperature is -15°C, where the inverter should stop charging and the BMS should forcibly turn off the charging MOS.                                                                                                            |
| <b>BIT14</b> | MOSFET high temperature alarm                         | The warning MOS over-temperature is 90°C, where the inverter should stop charging and discharging and the BMS should not turn off the charging and discharging MOS.                                                                                     |
| <b>BIT15</b> | Low SOC alarm                                         | The warning low battery SOC is less than 5%, where the inverter should stop discharging and the BMS should not turn off the charging and discharging MOS and should not alarm during charging.                                                          |

### 8.3.4 BMS Protection codes and description

| Code        | Description                           | Possible Solutions                                                                                                                                                                                                                                                                                           |
|-------------|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>BIT0</b> | Battery cell overvoltage protection   | The unit overcharging protection voltage is 3700mV, where the inverter should stop charging and the BMS should forcibly turn off the charging MOS.                                                                                                                                                           |
| <b>BIT1</b> | Battery cell under-voltage protection | The unit over discharge protection voltage is 2500mV, where the inverter should stop discharging and the BMS should forcibly turn off the discharging MOS. After 30 seconds of over discharge protection, if the battery still cannot be restored, it will enter a low power consumption mode.               |
| <b>BIT2</b> | Battery PACK overvoltage protection   | The overall overcharge protection voltage is 59V, where the inverter should stop charging and the BMS should turn off the charging MOS.                                                                                                                                                                      |
| <b>BIT3</b> | Battery PACK under-voltage protection | The overall over discharge protection voltage is 40V, where the inverter should stop discharging and the BMS should forcibly turn off the discharging MOS. After 30 seconds of over discharge protection, if the battery still cannot be restored, it will enter a low power consumption mode.               |
| <b>BIT4</b> | Charging overcurrent protection       | The protective limit of charging overcurrent is 120A, where the BMS should forcibly turn off the charging MOS. This state will be locked and not be exited automatically if it occurs continuously for 10 times.                                                                                             |
| <b>BIT5</b> | Discharging overcurrent protection    | The protective limit of discharging overcurrent 1 is 130A and the protective limit of discharging overcurrent 2 is 200A with a delay of 100ms, where the BMS should forcibly turn off the discharging MOS. This state will be locked and not be exited automatically if it occurs continuously for 10 times. |
| <b>BIT6</b> | Short circuit current protection      | The short circuit protection current is no less than 350A with a delay of 300us, where the BMS should forcibly turn off the discharging MOS.                                                                                                                                                                 |
| <b>BIT7</b> | Charging overvoltage protection       | The overall overcharge protection voltage is 59V, where the inverter should stop charging and the BMS                                                                                                                                                                                                        |

|              |                                                            |                                                                                                                                   |
|--------------|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
|              |                                                            | should turn off the charging MOS.                                                                                                 |
| <b>BIT8</b>  | Charging high temperature protection (cell temperature)    | The protective limit of charging high temperature is 57℃, where the BMS should forcibly turn off the charging MOS.                |
| <b>BIT9</b>  | Discharging high temperature protection (cell temperature) | The protective limit of discharging high temperature is 57℃, where the BMS should forcibly turn off the discharging MOS.          |
| <b>BIT10</b> | Charging low temperature protection (cell temperature)     | The protective limit of charging low temperature is 0℃, where the BMS should forcibly turn off the charging MOS.                  |
| <b>BIT11</b> | Discharging low temperature protection (cell temperature)  | The protective limit of discharging low temperature is -20℃, where the BMS should forcibly turn off the discharging MOS.          |
| <b>BIT12</b> | MOSFET high temperature protection                         | The protective limit of MOS over-temperature is 110℃, where the BMS should forcibly turn off the charging and discharging MOS.    |
| <b>BIT13</b> | High ambient temperature protection                        | The protective limit of high ambient temperature is 70℃, where the BMS should forcibly turn off the charging and discharging MOS. |
| <b>BIT14</b> | Low ambient temperature protection                         | The protective limit of low ambient temperature is -25℃, where the BMS should forcibly turn off the charging and discharging MOS. |
| <b>BIT15</b> | Heating function fault                                     | Reset the battery PACK; If the fault is not clear, contact the service engineer.                                                  |

### 8.3.5 BMS Fault codes and description

| Code         | Description                              | Possible Solutions                                                                                                                           |
|--------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>BIT0</b>  | Charging MOSFET malfunction              | Restart the battery PACK, if the fault still exists, contact the manufacturer and lock it until the technical personnel resolve the problem. |
| <b>BIT1</b>  | Discharging MOSFET malfunction           | Restart the battery PACK, if the fault still exists, contact the manufacturer and lock it until the technical personnel resolve the problem. |
| <b>BIT2</b>  | Temperature sensor malfunction           | Restart the battery PACK, if the fault still exists, contact the manufacturer and lock it until the technical personnel resolve the problem. |
| <b>BIT3</b>  | Cell voltage sampling fault              | Reset the battery PACK; If the fault is not clear, contact the service engineer.                                                             |
| <b>BIT4</b>  | Battery cell malfunction                 | Restart the battery PACK, if the fault still exists, contact the manufacturer and lock it until the technical personnel resolve the problem. |
| <b>BIT5</b>  | Front-end sampling communication failure | Restart the battery PACK, if the fault still exists, contact the manufacturer and lock it until the technical personnel resolve the problem. |
| <b>BIT6</b>  | Heating control MOSFET fault             | Reset the battery PACK; If the fault is not clear, contact the service engineer.                                                             |
| <b>BIT14</b> | Reverse DC connection                    | Check whether or not the wiring between the battery PACK and the positive and negative wires of the inverter battery is proper.              |

## 9 Technical Data

### 9.1 Hybrid Inverter

|                                                  |                                                                                                                                                                                                                                                                                             |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Dimension (W × H × D, mm)</b>                 | 725 × 490 × 245                                                                                                                                                                                                                                                                             |
| <b>Net Weight (kg)</b>                           | 4-6kw:40; 8-12kw:43<br>(Does not include the weight of the base)                                                                                                                                                                                                                            |
| <b>Operating Temperature</b>                     | -25°C to +60°C, derated over 40°C                                                                                                                                                                                                                                                           |
| <b>Operating Relative Humidity</b>               | 0–95% (No condensation)                                                                                                                                                                                                                                                                     |
| <b>Operating Altitude</b>                        | ≤ 3000 m                                                                                                                                                                                                                                                                                    |
| <b>Protective Class</b>                          | Class I                                                                                                                                                                                                                                                                                     |
| <b>Pollution degree classification</b>           | External (PD3), Internal (PD2)                                                                                                                                                                                                                                                              |
| <b>Overvoltage Category</b>                      | II (DC side), III (AC side)                                                                                                                                                                                                                                                                 |
| <b>Topology</b>                                  | High Frequency Isolation                                                                                                                                                                                                                                                                    |
| <b>Cooling</b>                                   | Natural Convection                                                                                                                                                                                                                                                                          |
| <b>Display</b>                                   | LED/APP                                                                                                                                                                                                                                                                                     |
| <b>Communication Interface</b>                   | RS485, CAN2.0, Wi-Fi, and 4G                                                                                                                                                                                                                                                                |
| <b>Ingress Protection</b>                        | IP66                                                                                                                                                                                                                                                                                        |
| <b>Max. Conversion Efficiency (From Battery)</b> | 93.5%                                                                                                                                                                                                                                                                                       |
| <b>Max. Conversion Efficiency (From PV)</b>      | 4-6kw 96.6%; 8-12kw 97.2%                                                                                                                                                                                                                                                                   |
| <b>Euro Efficiency</b>                           | 4-6kw 94.5%; 8-12kw 95.5%                                                                                                                                                                                                                                                                   |
| <b>MPPT Efficiency</b>                           | 99.5 %                                                                                                                                                                                                                                                                                      |
| <b>Protection Function</b>                       | <ul style="list-style-type: none"> <li>• Short Circuit Protection</li> <li>• AC Leakage Fault Protection</li> <li>• Grounding Fault Protection</li> <li>• Anti-islanding Protection</li> <li>• Overload Protection</li> <li>• Surge Protection</li> <li>• DC Polarity Protection</li> </ul> |
| <b>Grid Regulation</b>                           | <ul style="list-style-type: none"> <li>• EN50549-10</li> <li>• VDE-AR-N4105</li> <li>• VDE0126-1-1</li> </ul> <p>More grid regulation certifications are to be made available. Please contact KSTAR New Energy for the latest information.</p>                                              |
| <b>Safety Regulation</b>                         | <ul style="list-style-type: none"> <li>• IEC/EN 62109-1&amp;2</li> <li>• IEC62040-1</li> <li>• IEC62619</li> </ul>                                                                                                                                                                          |

|            |                                                                                                                                                                                                                                    |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>EMC</b> | <ul style="list-style-type: none"> <li>• EN61000-6-1</li> <li>• EN61000-6-2</li> <li>• EN61000-6-3</li> <li>• EN61000-6-4</li> <li>• EN61000-3-2</li> <li>• EN61000-3-3</li> <li>• EN61000-3-11</li> <li>• EN61000-3-12</li> </ul> |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 9.2 Battery Terminal Input /Output

|                                         | <b>E4KT-D22</b>                | <b>E5KT-D22</b> | <b>E6KT-D22</b> |
|-----------------------------------------|--------------------------------|-----------------|-----------------|
| <b>Battery Type</b>                     | Lithium or lead-acid batteries |                 |                 |
| <b>Voltage Range</b>                    | 44–58 VDC                      |                 |                 |
| <b>Rated Voltage</b>                    | 51.2 VDC                       |                 |                 |
| <b>Maximum Charge/Discharge Current</b> | 100 ADC/100 ADC                | 120 ADC/120 ADC | 120ADC/150 ADC  |
| <b>Rated Charge/Discharge Power</b>     | 4000 W/4000 W                  | 5,000 W/5,000 W | 6,000 W/6,000 W |

|                                         | <b>E8KT-D22</b>                | <b>E10KT-D22</b>  | <b>E10KTBE-D22</b> | <b>E12KT-D22</b>  |
|-----------------------------------------|--------------------------------|-------------------|--------------------|-------------------|
| <b>Battery Type</b>                     | Lithium or lead-acid batteries |                   |                    |                   |
| <b>Voltage Range</b>                    | 44–58 VDC                      |                   |                    |                   |
| <b>Rated Voltage</b>                    | 51.2 VDC                       |                   |                    |                   |
| <b>Maximum Charge/Discharge Current</b> | 160 ADC/200 ADC                | 200 ADC/240 ADC   | 200 ADC/240 ADC    | 200ADC/240 ADC    |
| <b>Rated Charge/Discharge Power</b>     | 8000 W/8000 W                  | 10,000 W/10,000 W | 10,000 W/10,000 W  | 10,000 W/12,000 W |

## 9.3 PV Input

|                                                    | <b>E4KT-D22</b> | <b>E5KT-D22</b> | <b>E6KT-D22</b> |
|----------------------------------------------------|-----------------|-----------------|-----------------|
| <b>Vmax. PV</b>                                    | 1000 VDC        |                 |                 |
| <b>Rated Voltage</b>                               | 720 VDC         |                 |                 |
| <b>PV Start Voltage</b>                            | 200 VDC         |                 |                 |
| <b>MPPT Voltage Range</b>                          | 140–950 VDC     |                 |                 |
| <b>MPPT Range (Full Load)</b>                      | 200–800 VDC     | 230–800VDC      | 250–800 VDC     |
| <b>MPPT Tracker/Strings</b>                        | 2               |                 |                 |
| <b>Max. Continuous PV Input Current</b>            | 20 ADC × 2      |                 |                 |
| <b>Isc PV</b>                                      | 25 ADC × 2      |                 |                 |
| <b>Max. inverter backfeed current to the array</b> | 0 ADC           |                 |                 |
| <b>Max. Back feed Current</b>                      | 0 ADC           |                 |                 |
| <b>Max. Continuous PV Input Power</b>              | 10,000 W        | 11,000 W        | 12,000 W        |

|                                                    | <b>E8KT-D22</b> | <b>E10KT-D22</b> | <b>E10KTBE-D22</b> | <b>E12KT-D22</b> |
|----------------------------------------------------|-----------------|------------------|--------------------|------------------|
| <b>Vmax. PV</b>                                    | 1000 VDC        |                  |                    |                  |
| <b>Rated Voltage</b>                               | 720 VDC         |                  |                    |                  |
| <b>PV Start Voltage</b>                            | 200 VDC         |                  |                    |                  |
| <b>MPPT Voltage Range</b>                          | 140–950 VDC     |                  |                    |                  |
| <b>MPPT Range (Full Load)</b>                      | 290–800 VDC     | 320–800VDC       | 320–800VDC         | 350–800 VDC      |
| <b>MPPT Tracker/Strings</b>                        | 2               |                  |                    |                  |
| <b>Max. Continuous PV Input Current</b>            | 20 ADC × 2      |                  |                    |                  |
| <b>Isc PV</b>                                      | 25 ADC × 2      |                  |                    |                  |
| <b>Max. inverter backfeed current to the array</b> | 0 ADC           |                  |                    |                  |
| <b>Max. Back feed Current</b>                      | 0 ADC           |                  |                    |                  |
| <b>Max. Continuous PV Input Power</b>              | 16,000 W        | 20,000 W         | 20,000 W           | 22,000 W         |

## 9.4 Grid Terminal Input /Output

|                                                 | E4KT-D22                | E5KT-D22 | E6KT-D22 |
|-------------------------------------------------|-------------------------|----------|----------|
| <b>Rated Voltage</b>                            | 220/230/240 VAC         |          |          |
| <b>Rated Frequency</b>                          | 50 Hz /60 Hz            |          |          |
| <b>Maximum Continuous Input Current</b>         | 21 AAC                  | 22.6 AAC | 22.6 AAC |
| <b>Maximum Continuous Input Power</b>           | 10,000 W                | 11,000 W | 12,000 W |
| <b>Rated Output Current</b>                     | 5.8 AAC                 | 7.3 AAC  | 8.7 AAC  |
| <b>Maximum Continuous Output Current</b>        | 13.1 AAC                | 13.1 AAC | 13.1 AAC |
| <b>Power factor (Cos phi), Adjustable</b>       | 0.8 leading–0.8 lagging |          |          |
| <b>Rated Output Power</b>                       | 4,000 W                 | 5,000 W  | 6,000 W  |
| <b>Maximum Continuous Output Apparent Power</b> | 4,400 VA                | 5,500 VA | 6,600 VA |
| <b>Grid Port Overcurrent Protection</b>         | 40 A                    |          |          |

|                                                 | E8KT-D22                | E10KT-D22 | E10KTBE-D22 | E12KT-D22 |
|-------------------------------------------------|-------------------------|-----------|-------------|-----------|
| <b>Rated Voltage</b>                            | 220/230/240 VAC         |           |             |           |
| <b>Rated Frequency</b>                          | 50 Hz /60 Hz            |           |             |           |
| <b>Maximum Continuous Input Current</b>         | 35 AAC                  | 35 AAC    | 35 AAC      | 35 AAC    |
| <b>Maximum Continuous Input Power</b>           | 16,000 W                | 20,000 W  | 20,000 W    | 22,000 W  |
| <b>Rated Output Current</b>                     | 11.6 AAC                | 14.5 AAC  | 14.5 AAC    | 17.4 AAC  |
| <b>Maximum Continuous Output Current</b>        | 26.1 AAC                | 26.1 AAC  | 26.1 AAC    | 26.1 AAC  |
| <b>Power factor (Cos phi), Adjustable</b>       | 0.8 leading–0.8 lagging |           |             |           |
| <b>Rated Output Power</b>                       | 8,000 W                 | 10,000 W  | 10,000 W    | 12,000 W  |
| <b>Maximum Continuous Output Apparent Power</b> | 8,800 VA                | 11,000 VA | 10,000 VA   | 13,200 VA |
| <b>Grid Port Overcurrent Protection</b>         | 63 A                    |           |             |           |

## 9.5 Backup load Terminal Output

|                                            | E4KT-D22                | E5KT-D22 | E6KT-D22 |
|--------------------------------------------|-------------------------|----------|----------|
| <b>Rated Voltage</b>                       | 230 VAC                 |          |          |
| <b>Rated frequency</b>                     | 50 Hz/60 Hz             |          |          |
| <b>Rated Output Current</b>                | 5.8 AAC                 | 7.3 AAC  | 8.7 AAC  |
| <b>Maximum Continuous Output Current</b>   | 13.1 AAC                | 13.1 AAC | 13.1 AAC |
| <b>Power factor (Cos phi)</b>              | 0.8 leading–0.8 lagging |          |          |
| <b>Rated Continuous Output Power</b>       | 4,000 W                 | 5,000 W  | 6,000 W  |
| <b>Maximum Output Apparent Power</b>       | 4,000 VA                | 5,000 VA | 6,000 VA |
| <b>BACK UP load Overcurrent Protection</b> | 32 A                    |          |          |

|                                            | E8KT-D22                | E10KT-D22 | E10KTBE-D22 | E12KT-D22 |
|--------------------------------------------|-------------------------|-----------|-------------|-----------|
| <b>Rated Voltage</b>                       | 230 VAC                 |           |             |           |
| <b>Rated frequency</b>                     | 50 Hz/60 Hz             |           |             |           |
| <b>Rated Output Current</b>                | 11.6 AAC                | 14.5 AAC  | 14.5 AAC    | 17.4 AAC  |
| <b>Maximum Continuous Output Current</b>   | 26.1 AAC                | 26.1 AAC  | 26.1 AAC    | 26.1 AAC  |
| <b>Power factor (Cos phi)</b>              | 0.8 leading–0.8 lagging |           |             |           |
| <b>Rated Continuous Output Power</b>       | 8,000 W                 | 10,000 W  | 10,000 W    | 12,000 W  |
| <b>Maximum Output Apparent Power</b>       | 8,000 VA                | 10,000 VA | 10,000 VA   | 12,000 VA |
| <b>BACK UP load Overcurrent Protection</b> | 40 A                    |           |             |           |

## 9.6 Battery Pack

| Battery specification  |                             |           | BP48100P1A-G2                                                                               | BP48100PF1A-G2 |
|------------------------|-----------------------------|-----------|---------------------------------------------------------------------------------------------|----------------|
| normal                 | Battery capacity            |           | 5.12 kWh                                                                                    |                |
|                        | Battery type                |           | LFP                                                                                         |                |
|                        | Rated voltage               |           | 51.2V                                                                                       |                |
|                        | Operating voltage range     |           | 44.8–57.6V                                                                                  |                |
| Operations             | Maximum charging current    |           | 80A (0.8C)                                                                                  |                |
|                        | Maximum discharging current |           | 80A (0.8C)                                                                                  |                |
|                        | Operating temperature range | Charge    | 0°C~+50°C                                                                                   | -10°C~+50°C    |
|                        |                             | Discharge | -10°C~+50°C                                                                                 |                |
|                        | Storage temperature range   |           | 0°C~+35°C                                                                                   |                |
|                        | Relative humidity           |           | 0%~95%(No condensation)                                                                     |                |
|                        | Protective class            |           | I                                                                                           |                |
|                        | Short circuit ratings       |           | 360A 300us                                                                                  |                |
| BMS                    | Maximum number of batteries |           | Maximum 8 batteries in parallel                                                             |                |
|                        | Monitored item              |           | System voltage, current, battery voltage, battery temperature, PCBA temperature measurement |                |
|                        | Communication mode          |           | CAN                                                                                         |                |
|                        | Ventilation mode            |           | Passive cooling                                                                             |                |
| Physical parameters    | Weight (kg)                 |           | 50.5                                                                                        |                |
|                        | Size (W×H×D) mm             |           | 725*165*370(Excluding handles)                                                              |                |
|                        | Water resistance level      |           | IP65                                                                                        |                |
| Reference to standards |                             |           | IEC 62619<br>IEC 62477<br>IEC 62040<br>IEC61000-6-1//3<br>UN38.3                            |                |

## 10 Quality Assurance

When product faults occur during the warranty period, his partner will provide free service or replace the product with a new one.

### **Evidence**

During the warranty period, the customer shall provide the product purchase invoice and date. In addition, the trademark on the product shall be undamaged and legible. Otherwise, company has the right to refuse to honor the quality guarantee.

### **Conditions**

After replacement, unqualified products shall be processed by company.

The customer shall give company or his partner a reasonable period to repair the faulty device.

### **Exclusion of Liability**

In the following circumstances, company has the right to refuse to honor the quality guarantee:

The free warranty period for the whole machine/components has expired.

The device is damaged during transport.

The device is incorrectly installed, refitted, or used.

The device operates in harsh environment, as described in this manual.

The fault or damage is caused by installation, repairs, modification, or disassembly performed by a service provider or personnel not from company or his authorized partner.

The fault or damage is caused by the use of non-standard or company.

### **Components or software.**

The installation and use range are beyond stipulations of relevant international standards.

The damage is caused by unexpected natural factors.

For faulty products in any of above cases, if the customer requests maintenance, paid maintenance service may be provided based on the judgment of company.

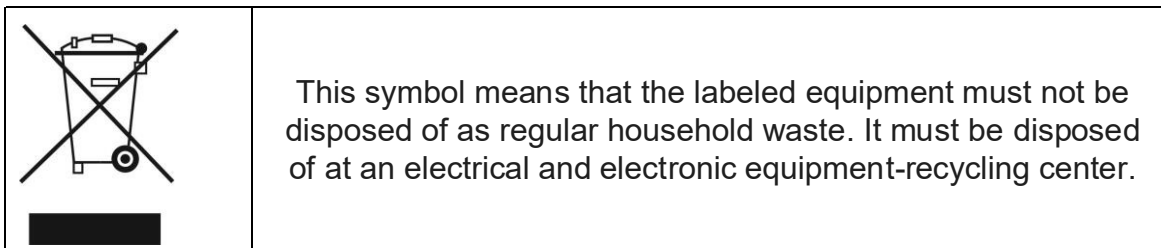
## 11 Disposal

When the system reaches the end of its service life, follow these step to dispose of the equipment:

**Step 1.** Uninstall the system:

- 1.1 Disconnect all power sources.
- 1.2 Disassemble all parts of the system from top to bottom.

**Step 2.** Dispose of all the parts. DO NOT dispose of the battery packs as regular House hold waste.



### NOTICE

If you need to replace a battery pack, you should request a new dangerous goods package, pack the battery pack, and then have the supplier pick it up.

KSTAR New Energy does not recycle batteries. Please contact your local recycling organization for disposal. If there is no local recycling organization, you should contact the nearest recycling organization in your country.

## 12 Abbreviations

### A

|      |                               |
|------|-------------------------------|
| AC   | Alternating Current           |
| AFCI | Arc-Fault Circuit-Interrupter |
| App  | Application                   |
| AWG  | American Wire Gauge           |

### B

|      |                               |
|------|-------------------------------|
| BESS | Battery Energy Storage System |
| BMS  | Battery Management System     |

### C

|    |                     |
|----|---------------------|
| CT | Current Transformer |
|----|---------------------|

### D

|    |                |
|----|----------------|
| DC | Direct Current |
|----|----------------|

|      |                                 |
|------|---------------------------------|
| DOD  | Depth of Discharge              |
| DRED | Demand Response Enabling Device |
| DRM  | Demand Response Mode            |
| DSP  | Digital Signal Processor        |

## E

|         |                              |
|---------|------------------------------|
| EMI     | Electromagnetic Interference |
| EMS     | Energy Management System     |
| BACK UP | Emergency Power Supply       |

## G

|      |                                  |
|------|----------------------------------|
| GFCI | Ground Fault Circuit Interrupter |
|------|----------------------------------|

## I

|     |            |
|-----|------------|
| ISO | Insulation |
|-----|------------|

## M

|      |                             |
|------|-----------------------------|
| MPPT | Maximum Power Point Tracker |
|------|-----------------------------|

## P

|    |              |
|----|--------------|
| PV | Photovoltaic |
|----|--------------|

## R

|      |                               |
|------|-------------------------------|
| RCD  | Residual Current Device       |
| RESP | Response                      |
| RRCR | Radio Ripple Control Receiver |

## S

|     |                                |
|-----|--------------------------------|
| SCI | Serial Communication Interface |
| SOC | State of Charge                |

## 13 Appendix: Definition of DVC

| Decisive voltage<br>Classification<br>(DVC)                                                                                                                                                                                                                                                                                             | Limits of working voltage V         |                                    |                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|------------------------------------|-----------------------------------|
|                                                                                                                                                                                                                                                                                                                                         | a.c. voltage<br>r.m.s.<br>$U_{ACL}$ | a.c. voltage<br>peak<br>$U_{ACPL}$ | d.c. voltage<br>mean<br>$U_{DCL}$ |
| A*                                                                                                                                                                                                                                                                                                                                      | 25<br>(16)                          | 35.4<br>(22.6)                     | 60<br>(35)                        |
| B                                                                                                                                                                                                                                                                                                                                       | 50<br>(33)                          | 71<br>(46.7)                       | 120<br>(70)                       |
| C                                                                                                                                                                                                                                                                                                                                       | > 50<br>(> 33)                      | > 71<br>(> 46.7)                   | > 120<br>(> 70)                   |
| <p>The table values in parentheses are to be used for PCE or portions of PCEs rated for installation in wet locations as addressed in 6.1 for environmental categories and minimum environmental conditions.</p> <p>*DVC-A circuits are allowed under fault conditions to have voltages up to the DVC- B limits, for maximum 0.2 s.</p> |                                     |                                    |                                   |

The KSTAR logo is displayed in white, bold, italicized capital letters on a solid blue rectangular background.

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