V2.0 2026-10-23

Residential All-In-One Energy Storage System

ESA 3-10kW

GW5.1-BAT-D-G20
GW8.3-BAT-D-G20
GW5.1-BAT-D-G21
GW8.3-BAT-D-G21
GW6.0-BAT-D-G20
GW9.0-BAT-D-G20

Solutions Manual

GOODWE

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Note

Due to product version upgrades or other reasons, the document content will be updated from time to time. Unless otherwise agreed, the document content cannot replace the safety precautions on the product label. All descriptions in the document are for guidance only.

Preface

Overview

This document mainly introduces the energy storage system composed of an inverter, battery system, static transfer switch cabinet (hereinafter referred to as STS), and smart meter. It covers product information, installation and wiring, configuration and commissioning, troubleshooting and maintenance. Please read this manual carefully before installing and using the product, understand the product safety information, and familiarize yourself with the product's functions and features. The document may be updated periodically. Please obtain the latest version of the documentation and more product information from the official website.

Applicable Products

The energy storage system includes the following products:

Product Type	Product Information	Description
Inverter	GW3K-EHA-G20 GW3.6K-EHA-G20 GW5K-EHA-G20 GW6K-EHA-G20 GW8K-EHA-G20 GW9.999K-EHA-G20 GW10K-EHA-G20 GW3K-BHA-G20 GW3.6K-BHA-G20 GW5K-BHA-G20 GW6K-BHA-G20 GW8K-BHA-G20 GW9.999K-BHA-G20 GW10K-BHA-G20	Rated output power: 3 kW–10 kW

Product Type	Product Information	Description
Battery System	GW5.1-BAT-D-G20	Rated energy: 5.12 kWh
	GW5.1-BAT-D-G21	
	GW8.3-BAT-D-G20	Rated energy: 8.32 kWh
	GW8.3-BAT-D-G21	
	GW6.0-BAT-D-G20	Rated energy: 6 kWh
	GW9.0-BAT-D-G20	Rated energy: 9 kWh
Static Transfer Switch (STS)	GW30K-STS-G10	Rated output power: 30 kW (grid side)
	GW60K-STS-G10	Rated output power: 60 kW (grid side)
Meter	GMK110	A monitoring module in the energy storage system that measures operating voltage, current, and other system data
	GM330	
	GMK330	
Communication Module	WiFi/LAN Kit-20	System operating data can be uploaded to the monitoring platform via Wi-Fi or LAN.
	4G Kit-CN-G20 (China only)	System operating data can be uploaded to the monitoring platform via 4G.
	4G Kit-G20	System operating data can be uploaded to the monitoring platform via 4G.

Symbol Definitions

⚠Danger
Indicates a highly potential hazard that, if not avoided, will result in death or serious injury.
⚠Warning

Indicates a moderately potential hazard that, if not avoided, may result in death or serious injury.
⚠Caution
Indicates a low potential hazard that, if not avoided, may result in minor or moderate injury.
Note
Emphasis and supplement to the content. It may also provide tips or tricks for optimal use of the product, helping you solve a problem or save your time.

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1 Safety Precautions

Please always follow the safety precautions contained in this document when operating the equipment.

⚠Warning
The equipment has been designed strictly in accordance with safety regulations and has passed testing. However, as electrical equipment, relevant safety instructions must be followed before performing any operation on the equipment. Improper operation may lead to serious injury or property damage.

1.1 General Safety

NOTICE

- This document is updated periodically due to product version upgrades or other reasons. Unless otherwise agreed, the content of this document does not replace the safety precautions on product labels. All descriptions in this document are provided for guidance only.
- Read this document carefully before installing the equipment to learn about the product and the precautions.
- All work on the equipment must be performed by qualified electrical technicians who are familiar with the applicable standards and safety regulations in the project location.
- When operating the equipment, use insulated tools and wear personal protective equipment to ensure personal safety. When handling electronic components, wear anti-static gloves, an anti-static wrist strap, anti-static clothing, and other protective equipment to prevent electrostatic discharge damage to the equipment.
- Unauthorized disassembly or modification may damage the equipment; such damage is not covered by the warranty.
- The equipment manufacturer shall not be liable for equipment damage or personal injury resulting from failure to install, use, or configure the equipment in accordance with this document or the corresponding user manual.
- For more information about product warranties, please visit the official website:https://www.goodwe.com/warrantyrelated.html。

1.2 Personnel Requirements

Note

To ensure the safety, compliance, and efficiency of the entire process of equipment transportation, installation, wiring, operation, and maintenance, operations must be carried out by professional or qualified personnel.

1. Professional or qualified personnel include:
   - Personnel who have mastered the working principles, system structure, risk and hazard related knowledge of the equipment, and have received professional operation training or have extensive practical experience.
   - Personnel who have received relevant technical and safety training, have certain operational experience, are able to be aware of the dangers that specific operations may pose to themselves, and are able to take protective measures to minimize risks to themselves and others.
   - Qualified electrical technicians who meet the regulatory requirements of the country/region where the project is located.
   - Possess a degree in electrical engineering / advanced diploma in electrical discipline or equivalent / professional qualifications in the electrical field, and have at least 2/3/4 years of experience in testing and supervising work using electrical equipment safety standards.
2. Personnel involved in special tasks such as electrical work, work at heights, and special equipment operation must hold valid qualification certificates required by the location where the equipment is installed.
3. Medium-voltage equipment operations must be performed by certified high-voltage electricians.
4. Replacement of equipment and parts shall only be performed by authorized personnel.

1.3 System Safety

DANGER

- Before making electrical connections, disconnect all upstream switches and ensure that the equipment is de-energized. Never work on energized equipment, as this may cause electric shock or other hazards.
- For equipment that supports PV string connections, the PV input terminals have a low withstand capability against surge current. Never power up the equipment by directly connecting a DC voltage source to the PV terminals. If power-up via the PV terminals is required, follow the steps below. Damage to the equipment caused by improper operation is considered user-caused damage and is not covered by the product warranty.
  1. First, limit the output current of the DC voltage source to within the maximum input current permitted at the PV port.
  2. Then close the inverter DC Switch.
  3. Finally, slowly increase the DC source output voltage from zero to the target value at a rate of ≤50 V/s.
- To prevent personal injury or equipment damage caused by working on energized equipment, a circuit breaker must be installed on the equipment's voltage input side.
- All activities, including transportation, storage, installation, operation, use, and maintenance, must comply with applicable laws, regulations, standards, and codes.
- The specifications of cables and components used for electrical connections must comply with local laws, regulations, standards, and codes.
- Use the cable connectors supplied with the equipment to connect its cables. If connectors of other models are used, the equipment manufacturer is not responsible for any resulting equipment damage.
- Ensure that all equipment cables are connected correctly and securely, with no looseness. Improper wiring may result in poor contact or equipment damage.
- The equipment protective earth conductor must be securely connected.
- To protect the equipment and its components from damage during transport, ensure that transport personnel are professionally trained. Record the handling procedures during transport and keep the equipment balanced to prevent it from falling.
- The equipment is heavy. Assign an appropriate number of personnel according to its weight to avoid exceeding safe lifting limits and causing injury.
- Ensure that the equipment is placed securely and is not tilted. If the equipment tips over, it may be damaged and cause personal injury.

⚠WARNING

- During equipment installation, do not place any load on the terminals, as this may damage them.
- Avoid subjecting cables to excessive tension, as this may result in poor connections. Leave an appropriate length of cable when wiring to ensure that the cables are not taut.
- Secure and support the cables properly to prevent their weight, tension, bending force, torsion, or other external mechanical stress from acting on terminals or connectors over an extended period.
- Ensure that the protective earth conductor is reliably connected and has adequate slack. In the event of external mechanical stress, such as accidental pulling, ensure that the protective earth conductor does not disconnect before the other conductors.
- Bundle cables of the same type together. Route different types of cables at least 30 mm apart. Do not intertwine or cross them.
- Using cables in high-temperature environments may cause their insulation to age or become damaged. Keep cables at least 30 mm away from heating components or the perimeter of heat source areas.

1.3.1 PV String Safety

⚠Warning

- Ensure that the module frame and mounting system are properly grounded.
- After completing DC cable connections, ensure that the cable connections are tight and free of looseness. Improper wiring may cause poor contact or high impedance and damage the inverter.
- Use a multimeter to measure the positive and negative poles of the DC cables to ensure that the polarity is correct, with no reverse connection, and that the voltage is within the allowable range.
- Use a multimeter to measure the DC cables, ensure that the positive and negative poles are correct and no reverse connection occurs. The voltage should be lower than the maximum DC input voltage. Damage caused by reverse connection and Overvoltage is not within the responsibility of the equipment manufacturer.
- PV string output does not support grounding. Before connecting the PV string to the inverter, ensure that the minimum insulation resistance of the PV string to ground meets the minimum insulation impedance requirement (R = Max. Input Voltage (V) / 30 mA).
- Do not connect the same PV string to multiple inverters; otherwise, the inverter may be damaged.
- The PV modules used with the inverter must comply with IEC 61730 Class A standard.
- When the PV string input voltage or input current is high, the inverter output power may be derated.

1.3.2 Inverter Safety

⚠WARNING

- Ensure that the voltage and frequency at the grid connection point comply with the inverter's grid connection specifications.
- It is recommended to install protective devices, such as a circuit breaker or fuse, on the inverter AC side. The protective device rating must be greater than 1.25 times the inverter's maximum AC output current.
- If the inverter triggers an arc-fault alarm fewer than 5 times within 24 hours, the alarm can be cleared automatically. After the fifth arc-fault alarm, the inverter shuts down for protection. The fault must be cleared before the inverter can operate normally.
- If no battery is configured in the PV system, use of the BACK-UP function is not recommended, as it may cause a system power outage.
- Changes in grid voltage and frequency may cause the inverter to derate its output power.

1.3.3 Battery Safety

⚠Danger

- Before operating any equipment in the system, ensure that the equipment is powered off to avoid electric shock. During operation, strictly comply with all safety precautions in this manual and the safety labels on the equipment.
- Do not disassemble, modify, or repair the battery without official authorization from the equipment manufacturer. Otherwise, there may be a risk of electric shock or damage to the equipment. Any losses incurred as a result are not within the responsibility scope of the equipment manufacturer.
- Do not strike, pull, drag, squeeze, or step on the equipment, and do not place the battery in fire; otherwise, there is a risk of explosion.
- Do not place the battery in a high-temperature environment. Ensure that there are no heat sources near the battery and that it is not exposed to direct sunlight. If the ambient temperature exceeds 60°C, a fire may occur.
- If the battery has obvious defects, cracks, damage, or other issues, do not use it. A damaged battery may cause electrolyte leakage.
- Do not move the battery system while the battery is operating. If the battery needs to be replaced or added, contact the after-sales service center.
- Battery Short Circuit may cause personal injury. The instantaneous high current caused by a short circuit can release a large amount of energy and may cause a fire.
- For the Protection of the Battery BANK and its components from damage during transportation, please ensure that transportation personnel have received professional training. Record operational procedures during transportation and keep the equipment balanced to prevent the equipment from falling.
- The battery equipment is heavy. Please allocate personnel according to the equipment Weight to avoid the equipment exceeding the Weight range that can be carried by personnel, causing injury.

⚠Warning

- Battery Current may be affected by certain factors, such as temperature, humidity, and weather conditions, which may result in battery current limiting and affect the load capacity.
- If the battery fails to start, contact the after-sales service center as soon as possible. Otherwise, the battery may be permanently damaged.
- Perform regular inspection and maintenance on the battery according to the battery maintenance requirements.
- Ensure the battery system is not damaged during transportation and storage. Ensure the equipment is placed stably and must not be tilted; tipping over may cause equipment damage and personal injury.

Emergency Response Measures

- Battery Electrolyte Leakage
  If the battery module leaks electrolyte, avoid contact with the leaked liquid or gas. Electrolyte is corrosive and contact may cause skin irritation and chemical burns. If you accidentally come into contact with leaked substances, take the following actions:
  - Inhalation: Evacuate from the contaminated area and seek medical help immediately.
  - Eye contact: Rinse with clean water for at least 15 minutes and seek medical help immediately.
  - Skin contact: Thoroughly wash the affected area with soap and water, and seek medical help immediately.
  - Ingestion: Induce vomiting and seek medical help immediately.
- Fire
  - When the battery temperature exceeds 150°C, there is a risk of fire. A battery fire may release toxic and hazardous gases.
  - To avoid fire, ensure that a carbon dioxide or water fire extinguisher is available near the equipment.
  - When extinguishing a fire, do not use ABC dry powder fire extinguishers. Firefighters must wear protective clothing and self-contained breathing apparatus.
- Battery Fire Protection Activation
  For batteries with the optional fire protection function, after the fire protection function is triggered, perform the following operations:
  - Immediately turn off the main power switch to ensure that no current flows

through the battery system.
- Perform a preliminary visual inspection of the battery for damage, deformation, leakage, or odor. Inspect the battery casing, connectors, and cables.
- Use a temperature sensor to check the battery and its ambient temperature to ensure there is no risk of overheating.
- Isolate and mark the damaged battery, and dispose of it properly in accordance with local regulations.

1.3.4 Meter Safety

⚠Warning

If the grid voltage fluctuates above 265V, long-term overvoltage operation may cause damage to the meter. It is recommended to add a fuse with a Rated Current of 0.5A on the voltage input side of the meter to provide Protection for the meter.

1.4 Description of Safety Symbols and Certification Marks

⚠DANGER

- After the equipment is installed, labels and warning signs on the enclosure must remain clearly visible. Do not cover, alter, or damage them.
- The following descriptions of enclosure warning labels are for reference only. Refer to the labels actually affixed to the equipment.

No.	Symbol	Meaning
1		Potential hazards are present while the equipment is operating. Take appropriate precautions when operating the equipment.

No.	Symbol	Meaning
2		High-voltage hazard. High voltage is present while the equipment is operating. Ensure that the equipment is de-energized before working on it.
3		The inverter surface becomes hot. Do not touch it while the equipment is operating, as this may cause burns.
4		Use the equipment properly. In extreme conditions, the equipment may pose an explosion risk.
5		The battery contains flammable materials. Beware of fire.
6		The equipment contains corrosive electrolyte. Avoid contact with leaked electrolyte or vapors.
7		Delayed discharge. After de-energizing the equipment, wait 5 minutes for it to fully discharge.
8		Keep the equipment away from open flames and sources of ignition.
9		Keep the equipment out of reach of children.
10		Do not extinguish with water.
11		Do not lift the equipment after the battery system has been wired or while it is operating.

No.	Symbol	Meaning
12		Do not disassemble
13		Read the product manual carefully before operating the equipment.
14		Do not disconnect or plug in/unplug the DC terminals while the equipment is operating.
15		Wear personal protective equipment during installation, operation, and maintenance.
16	 	Do not dispose of the equipment as household waste. Dispose of it in accordance with local laws and regulations, or return it to the equipment manufacturer.
17		Protective earth conductor connection point.
18		Recycling symbol.
19		CE Certification mark.
20		TÜV mark.

No.	Symbol	Meaning
21		RCM mark.

1.5 EU Declaration of Conformity

1.5.1 Devices with Wireless Communication Function

Equipment with wireless communication functions that can be sold in the European market meets the requirements of the following directives:

- Radio Equipment Directive 2014/53/EU (RED)
- Restrictions of Hazardous Substances Directive 2011/65/EU and (EU) 2015/863 (RoHS)
- Waste Electrical and Electronic Equipment 2012/19/EU
- Registration, Evaluation, Authorization and Restriction of Chemicals (EC) No 1907/2006 (REACH)

1.5.2 Devices without Wireless Communication Function (except Batteries)

Devices without wireless communication functions that can be sold on the European market meet the following directive requirements:

- Electromagnetic compatibility Directive 2014/30/EU (EMC)
- Electrical Apparatus Low Voltage Directive 2014/35/EU (LVD)
- Restrictions of Hazardous Substances Directive 2011/65/EU and (EU) 2015/863 (RoHS)
- Waste Electrical and Electronic Equipment 2012/19/EU
- Registration, Evaluation, Authorization and Restriction of Chemicals (EC) No 1907/2006 (REACH)

1.5.3 Battery

Batteries that can be sold on the European market meet the following directive requirements:

- Electromagnetic compatibility Directive 2014/30/EU (EMC)
- Electrical Apparatus Low Voltage Directive 2014/35/EU (LVD)
- Restrictions of Hazardous Substances Directive 2011/65/EU and (EU) 2015/863 (RoHS)*1
- Regulation (EU) 2023/1542 Article 12 - Safety of stationary battery energy storage systems
- Regulation (EU) 2023/1542 Article 10 - Performance and durability requirements for rechargeable industrial batteries, LMT batteries and electric vehicle batteries
- Regulation (EU) 2023/1542 Article 14 - Information on the state of health and expected lifetime of batteries
- Waste Electrical and Electronic Equipment 2012/19/EU
- Registration, Evaluation, Authorization and Restriction of Chemicals (EC) No 1907/2006 (REACH)
  *1: Our battery products meet the hazardous substance limit requirements stipulated in this regulation.

More EU Declarations of Conformity can be obtained from theofficial website.

2 System Introduction

2.1 System Overview

The all-in-one residential energy storage solution integrates inverters, batteries, smart meters, smart communication sticks, and other devices. In a photovoltaic system, it converts solar energy into electrical energy to meet household electricity needs. The energy IoT devices in the system manage electrical equipment by identifying the overall power conditions in the system, thereby intelligently managing electricity for load supply, battery storage, or grid output.

⚠Warning

- The energy storage system is not suitable for use with devices that require a stable power supply, such as life-sustaining medical equipment. Please ensure that when the system is powered off,it will not cause personal injury.
- If the all-in-one residential energy storage unit is in a high-temperature or BMS current-limiting condition, the battery charging power may be limited, resulting in excessive system voltage and triggering overvoltage Protection.
- In the Microgrid Scenario, the PV open-circuit voltage of the all-in-one residential energy storage unit is recommended to be <500V to avoid overvoltage Protection triggered by excessive system voltage under harsh operating conditions.
- If output power limiting is required for the grid-connected inverter, please connect a meter, CT, or other devices separately.
- In a system where the inverter operates fully off-grid, if the battery is under low sunlight or rainy weather for a long time and is not recharged in time, over-discharge may occur, resulting in battery performance degradation or damage. To ensure long-term stable operation of the system, avoid fully discharging the battery. Recommended measures are as follows:
  1. When operating off-grid, set the minimum SOC Protection threshold. It is recommended to set the off-grid battery SOC lower limit to 30%.
  2. When SOC approaches the Protection threshold, the system will automatically enter load-limiting or Protection mode.
  3. If there is insufficient sunlight for several consecutive days and the battery SOC is too low, the battery should be replenished promptly through external

⚠Warning

energy sources (such as generator or grid-assisted charging).

4. Regularly check the battery status to ensure it remains within the safe operating range.
5. It is recommended to fully charge and discharge the battery once every six months to calibrate SOC accuracy.

- Please connect the inverter to the APP and complete the corresponding settings for the battery parameters.
- Due to product version upgrades or other reasons, the document content will be updated from time to time. For the matching relationship between inverters and IoT products, refer to:https://en.goodwe.com/Ftp/EN/Downloads/User%20Manual/GW_Compatibility-list-of-GoodWe-inverters-and-IoT-products-EN.pdf
- For detailed networking and wiring solutions for each scenario, please refer to:5.3.System Wiring Detail Diagram(Page 116).

Note

- Whole-house backup power scenario: When the grid is interrupted, the energy storage system can seamlessly take over all loads, achieving continuous and stable power supply for the entire house, ensuring that all electrical equipment is unaffected by grid fluctuations.
- When using an STS VERSION inverter in a whole-house backup scenario, there is no need to connect an additional meter or CT. Simply set 'Meter Type' to 'Built-in CT, no external meter, no CT' in the App to implement the Power Limit function.

When the energy storage system is off-grid, the following loads can be powered normally:

Off-grid Load Capacity Description		
Inverter Model	ESA 3-6kW	ESA 8-10kW
Rated Power of a single inductive load (kVA)	2.2	2.2

Off-grid Load Capacity Description		
Total Rated Power of multiple inductive loads (kVA)	2.2	3.7
Capacitive Load (kVA)	0.33*Pn	0.33*Pn

Note:

- Pn: Rated output power of the inverter.
- For 2 or more units in parallel, the allowable total inductive load Rated Power = Rated Power of a single inductive load * number of parallel units * 80%.

Note

If you need to use a static transfer switch cabinet (STS), please ensure the following:

1. When non-critical loads are connected to the SMART-PORT port, the maximum total load capacity for the SMART-PORT and BACK-UP ports is as follows:
   - GW30K-STS-G10≤30kVA
   - GW60K-STS-G10≤60kVA
     To ensure that loads connected to the BACK-UP port can be continuously powered during a Grid Power Outage, it is recommended that the total power of SMART-PORT + BACK-UP loads does not exceed the rated output power of the energy storage system.

2.1.1 General Application

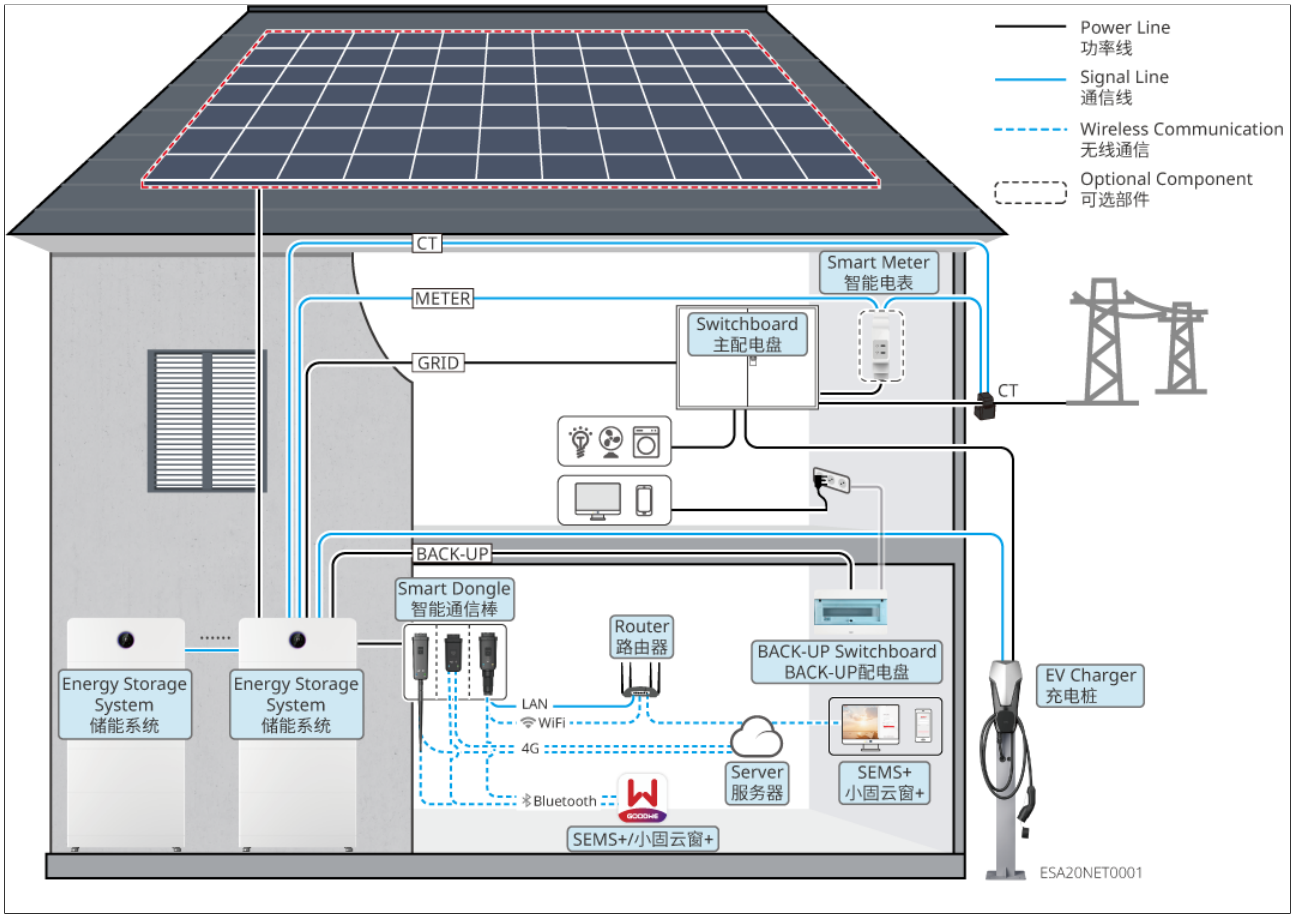


Figure1 General Scenario 1

With static transfer switch cabinet (STS)

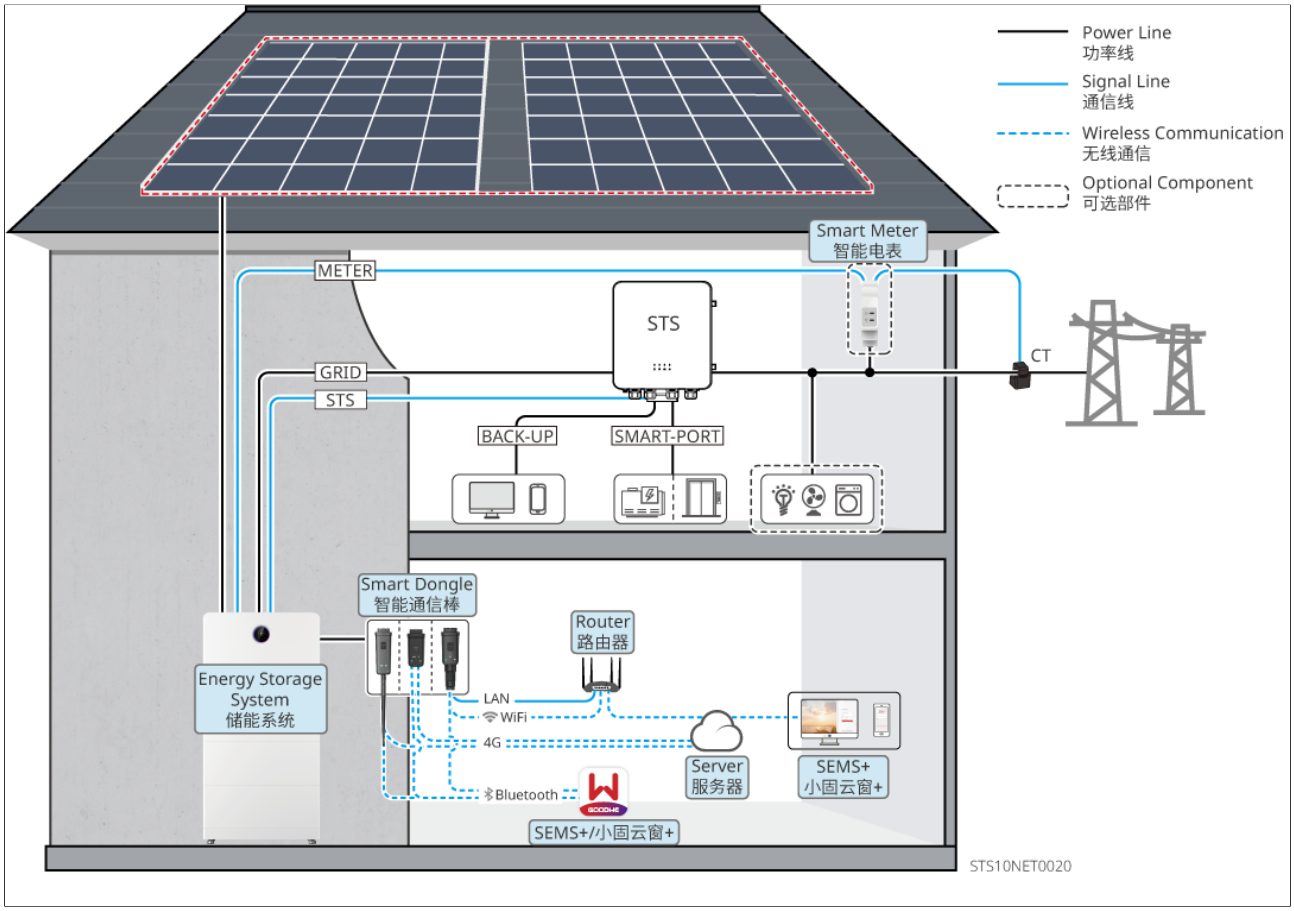


Figure2 General Scenario 2: With STS

Device Type	Model	Description
Energy storage inverter	GW3K-EHA-G20 GW3.6K-EHA-G20 GW5K-EHA-G20 GW6K-EHA-G20 GW8K-EHA-G20 GW9.999K-EHA-G20 GW10K-EHA-G20 GW3K-BHA-G20 GW3.6K-BHA-G20 GW5K-BHA-G20 GW6K-BHA-G20 GW8K-BHA-G20 GW9.999K-BHA-G20 GW10K-BHA-G20	• Can be connected to GoodWe AC EV chargers. • Only STS VERSION inverters support connection to a static transfer switch cabinet (STS). • The system supports up to 10 inverters in a parallel system, and supports parallel operation of inverters with different power ratings in On/Off-grid modes. If the number of parallel-connected inverters exceeds 6, contact the after-sales service center. • In a parallel system, when GW3K/3.6K/5K/6K models are paralleled with GW8K/9.999K/10K models, set the GW8K/9.999K/10K model as the master inverter. • To connect a generator or configure Parallel Networking, use a GMK110, GM330, or GMK330 smart meter. If more than two inverters are connected in parallel, use a GM330 smart meter. • Each inverter in a parallel system must be equipped with a WiFi/LAN Kit-20, with software version V2.5 or later. • When networking the system, ensure that the following version requirements are met: ◦ The inverter ARM software version must be 05.133 or later. ◦ The inverter DSP software version must be 06.6028 or later.

Device Type	Model	Description
Battery System	GW5.1-BAT-D-G20 GW5.1-BAT-D-G21 GW8.3-BAT-D-G20 GW8.3-BAT-D-G21 GW6.0-BAT-D-G20 GW9.0-BAT-D-G20	• Battery modules of different models can be used together. • The system supports5-108kWh, accommodating different power and energy configurations. • The battery heating film is optional. The "Battery Heating" function can only be enabled on models equipped with a heating film. Do not use batteries without a heating film in low-temperature environments, as this may prevent the equipment from operating. • GW5.1-BAT-D-G20, GW8.3-BAT-D-G20, GW6.0-BAT-D-G20, GW9.0-BAT-D-G20, GW5.1-BAT-D-G21, and GW8.3-BAT-D-G21 can be used together in parallel. When used with certain models that are not equipped with a heating film, the battery heating function is unavailable. • If the system requires mixed battery models and split-type capacity expansion, ensure that the BMS software version is V06 or later and the DCDC version is V06 or later.
Static transfer switch cabinet (STS)	GW30K-STS-G10 GW60K-STS-G10	• Optional. Contact GoodWe to purchase if required. • Supports connection of 1 energy storage inverter, a diesel generator, loads, and the grid.
Smart Meter	Built-in meter (shipped with the inverter)	

Device Type	Model	Description
	GMK110 (purchased from GoodWe) GM330 (purchased from GoodWe) GMK330(purchased from GoodWe)	• Built-in meter: Use the CT supplied with the inverter. ◦ CT ratio: 120 A:40 mA. ◦ If the inverter's built-in meter does not meet your requirements, contact your distributor or other supplier to purchase a GMK110, GM330, or GMK330 smart meter. • GMK110: CT replacement is not supported; CT ratio: 120 A:40 mA • GM330: CTs can be purchased from GoodWe or sourced independently; CT ratio: n A:5 A. • GMK330: CT replacement is not supported; CT ratio: 120 A:40 mA • If more than 2 inverters are connected in parallel, or if the conductor size or current range of the supplied CT does not meet the total current requirements of the parallel system at the site, use a GM330 smart meter.
Smart communication stick	WiFi/LAN Kit-20	• Applicable to standalone and parallel inverter networking scenarios. • Use Bluetooth to configure device parameters and view device operating information locally; use WiFi or LAN to upload system operating information to the monitoring platform. • To use features such as one-click upgrades and operation log export on the inverter, ensure that the WiFi/LAN Kit-20 software version is V2.3 or later.

Device Type	Model	Description
	4G Kit-CN-G20 (China only)	• Applicable to standalone and parallel inverter networking scenarios. • Use Bluetooth to configure device parameters and view device operating information locally; use 4G to upload system operating information to the monitoring platform. • To use features such as one-click upgrades and operation log export on the inverter, ensure that the 4G Kit-CN-G20 version is 05 or later. • To use the 4G Kit-CN-G20 for Parallel Networking, ensure that the smart communication stick is V8.8.76 or later.
	4G Kit-G20	• Applicable to standalone and parallel inverter networking scenarios. • Use Bluetooth to configure device parameters and view device operating information locally; use 4G to upload system operating information to the monitoring platform. • To use the 4G Kit-G20 for Parallel Networking, ensure that the smart communication stick is V9.3.14 or later.

2.1.2 Microgrid Scenario

When a grid-tied inverter is connected to the BACK-UP port of an energy storage inverter, this is a Microgrid Scenario.

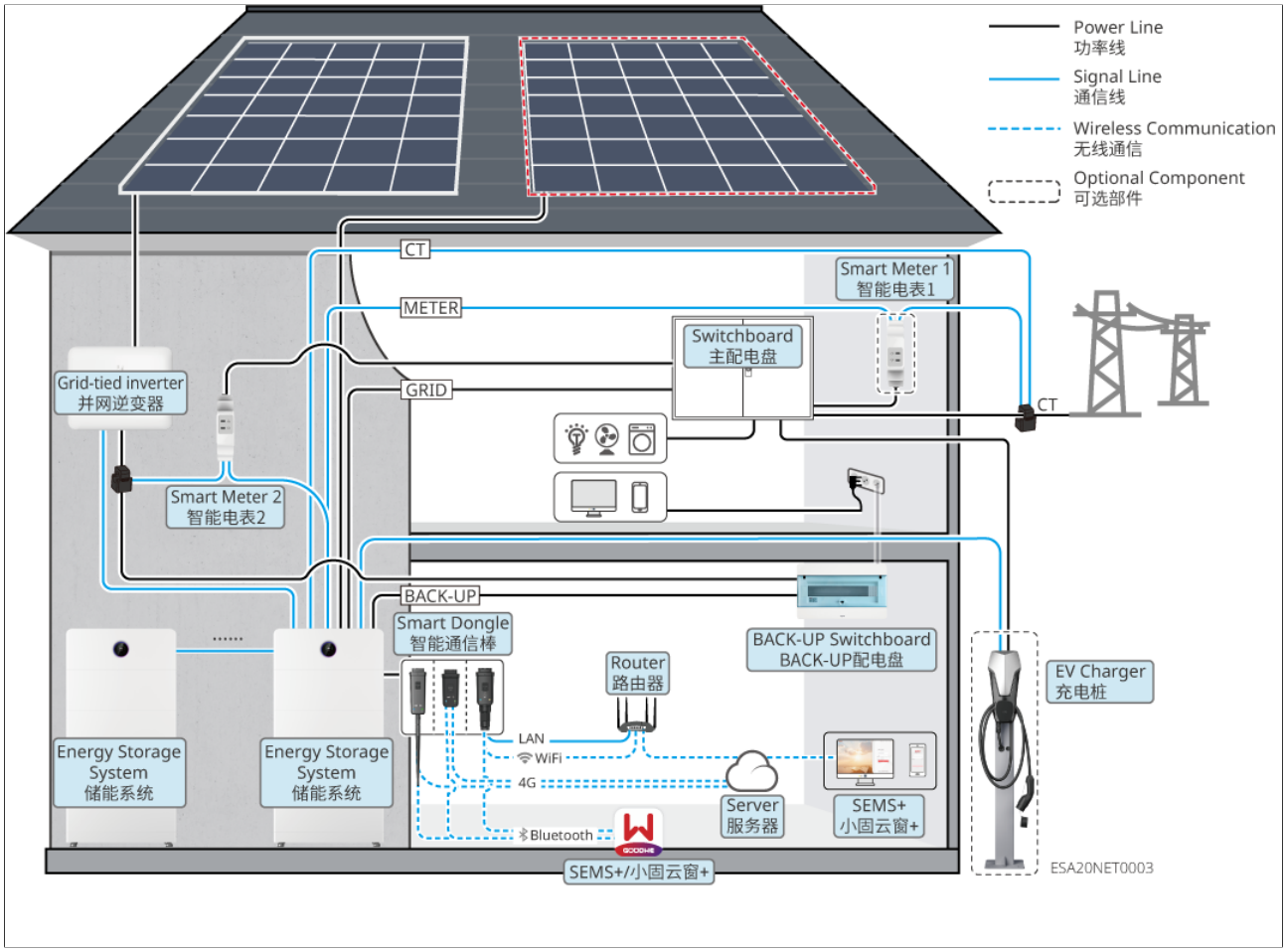


Figure3 Microgrid Scenario 1

With a static transfer switch cabinet (STS)

When a grid-tied inverter is connected to the SMART-PORT of a static transfer switch cabinet (STS), this is a Microgrid Scenario.

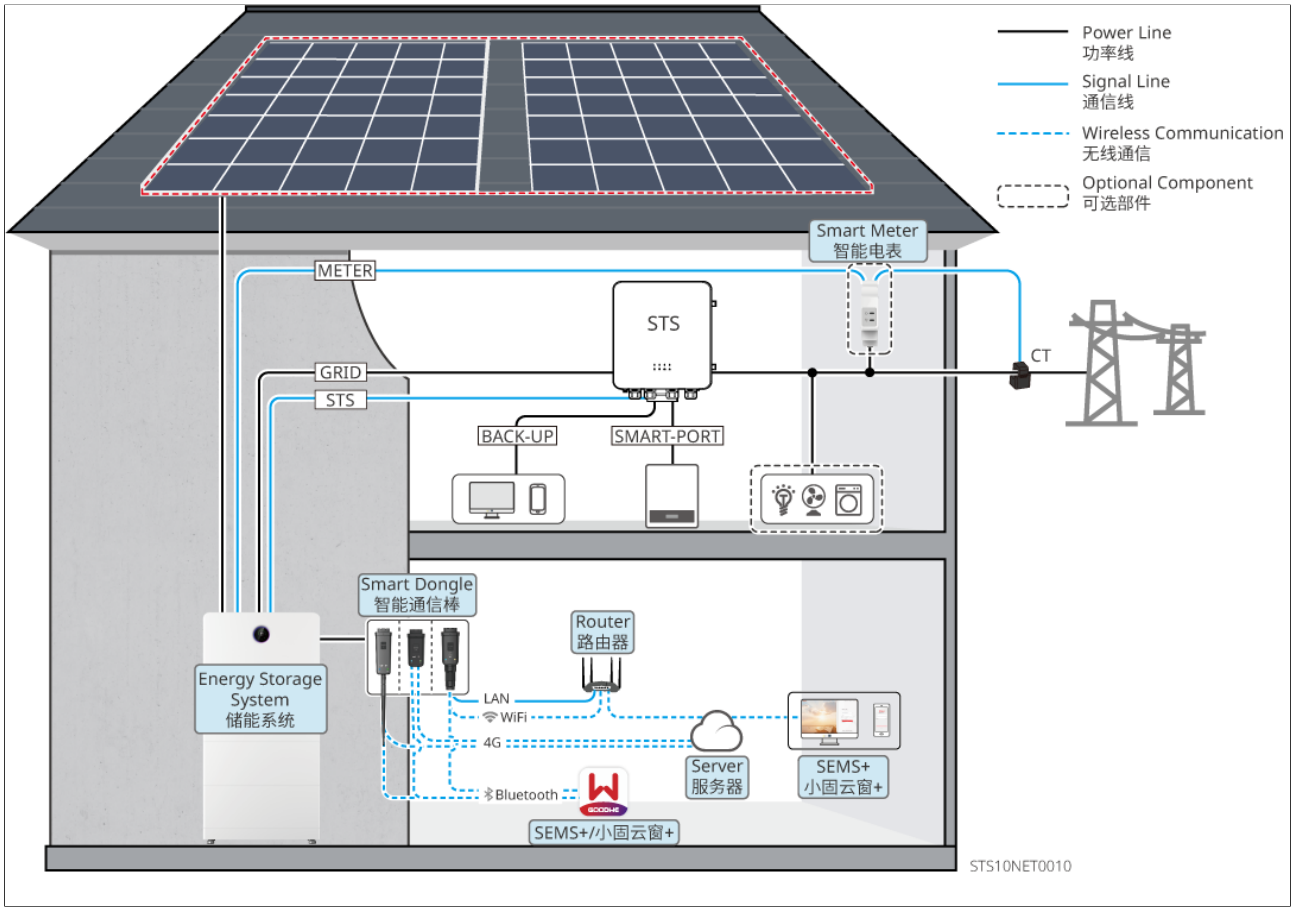


Figure4 Microgrid Scenario 2: With STS

Device Type	Model	Description
Energy storage inverter	GW3K-EHA-G20 GW3.6K-EHA-G20 GW5K-EHA-G20 GW6K-EHA-G20 GW8K-EHA-G20 GW9.999K-EHA-G20 GW10K-EHA-G20 GW3K-BHA-G20 GW3.6K-BHA-G20 GW5K-BHA-G20 GW6K-BHA-G20 GW8K-BHA-G20 GW9.999K-BHA-G20 GW10K-BHA-G20	• Can be connected to GoodWe AC EV chargers. • Generators cannot be connected in a Microgrid Scenario. • Only STS VERSION inverters support connection to a static transfer switch cabinet (STS). • The system supports up to 10 inverters in a parallel system, and supports parallel operation of inverters with different power ratings in On/Off-grid modes. If the number of parallel-connected inverters exceeds 6, contact the after-sales service center. • In a parallel system, if GW3K/3.6K/5K/6K models are paralleled with GW8K/9.999K/10K models, set the GW8K/9.999K/10K model as the master inverter. • To connect a generator or configure Parallel Networking, use a GMK110, GM330, or GMK330 smart meter. If more than two inverters are connected in parallel, use a GM330 smart meter. • Each inverter in a parallel system must be equipped with a WiFi/LAN Kit-20, with software version V2.5 or later. • When networking the system, ensure that the following version requirements are met: ◦ The inverter ARM software version must be 05.133 or later. ◦ The inverter DSP software version must be 06.6028 or later.

Device Type	Model	Description
Battery System	GW5.1-BAT-D-G20 GW5.1-BAT-D-G21 GW8.3-BAT-D-G20 GW8.3-BAT-D-G21 GW6.0-BAT-D-G20 GW9.0-BAT-D-G20	• Battery modules of different models can be used together. • The system supports5-108kWh, accommodating different power and energy configurations. • The battery heating film is optional. The "Battery Heating" function can only be enabled on models equipped with a heating film. Do not use batteries without a heating film in low-temperature environments, as this may prevent the equipment from operating. • GW5.1-BAT-D-G20, GW8.3-BAT-D-G20, GW6.0-BAT-D-G20, GW9.0-BAT-D-G20, GW5.1-BAT-D-G21, and GW8.3-BAT-D-G21 can be used together in parallel. When used with certain models that are not equipped with a heating film, the battery heating function is unavailable. • If the system requires mixed battery models and split-type capacity expansion, ensure that the BMS software version is V06 or later and the DCDC version is V06 or later.
Static transfer switch cabinet (STS)	GW30K-STS-G10 GW60K-STS-G10	• Optional. Contact GoodWe to purchase if required. • Supports connection of 1 energy storage inverter, a diesel generator, loads, and the grid.
Smart Meter	Built-in meter (shipped with the inverter)	
	GMK110 (purchased from GoodWe)	
	GM330 (purchased from GoodWe)	

Device Type	Model	Description
	GMK330(purchased from GoodWe)	• Built-in meter: Use the CT supplied with the inverter. ◦ CT ratio: 120 A:40 mA. ◦ If the inverter's built-in meter does not meet your requirements, contact your distributor or other supplier to purchase a GMK110, GM330, or GMK330 smart meter. • GMK110: CT replacement is not supported; CT ratio: 120 A:40 mA • GM330: CTs can be purchased from GoodWe or sourced independently; CT ratio: n A:5 A. • GMK330: CT replacement is not supported; CT ratio: 120 A:40 mA • If more than 2 inverters are connected in parallel, or if the conductor size or current range of the supplied CT does not meet the total current requirements of the parallel system at the site, use a GM330 smart meter.
Smart communication stick	WiFi/LAN Kit-20	• Applicable to standalone and parallel inverter networking scenarios. • Use Bluetooth to configure device parameters and view device operating information locally; use WiFi or LAN to upload system operating information to the monitoring platform. • To use features such as one-click upgrades and operation log export on the inverter, ensure that the WiFi/LAN Kit-20 software version is V2.3 or later.

Device Type	Model	Description
	4G Kit-CN-G20 (China only)	• Applicable to standalone and parallel inverter networking scenarios. • Use Bluetooth to configure device parameters and view device operating information locally; use 4G to upload system operating information to the monitoring platform. • To use features such as one-click upgrades and operation log export on the inverter, ensure that the 4G Kit-CN-G20 version is 05 or later. • To use the 4G Kit-CN-G20 for Parallel Networking, ensure that the smart communication stick is V8.8.76 or later.
	4G Kit-G20	• Applicable to standalone and parallel inverter networking scenarios. • Use Bluetooth to configure device parameters and view device operating information locally; use 4G to upload system operating information to the monitoring platform. • To use the 4G Kit-G20 for Parallel Networking, ensure that the smart communication stick is V9.3.14 or later.

Device Type	Model	Description
Grid-tied inverter	• DNS G3 • MS G3 • Third-party grid-tied inverter	• GoodWe grid-tied inverters are recommended; third-party grid-tied inverters are also supported. • To use a GoodWe grid-tied inverter, connect its RS485 port to the EMS port on COM2 of the energy storage inverter (RS485-B1 and RS485-A1). Then use the app to set "AC Port Connection Settings". • In a Microgrid Scenario, ensure that the rated output power of the grid-tied inverter is ≤ the rated output power of the energy storage inverter. • When the microgrid system is grid-connected, if power limitation is required, ensure that: ◦ Configure the energy storage inverter in the grid-tied power limit screen in the app. Configure the grid-tied inverter using the tool appropriate for the actual application. ◦ To ensure that the grid-tied inverter can continue operating and generating power, adjust the output power of the energy storage inverter in the microgrid mode screen in the app. Note: The output power control accuracy varies among grid-tied inverters. Set the grid-tied power limit parameter according to the actual conditions.

2.1.3 AC-Coupled Scenario

When a grid-tied inverter is connected to the GRID port of an energy storage inverter, this is an AC-coupled scenario.

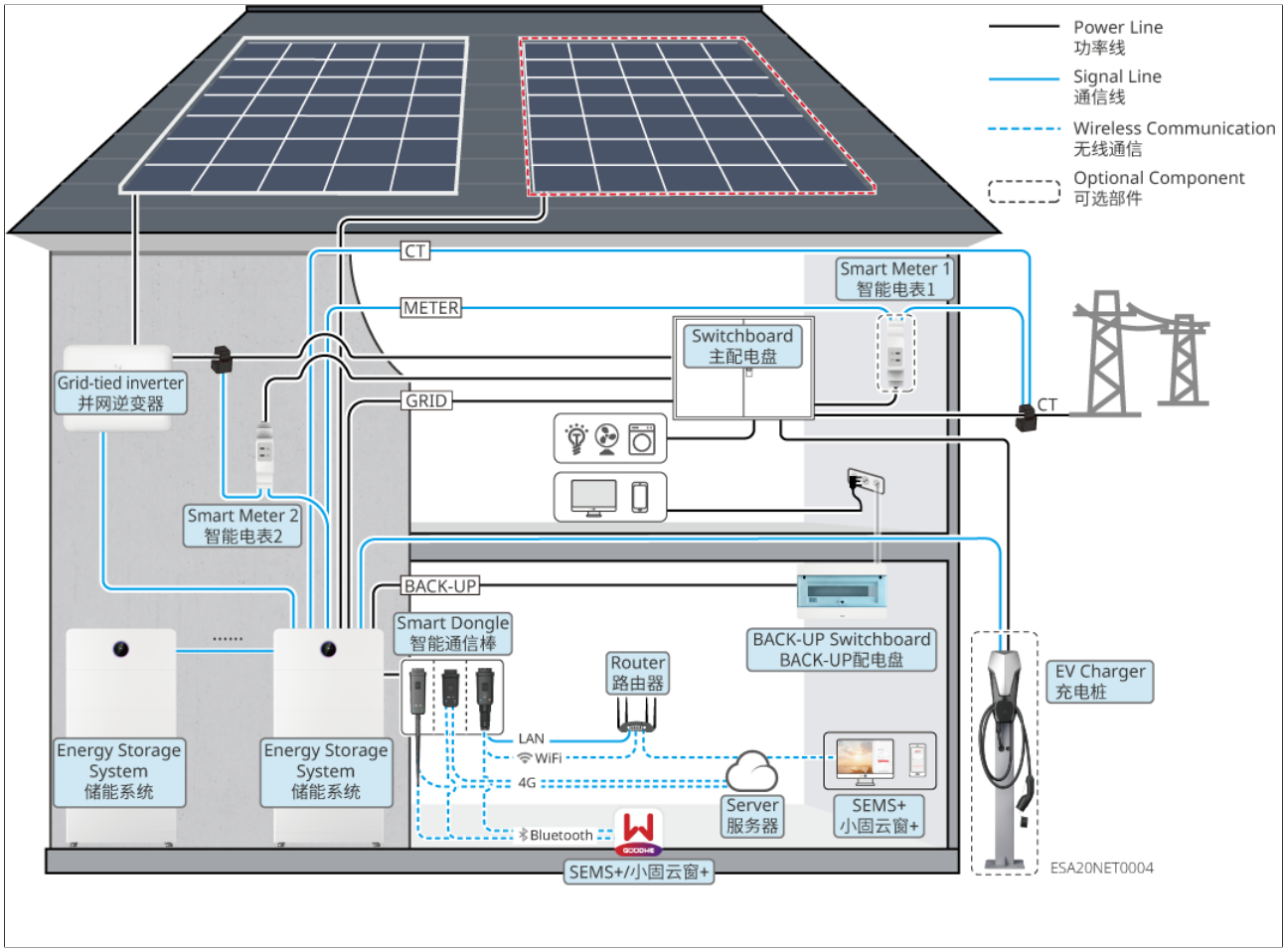


Figure5 AC-coupled scenario 1

System configuration with a static transfer switch (STS)

When a grid-tied inverter is connected to the GRID port of the static transfer switch (STS), this is a coupled configuration.

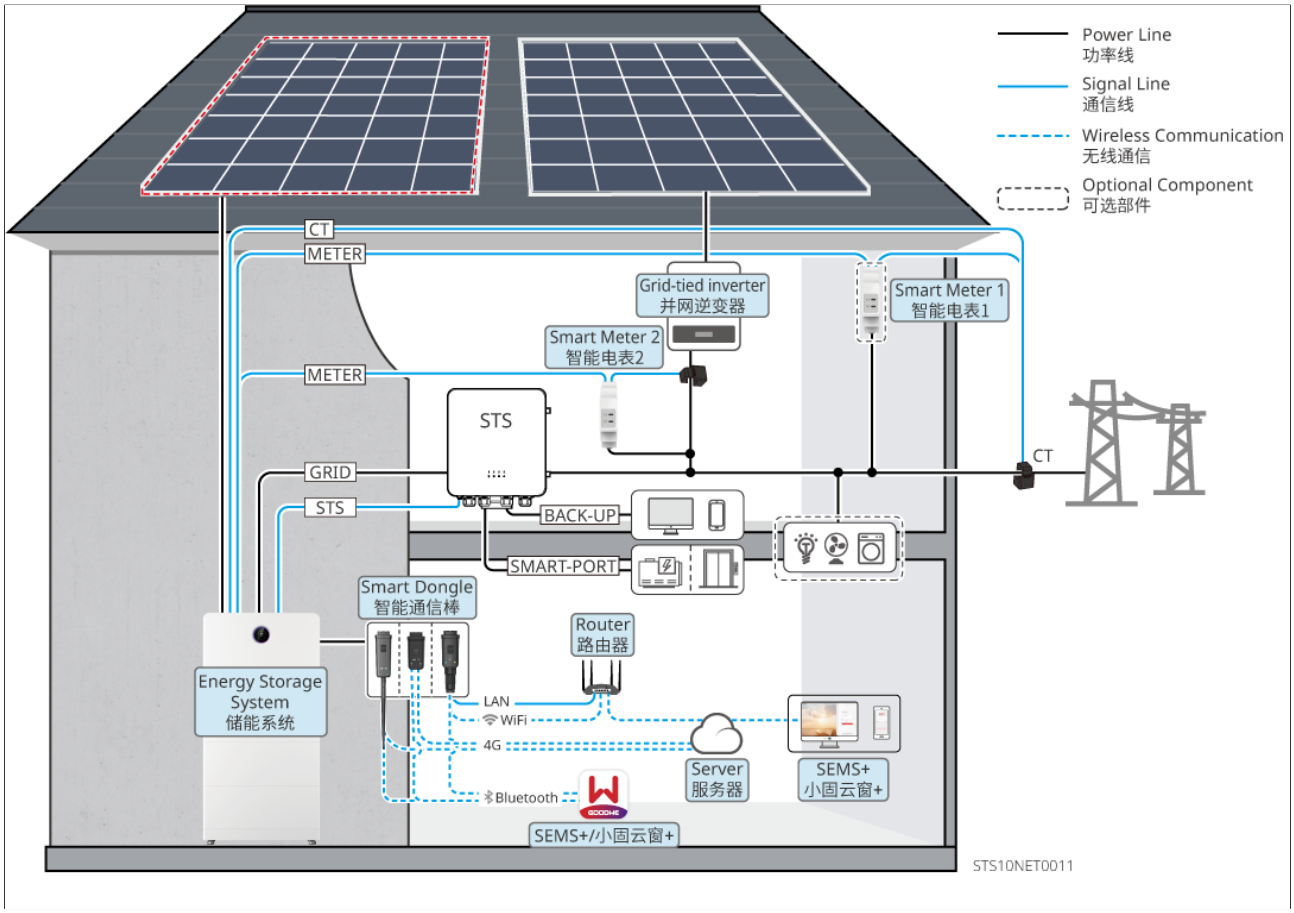


Figure6 Coupled Configuration 2: With STS

Device Type	Model	Description
Energy storage inverter	GW3K-EHA-G20 GW3.6K-EHA-G20 GW5K-EHA-G20 GW6K-EHA-G20 GW8K-EHA-G20 GW9.999K-EHA-G20 GW10K-EHA-G20 GW3K-BHA-G20 GW3.6K-BHA-G20 GW5K-BHA-G20 GW6K-BHA-G20 GW8K-BHA-G20 GW9.999K-BHA-G20 GW10K-BHA-G20	• The system supports up to 10 inverters in a parallel system, and supports parallel operation of inverters with different power ratings in On/Off-grid modes. If the number of parallel-connected inverters exceeds 6, contact the after-sales service center. • Only STS VERSION inverters support connection to a static transfer switch cabinet (STS). • In a parallel system, when GW3K/3.6K/5K/6K models are paralleled with GW8K/9.999K/10K models, set the GW8K/9.999K/10K model as the master inverter. • To connect a generator or configure Parallel Networking, use a GMK110, GM330, or GMK330 smart meter. If more than two inverters are connected in parallel, use a GM330 smart meter. • Each inverter in a parallel system must be equipped with a WiFi/LAN Kit-20, with software version V2.5 or later. • When networking the system, ensure that the following version requirements are met: ◦ The inverter ARM software version must be 05.133 or later. ◦ The inverter DSP software version must be 06.6028 or later.

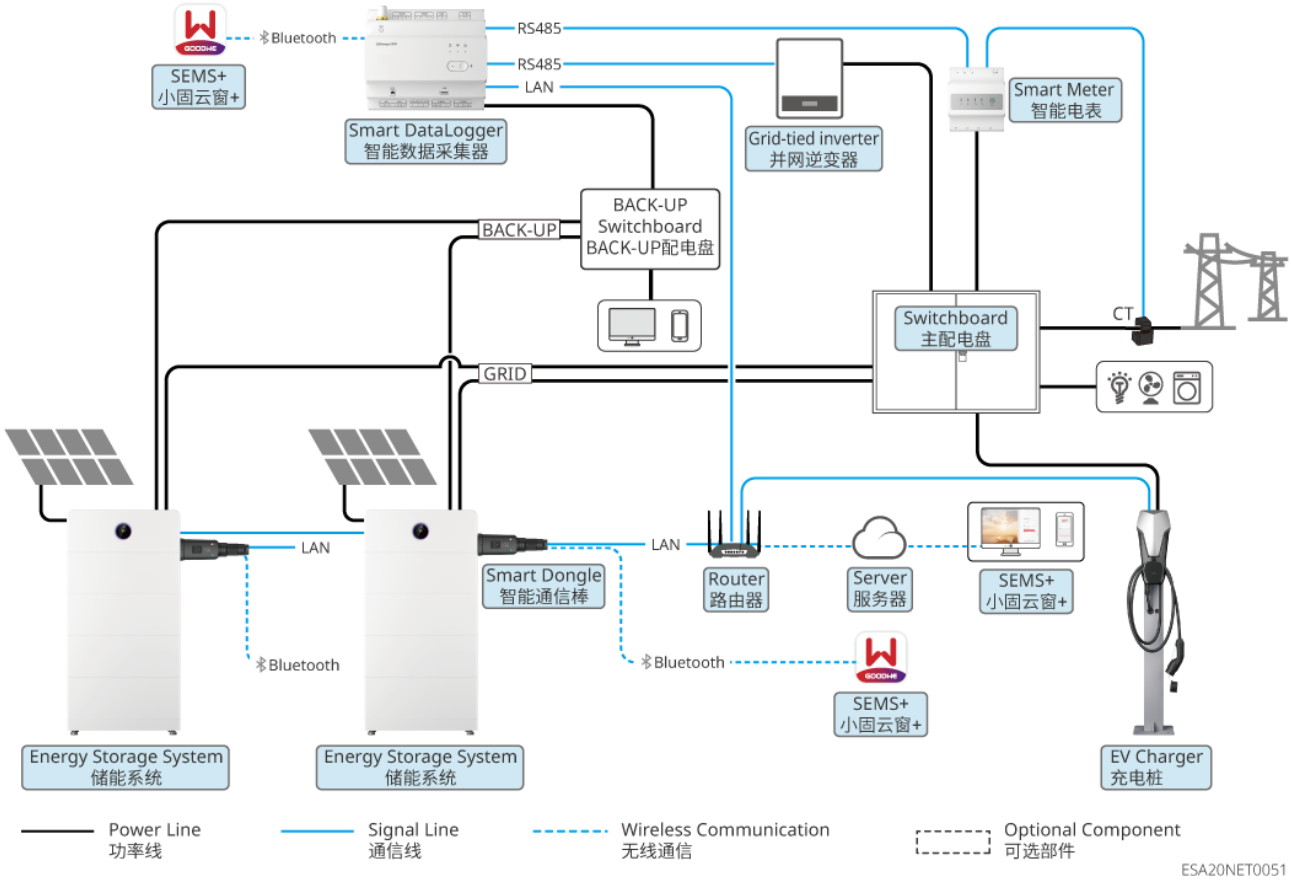
Device Type	Model	Description
Battery System	GW5.1-BAT-D-G20 GW5.1-BAT-D-G21 GW8.3-BAT-D-G20 GW8.3-BAT-D-G21 GW6.0-BAT-D-G20 GW9.0-BAT-D-G20	• Battery modules of different models can be used together. • The system supports5-108kWh, accommodating different power and energy configurations. • The battery heating film is optional. The "Battery Heating" function can only be enabled on models equipped with a heating film. Do not use batteries without a heating film in low-temperature environments, as this may prevent the equipment from operating. • GW5.1-BAT-D-G20, GW8.3-BAT-D-G20, GW6.0-BAT-D-G20, GW9.0-BAT-D-G20, GW5.1-BAT-D-G21, and GW8.3-BAT-D-G21 can be used together in parallel. When used with certain models that are not equipped with a heating film, the battery heating function is unavailable. • If the system requires mixed battery models and split-type capacity expansion, ensure that the BMS software version is V06 or later and the DCDC version is V06 or later.
Static transfer switch cabinet (STS)	GW30K-STS-G10 GW60K-STS-G10	• Optional. Contact GoodWe to purchase if required. • Supports connection of 1 energy storage inverter, a diesel generator, loads, and the grid.
Smart Meter	Built-in meter (shipped with the inverter)	

Device Type	Model	Description
	GMK110 (purchased from GoodWe)	• Built-in meter: Use the CT supplied with the inverter. ◦ CT ratio: 120 A:40 mA. ◦ If the inverter's built-in meter does not meet your requirements, contact your distributor or other supplier to purchase a GMK110, GM330, or GMK330 smart meter. • GMK110: CT replacement is not supported; CT ratio: 120 A:40 mA • GM330: CTs can be purchased from GoodWe or sourced independently; CT ratio: n A:5 A. • GMK330: The CT cannot be replaced; the CT ratio is 120 A:40 mA. • If more than 2 inverters are connected in parallel, or if the conductor size or current range of the supplied CT does not meet the total current requirements of the parallel system at the site, use a GM330 smart meter.
	GM330 (purchased from GoodWe)	
	GMK330(purchased from GoodWe)	
Smart communication stick	WiFi/LAN Kit-20	• Applicable to standalone and parallel inverter networking scenarios. • Use Bluetooth to configure device parameters and view device operating information locally; use WiFi or LAN to upload system operating information to the monitoring platform. • To use features such as one-click upgrades and operation log export on the inverter, ensure that the WiFi/LAN Kit-20 software version is V2.3 or later.

Device Type	Model	Description
	4G Kit-CN-G20 (China only)	• Applicable to standalone and parallel inverter networking scenarios. • Use Bluetooth to configure device parameters and view device operating information locally; use 4G to upload system operating information to the monitoring platform. • To use features such as one-click upgrades and operation log export on the inverter, ensure that the 4G Kit-CN-G20 version is 05 or later. • To use the 4G Kit-CN-G20 for Parallel Networking, ensure that the smart communication stick is V8.8.76 or later.
	4G Kit-G20	• Applicable to standalone and parallel inverter networking scenarios. • Use Bluetooth to configure device parameters and view device operating information locally; use 4G to upload system operating information to the monitoring platform. • To use the 4G Kit-G20 for Parallel Networking, ensure that the smart communication stick is V9.3.14 or later.

Device Type	Model	Description
Grid-tied inverter	• DNS G3 • MS G3 • Third-party grid-tied inverter	• GoodWe grid-tied inverters are recommended; third-party grid-tied inverters are also supported. • To use a GoodWe grid-tied inverter, connect its RS485 port to the EMS port on COM2 of the energy storage inverter (RS485-B1 and RS485-A1). Then use the app to configure "AC Port Connection Settings." • In a coupled configuration, ensure that the rated output power of the grid-tied inverter is less than or equal to that of the energy storage inverter. • When the coupled system is grid-connected, if power limiting is required, ensure that the energy storage inverter is configured through the grid power limit screen in the app, and configure the grid-tied inverter using the appropriate tool for the application. Note: The output power control accuracy varies among grid-tied inverters. Set the grid-tied power limit parameter according to the actual conditions.

2.1.4 Used with the Ezmanager3000 Scenario


Bluetooth
SEMS+
小固云窗+
RS485
RS485
LAN
Smart DataLogger
智能数据采集器
Grid-tied inverter
并网逆变器
Smart Meter
智能电表
BACK-UP
Switchboard
BACK-UP配电盘
BACK-UP
GRID
Switchboard
主配电盘
CT
LAN
LAN
Smart Dongle
智能通信棒
Router
路由器
Server
服务器
SEMS+
小固云窗+
Bluetooth
Bluetooth
SEMS+
小固云窗+
Energy Storage System
储能系统
Energy Storage System
储能系统
EV Charger
充电桩
Power Line
功率线
Signal Line
通信线
Wireless Communication
无线通信
Optional Component
可选部件
ESA20NET0051

Device Type	Model	Description
Energy Storage Inverter	GW3K-EHA-G20 GW3.6K-EHA-G20 GW5K-EHA-G20 GW6K-EHA-G20 GW8K-EHA-G20 GW9.999K-EHA-G20 GW10K-EHA-G20 GW3K-BHA-G20 GW3.6K-BHA-G20 GW5K-BHA-G20 GW6K-BHA-G20 GW8K-BHA-G20 GW9.999K-BHA-G20 GW10K-BHA-G20	• Compatible with GoodWe second-generation AC EV chargers. • When using the system with EzManager3000, use an external energy meter. Do not connect a generator. • Supports connection of up to 4 energy storage inverters and 4 grid-tied inverters. Supports mixed On/Off-grid parallel operation of inverters with different power ratings. • In a parallel system, each inverter must be installed with a WiFi/LAN Kit-20, 4G Kit-CN-G20, or 4G Kit-G20. • When configuring the system, the following software versions are required: ◦ The inverter ARM software version must be 05.133 or later. ◦ The inverter DSP software version must be 06.6028 or later.

Device Type	Model	Description
Battery System	GW5.1-BAT-D-G20 GW5.1-BAT-D-G21 GW8.3-BAT-D-G20 GW8.3-BAT-D-G21 GW6.0-BAT-D-G20 GW9.0-BAT-D-G20	• Battery modules of different models can be used together. • The system supports5-108kWh, accommodating different power and energy configurations. • The battery heating film is optional. The "Battery Heating" function can only be enabled on models equipped with a heating film. Do not use batteries without a heating film in low-temperature environments, as this may prevent the equipment from operating. • GW5.1-BAT-D-G20, GW8.3-BAT-D-G20, GW6.0-BAT-D-G20, GW9.0-BAT-D-G20, GW5.1-BAT-D-G21, and GW8.3-BAT-D-G21 can be used together in a parallel system. When used with some models not equipped with a heating film,the battery heating function is unavailable. • If the system requires mixed battery use or modular capacity expansion, ensure that the BMS software version is V06 or later and the DCDC version is V06 or later.

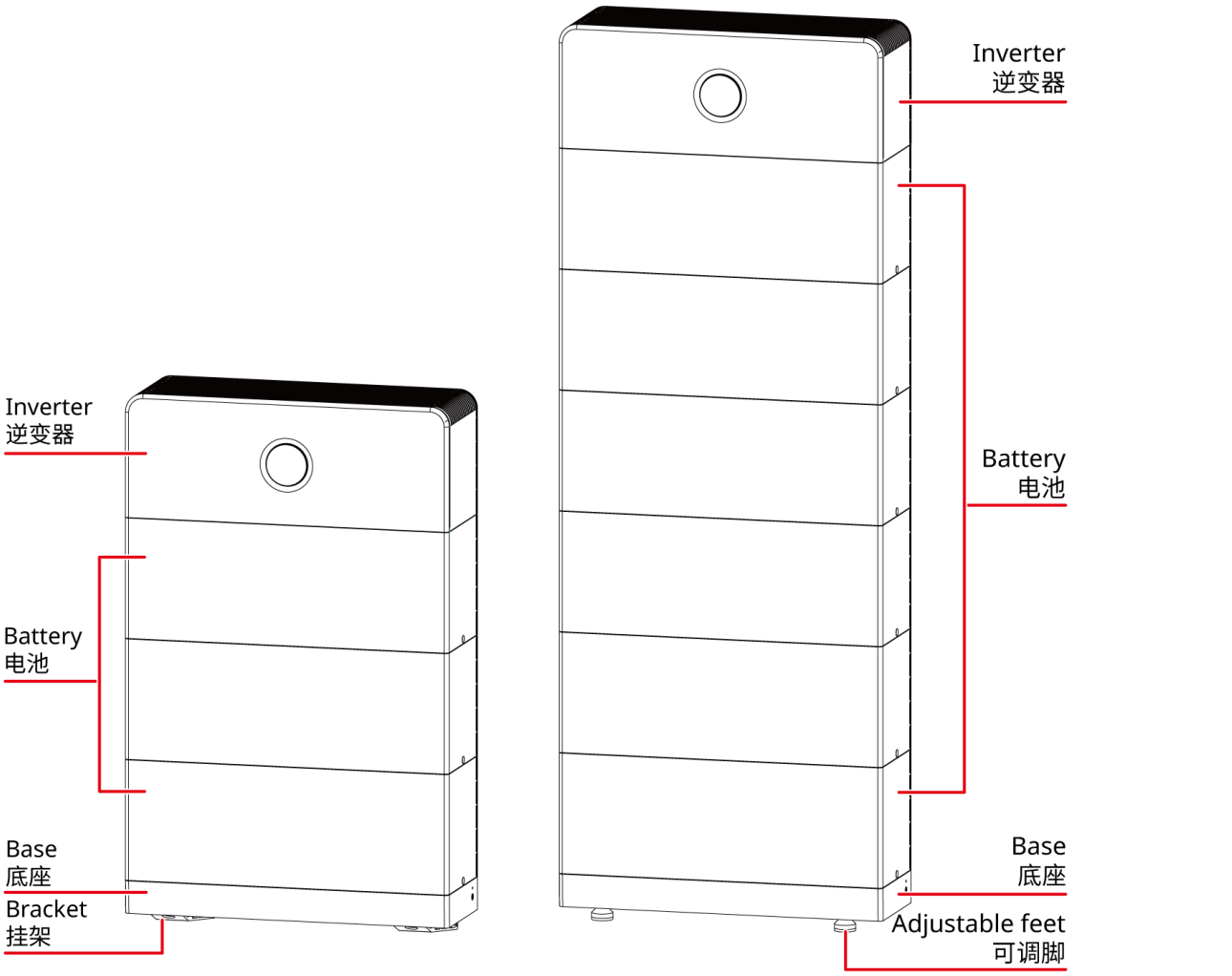
Device Type	Model	Description
Smart Data Logger	EzManager3000	EzManagerenables centralized dispatch and management of household energy. It supportsAIMode, Self-consumption, grid power control, and other plant-level Power Control functions to optimize energy at the plant level. • Connect smart meters, grid-tied inverters, and other devices via RS485. • If a third-party grid-tied inverter is used in the system, its data cannot be collected by EzManager, which may affect EMS dispatch. Use with caution. Software Version Requirements: • For a single inverter: EzManager3000 software version V00 or later . • For inverters in parallel: EzManager3000 software version V04 or later .
Static Transfer Switch Cabinet (STS)	GW30K-STS-G10 GW60K-STS-G10	• Optional. Contact GoodWe to purchase if required. • Supports connection of one energy storage inverter, a diesel generator, loads, and the grid.
Smart Meter	GMK110 (purchased from GoodWe)	
	GM330 (purchased from GoodWe)	

Device Type	Model	Description
	GMK330(purchased from GoodWe)	• GMK110: CT replacement is not supported; CT ratio: 120 A:40 mA • GM330: CTs can be purchased from GoodWe or sourced independently. CT ratio: nA:5A. • GMK330: CT replacement is not supported. CT ratio: 120A:40mA • If more than two inverters are connected in parallel, or if the wire gauge or range of the standard CT does not meet the total current requirements at the site, use the GM330 smart meter.
Smart Communication Stick	WiFi/LAN Kit-20	• Suitable for single-inverter and parallel networking scenarios. • Use Bluetooth to configure device parameters and view device operating information locally. Upload system operating information to the monitoring platform via Wi-Fi or LAN. • To use features such as one-click inverter upgrades and operation log export, ensure that the WiFi/LAN Kit-20 software version is V2.3 or later.

2.2 Product Overview

2.2.1 All-in-One Residential Energy Storage System (Single-Phase)

Residential Single-Phase All-in-One Unit:
The residential single-phase all-in-one unit features a modular design that integrates the battery and inverter, using blind-mate connections for stacking.



The energy storage system supports battery capacity expansion. The total battery capacity is determined by the number and specifications of the battery modules. The configuration must strictly comply with the restrictions specified in this section.
System configuration overview:

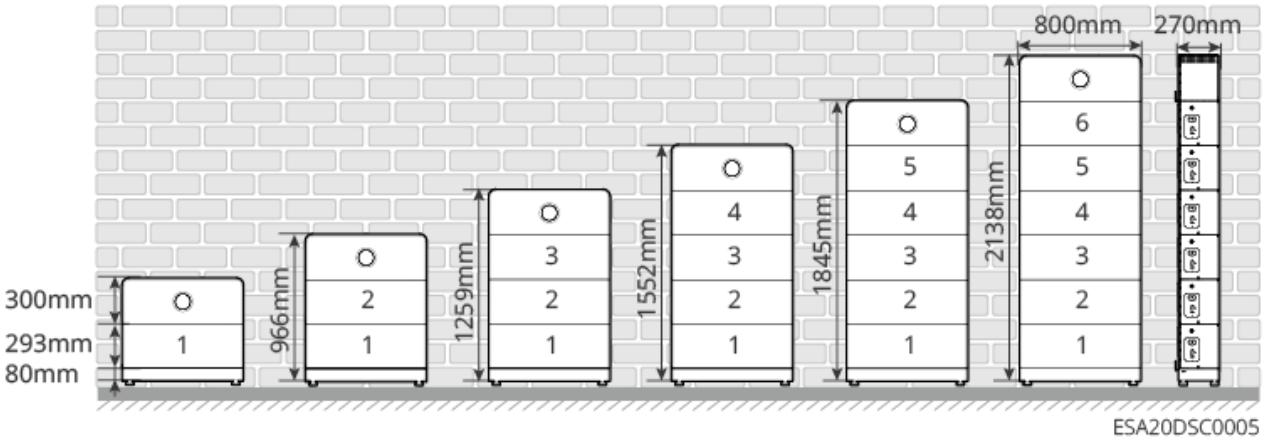
A: GW5.1-BAT-D-G20, GW5.1-BAT-D-G21, GW6.0-BAT-D-G20

B: GW8.3-BAT-D-G20, GW8.3-BAT-D-G21, GW9.0-BAT-D-G20

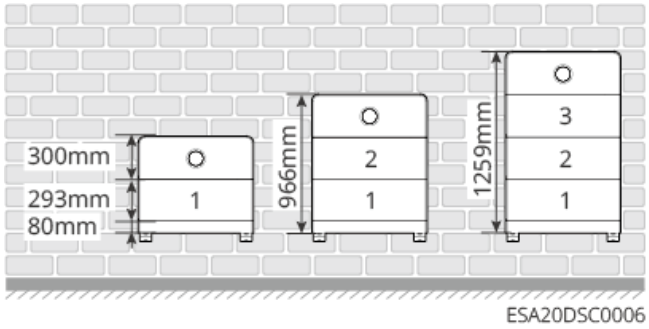
Mounting Method	Number of Expansion Groups	Modules per Stack	Total Number of Batteries
Floor-Mounted Installation	≤3groups	≤6batteries	≤12batteries
Wall-mounted installation （**A**)	≤3groups	≤3batteries	≤9batteries
Wall-mountedinstallation (**A/B/A+B**)	≤3groups	≤2batteries	≤6batteries

Mounting Method	Number of Expansion Groups	Modules per Stack	Total Number of Batteries
Note: Number of expansion groups × number of battery units stacked per group ≤ total number of batteries in the system			

Floor-Mounted Installation

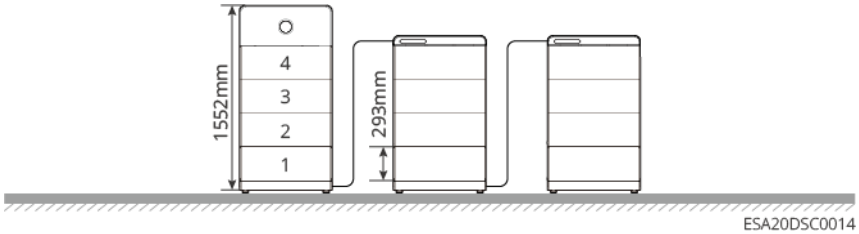


Wall-mounted installation

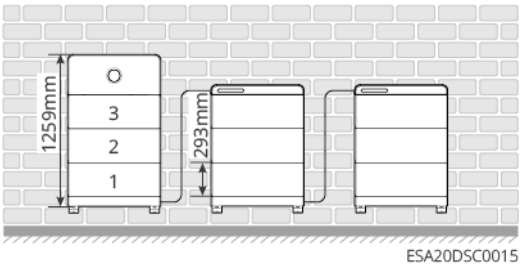


Cluster expansion installation

Floor-Mounted Installation

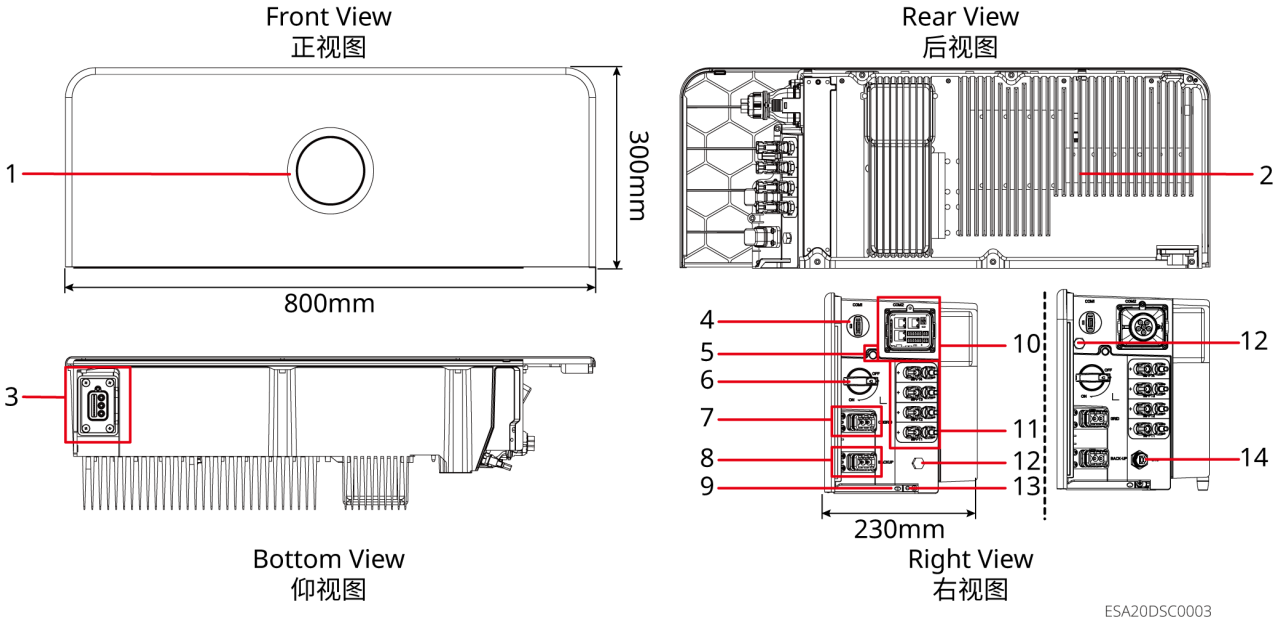


Wall-mounted installation



Inverter:

In a PV system, the inverter controls and optimizes energy flows through its integrated energy management system. The electricity generated by the PV system can be used by loads, stored in batteries, or exported to the grid.



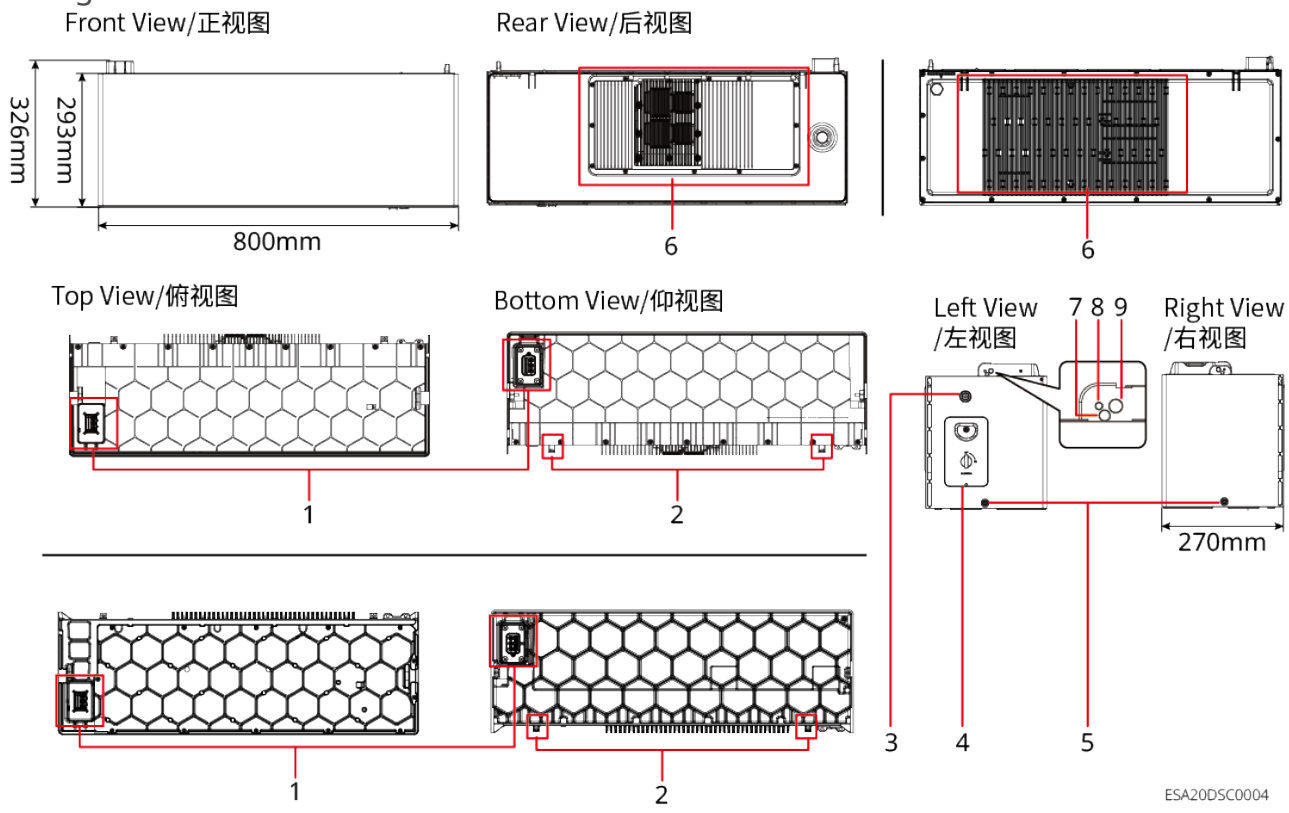
No.	Component/Label	Description
1	Indicator Lights	Indicate the operating status of the inverter.
2	Heat sink	Inverter cooling.
3	Connector	Power and communication ports for connecting the inverter and battery.

No.	Component/Label	Description
4	Smart dongle connection port	• Can connect to a smart dongle, such as the WiFi/LAN Kit-20 or 4G Kit-CN-G20. Select the module type according to your needs. • Supports USB flash drive connection for Local Upgrade of the inverter software.
5	Lifting handle mounting hole	Used to install the lifting handles. Use when carrying the inverter.
6	DC Switch	EHA models only; BHA models do not have a DC Switch. Controls the connection and disconnection of the DC input.
7	ON-GRID port	Connect the AC cable to connect the inverter to the grid.
8	BACK-UP port	Connect the AC cable to connect critical loads or a grid-tied inverter.
9	Battery mounting hole	Secure the inverter and battery.
10	Communication Port	Can connect communication cables for load control, CT, RS485, Remote Shutdown/Rapid Shutdown, DRED (Australia)/RCR (Europe), etc.
11	PV Input Terminals	EHA models only; BHA models do not have PV input terminals. Connect the DC input cables from the PV modules. The number of PV input terminals is as follows: • GW3K-EHA-G20, GW3.6K-EHA-G20, GW5K-EHA-G20, GW6K-EHA-G20：2 • GW8K-EHA-G20, GW9.999K-EHA-G20, GW10K-EHA-G20: 4
12	Breather Valve	-

No.	Component/Label	Description
13	Protective Ground Terminal	Connect the enclosure to the protective ground wire.
14	STS communication interface	Connects to the static transfer switch (STS) cabinet.

Battery:

The battery system stores and releases energy as required by the PV energy storage system. Both the input and output ports of the energy storage system carry high-voltage DC.

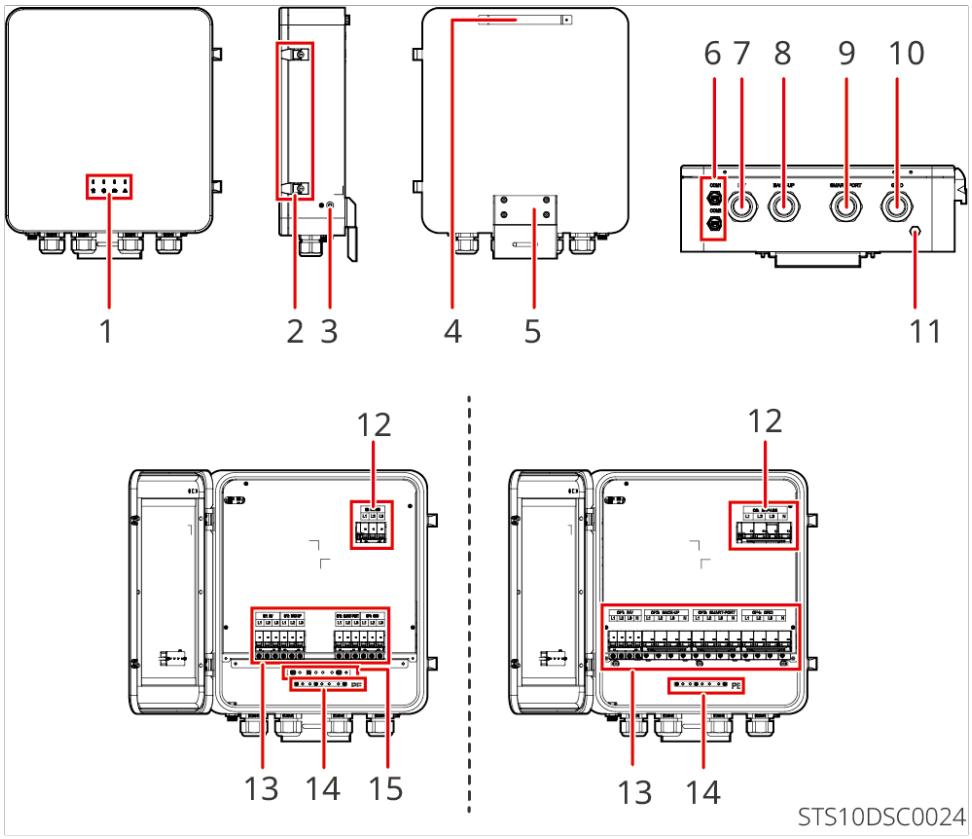


No.	Component	Description
1	Connector	Power and communication ports for connections between batteries and between the battery and inverter.

No.	Component	Description
2	Anti-tip bracket mounting hole	Used to secure the battery to the wall.
3	Multifunction button indicator	• Indicates the operating status of the battery. • Battery black-start function: When the PV system is not generating power and the grid is abnormal, the inverter cannot operate normally. In this case, press and hold the multifunction button for 2 s to start the battery system and activate the inverter, putting it into off-grid mode so the battery can discharge to supply the loads. • Battery shutdown function: Press and hold the multifunction button for more than 5 s to shut down the battery system.
4	Battery disconnect switch	Battery power input/output switch.
5	Battery-to-battery mounting holes	Used to secure two batteries together.
6	Heat sink	Battery heat dissipation
7	Battery lifting holes	Used for lifting the battery. When stacking more than three batteries, use lifting equipment for installation.
8	Battery or inverter mounting holes	Used to secure batteries to each other or to secure the inverter to a battery.
9	Lifting handle mounting hole	Used to install the lifting handles. Used for manual battery handling.

2.2.2 STS Appearance Description

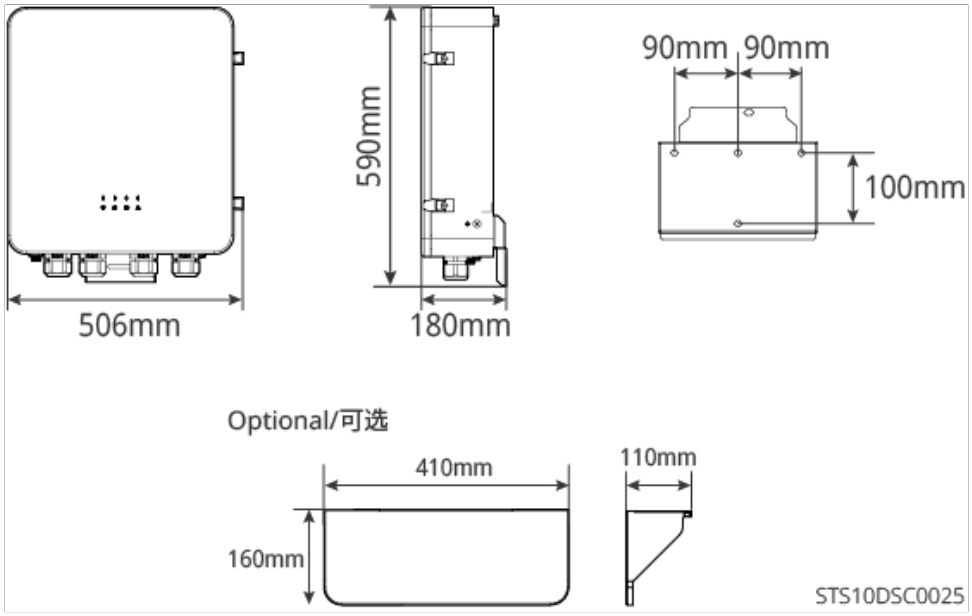
Appearance



No.	Component Names	Description
1	Indicator light	Indicates equipment working status
2	Latch	Used to open/close the STS cabinet door
3	Protection ground terminal	Used to connect the cabinet grounding wire
4	Mounting bracket	Used to mount the device on the backplate
5	Fixed support bracket	Used to fix and support the device on the wall
6	Communication terminal	• COM1: Connect to the inverter STS communication port • COM2: Reserved

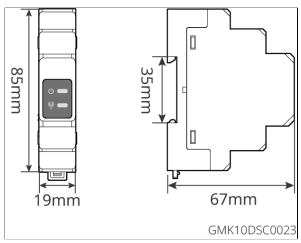
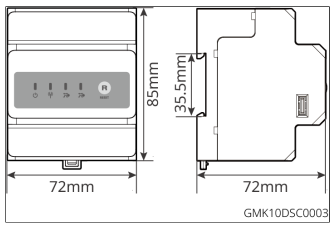
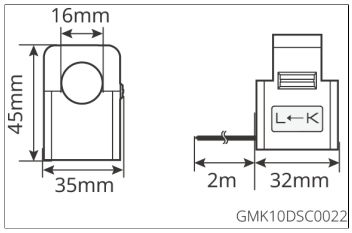
No.	Component Names	Description
7	Inverter cable entry	Cable threading port
8	BACK-UP cable entry	
9	Smart port cable entry	
10	Grid cable entry	
11	Breather valve	-
12	BYPASS switch	During inverter shutdown for maintenance, if the load on the STS BACK-UP port needs to remain powered, close the BYPASS switch so that the mains supply the load directly; after the inverter is powered on and resumes operation, open the BYPASS switch, and the load switches back to inverter power.
13	Circuit breaker and AC connection terminals	• INVERTER: used to connect the inverter • BACK-UP: used to connect BACKUP loads • SMART-PORT: used to connect generators, large loads, or grid-tied inverters • GRID: used to connect to the grid
14	PE terminal block	Used to connect the PE wire
15	(Australia only) N terminal block	Used to connect the N wire

Dimensions



2.2.3 Smart Meter

Smart meters can measure and monitor electrical data in PV energy storage systems, such as voltage, current, frequency, Power Factor, power, etc.

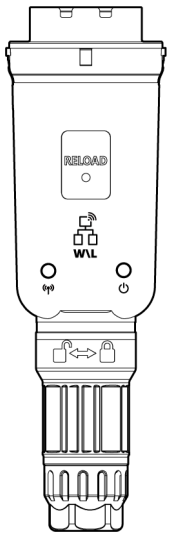
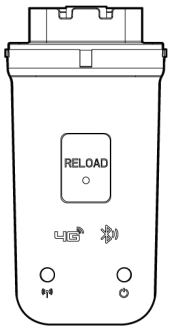
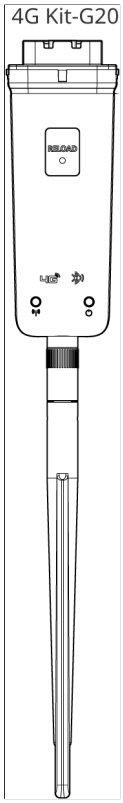
GMK110	GM330&GMK330	CT
		

No.	Model	Applicable Scenarios
1	GMK110	CT is not replaceable; CT ratio: 120A: 40mA
2	GM330	CTs can be purchased from GoodWe or purchased separately. CT ratio requirement: nA: 5A • nA: CT primary-side input current, n ranges from 200 to 5000 • 5A: CT secondary-side output current

No.	Model	Applicable Scenarios
3	GMK330	CT ships with the meter,CT ratio: • 120A: 40mA

2.2.4 Smart Communication Stick

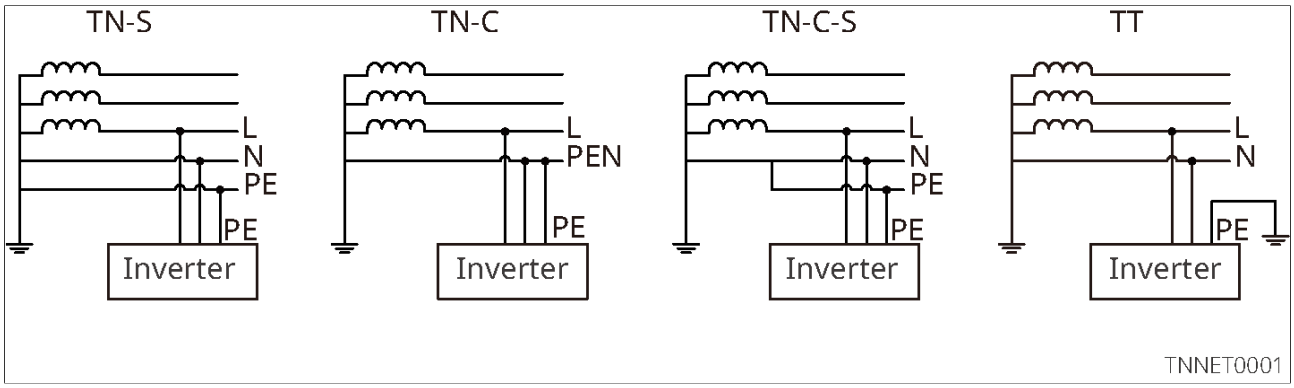
The smart communication stick is primarily used to transmit inverter generation data to a remote monitoring platform in real time, and to connect to the stick via the app for on-site device commissioning.

WiFi/LAN Kit-20 	4G Kit-CN-G20 	4G Kit-G20 

No.	Model	Signal Type	Applicable Scenarios
1	WiFi/LAN Kit-20	Wi-Fi, LAN, Bluetooth	Single-inverter and multi-inverter scenarios

No.	Model	Signal Type	Applicable Scenarios
2	4G Kit-CN-G20 (China only)	4G, Bluetooth	Single-inverter and multi-inverter scenarios
3	4G Kit-G20	4G, Bluetooth	Single-inverter and multi-inverter scenarios

2.3 Supported Grid Forms



2.4 System Mode

Note
To calibrate the battery management system (BMS), the system automatically performs a full battery charge after the First-time Installation and commissioning are complete. After this process is completed, the system operates in the set working mode.

Self-consumption

- This is the basic mode of system operation.
- PV generation powers the load first. Surplus electricity charges the battery, and the remaining electricity is sold to the grid. When PV generation cannot meet the load demand, the battery supplies the load; when the battery's energy is also insufficient to meet the load demand, the grid supplies the load.

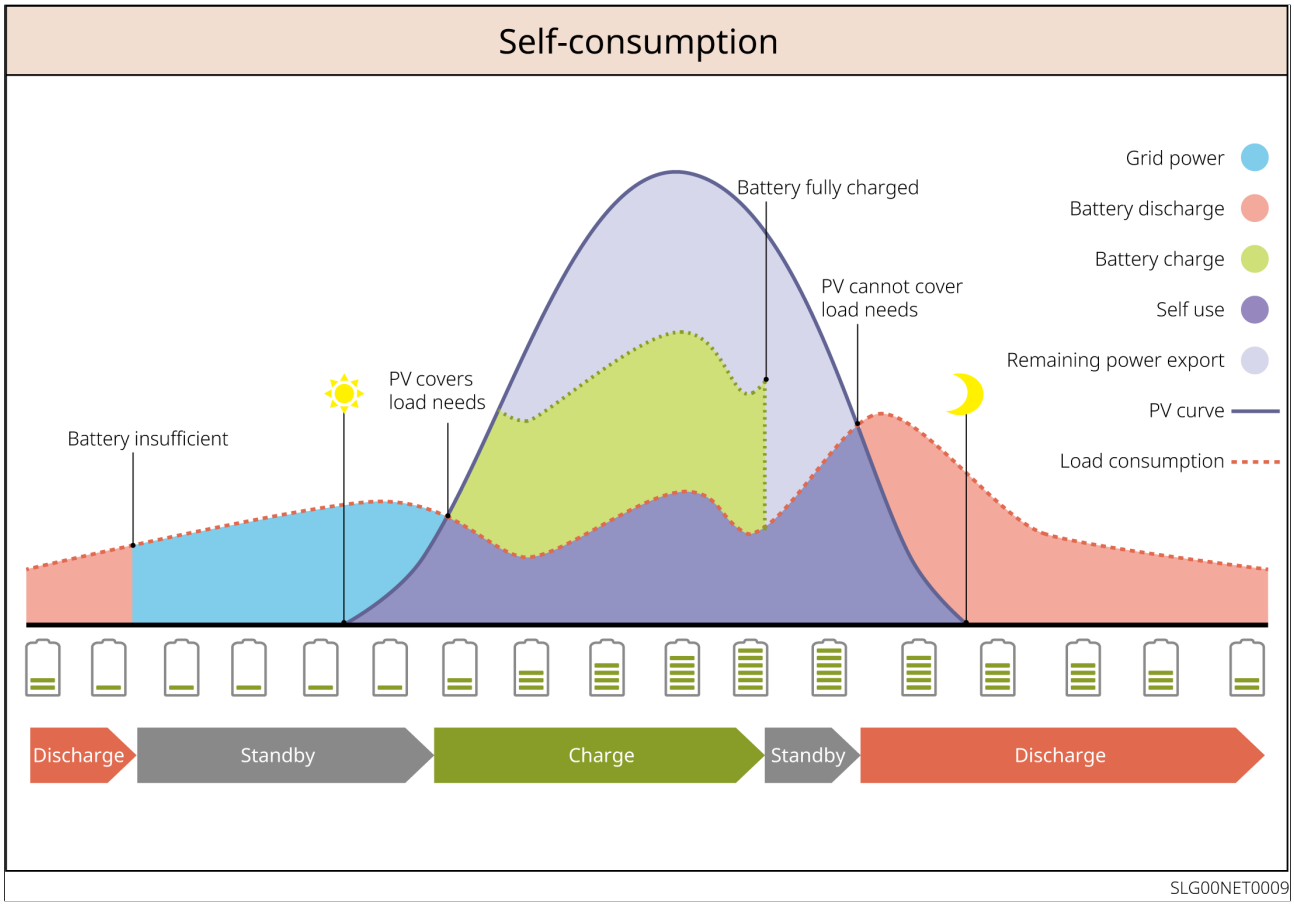


Figure7 Self-consumption

Backup Mode

- It is recommended for use in areas with unstable power grids.
- During a Grid Power Outage, the inverter switches to off-grid operating mode, and the battery discharges to power the loads, ensuring that BACK-UP loads remain powered. When the grid is restored, the inverter switches to grid-connected operation.
- To ensure that the battery SOC is sufficient to maintain normal operation of the system when off-grid, the battery will be charged using PV or electricity purchased from the grid to the backup power SOC while the system is grid-connected. If you need to purchase electricity from the grid to charge the battery, please confirm that it complies with local grid laws and regulations.

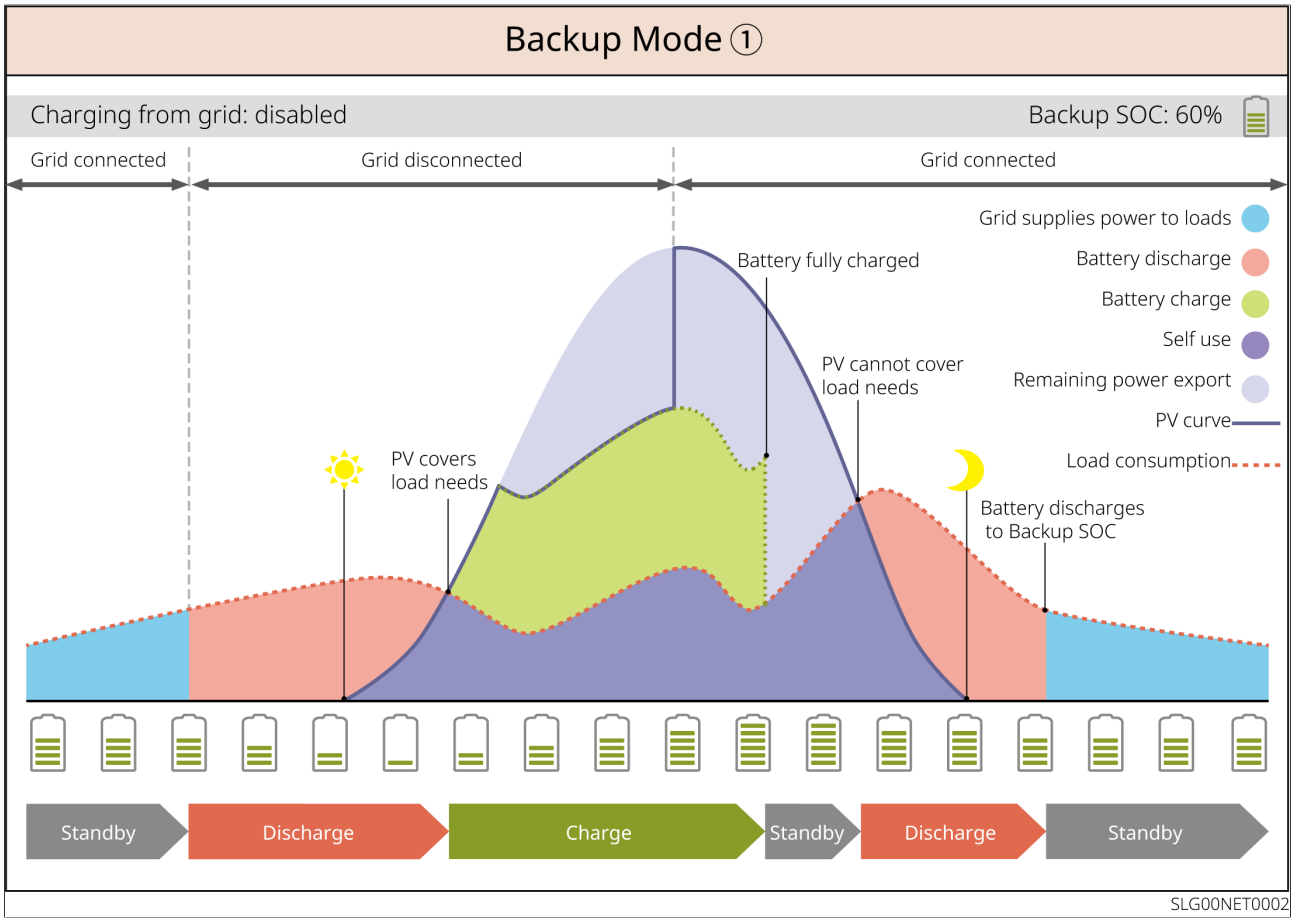


Figure8 Backup Mode 1

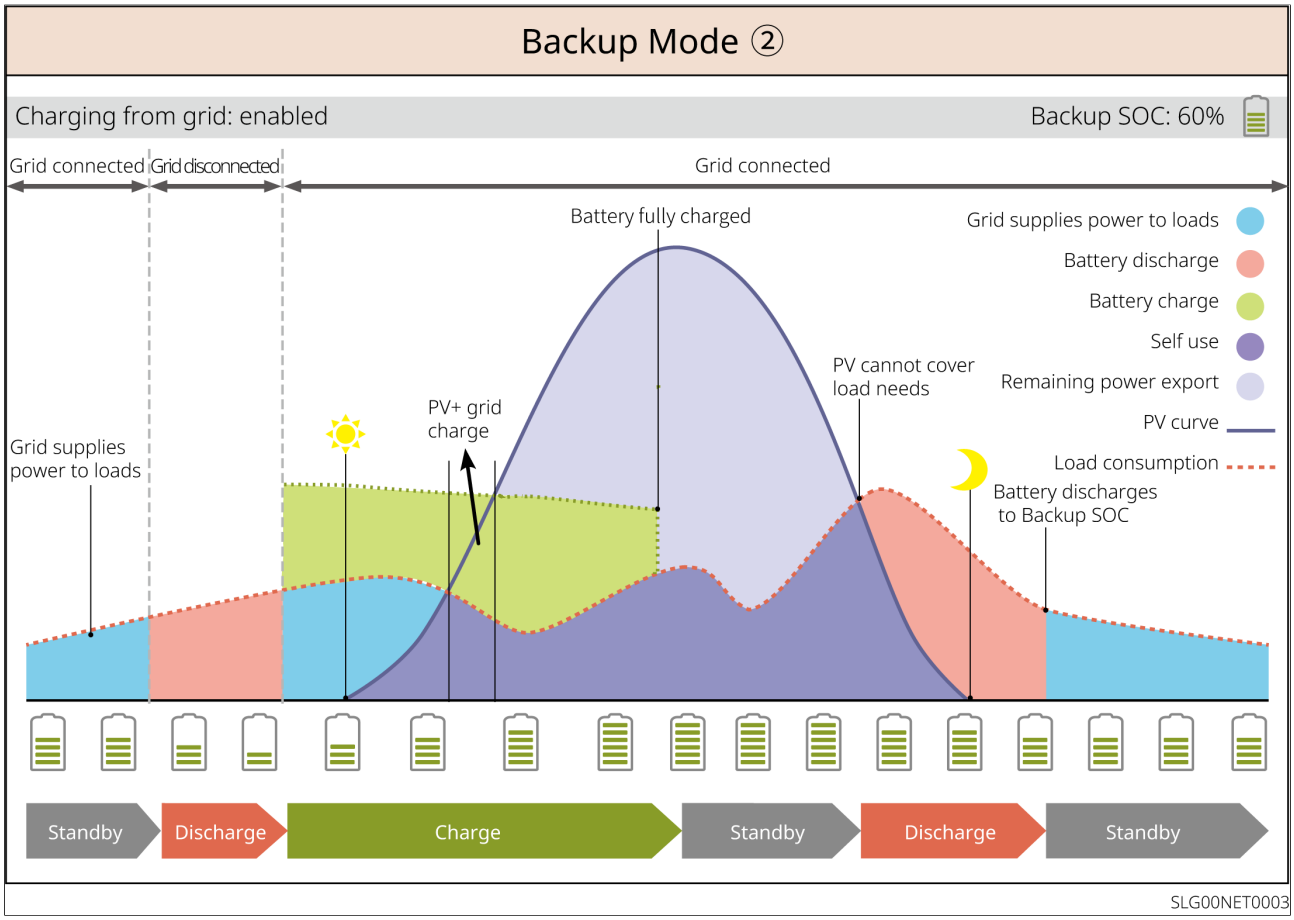


Figure9 Backup Mode 2

TOU Mode

Under the premise of complying with local laws and regulations, set different time periods for purchasing electricity and Export Energy based on the grid's peak-valley Tariff differences.

For example, during valley Tariff periods, set the battery to charging mode and purchase electricity from the grid to charge it; during peak Tariff periods, set the battery to discharging mode and supply power to the load through the battery.

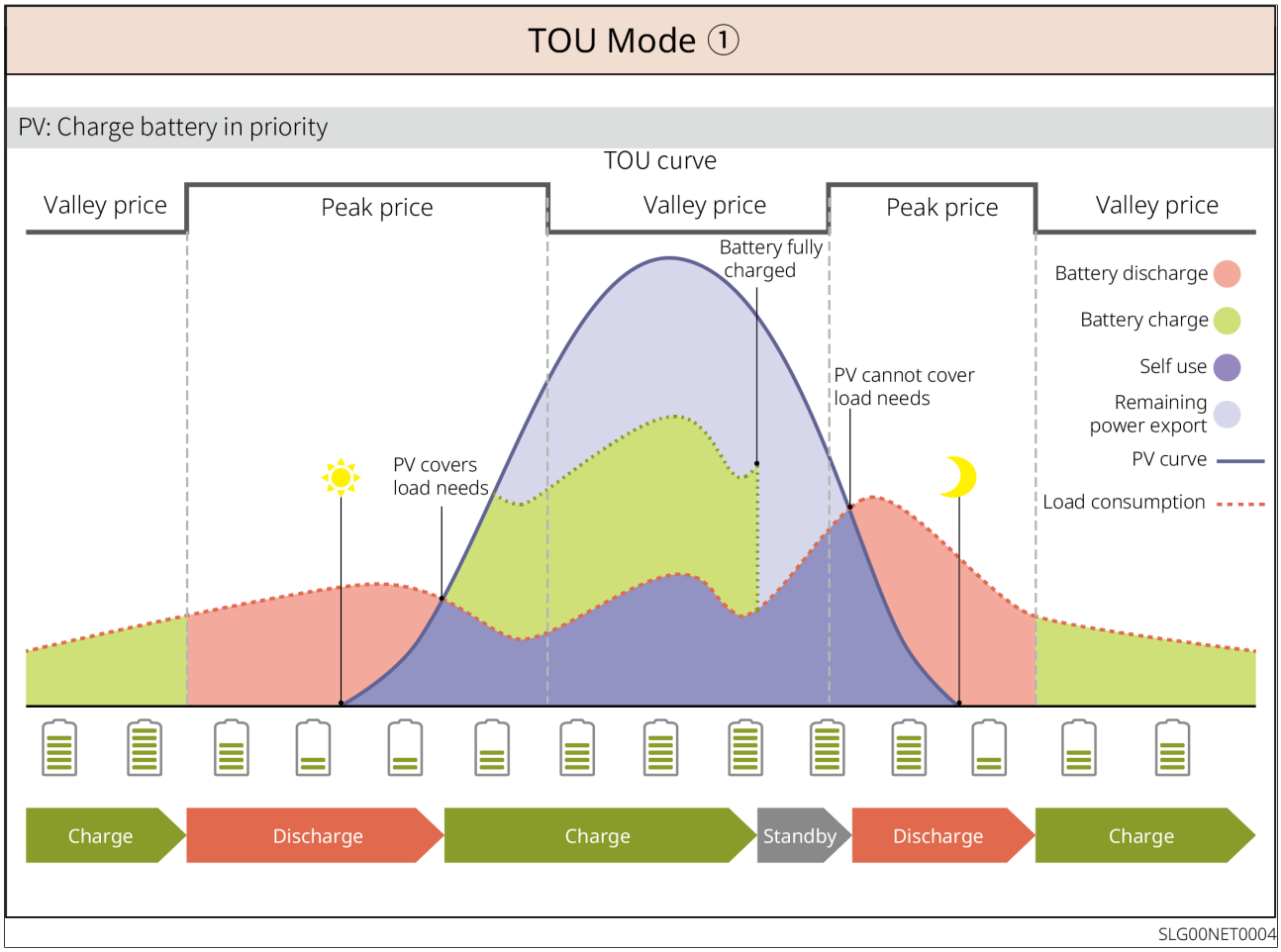


Figure10 TOU Mode 1

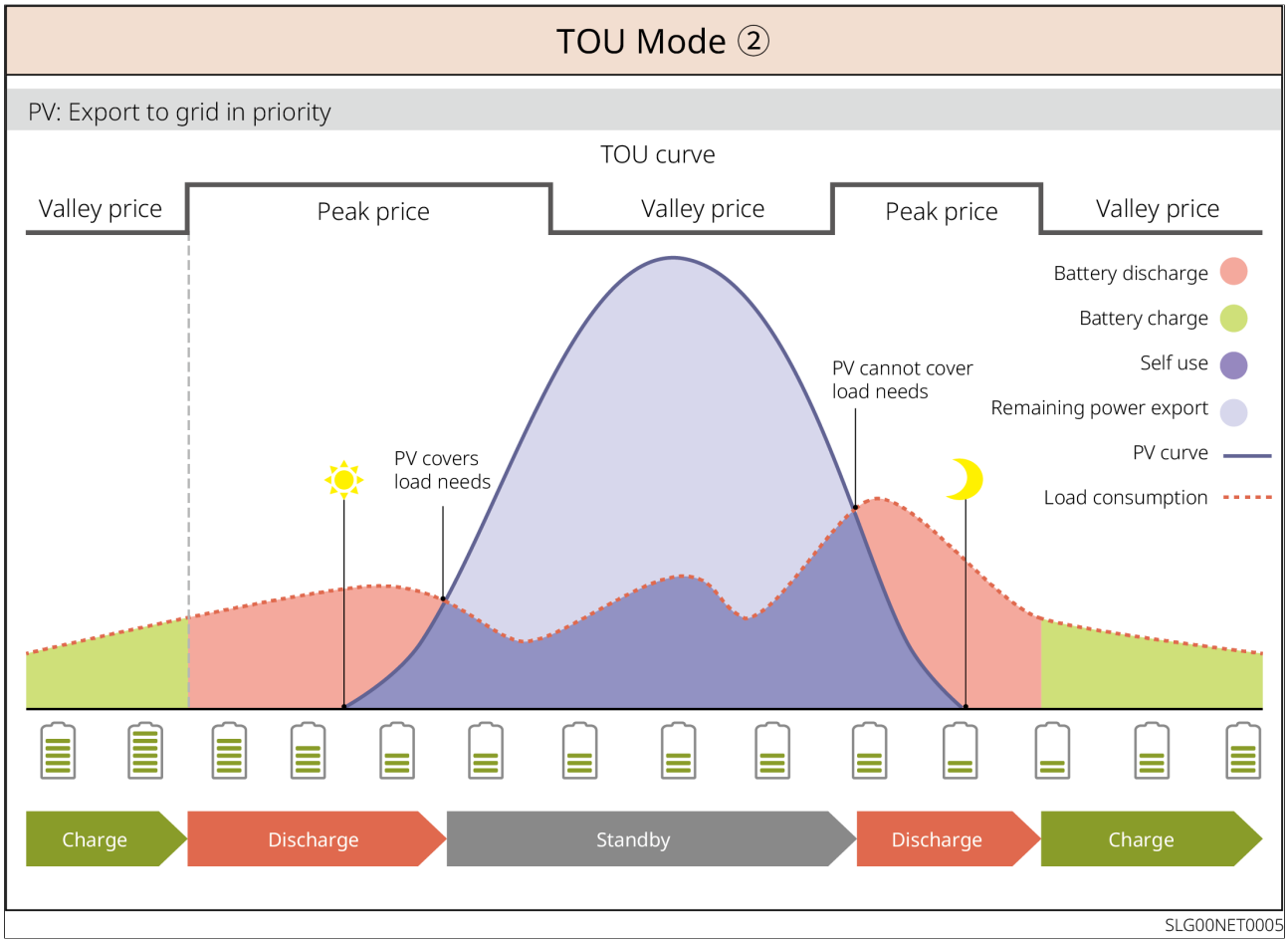


Figure11 TOU Mode 2

Smart Charging (Delayed Charging) Mode

- Applicable to areas with grid-connected power output restrictions.
- Setting a peak power limit allows PV generation that exceeds the grid-connected limit to be used to charge the battery; alternatively, set a PV charging period to use PV generation to charge the battery during the charging period.

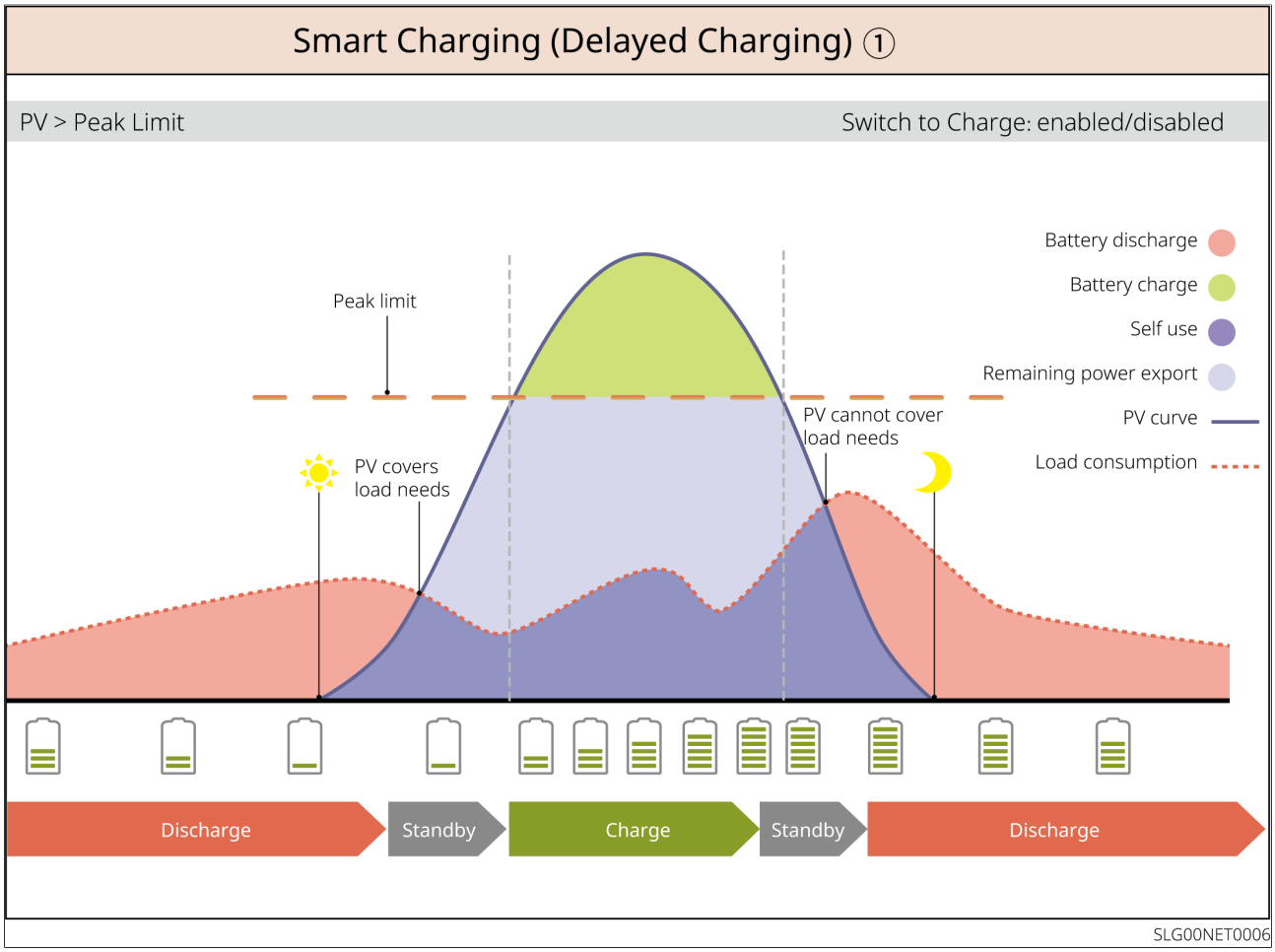


Figure12 Delayed Charging Mode 1

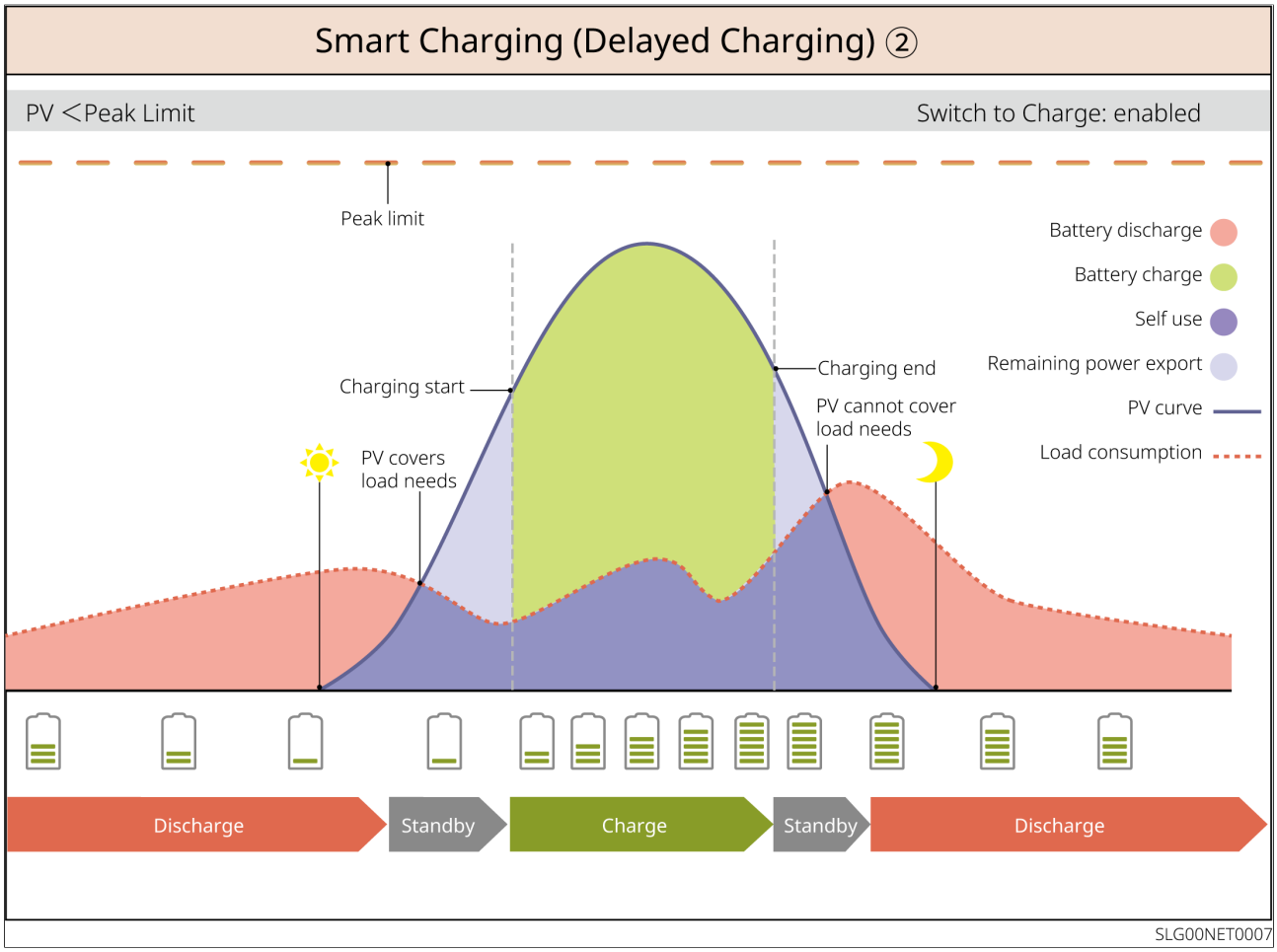


Figure13 Delayed Charging Mode 2

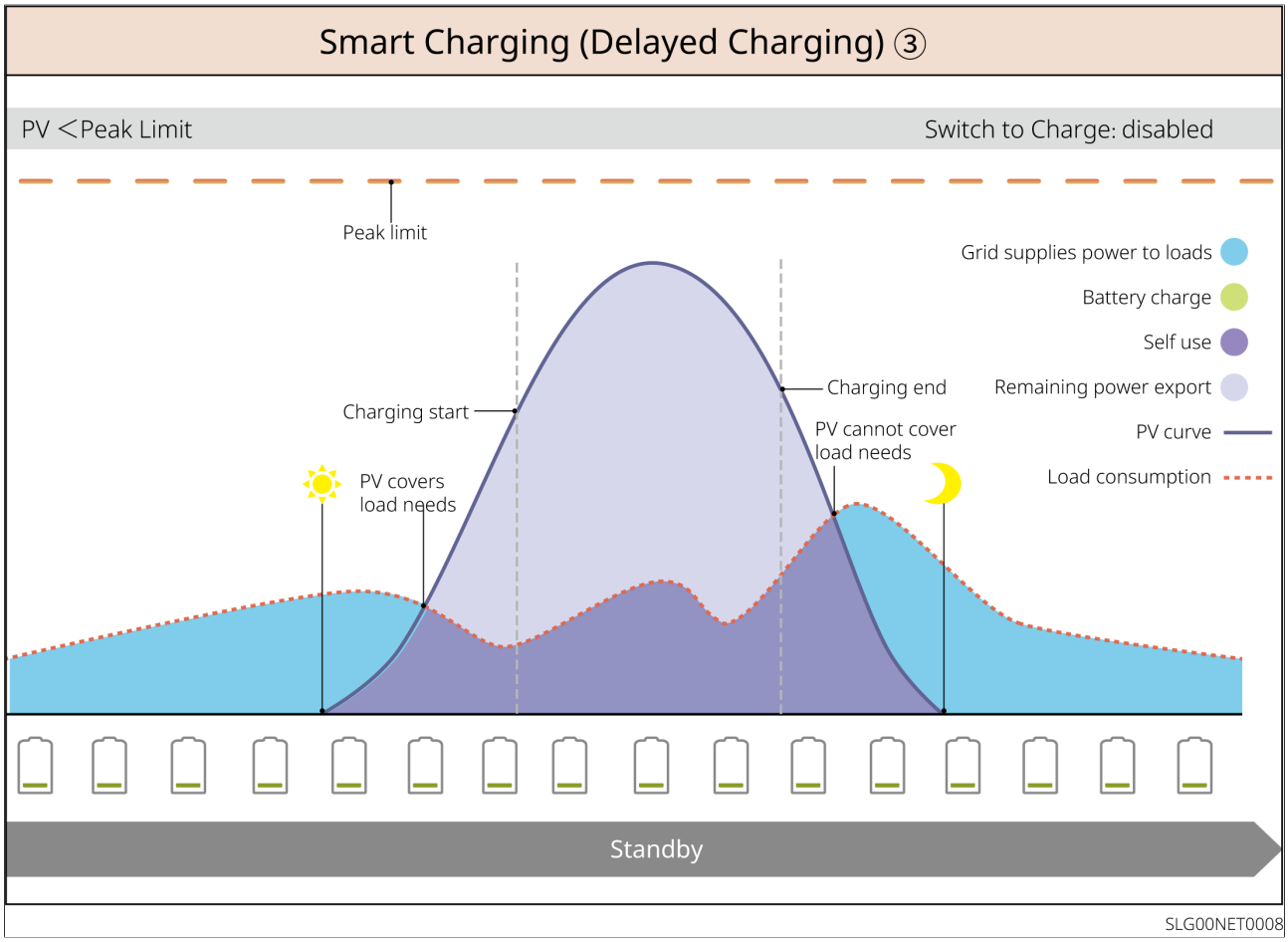


Figure14 Delayed Charging Mode 3

Demand Control Mode

- Mainly applicable to industrial and commercial scenarios.
- When the total load power exceeds the electricity quota in a short time, battery discharge can be used to reduce the portion of electricity consumption that exceeds the quota.
- When the battery SOC is lower than the reserved SOC for demand management, the system purchases electricity from the grid based on the time period, load consumption, and the grid purchase peak limit.

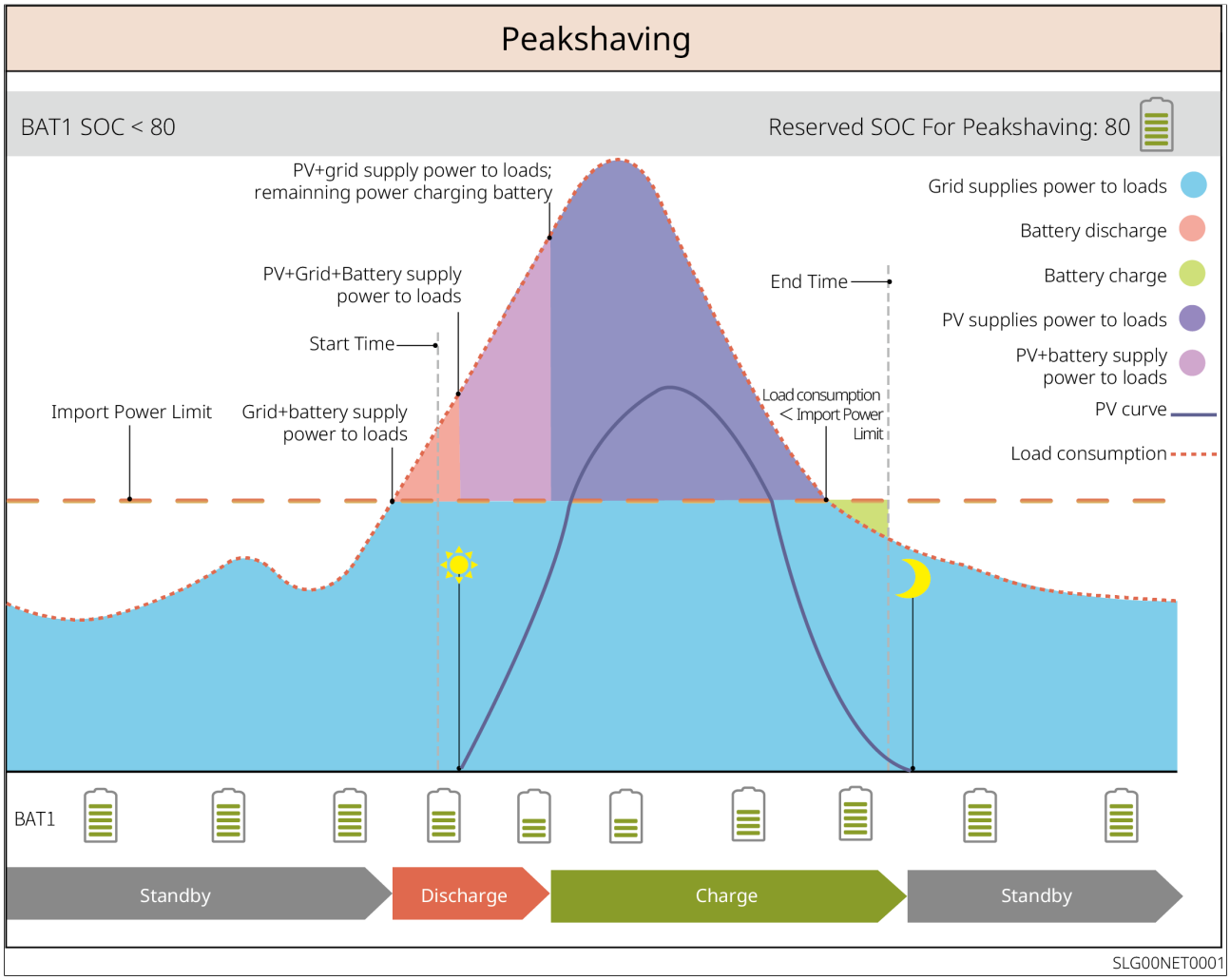


Figure15 Demand Control Mode

Off-grid Mode

Note
Do not operate in pure off-grid mode when the inverter is Not Connected to a battery system.

During a Grid Power Outage, the inverter switches to off-grid operating mode.

- During the day, PV power is prioritized for the load, and excess electricity charges the battery.
- At night, the battery discharges to power the load, ensuring that the BACK-UP load remains powered.

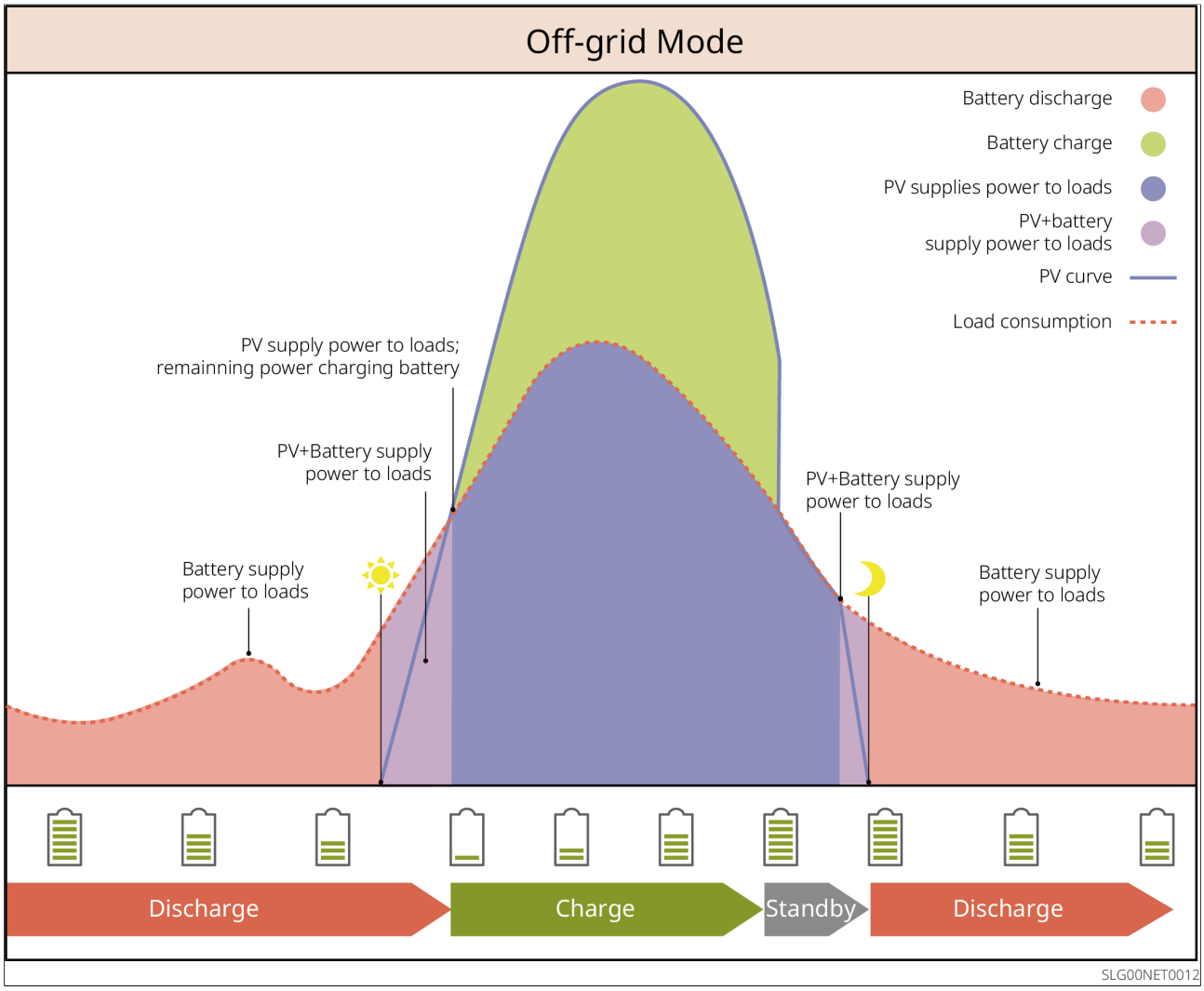


Figure16 Off-grid Mode

2.5 Functional Features

NOTICE
Please refer to the actual product configuration for specific functional features.

AFCI

The inverter integrates an AFCI circuit Protection device to detect Arc Faults and quickly disconnect the circuit when an Arc Fault is detected, thereby preventing electrical fires.

Causes of arc faults:

- A connection in the PV system has been damaged.
- The cables are connected incorrectly or damaged.
- The connectors or cables have aged.

Troubleshooting:

1. When the inverter detects an arc fault, you can view the fault type in the app.
2. If the inverter triggers a fault fewer than 5 times within 24 hours, it will automatically resume grid-connected Protection after 5 minutes. After the fifth Arc Fault, the fault must be cleared before the inverter can operate normally. For details, refer to the app user manual.

Model	Label	Description
GW3K-EHA-G20 GW3.6K-EHA-G20 GW5K-EHA-G20 GW6K-EHA-G20	AFCI: F-I-AFPE-1-2-1	F: Full coverage I: Integrated AFPE: Detection and interruption capability provided 1: 1 monitored string per input port 2: 2 input ports per channel 1: 1 monitored channel
GW8K-EHA-G20 GW9.999K-EHA-G20 GW10K-EHA-G20	AFCI: F-I-AFPE-1-2/2-2	F: Full coverage I: Integrated AFPE: Detection and interruption capability provided 1: 1 monitored string per input port 2/2: 2/2 input ports per channel(AFD1: 2 , AFD2: 1) 2: 2 monitored channels

Load Control
The inverter's dry contact control port supports connection to an additional contactor to switch loads on or off. It supports household loads, heat pumps, and more.
The load control methods are as follows:

- Time control: Set the times for switching the load on or off. The load will switch on

or off automatically during the set time period.

- Switch control: When the control mode is set to ON, the load will switch on; when it is set to OFF, the load will switch off.
- BACK-UP load control: The inverter has a built-in relay dry contact control port, which can be used to control whether a load is switched off. In off-grid mode, if an Overload is detected at the BACK-UP terminal or the battery SOC is below the battery off-grid Protection threshold, the load connected to the relay port can be switched off.

Rapid Shutdown (RSD) Rapid Shutdown

In a Rapid Shutdown system, the Rapid Shutdown transmitter works with the receiver to rapidly shut down the system. The receiver maintains module output by receiving signals from the transmitter. The transmitter can be installed externally or integrated into the inverter. In an emergency, enable the external trigger device to stop the transmitter, thereby shutting down the modules.

- External transmitter
  - Transmitter models: GTP-F2L-20, GTP-F2M-20
    https://www.goodwe.com/Ftp/Installation-instructions/RSD2.0-transmitter.pdf
  - Receiver models: GR-B1F-20, GR-B2F-20
    https://en.goodwe.com/Ftp/EN/Downloads/User%20Manual/GW_RSD-20_Quick-Installation-Guide-POLY.pdf
- Built-in transmitter
  - External triggering device: external switch
  - Receiver models: GR-B1F-20, GR-B2F-20
  - If the inverter cannot be connected to an external synchronization signal and multiple inverters need to operate in parallel, ensure that the PV cables for different inverters are routed through separate cable trays and that the cable trays are kept at least 20 cm apart.
  - If the inverter can be connected to an external synchronization signal, ensure that no more than five transmitters are connected to the same synchronization group.
    https://en.goodwe.com/Ftp/EN/Downloads/User%20Manual/GW_RSD-20_Quick-Installation-Guide-POLY.pdf

3 Equipment Inspection And Storage

3.1 Equipment Inspection

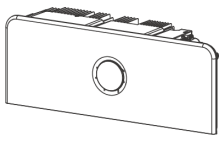
Before accepting the product, carefully check the following:

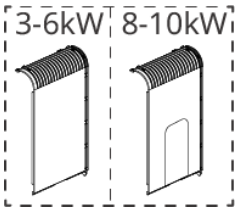
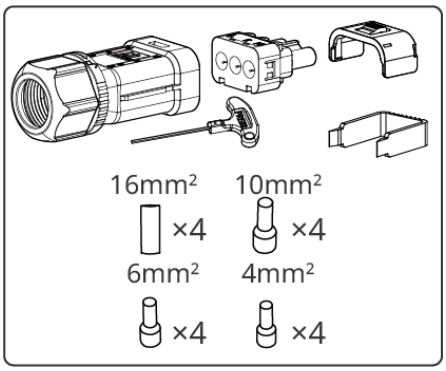
1. Check the outer packaging for damage, such as deformation, holes, cracks, or any other signs that the equipment inside may have been damaged. If damage is found, do not open the package and contact your distributor or after-sales service center.
2. Check that the equipment model is correct. If it does not match, do not open the packaging; contact your dealer or after-sales service center.
3. Check that the type and quantity of items delivered are correct and that they are not visibly damaged. If any damage is found, contact your distributor or after-sales service center.

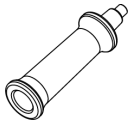
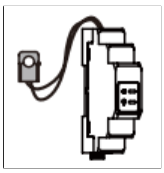
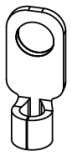
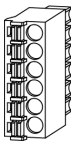
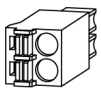
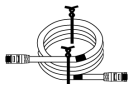
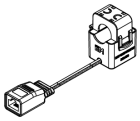
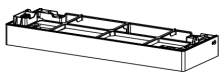
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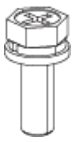
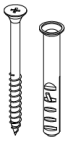
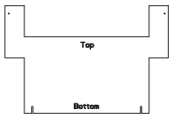
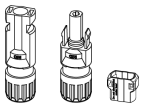
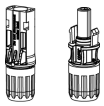
⚠WARNING
Check that the types and quantities of delivered items are correct and that they are undamaged. If any item is damaged, contact your distributor. After removing the delivered items from the packaging, do not place them on rough, uneven, or sharp surfaces to avoid damaging the paint.

3.2.1 Inverter Package Contents

Component	Description	Component	Description
	Inverter x 1		Top decorative cover x 1

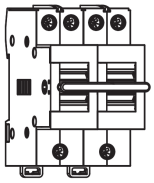
Component	Description	Component	Description
	Left decorative cover x 1		Right decorative cover x 1
			AC terminal kit x 2 • AC wiring terminal x 2 • Hex screwdriver x 1 • Tubular terminal ◦ 4mm² x 4 ◦ 6mm² x 4 ◦ 10mm² x 4 ◦ 16mm² x 4

Component	Description	Component	Description
	Handle x 2		GMK110 smart meter x N • GW3K-EHA-G20, GW3.6K-EHA-G20, GW5K-EHA-G20, GW6K-EHA-G20, GW8K-EHA-G20, GW9.999K-EHA-G20, GW10K-EHA-G20 x 0 • GW3K-BHA-G20, GW3.6K-BHA-G20, GW5K-BHA-G20, GW6K-BHA-G20, GW8K-BHA-G20, GW9.999K-BHA-G20, GW10K-BHA-G20 x 1
	OT grounding terminal x 1		6-pin communication terminal x 2
	2-pin communication terminal x 2		Tubular terminal x 16
	CT cable x 1		CT x 1
	Battery base x 1		Adjustable foot x 4

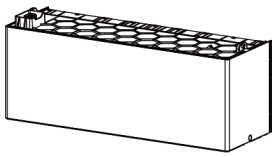
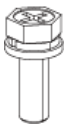
Component	Description	Component	Description
	Anti-tip bracket x 4		M5*16 screw x 9
	M5*60 expansion bolt x 4		Drilling template x 2
 or 	PV terminals and PV terminal anti-tamper caps x N GW3K-EHA-G20, GW3.6K-EHA-G20, GW5K-EHA-G20, GW6K-EHA-G20 x 4 GW8K-EHA-G20, GW9.999K-EHA-G20, GW10K-EHA-G20 x 8 Note: PV terminal anti-tamper caps are not supplied in China. GW3K-BHA-G20, GW3.6K-BHA-G20, GW5K-BHA-G20, GW6K-BHA-G20, GW8K-BHA-G20, GW9.999K-BHA-G20, GW10K-BHA-G20 x 0		PV terminal unlocking tool x N N: China x 0; other regions x 1.
		 or 	Smart communication stick x 1

Component	Description	Component	Description
	• (Australia only) Manual transfer switch x 1 Note: For use only in single-inverter applications		Product documentation x 1

(Europe only) Manual transfer switch

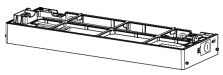
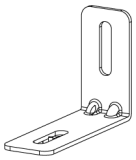
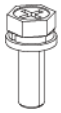
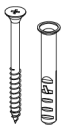
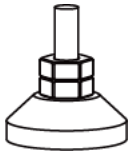
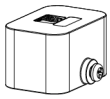
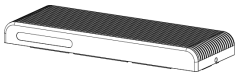
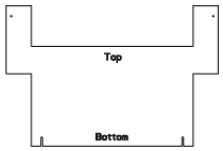
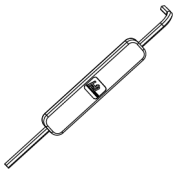
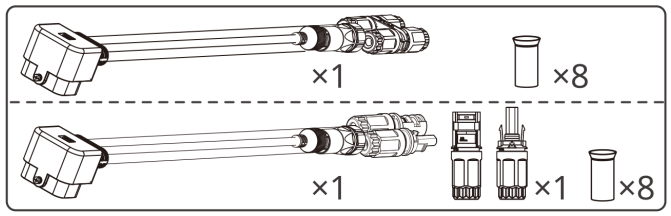
Component	Description
	• Manual transfer switch x 1 Note: For use only in single-inverter applications. Contact your distributor to purchase if required.

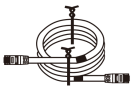
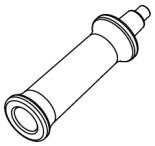
3.2.2 Battery Package Contents (Lynx D G2)

Components	Description	Components	Description
	Battery x 1		M5×16 screws x 2
	Silicone caps x 2	-	-

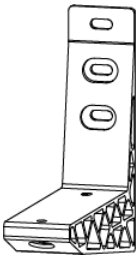
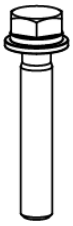
3.2.2.1 Battery Expansion Kit Deliverables (Optional)

Note
The system supports 5-108kWh. A maximum of 6 batteries can be stacked in a single row. If more energy is required, or if the stack height of a single row needs to be reduced due to installation conditions or other scenarios requiring expansion, please contact GoodWe or a dealer to purchase a battery expansion kit.

Part	Description	Part	Description
	Base x 1		Anti-tip brackets x 4
	M5 screws x 7		M6 expansion screws x 4
	Adjustable feet x 4		OT grounding terminal x 1
	Termination resistor x 1		Battery decorative cover x 1
	Drilling marking paper x 2		Hex wrench x 1
			Battery cluster expansion harness x 1

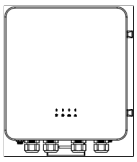
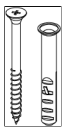
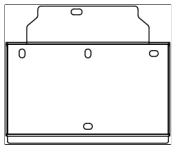
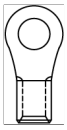
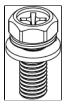
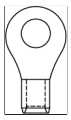
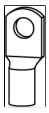
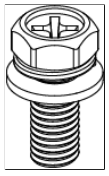
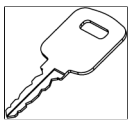
Part	Description	Part	Description
	Unlocking tool x N		3m battery cluster expansion positive connection harness x 1
	3m battery cluster expansion negative connection harness x 1		Battery cluster expansion network cable x 1
	Silicone caps x 2		Handles x 2
	Product documentation x 1	-	-

3.2.2.2 Battery Mounting Bracket Package Contents (Optional)

Components	Description	Components	Description
	Mounting bracket x 2		M10 expansion bolts x 6
	M10 screws x 4	-	-

3.2.3 STS Deliverables

Note
When different models of equipment are shipped to different markets, the required deliverables may vary. Please refer to the actual items received.

Part	Description	Part	Description
	Static transfer switch cabinet×1		Expansion bolts×6
	Back mounting plate ×1		N wire terminals×4
	63A AC terminals×16		N wire locking screws×4
	63A grounding terminals×4		Ground terminal screws×4
	M8 cabinet grounding OT terminal × 1		Cabinet grounding screw ×1
	Communication waterproof grommet ×1		Cabinet door keys × 2

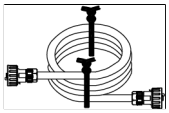
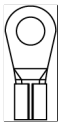
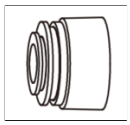
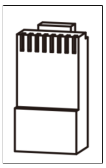
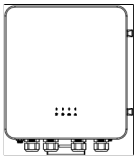
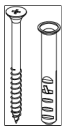
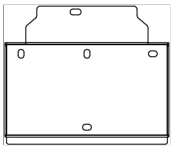
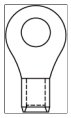
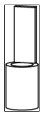
Part	Description	Part	Description
	ESA three-phase integrated unit communication adapter cable × 1		Inverter communication cable × 1
	100A grounding terminals×4		Gland rubber grommets×4
	Communication RJ45 plug ×2		Manual ×1

Table41 GW30K-STS-G10-Australia Region

Part	Description	Part	Description
	Static transfer switch cabinet×1		Expansion bolts×6
	Back mounting plate ×1		63A grounding terminals×4
	63A AC terminals×16		Ground terminal screws×4

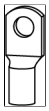
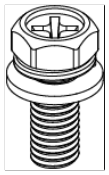
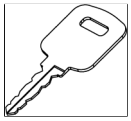
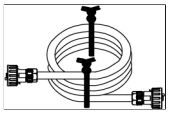
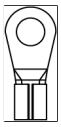
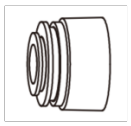
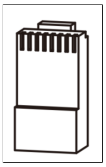
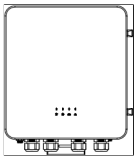
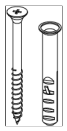
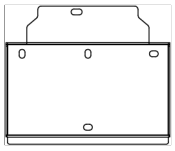
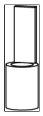
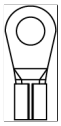
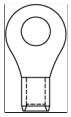
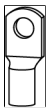
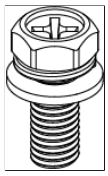
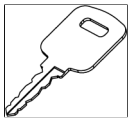
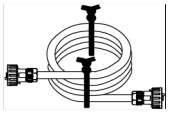
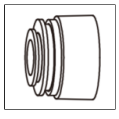
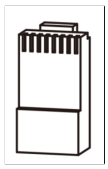
Part	Description	Part	Description
	M8 cabinet grounding OT terminal × 1		Cabinet grounding screw ×1
	Communication waterproof grommet ×1		Cabinet door keys × 2
	ESA three-phase integrated unit communication adapter cable × 1		Inverter communication cable × 1
	100A grounding terminals×4		Gland rubber grommets×4
	Communication RJ45 plug ×2		Manual ×1

Table42 GW30K-STS-G10-Other Regions

Part	Description	Part	Description
	Static transfer switch cabinet×1		Expansion bolts×6

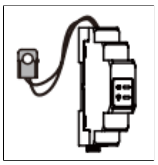
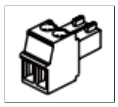
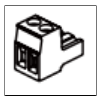
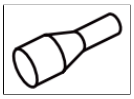
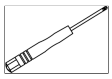
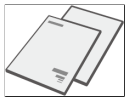
Part	Description	Part	Description
	Back mounting plate ×1		100A AC terminal ×12
	63A AC terminal ×4		100A grounding terminals×4
	63A grounding terminals×4		Ground terminal screws×4
	M8 cabinet grounding OT terminal × 1		Cabinet grounding screw ×1
	Communication waterproof grommet ×1		Cabinet door keys × 2
	ESA three-phase integrated unit communication adapter cable × 1		Inverter communication cable × 1
	Gland rubber grommets×4		Communication RJ45 plug ×2

Part	Description	Part	Description
	Manual ×1	-	-

Table43 GW60K-STS-G10-Other Regions

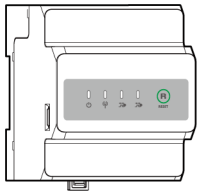
3.2.4 Smart Meter Delivery Package

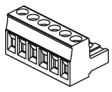
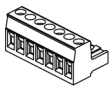
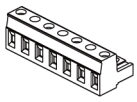
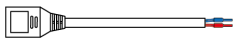
3.2.4.1 GMK110

Part	Description	Part	Description
	Smart meter and CT x 1		RS485 communication terminal x 1
	Voltage input side terminal x 1		Tubular terminal x 4
	Screwdriver x1		Product documentation x 1

3.2.4.2 Smart Meter Deliverables GM330&GMK330

3.2.4.2.1 Accessories List

Part	Description	Part	Description
	Smart meter x1 GMK330:CT×3; GMK360: CT×6; GM330: CT x 0。		2-pin communication terminal x1 Applicable to GM330.

Part	Description	Part	Description
	6PIN communication terminal x1 Applicable to GM330.		7-pin communication terminal x1 Applicable to GM330.
	Meter communication terminal Applicable to GMK330/GMK360.		RS485 communication terminal x 1
	2PINterminal andRJ45terminal adapter cable x 1		Screwdriver x1
	Ferrule terminal GMK330/GMK360: x 5 ; GM330: x 6。		Product documentation x 1

3.3 Equipment Storage

- If the inverter has been stored for more than two years or has been installed but not operated for more than 6 months, it is recommended that it be inspected and tested by qualified personnel before being put into operation.
- To ensure the proper electrical performance of the inverter's internal electronic components, it is recommended to power on the inverter once every 6 months during storage. If it has not been powered on for more than 6 months, have it inspected and tested by a qualified professional before use.
- To protect battery performance and service life, avoid storing the battery unused for extended periods. Long-term storage may cause deep discharge, resulting in irreversible chemical degradation and reduced capacity or even complete failure,; use the battery promptly. If long-term storage is necessary, maintain the battery as follows:

NOTICE
[1] Storage time is calculated from the SN date on the battery packaging. If the storage period is exceeded, charge/discharge maintenance is required. (Battery maintenance date = SN date + charge/discharge maintenance interval). For instructions on how to check the SN date, see:12.3.Battery SN Code Description(Page 330)。 [2] After the battery passes charge/discharge maintenance, update the maintenance information on the Maintaining Label if one is affixed to the outer carton. If there is no Maintaining Label, record the maintenance date and battery SOC yourself and retain the data for maintenance records.

Battery Model	Initial Battery SOC Range for Storage	Storage Temperature	Charge/Discharge Maintenance Interval[1]	Battery Maintenance Method[2]
GW5.1-BAT-D-G20	30~40%	0~35℃	-20–35°C, 12 months 35–45°C, 6 months	For maintenance instructions, consult your distributor or after-sales service center.
GW8.3-BAT-D-G20				
GW5.1-BAT-D-G21				
GW8.3-BAT-D-G21				
GW6.0-BAT-D-G20	30~40%	0~35℃	-20–35°C, 12 months 35–45°C, 6 months 45–55°C, 1 month	
GW9.0-BAT-D-G20				

Packaging requirements:
Ensure that the outer packaging is unopened and that the desiccant inside has not been removed.
Environmental requirements:

1. Store the equipment in a cool place, away from direct sunlight.
2. Ensure the storage environment is clean, with suitable temperature and humidity levels and no condensation. Do not install the equipment if condensation is present on its ports.
   - Battery storage humidity range for GW5.1-BAT-D-G20, GW8.3-BAT-D-G20, GW5.1-BAT-D-G21, and GW8.3-BAT-D-G21: 5%–95%.
   - Battery storage humidity range for GW6.0-BAT-D-G20 and GW9.0-BAT-D-G20: 4%–100%.
3. Store the equipment away from flammable, explosive, corrosive, and other hazardous materials.
4. Stacking requirements:
   - Ensure that the equipment is stacked in accordance with the stacking height and orientation indicated on the packaging labels.
   - Ensure that the stacked equipment is stable and not at risk of tipping over.

4 Installation

⚠DANGER

Use the parts supplied with the equipment when installing and making electrical connections. Damage to the equipment caused by failure to do so is not covered by the warranty.

4.1 Installation Requirements

4.1.1 Installation Environment Requirements

NOTICE

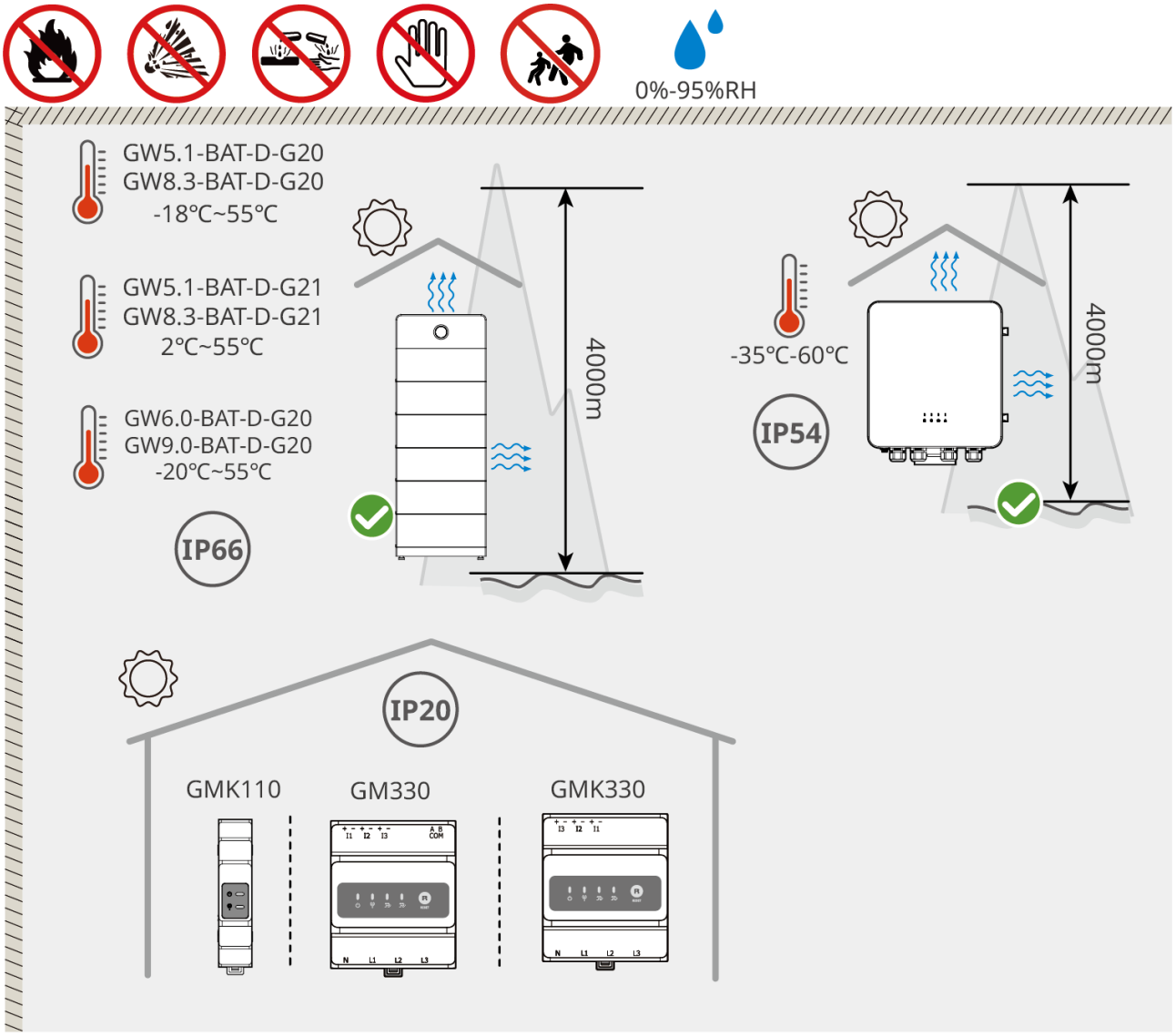
- Inverter Operating Temperature Range: -35°C to 60°C.
- GW5.1-BAT-D-G20 and GW8.3-BAT-D-G20: Charging temperature range: -18°C–55°C; discharging temperature range:-20℃-55°C. If installed in an ambient temperature below-18℃, the battery cannot be recharged to restore its energy after being fully discharged, resulting in Battery Undervoltage protection.
- GW5.1-BAT-D-G21 and GW8.3-BAT-D-G21: Charging temperature range: 2°C–55°C; discharging temperature range:-20℃-55°C. If installed in an ambient temperature below2℃, the battery cannot be recharged to restore its energy after being fully discharged, resulting in Battery Undervoltage protection.
- GW6.0-BAT-D-G20 and GW9.0-BAT-D-G20: Charging temperature range: -20°C–55°C; discharging temperature range:-20℃-55°C. If installed in an ambient temperature below -20℃, the battery cannot be recharged to restore its energy after being fully discharged, resulting in Battery Undervoltage protection.

1. The equipment must not be installed in environments that are flammable, explosive, highly corrosive, or similar.
2. Select a well-ventilated installation environment with evenly distributed temperature and humidity, and ensure that the ambient temperature and humidity always remain within the operating ranges specified in the manufacturer's datasheet.
3. It is recommended to install the equipment in a sheltered location, protected from

direct sunlight, rain, snow, and similar conditions. If site constraints prevent full shelter, ensure that ambient conditions, including temperature and humidity, always remain within the allowable ranges specified in the equipment datasheet, and implement the necessary protective measures.

4. Direct sunlight, high temperatures, and other adverse environmental conditions may cause the inverter to derate its output power. When selecting an installation site, give due consideration to heat dissipation and avoid direct sunlight on the equipment.
5. Do not install or store the equipment in areas exposed to direct cold airflow, such as near air conditioner outlets. Excessive localized temperature differences may cause condensation inside the equipment, potentially resulting in equipment damage.
6. Do not install the equipment in living areas such as bedrooms, living rooms, or children's rooms, or in locations prone to accidental contact, such as public corridors or beneath stairways, unless locking or physical isolation measures have been implemented. Install the equipment in an area accessible only to authorized personnel.
7. Install the equipment out of the reach of children and away from locations where it may be accidentally touched.
8. The equipment surface may become hot during operation. Take care to avoid burns.
9. The installation space must meet the equipment's ventilation and heat dissipation requirements, as well as provide sufficient clearance for operation.
10. The installation environment must meet the equipment's Ingress Protection Rating. The inverter, battery, and smart communication dongle are suitable for indoor and outdoor installation; the meter is for indoor installation only.
11. Install the equipment at a height that allows convenient operation and maintenance. Ensure that the indicator lights and all labels are easy to view and that the terminals are readily accessible.
12. The equipment installation altitude must be below the Max. Operating Altitude.
13. The equipment generates some Noise Emission during operation. When selecting an installation site, carefully consider the impact of noise on the surrounding environment. Install the equipment away from noise-sensitive areas, including but not limited to residential areas, schools, hospitals, nursing homes, and office buildings.
14. Consult the equipment manufacturer before installing equipment outdoors in areas subject to salt damage. Such areas generally refer to locations within 500 m of the coast. The affected area depends on factors such as sea winds, precipitation, and terrain.

15. Keep away from strong magnetic fields to avoid electromagnetic interference. If a radio station or wireless communication equipment operating below 30 MHz is located near the installation site, install the equipment as follows:
    a. Inverter: Add a ferrite core with multiple turns of winding to the inverter DC input cable or AC output cable, or install a low-pass EMI filter; alternatively, ensure the distance between the inverter and the radio interference device is greater than 30 m.
    b. Other equipment: Ensure the distance between the equipment and the radio interference device is greater than 30 m.



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4.1.2 Installation Space Requirements

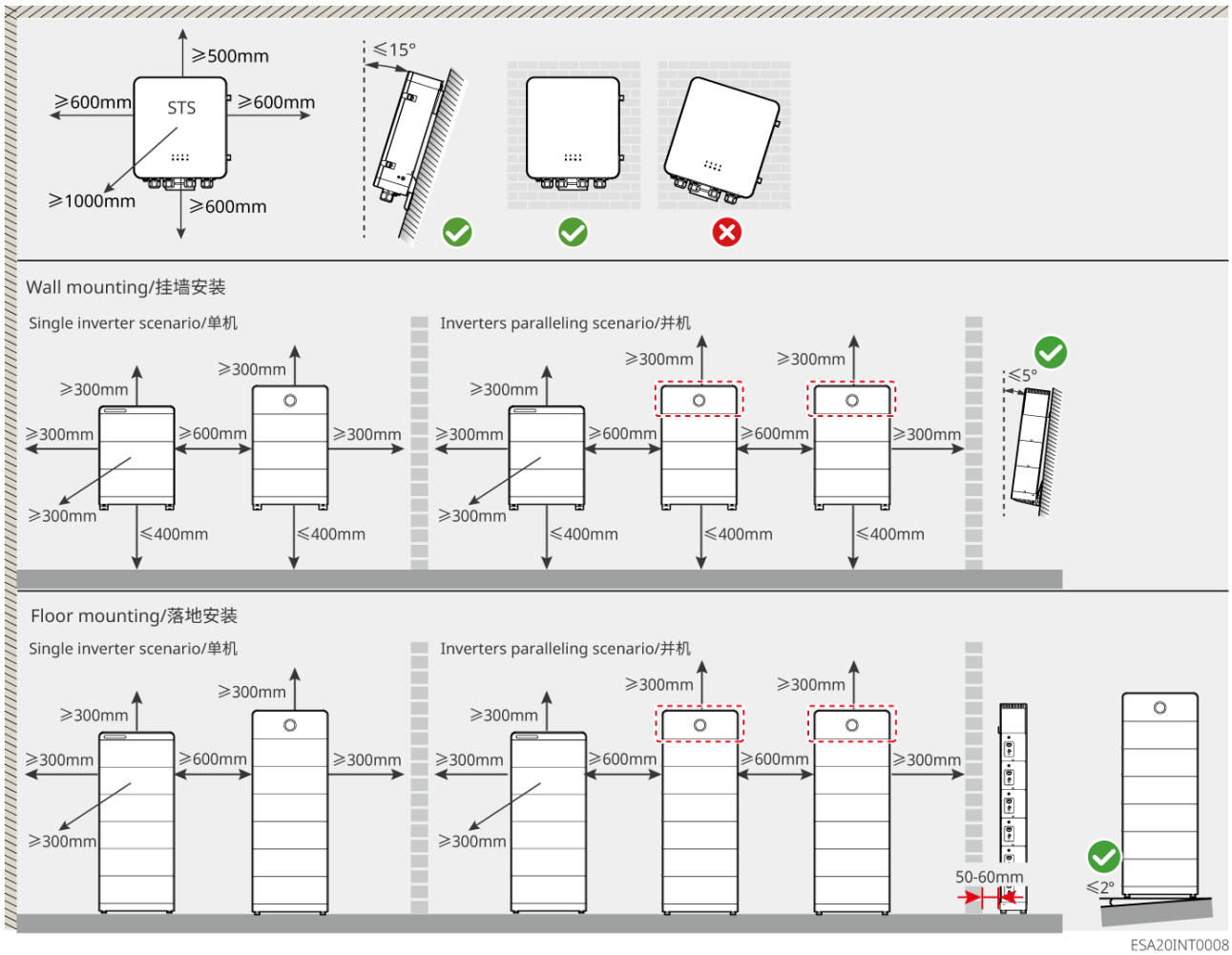
1. **Installation space**

a. Ventilation, heat dissipation, and operating space

- The installation space must meet the equipment ventilation and heat dissipation requirements, with sufficient clearance around the equipment for heat dissipation.
- The installation space must meet operational clearance requirements to facilitate routine inspections, wiring, and maintenance.

b. Installation height

- The equipment must be installed at a height that allows for easy operation and maintenance.
- Ensure that the equipment indicators and all labels are easy to view.
- Ensure that the wiring terminals are easily accessible.

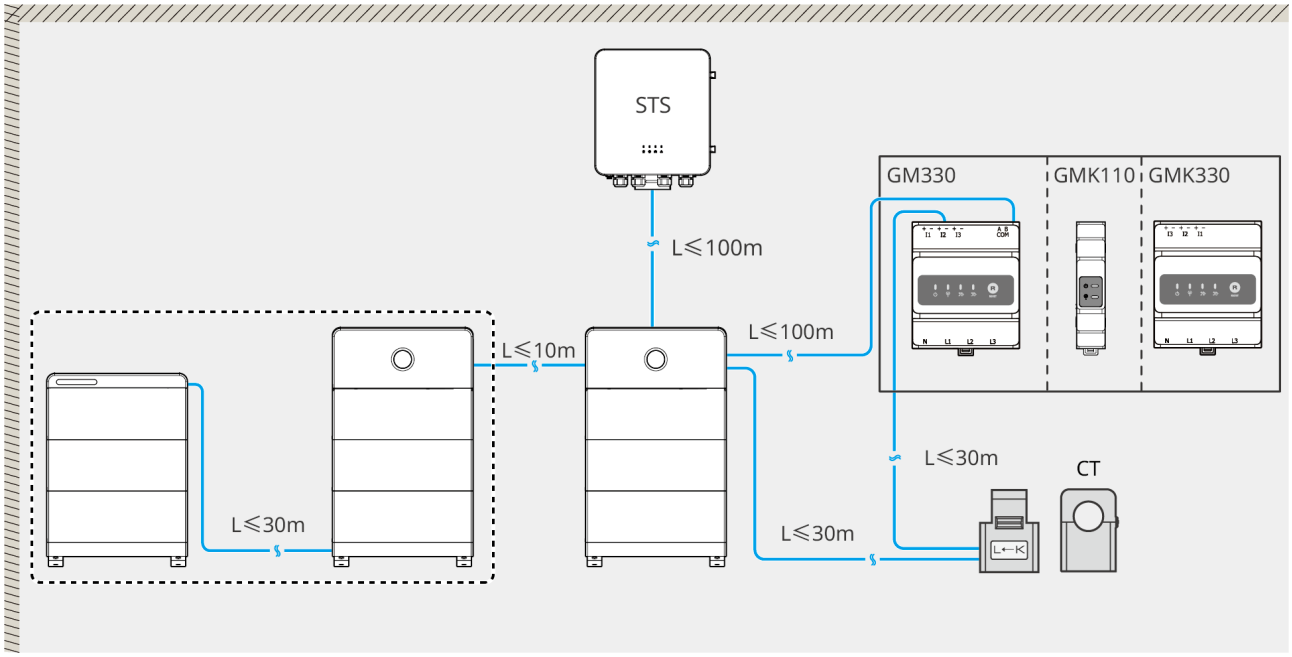


- When using CAT 7E communication cables between inverters, the cable length

must not exceed 10 m; when using CAT 5E or CAT 6E communication cables, the cable length must not exceed 5 m. Do not use communication cables longer than 10 m, as this may cause communication faults.

- Use shielded CAT 5E or higher-grade network cable for CT installation; the cable length must not exceed 30 m.
- The RS485 twisted-pair shielded cable for communication between the inverter and the energy meter must not exceed 100 m.

Communication cable length

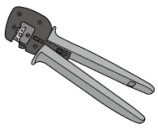
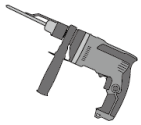
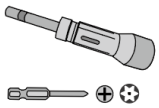
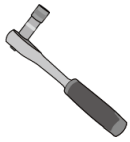
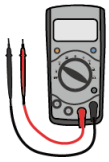
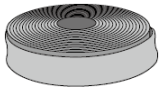
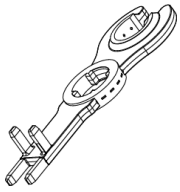


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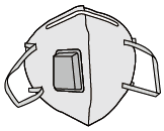
4.1.3 Tool Requirements

Note
During installation, it is recommended to use the following installation tools. If necessary, other auxiliary tools can be used on site.

Installation Tools

Tool Type	Description	Tool Type	Description
	Diagonal Cutting Pliers		RJ45 Crimping Tool
	Wire Strippers		Spirit Level
	Open-End Wrench		PV Terminal Crimping Tool PV-CZM-61100
	Impact drill (drill bit Φ12mm)		Torque wrench M4、M5、M6、M10
	Rubber mallet		Socket wrench set
	Marker pen		Multimeter Measuring range ≤600V
	Heat shrink tubing		Heat gun
	Cable ties		Vacuum cleaner
	(China Only) PV Unlock Tool	-	-

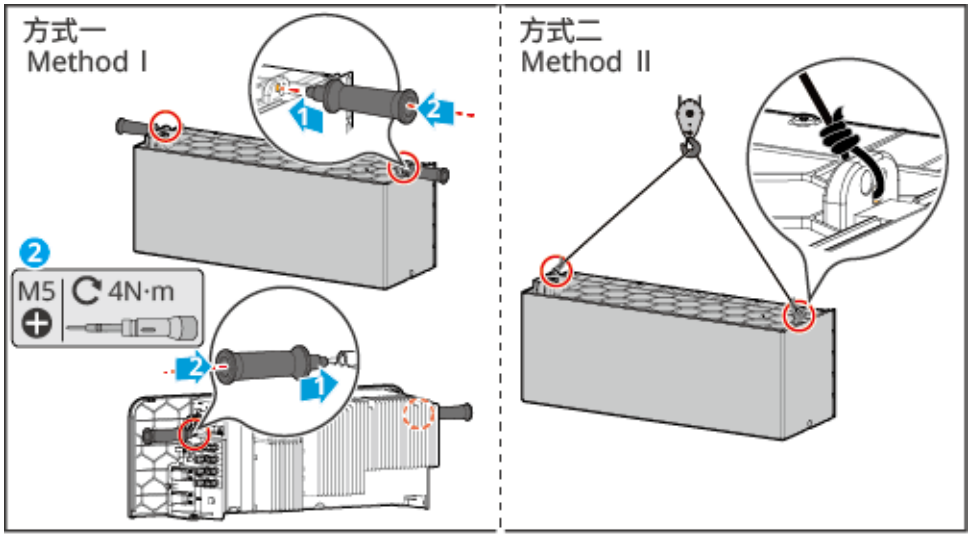
Personal protective equipment

Tool Type	Description	Tool Type	Description
	Insulating gloves, protective gloves		Dust mask
	Safety goggles		Safety shoes

4.2 Equipment Handling

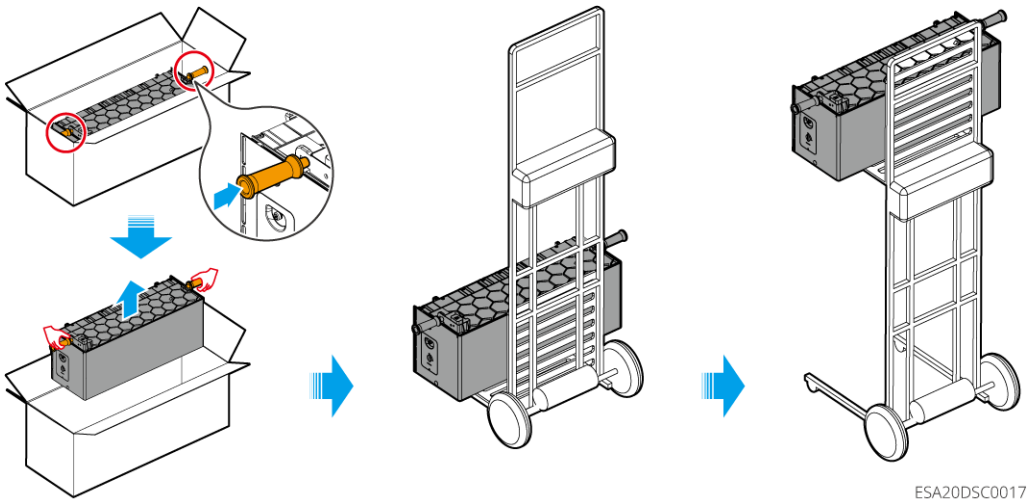
⚠CAUTION

- During transportation, transfer, installation, and other operations, comply with the laws, regulations, and applicable standards of the country or region where the work is performed.
- Before installation, move the equipment to the installation site. To prevent personal injury or equipment damage during handling, observe the following precautions:
  1. Assign an appropriate number of people based on the equipment weight to ensure it does not exceed the load that can be safely carried, which could cause injury if dropped.
  2. Wear safety gloves to prevent injury.
  3. Keep the equipment balanced during transport to prevent it from falling.
  4. The battery system can be transported to the installation site by crane or using a transport trolley.
     a. When using an installation trolley, select one with reference dimensions of 850 mm × 700 mm × 1900 mm, a load capacity of at least 300 kg, and a lifting height of 2 m. Follow the trolley manufacturer's instructions for specific operating procedures. Ensure personal safety during on-site operation and comply with local regulations.
     b. When lifting the equipment, use flexible slings or straps. Each individual strap must have the following load-bearing capacity:
        - GW5.1-BAT-D-G20, GW5.1-BAT-D-G21, GW6.0-BAT-D-G20 ⩾185KG
        - GW8.3-BAT-D-G20, GW8.3-BAT-D-G21, GW9.0-BAT-D-G20 ⩾240KG



ESA20INT0010

Method 3



ESA20DSC0017

4.3 Install The Device

⚠Caution

- When drilling, ensure the drilling position avoids water pipes, cables, etc. inside the wall to avoid danger.
- When drilling, wear safety goggles and a dust mask to avoid inhaling dust or getting it into your eyes.
- Install the inverter above the battery. Do not install the battery above the inverter.
- When installing the battery system, ensure that it is level and secure. When placing the battery base, battery, and inverter, confirm that the upper and lower mounting holes are aligned; the anti-tip bracket should be vertically flush against the ground, wall, or battery system surface.
- When drilling with an impact drill, cover the battery system with a protective shield such as cardboard to prevent foreign objects from entering the device and causing damage.
- For wall-mounted installation, to ensure the safety of your life and property, be sure to evaluate the load-bearing capacity of the wall.

Note

- The battery must be installed on the base. The base can be placed on the floor or installed on the wall-mounting bracket.
- When using the base installation, a maximum of 6 batteries can be stacked.
- The maximum number of stacked units when installing with a mounting bracket is as follows:
  - Same Energy Stacking:
    - Same Energy Stacking:
      - GW5.1-BAT-D-G20, GW5.1-BAT-D-G21: up to 3 units.
      - GW8.3-BAT-D-G20, GW8.3-BAT-D-G21: up to 2 units.
      - GW6.0-BAT-D-G20: up to 3 units.
      - GW9.0-BAT-D-G20: up to 2 units.
  - Different Energy Mixed Stacking:
    - When GW5.1-BAT-D-G20, GW5.1-BAT-D-G21, and GW6.0-BAT-D-G20 are mixed in a stack, each system stack supports up to 3 units.
    - GW8.3-BAT-D-G20, GW8.3-BAT-D-G21, GW9.0-BAT-D-G20, and models stacked in combination with them, a single system stack supports up to 2 units.
- The base, wall-mounting bracket, and topmost battery must be secured to the wall with anti-tip brackets.
- When marking the drilling positions for the bracket installation, have one person hold the base steady while the other marks the drilling positions with a marker.
- When installing the battery and inverter, remove the protective covers on the blind-mating connectors before stacking.

Wall-mounted installation

Step 1: Install the base onto the wall-mounting bracket.

Step 2: Position the wall-mounting bracket flush against the wall. Ensure the bracket is firmly placed, and check the level bubble at the center of the base.

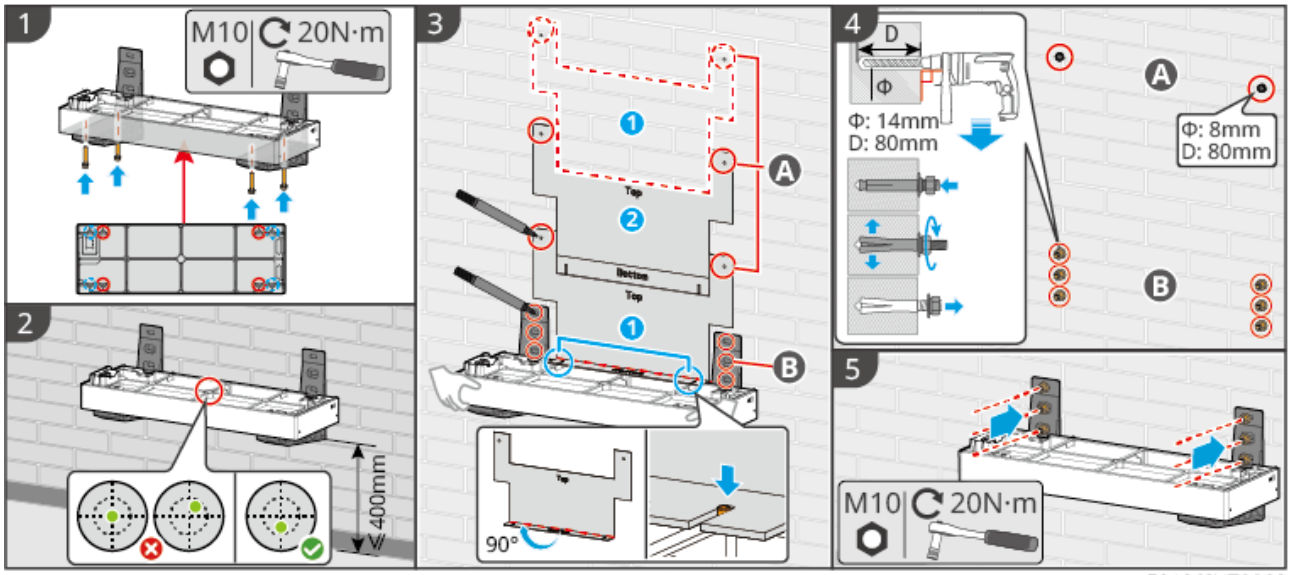
Step 3: After adjusting the position and levelness of the wall-mounting bracket, use a marker to mark the drilling positions. Once marked, move the bracket away. (A: PACK mounting holes; B: bracket mounting holes.)

Step 4: Drill the holes and install the expansion bolts.

1. Use an impact drill to drill the holes.

2. Clean the holes.
3. Use a rubber mallet to install the expansion bolts into the holes.
4. Use a hex wrench to tighten the nuts clockwise to expand the bolts.
5. Remove the nuts by turning them counterclockwise.
6. Use a torque screwdriver to fasten the anti-tip bracket to the wall.

Step 5: Use an external hex wrench to secure the mounting bracket to the wall.



ESA20INT0003

Install the base

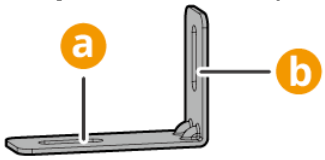
Step 1: Install the adjustable feet on the bottom of the base, and fasten the anti-tip bracket to the base.

Step 2: Place the base 50-60mmaway from the wall, keeping it parallel to the wall. Observe the level bubble in the center of the base; if the bubble is not centered, use the adjustable feet to level it.

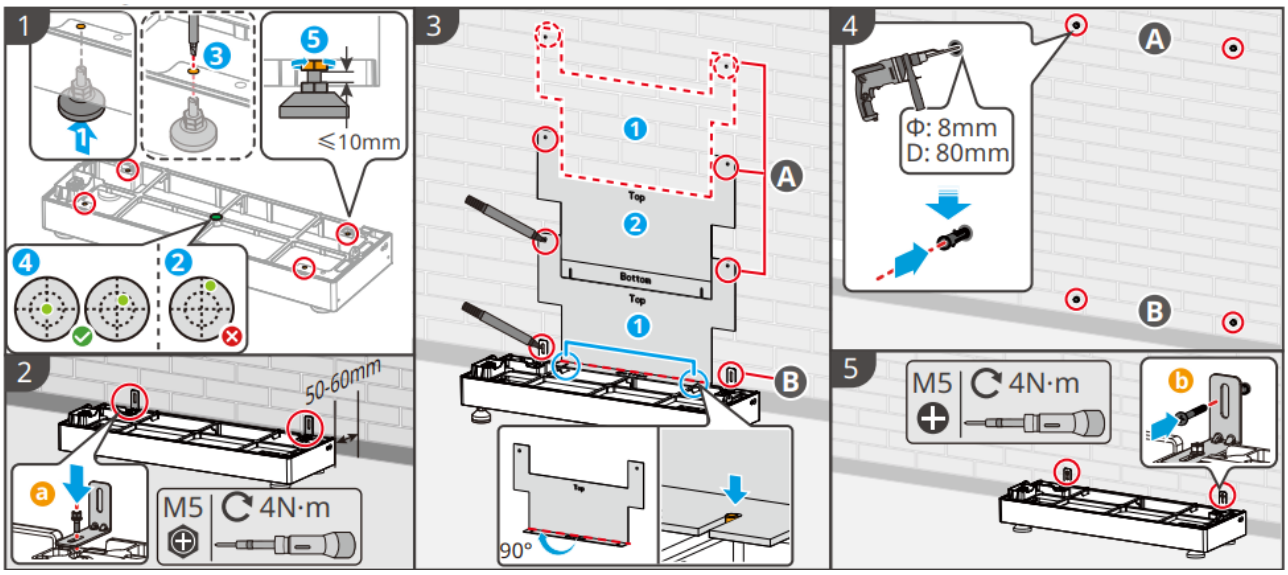
Step 3: After adjusting the position and levelness of the base, use the drilling marking paper to mark the hole positions. After marking, remove the base. (A: PACK fixing hole; B: bracket fixing hole.)

Step 4: Use an impact drill to drill the holes, and clean the holes.

Step 5: Use a Phillips screwdriver to fasten the anti-tip bracket to the wall.



a: surface fixed to the base; b: surface fixed to the wall.



Install the battery and inverter

Step 1: Remove the protective cover on the blind-mate connector at the bottom of the inverter or battery.

Step 2: Install the handle (optional), and stack the battery onto the base.

If installing more than 3 batteries, use lifting tools.

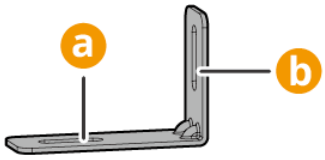
Step 3: Tighten the screws between the battery and the base or between batteries.

If you need to install multiple batteries, please repeat**Step1**and**Step2**to complete all battery installations. The number of stacked batteries shall follow "2.2.1.System Overall Configuration Description(Page 52)".

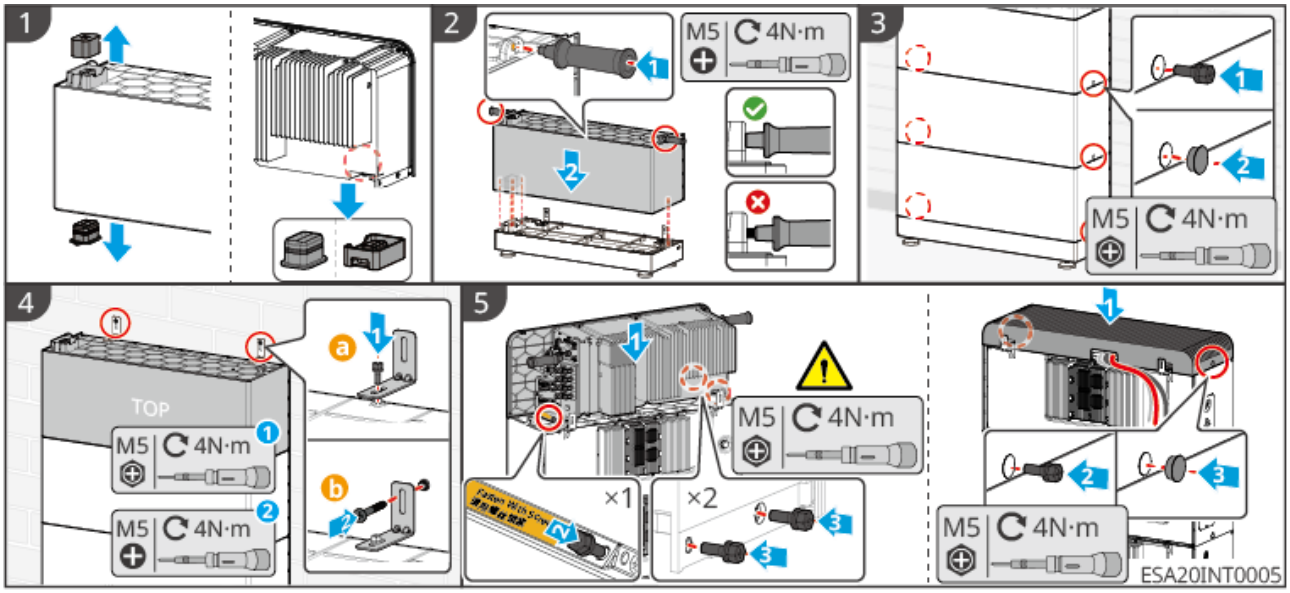
Step 4: Secure the topmost battery to the wall using the anti-tip bracket.

Step 5: Install the protective cover of the inverter or battery.

- Integrated installation: Lift the inverter, align it, and stack it on top of the battery, then tighten the screws between the inverter and the battery. If the system is an integrated configuration, the installation is now complete.
- Split-type expansion: Repeat the battery installation steps. After completing the electrical connections, place the battery protective cover on top of the battery and tighten the side screws.



a: surface fixed to the PACK; b: surface fixed to the wall.

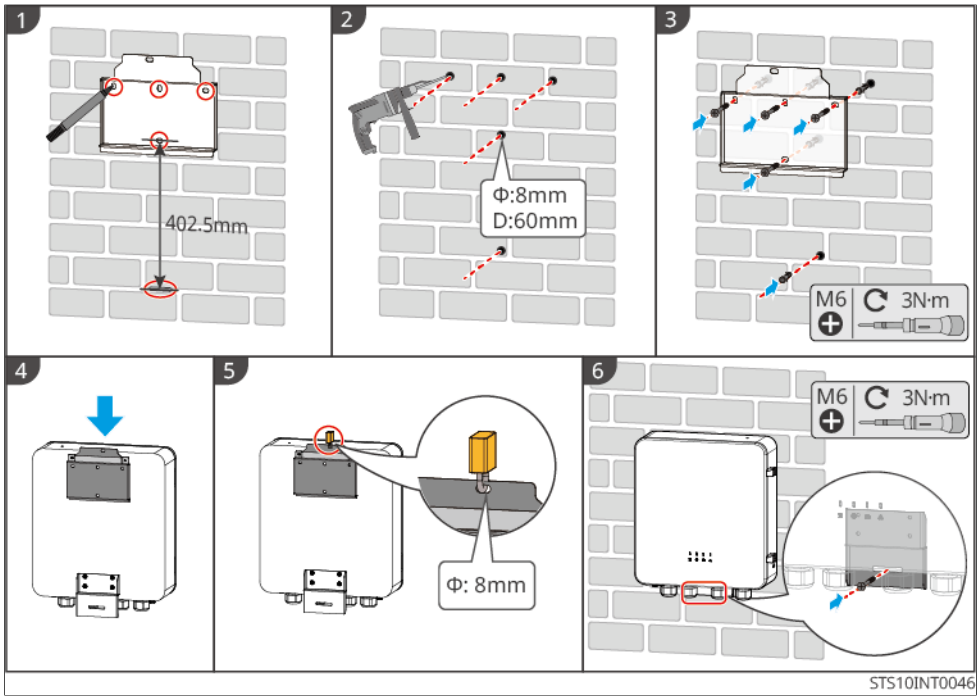


4.4 Install STS

⚠Caution

- When drilling, ensure the drilling position avoids water pipes, cables, etc. inside the wall to avoid danger.
- When drilling, wear safety goggles and a dust mask to avoid inhaling dust or getting it into your eyes.
- For wall-mounted installation, to ensure the safety of your life and property, be sure to evaluate the load-bearing capacity of the wall.
- Ensure the device is installed securely to prevent it from falling and injuring personnel.

1. Place the backplate horizontally on the wall, and use a marker pen to mark the drilling positions.
2. Use an impact drill to drill the holes.
3. Use expansion bolts to secure the backplate to the wall.
4. Mount the STS onto the backplate.
5. Install the anti-theft lock.
6. Secure the fixed support bracket to the wall using M6 screws.

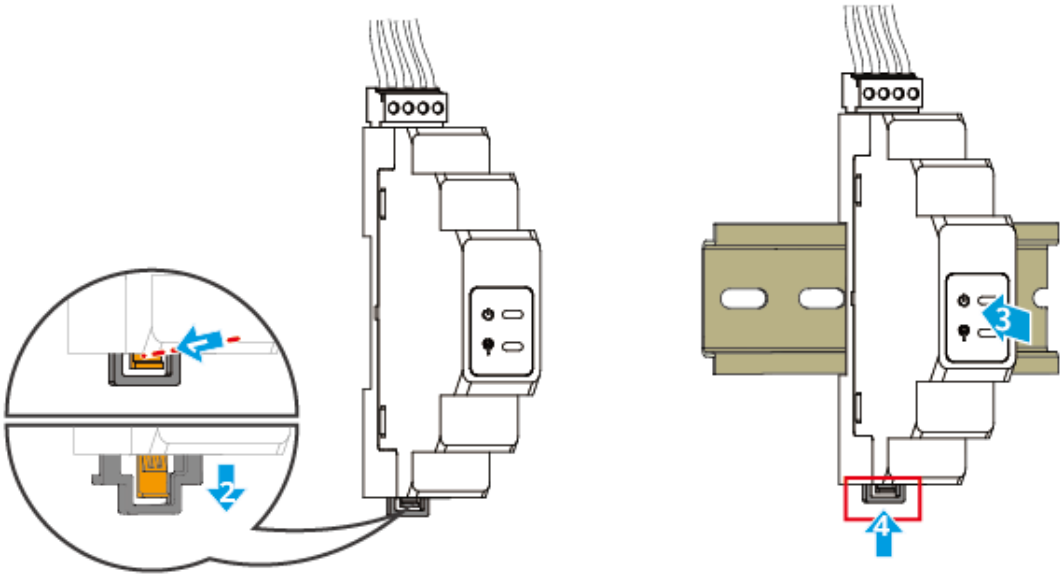


4.5 Meter Installation

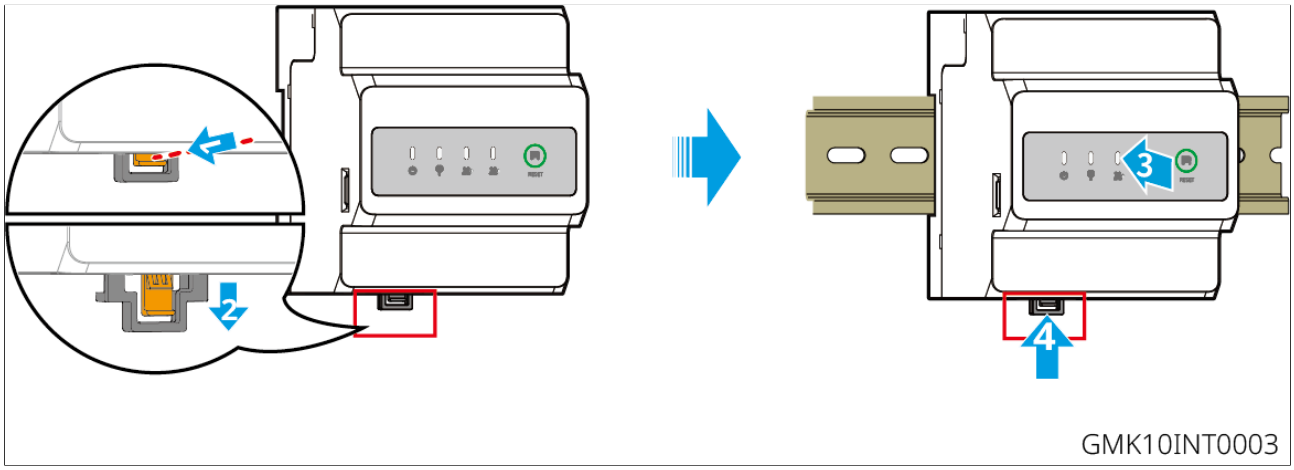
Warning

In areas with risk of lightning, if the meter cable length exceeds 10 m and the cable is not routed in grounded metal conduit, it is recommended to install an external lightning protection device.

GMK110



GM330&GMK330



5 System Wiring

⚠Danger

- The installation, routing and connection of cables must comply with local laws, regulations, and specification requirements.
- All operations during electrical connection and the specifications of cables and components used must comply with local laws and regulations.
- Before performing electrical connections, disconnect the device's DC Switch and AC output switch to ensure the device is powered off. Live work is strictly prohibited; otherwise, electric shock and other hazards may occur.
- Cables of the same type should be bundled together and routed separately from cables of different types. Mutual twisting or cross routing is prohibited.
- If the cable is subjected to excessive tension, it may lead to poor connections. When wiring, leave a certain length of spare cable before connecting it to the inverter terminal port.
- When crimping wiring terminals, ensure that the conductor part of the cable fully contacts the terminal. Do not crimp the cable insulation together with the terminal; otherwise, the equipment may fail to operate, or after operation, unreliable connections may cause heating and damage to the inverter terminal block.
- This inverter has not been tested and verified against the AS/NZS 4777.2:2020 standard for multi-phase inverter combinations, so such combination schemes should not be adopted.
- Seal unused cable routing holes and ports (including communication ports) reliably with the dedicated terminals or plugs provided in the accessory kit. Otherwise, the following risks may occur:
  - Electric shock hazard: Open electrical ports may expose personnel to live parts, causing electric shock accidents.
  - Protection failure: Open ports allow dust, moisture, or foreign objects to enter, which may cause short circuits, fire, or equipment failure.

Note

- When performing electrical connections, wear personal protective equipment such as safety shoes, protective gloves, and insulating gloves as required.
- Only professionals are allowed to perform electrical connection operations.
- The cable colors in the figures in this document are for reference only. Specific cable specifications must comply with local regulatory requirements.
- The Static Transfer Switch (STS) is an optional accessory and is only applicable to single-unit system scenarios. If needed, follow the wiring method below.

5.1 System Electrical Wiring Diagram

Note

- According to regulatory requirements in different regions, the wiring of the N and PE wires for the inverter's ON-GRID and BACK-UP ports varies. Refer to local regulatory requirements.
- The inverter has a built-in meter and can be used by connecting directly to CTs. The CT network cable shipped with the package is 10 meters. If a longer distance is required, use a shielded network cable of CAT5E or above to extend up to 30 meters.
- CTconnection length to the inverter exceeds 30m, accuracy will decrease. If high accuracy is required, an external smart meter can be connected.
- The inverter GRID AC port has a built-in relay. When the inverter is in off-grid mode, the built-in GRID relay is open; when the inverter is in grid-connected mode, the built-in GRID relay is closed.
- When the inverter is powered on, the BACK-UP AC port is live. If maintenance on the BACK-UP load is required, power off the inverter; otherwise, electric shock may occur.
- In a whole-home 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. At this time, please turn off some non-essential loads to ensure that the total load power is less than the inverter power.

N and PE wires are connected together in the distribution box.

Note

- To maintain neutral integrity, the neutral wires on the grid-connected side and the off-grid side must be connected together; otherwise, the off-grid function will not work properly.
- The following figure is a schematic of the grid system for regions such as Australia and New Zealand:

Type 1:

Whole-Home Backup

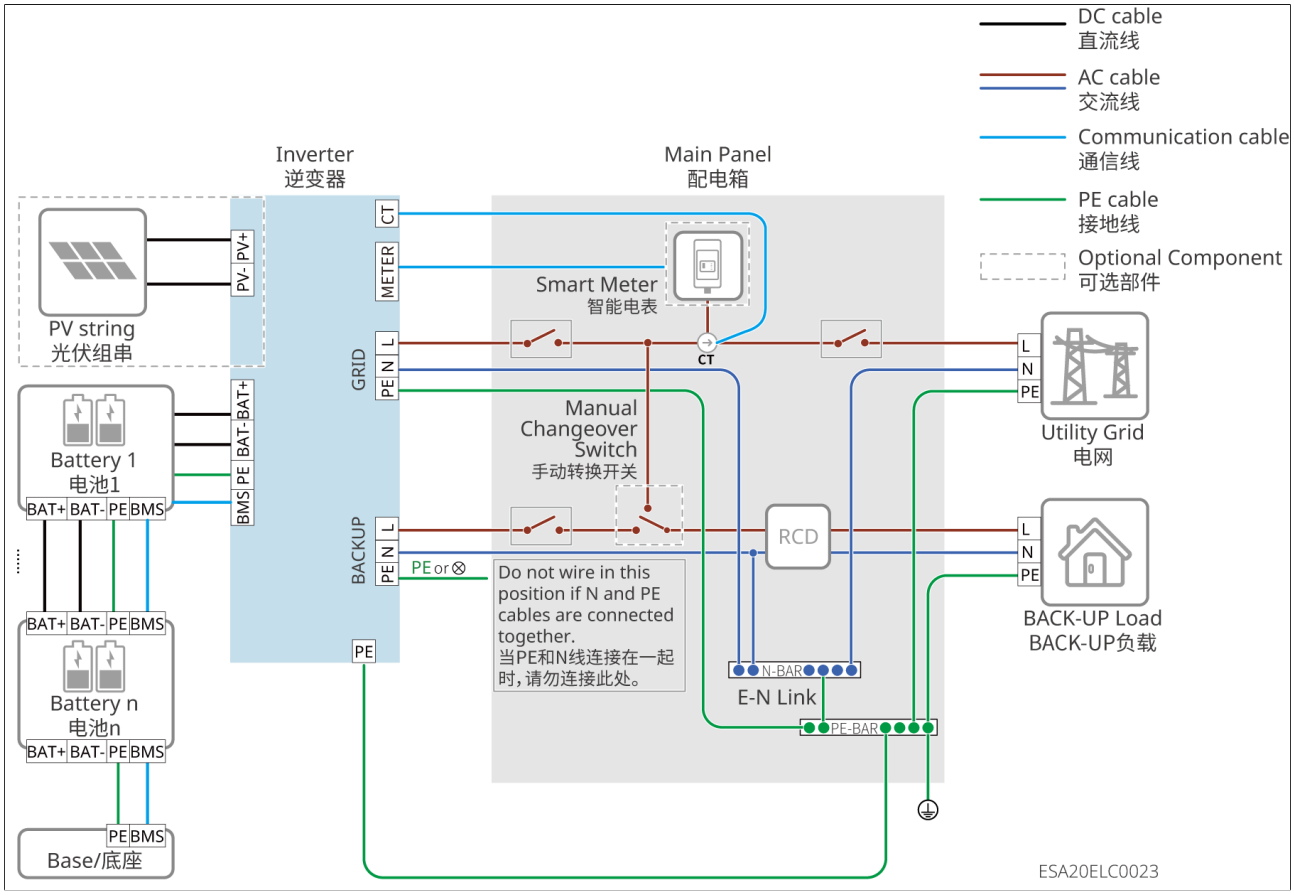


Figure17 Whole-Home Backup

Partial Backup

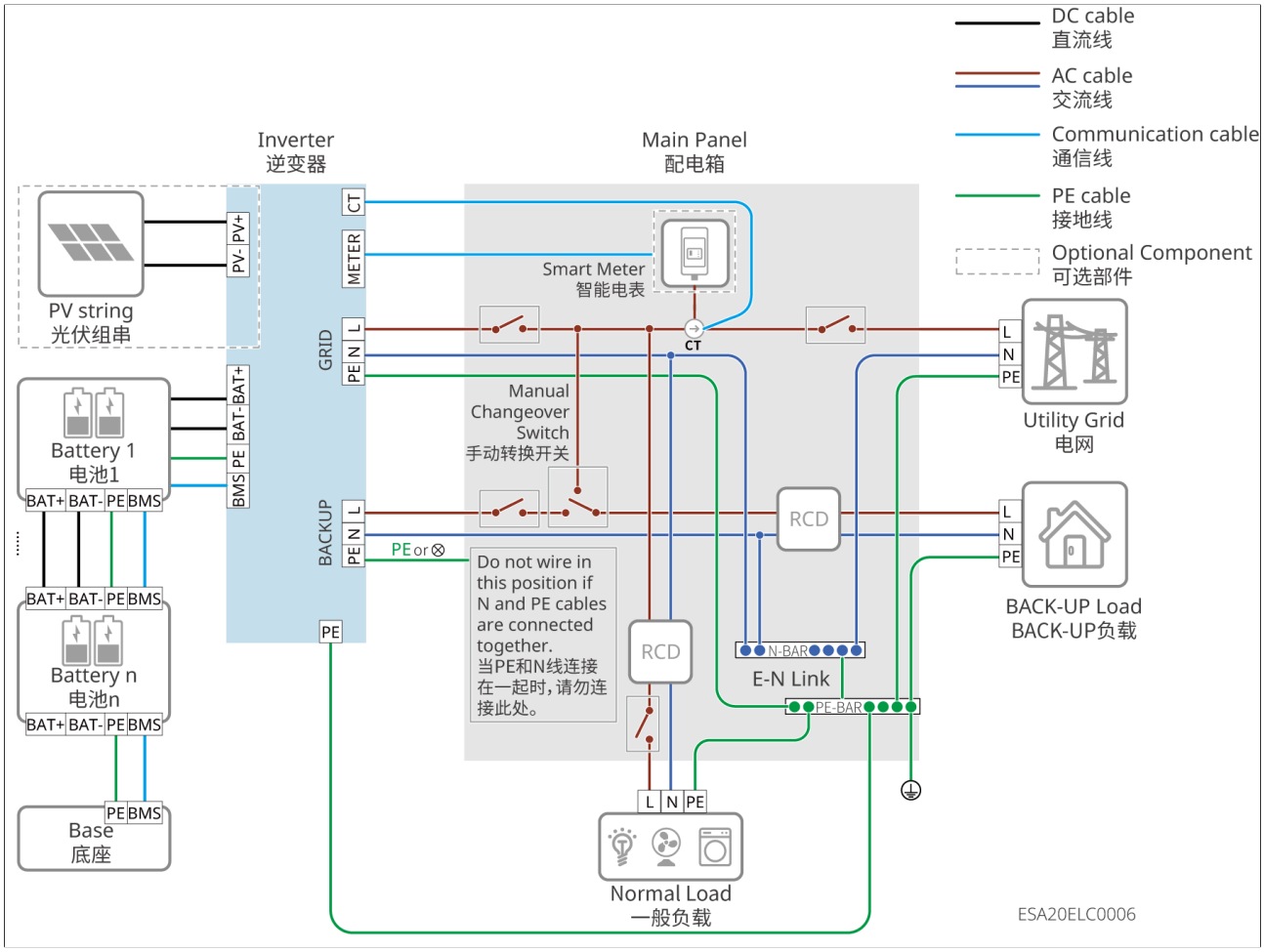


Figure18 Partial Backup

Type 2:

Whole-Home Backup

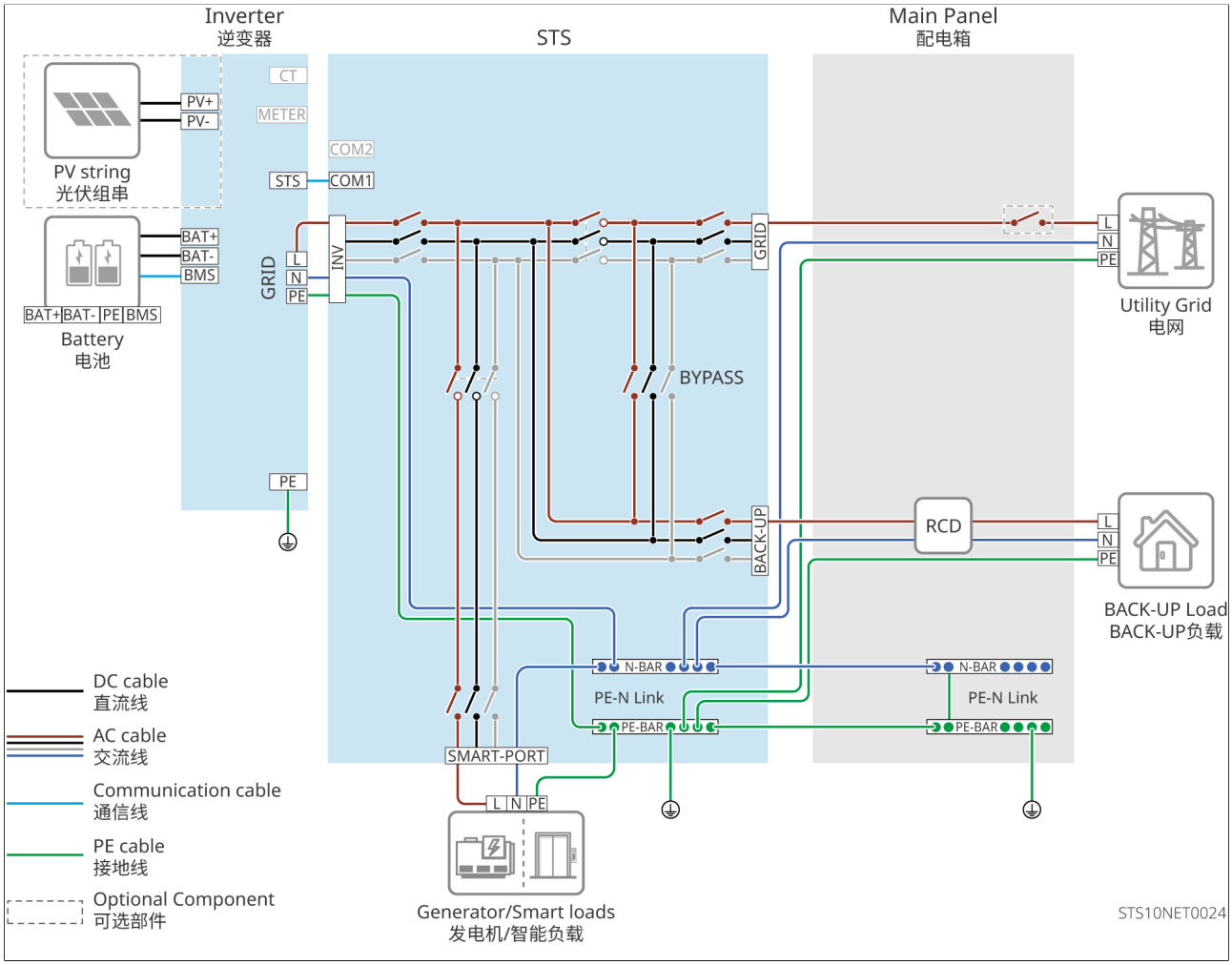


Figure19 Whole-Home Backup with STS

Partial Backup

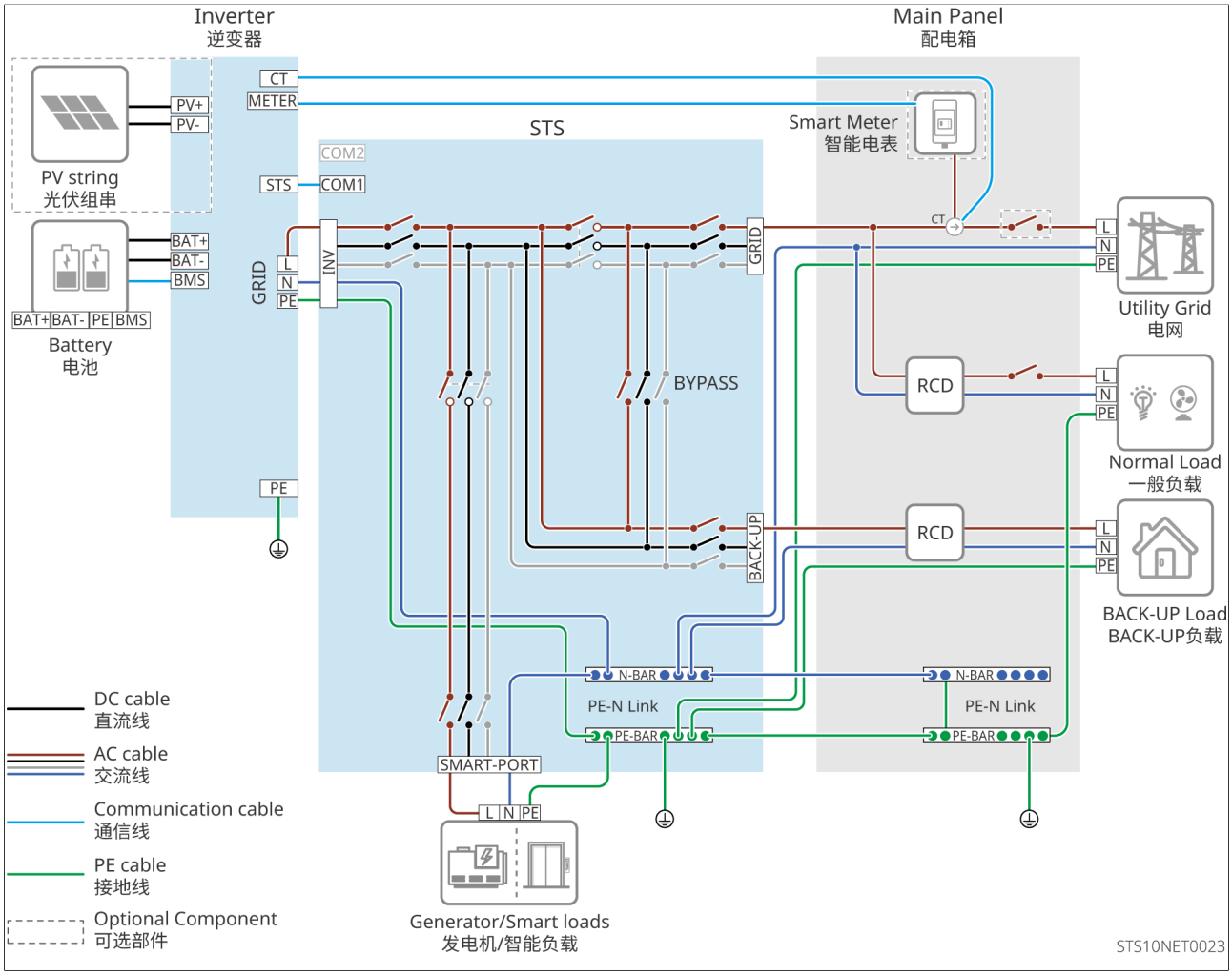


Figure20 Partial Backup with STS

NandPEwires are connected separately in the distribution box

Note

- Please ensure that the BACK-UP Protection earth wire is correctly and securely connected; otherwise, the BACK-UP function may malfunction when a grid fault occurs.
- In a parallel system, do not install Residual Current Protection Devices (RCD) on each inverter's grid-connected branch; RCDs should be uniformly installed at the grid aggregation point.
- For regions other than Australia, New Zealand, etc., the following wiring method applies:

Type 1:

Whole-Home Backup

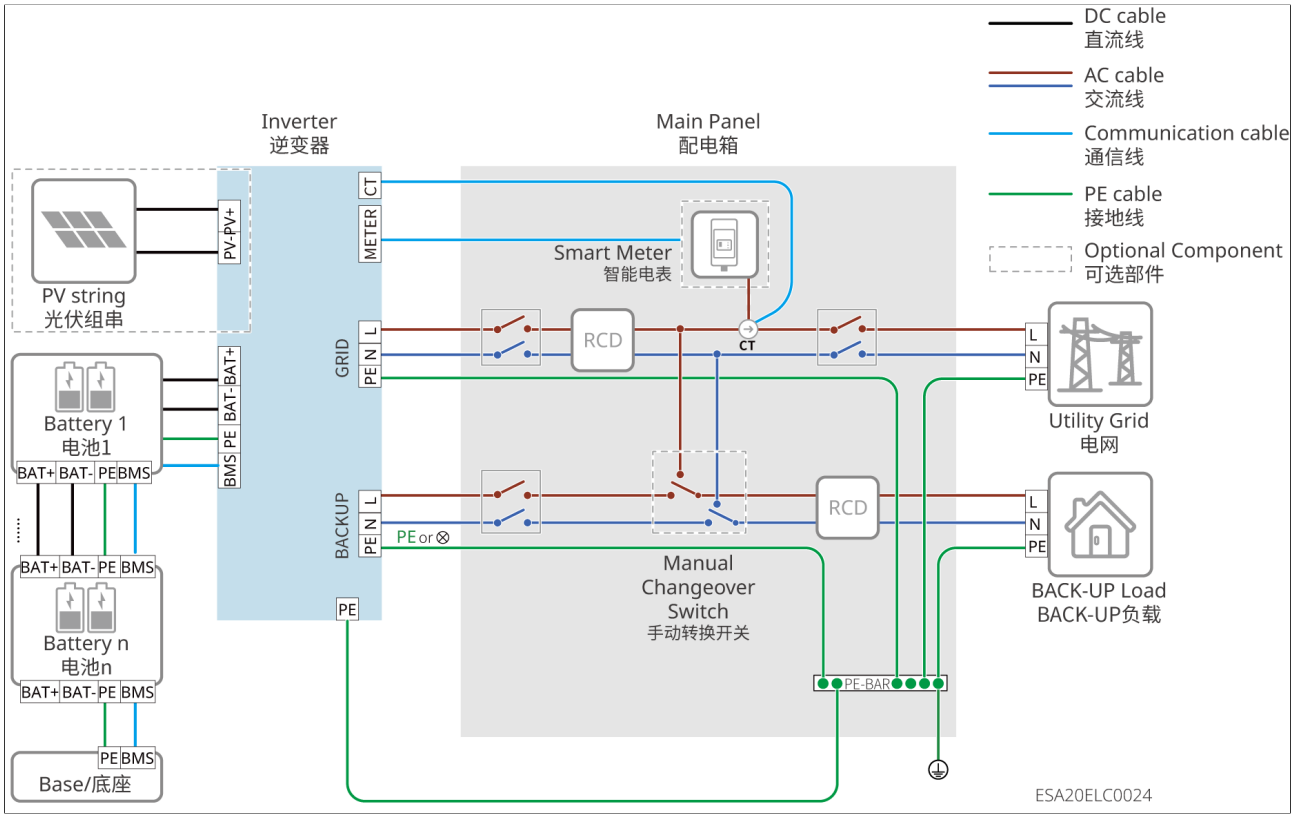


Figure21 Whole-Home Backup

Partial Backup

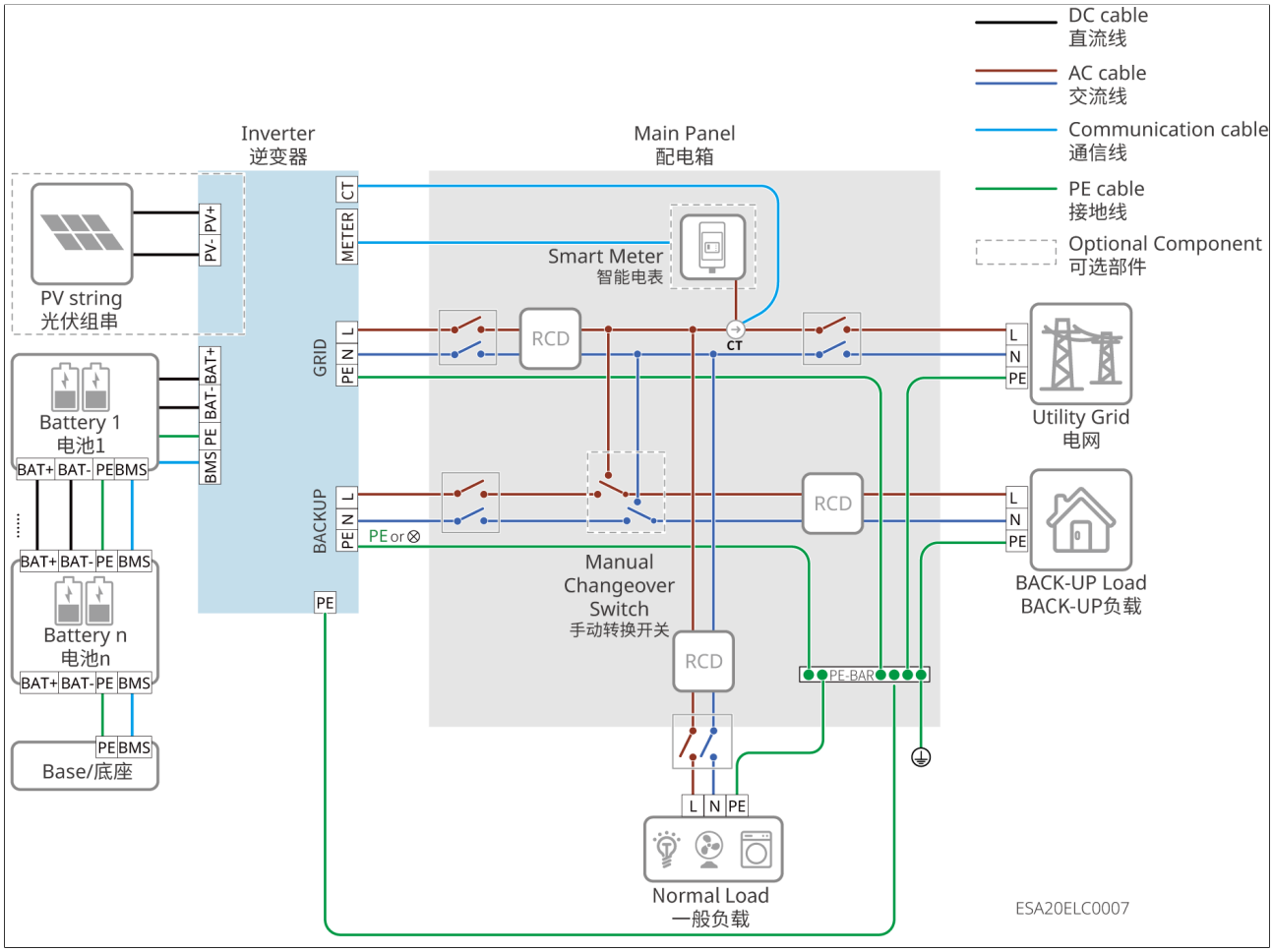


Figure22 Partial Backup

Type 2:

Note
If the inverter does not need to connect the N and PE wires when switched to off-grid mode, this function can be set via the 'Advanced Settings' screen in the App under 'Backup Power N and PE Relay Switch'. For regions other than Australia, New Zealand, etc., the following wiring method applies:

Whole-Home Backup

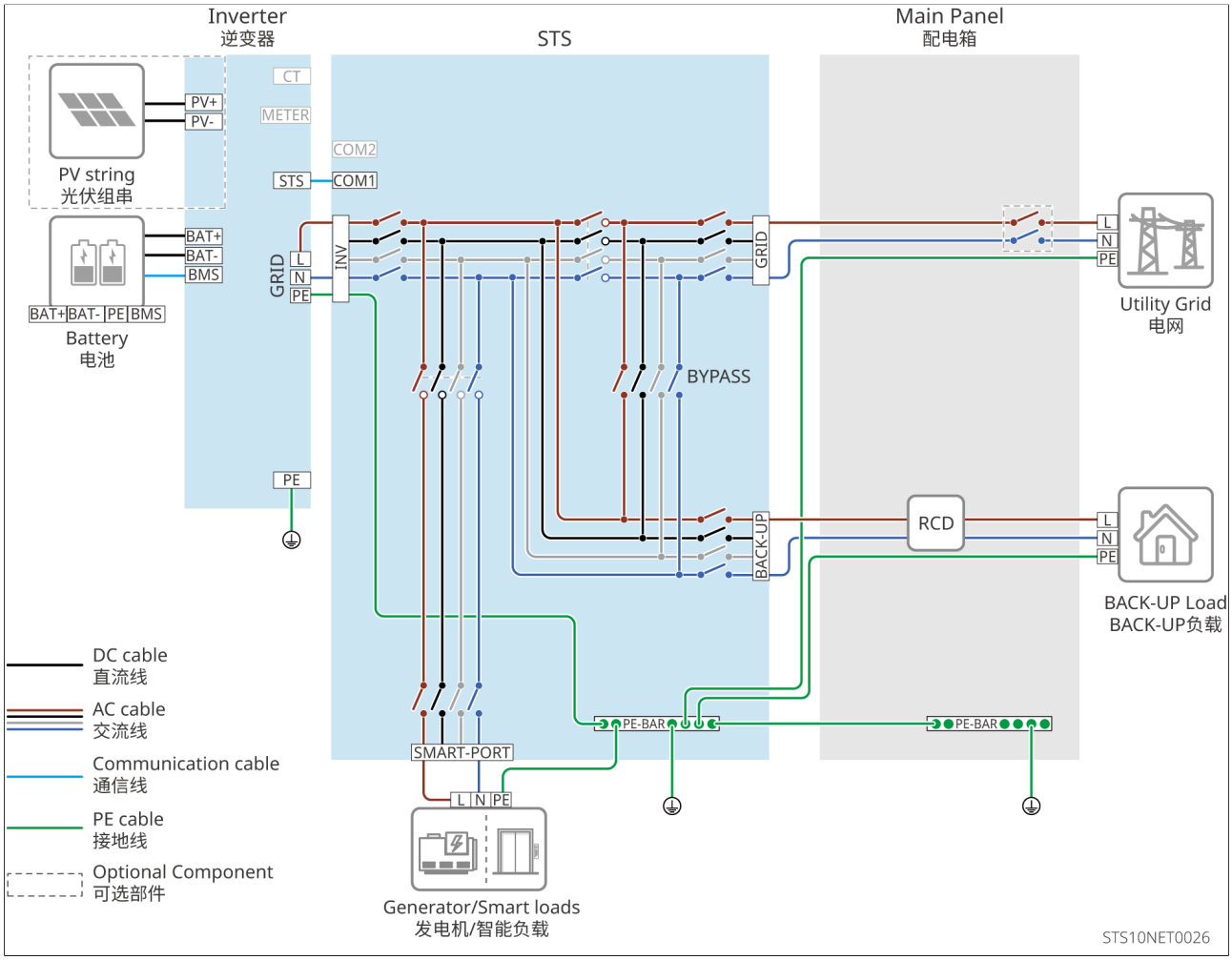


Figure23 Whole-Home Backup with STS

Partial Backup

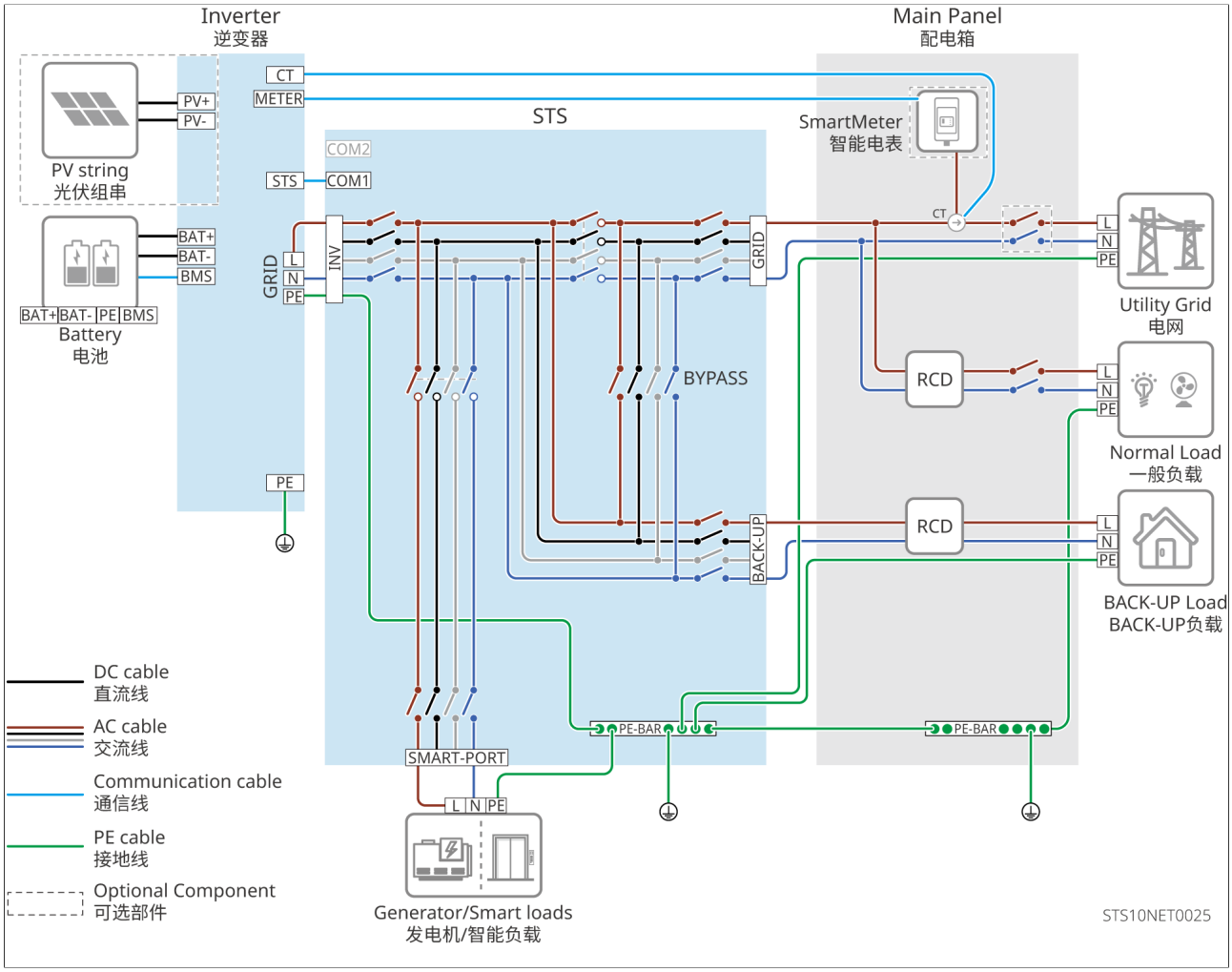
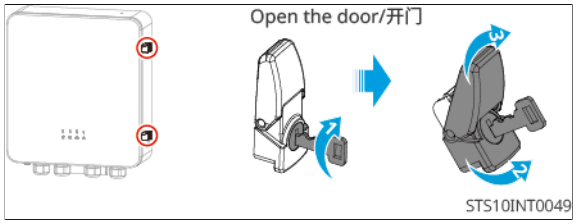
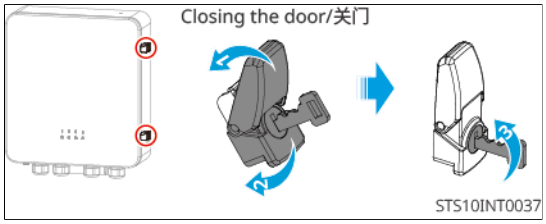


Figure24 Partial Backup with STS

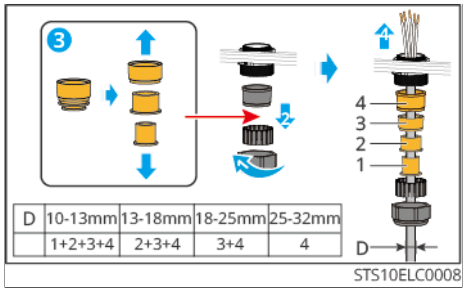
5.2 Preparation before STS Wiring

- **Cabinet Door**

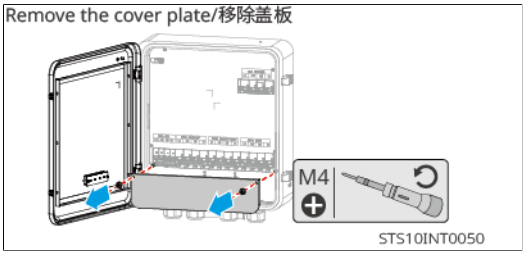


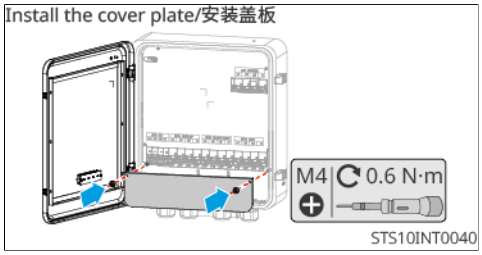


- **Cable Gland Operation**

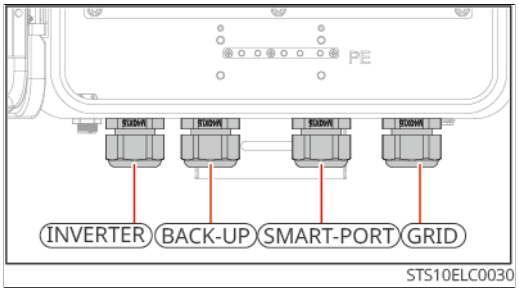


- **Cover Plate Operation**





- **Output Wiring Diagram**



5.3 Detailed System Wiring Diagram

When the loads in a PV system cannot consume all the electricity generated by the system, the surplus electricity is exported to the grid. A smart meter or CT can be used to monitor Energy Generation and control the amount of electricity exported to

the grid.

- Connect a smart meter to enable output power limitation and load monitoring.
- After connecting the smart meter, enable the "Grid-Tied Power Limit" function in the app.

The system wiring diagrams show wiring examples using only selected equipment models. Refer to the wiring instructions for the corresponding equipment in the relevant section and wire the system according to the equipment actually used.

⚠WARNING

The common terminal of the manual transfer switch must be connected to the inverter'sBACK-UPload side. Do not connect it to theGRIDgrid side. If connected to theGRIDgrid side, the inverter will operate in off-grid and bypass modes simultaneously. If the grid fails, the distribution board connected to the inverter'sGRIDport will still be energized at high voltage, posing a risk of electric shock.

Australia

NOTICE

In Australia, a 1-pole manual changeover switch is included with the product. To use it, wire the 1-pole manual changeover switch as shown in the wiring diagram below.

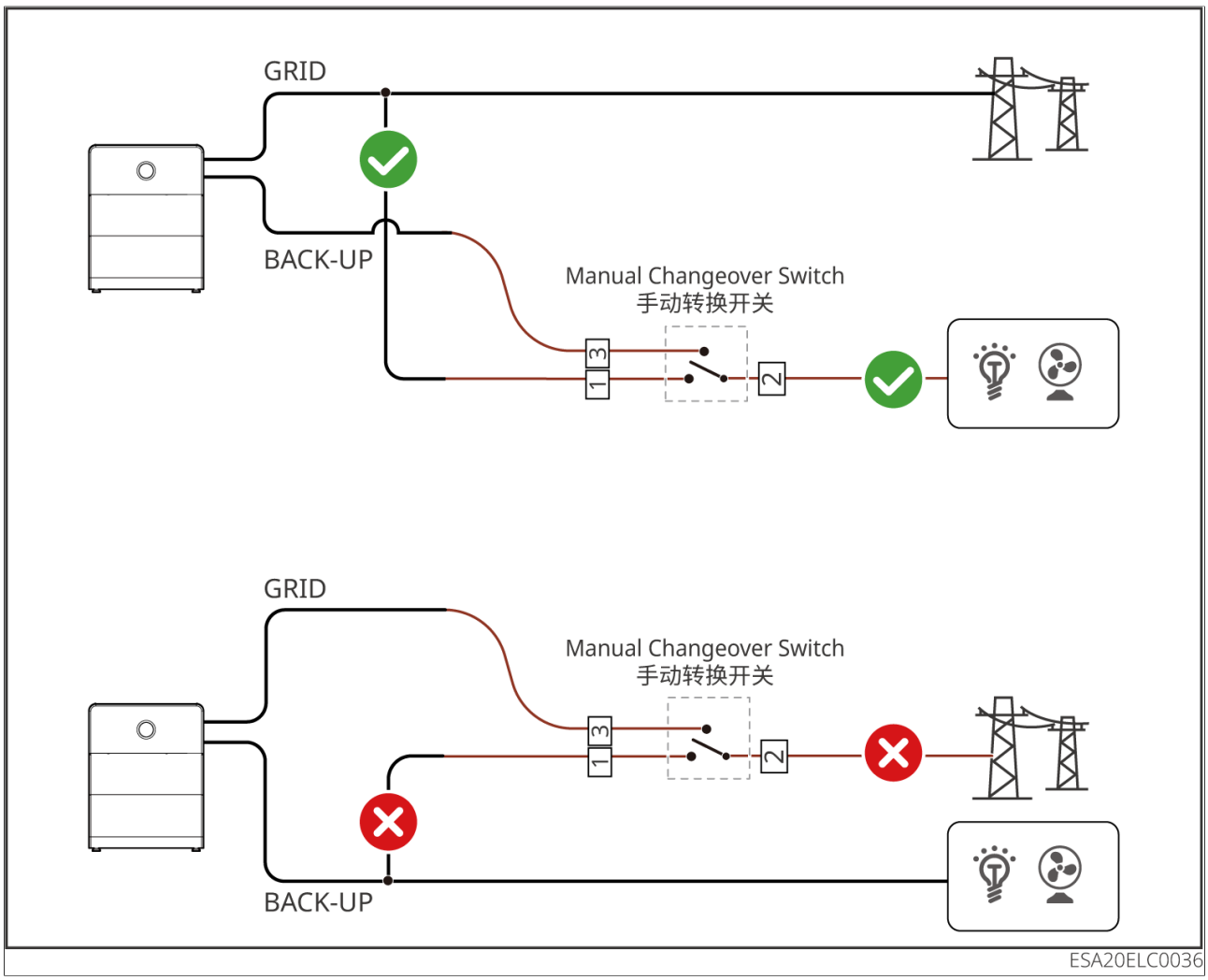


Figure25 Wiring Diagram for Manual Changeover Switch in Australia

Europe

NOTICE

In Europe, if you need to use a manual changeover switch, purchase a 2-pole manual changeover switch from your distributor or source one yourself. Once you have the switch, wire it as shown in the 2-pole manual changeover switch wiring diagram below.

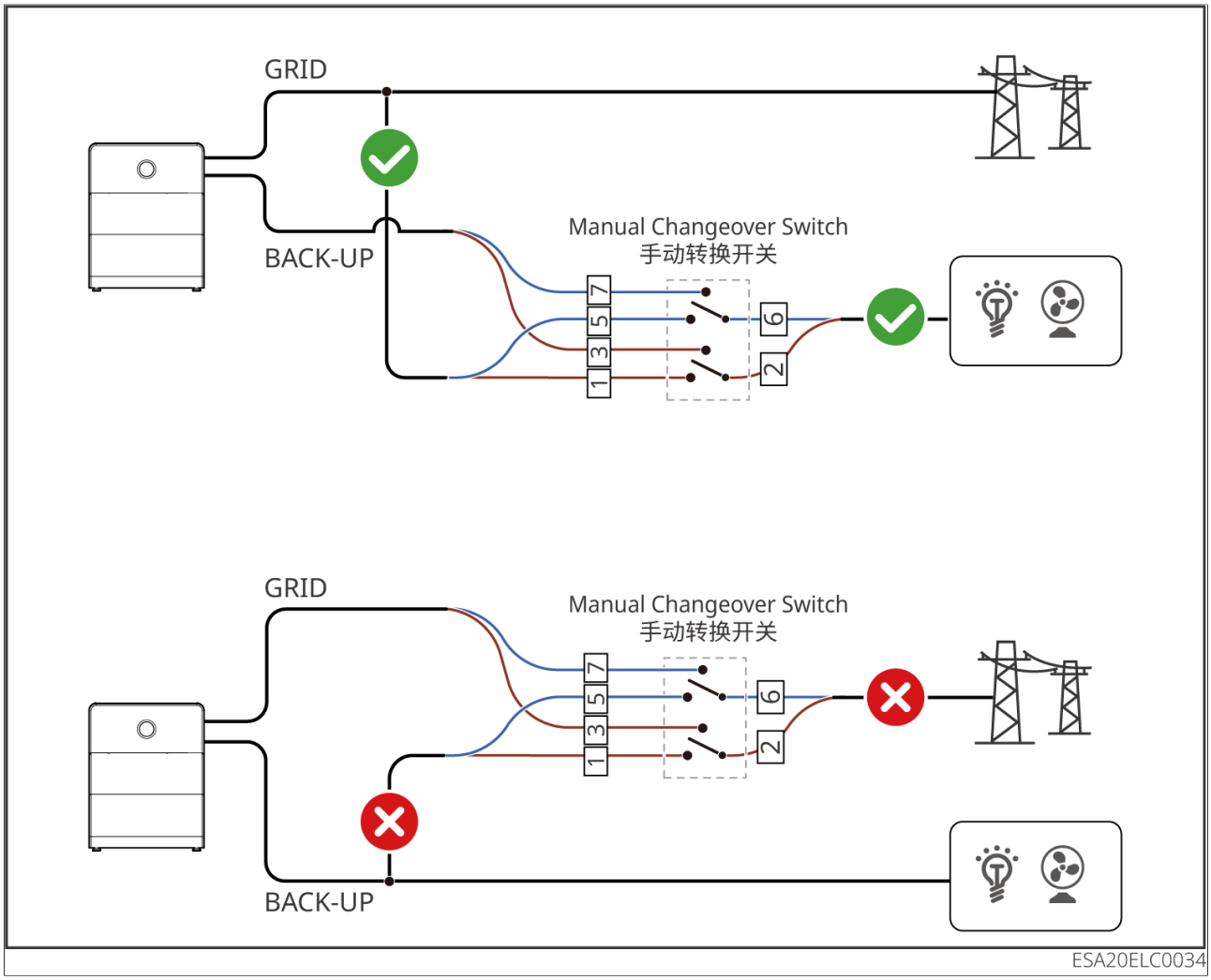


Figure26 Wiring Diagram for Manual Changeover Switch in Europe

NOTICE

- When installing the CT, ensure that current flows from the load side to the grid side. Reversing the polarity will cause equipment faults.
- Wiring may vary depending on the meter. Refer to the meter actually used.
- Do not connect the inverter's CT port if you are not using the inverter's built-in meter.
- For whole-home backup scenarios using an STS VERSION inverter, no additional meter or CT is required. Simply set "Meter Type" to "Built-in CT, no external meter or CT" in the app to enable Power Limit functionality.
- The manual transfer switch and STS are only applicable to single-inverter

NOTICE

scenarios. Decide whether to install one based on the actual operating conditions; use either one or the other. Do not install both。

- If the system requires a generator, follow these requirements:
  - If the system is not configured with an STS, connect the generator to the inverter's GRID port and use an external meter. If you provide your own ATS switch, it must have an interlock function.
  - If the system is configured with an STS, connect the generator to the STS Smart-Port. No external meter is required.
- If the system requires Parallel Networking, observe the following:
  - If the number of inverters operating in parallel exceeds 2, or the wire gauge or measurement range of the supplied CT does not meet the total current requirements of the parallel system on site, use the GM330 smart meter.
  - In a parallel system, set the DIP switches on the first and last inverters to ON, and set the DIP switches on all other inverters to OFF.
  - In a parallel system, the inverter connected to the meter is the master inverter; all others are slave inverters.
  - Set the master inverter as the host using "RS485 Parallel Configuration" in the app. The slave inverters must also be set as slaves. For detailed instructions, refer to the app user manual.
  - In a parallel system, connect DRED devices, RCR devices, Remote Shutdown devices, NS Protection, SG Ready heat pumps, etc. to the master inverter.
  - Remote Shutdown/NS Protection Function: Connect the communication cable to the master inverter. Rapid Shutdown Function: Connect the communication cables to each inverter individually. If you need to use Rapid Shutdown and Remote Shutdown/NS Protection simultaneously, contact the after-sales service center.
  - The parallel system supports generator connection. If connecting a generator, ensure that:
    - The generator power must exceed the total power of all loads connected to the BACKUP port.
    - The current rating of the compatible ATS must meet the total current requirement when all inverters are simultaneously operating at Rated Power.
  - In a parallel system, if you need to disconnect the circuit breaker on any port of an inverter, disconnect the circuit breakers on all other ports of that inverter at the same time; otherwise, the system may operate abnormally.

NOTICE

  - In a parallel system, each inverter must be equipped with a WiFi/LAN Kit-20, 4G Kit-CN-G20, and 4G Kit-G20 smart communication dongle for network communication.
- In microgrid and AC-coupled scenarios, a dual-meter network is required to enable power generation monitoring of the grid-tied inverter and load monitoring.
  - Meter 1 or the built-in meter is used to monitor the system's grid-connected power.
  - Meter 2 is used to monitor the power generation of the grid-tied inverter.
  - By integrating the data from Meter 1 and Meter 2, the monitoring platform can monitor load consumption in real time.
  - For dual-meter configurations in microgrid and AC-coupled scenarios, see the table "Dual-Meter Configuration Options" below. The wiring of the meter on the grid side and the AC side of the grid-tied inverter does not vary with the meter model.
  - If output power limiting is required for the grid-tied inverter, connect a meter, CT, or other device separately.

Dual-Meter Configuration Options	
Meter 1 (grid side)	Meter 2 (AC side of grid-tied inverter)
Built-in meter (single inverter only)	GMK110
Built-in meter (single inverter only)	GM330
Built-in meter (single inverter only)	GMK330
GMK110	GMK110
GMK110	GM330
GMK110	GMK330
GM330	GM330
GM330	GMK110
GM330	GMK330

Dual-Meter Configuration Options	
GMK330	GMK330
GMK330	GM330
GMK330	GMK110

5.3.1 General Scenarios

Detailed wiring diagram of the inverter single-unit system

- The manual transfer switch is optional; select whether to install it based on actual usage scenarios.

In the whole-home backup power scenario, built-in CT networking

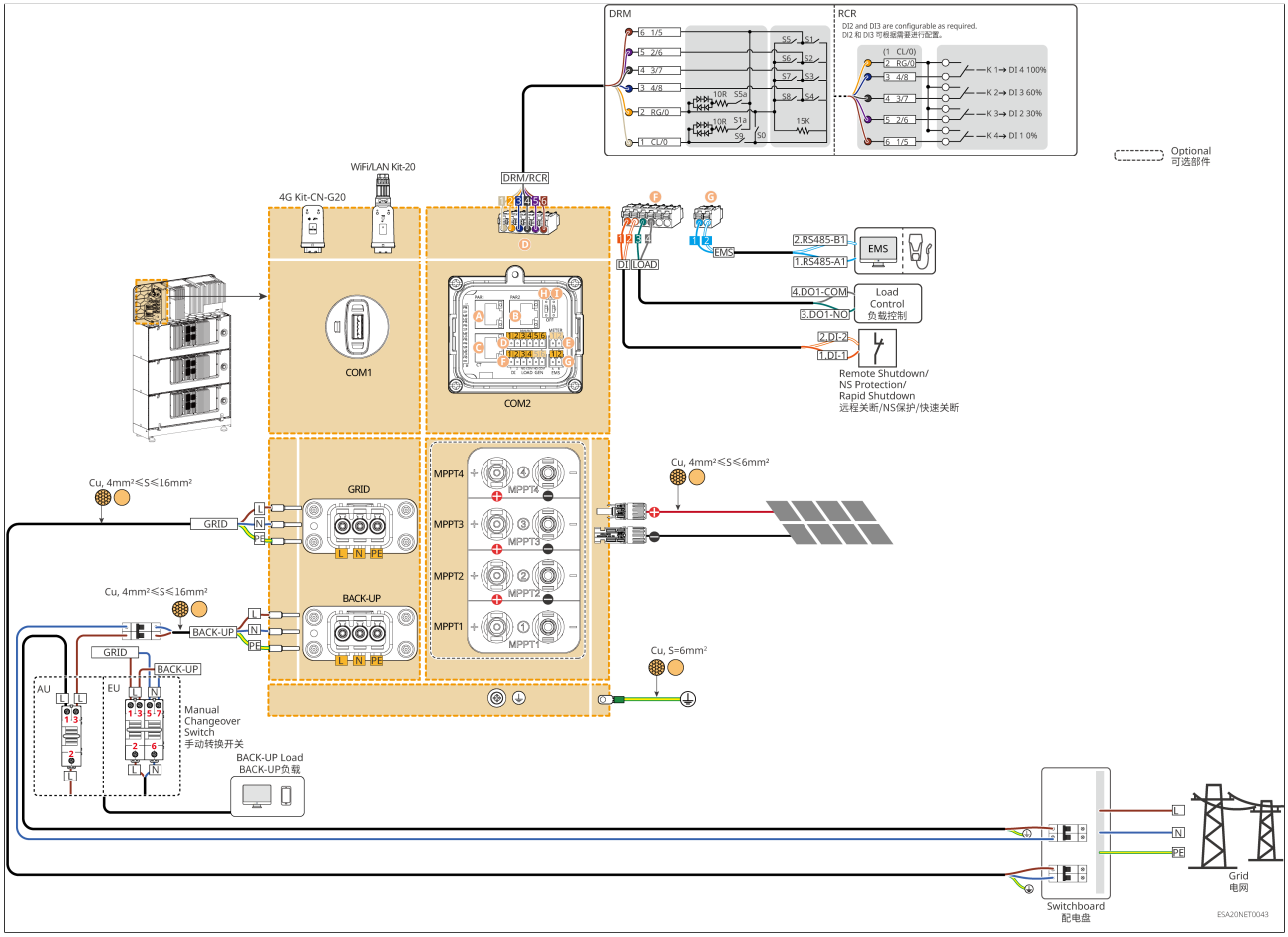


Figure27 Common scenario 1: Networking diagram of whole-home backup power with built-in CT

Networking with the built-in meter

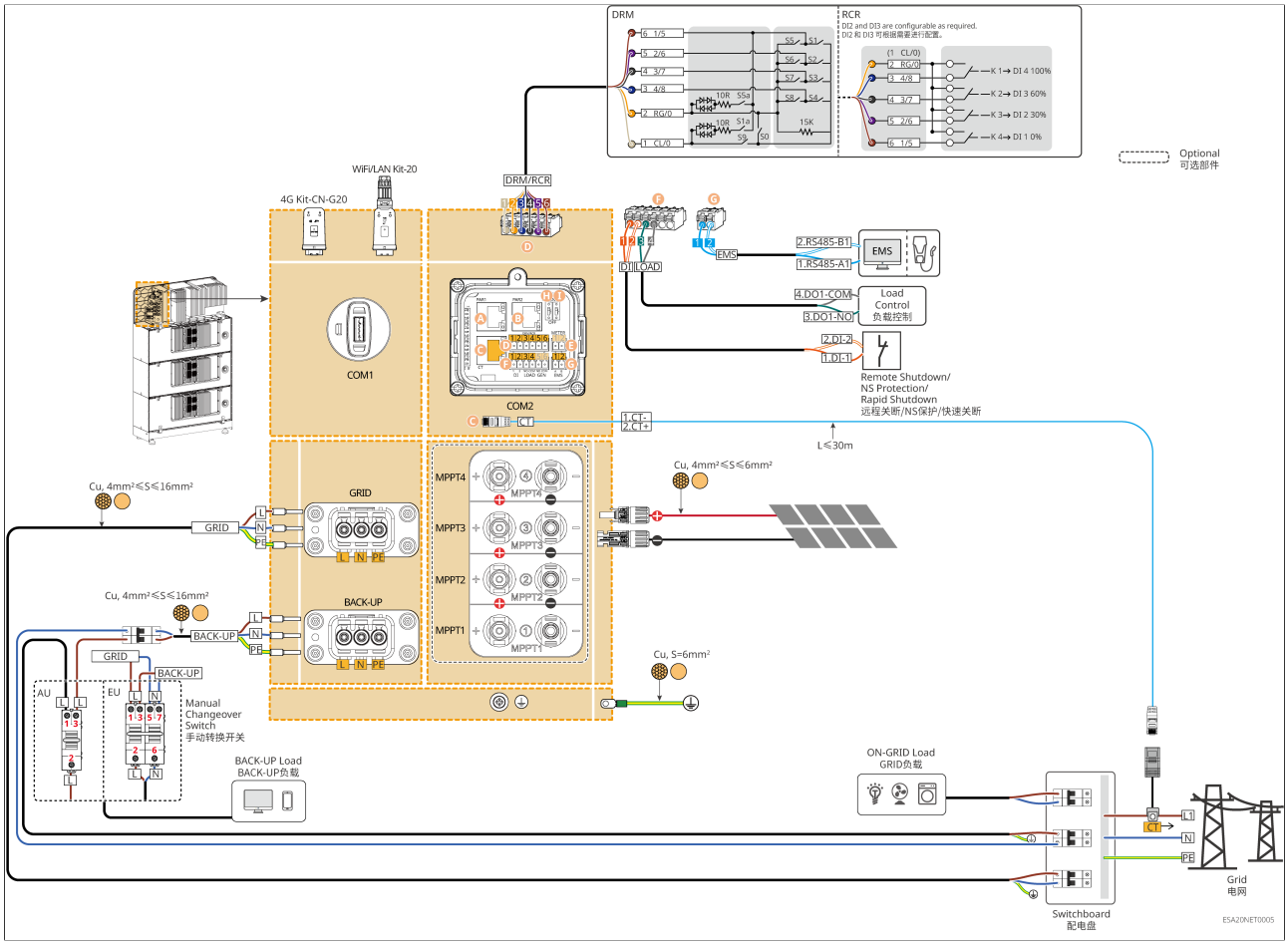


Figure28 Common scenario 2: Networking diagram with the built-in meter

Networking with GMK110 meter

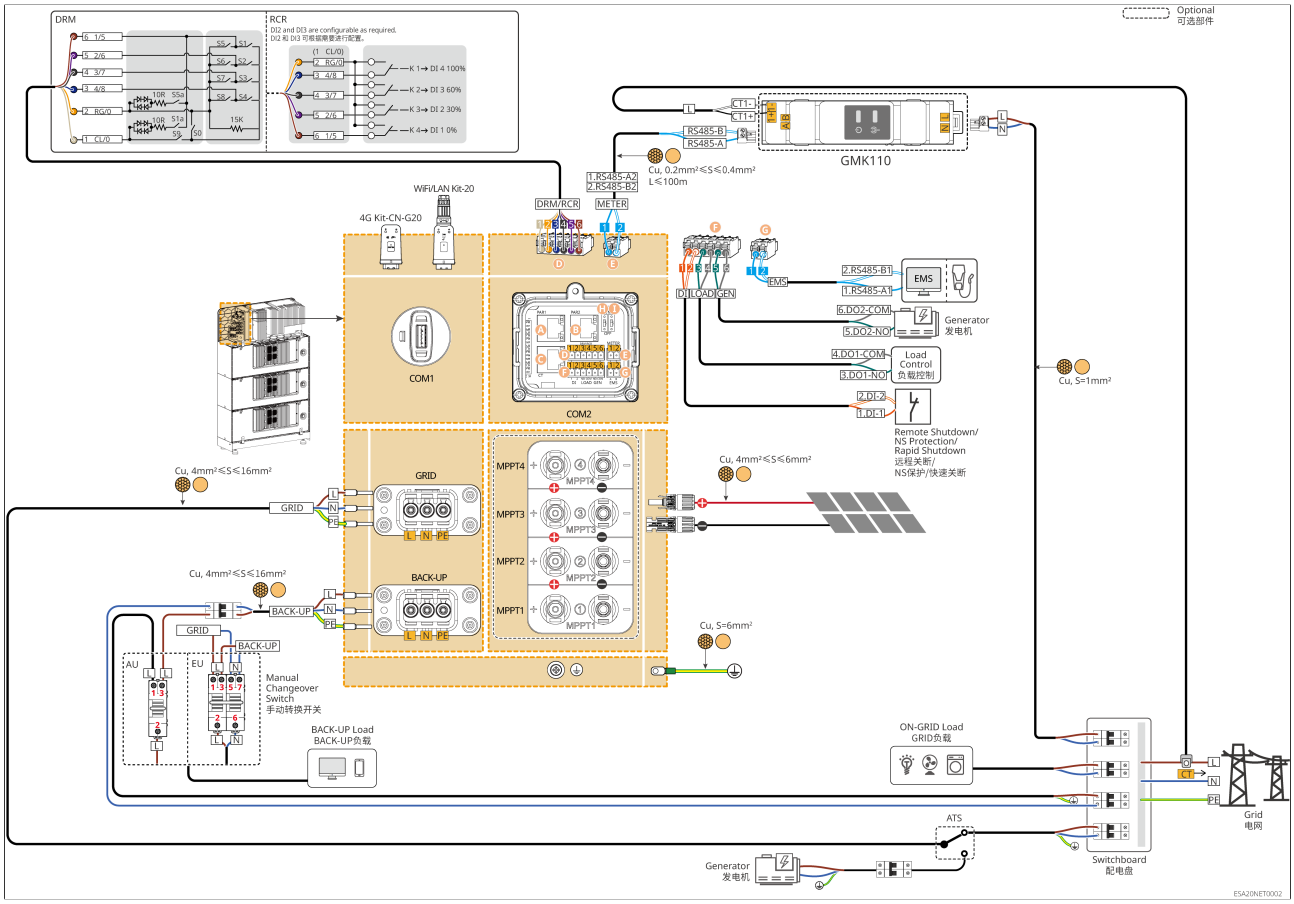


Figure29 Common scenario 3: Networking diagram with GMK110 meter

Networking with GM330 meter

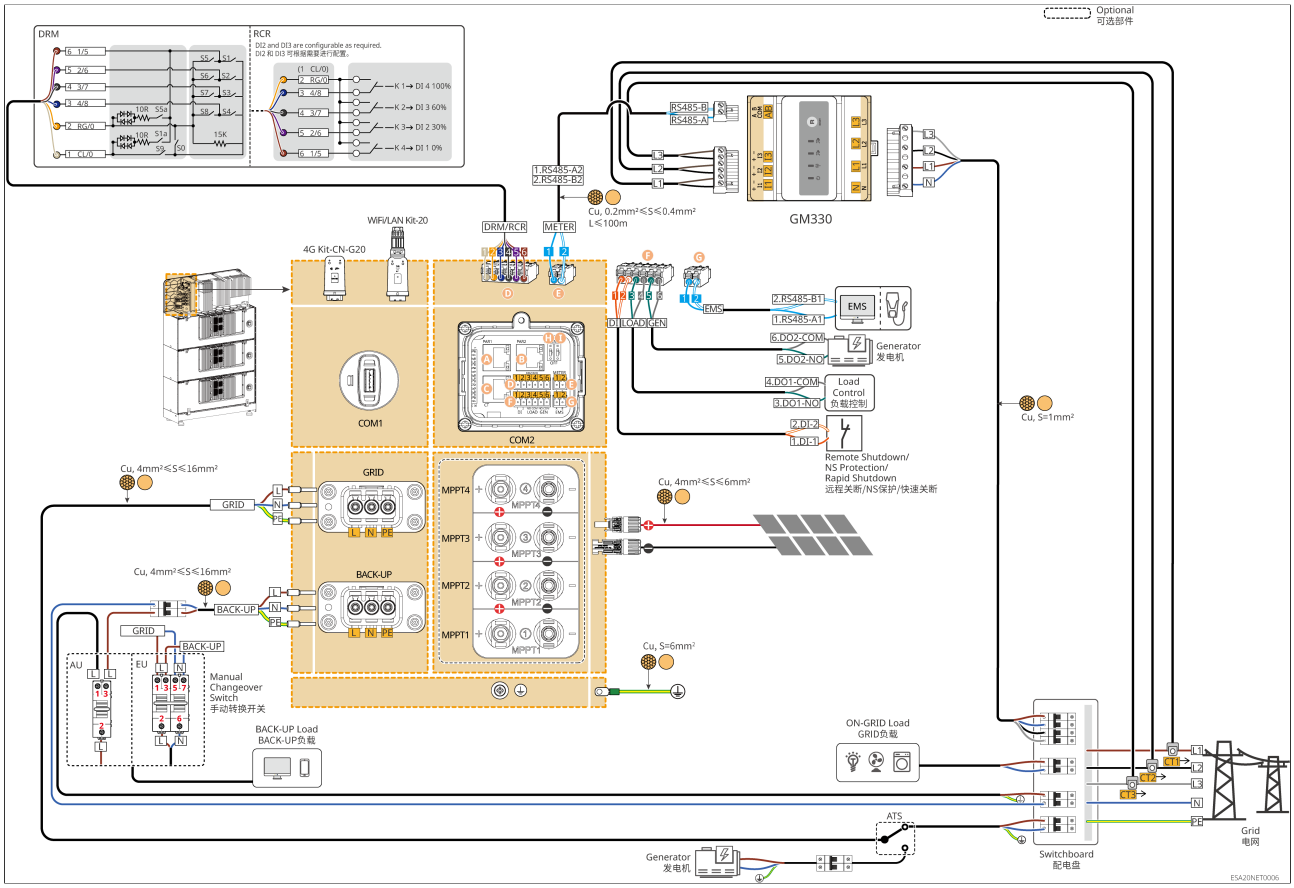


Figure30 Common scenario 4: Networking diagram with GM330 meter

Networking with GMK330 meter

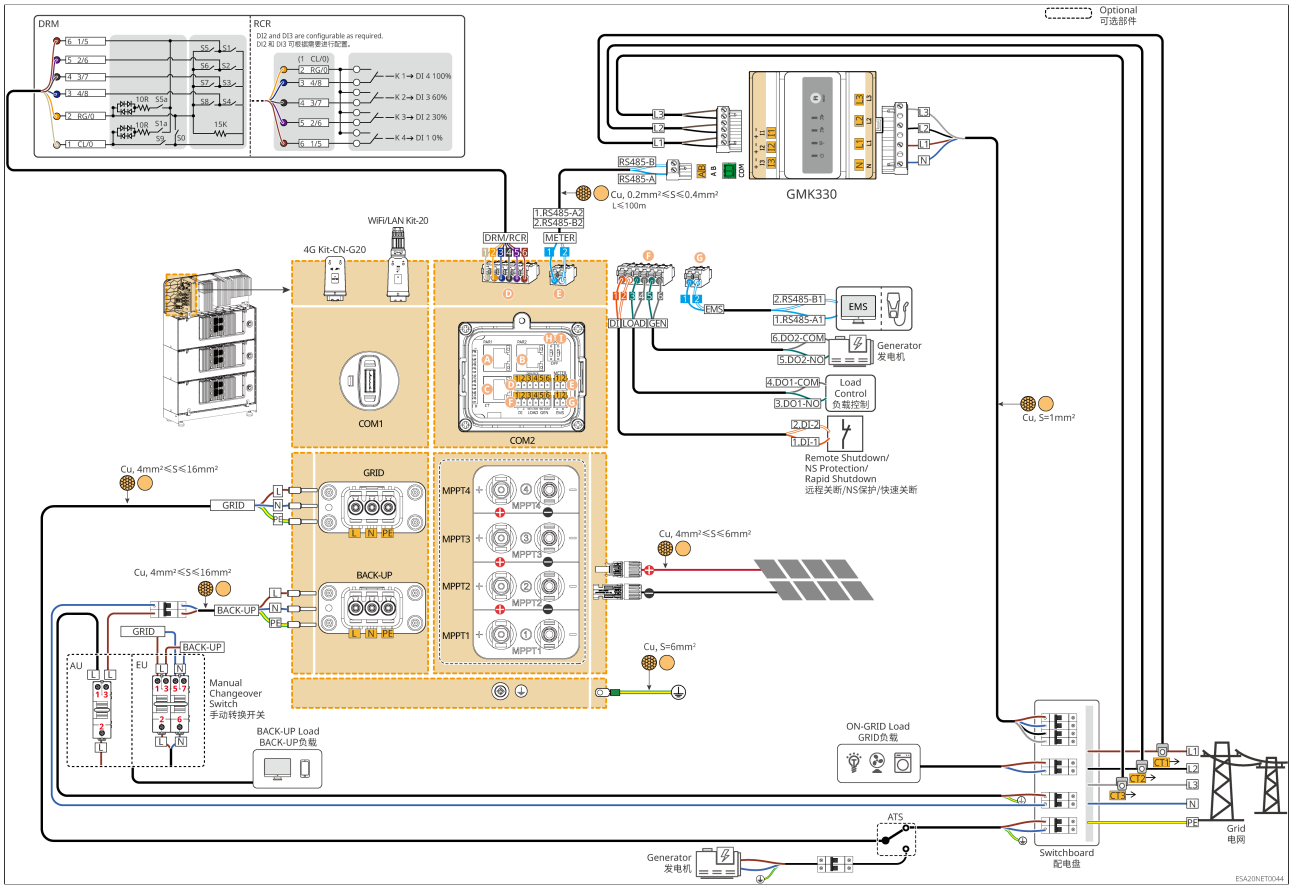


Figure31 Common scenario 5: Networking diagram with GMK330 meter

Networking diagram of the inverter with static transfer switch cabinet (STS)

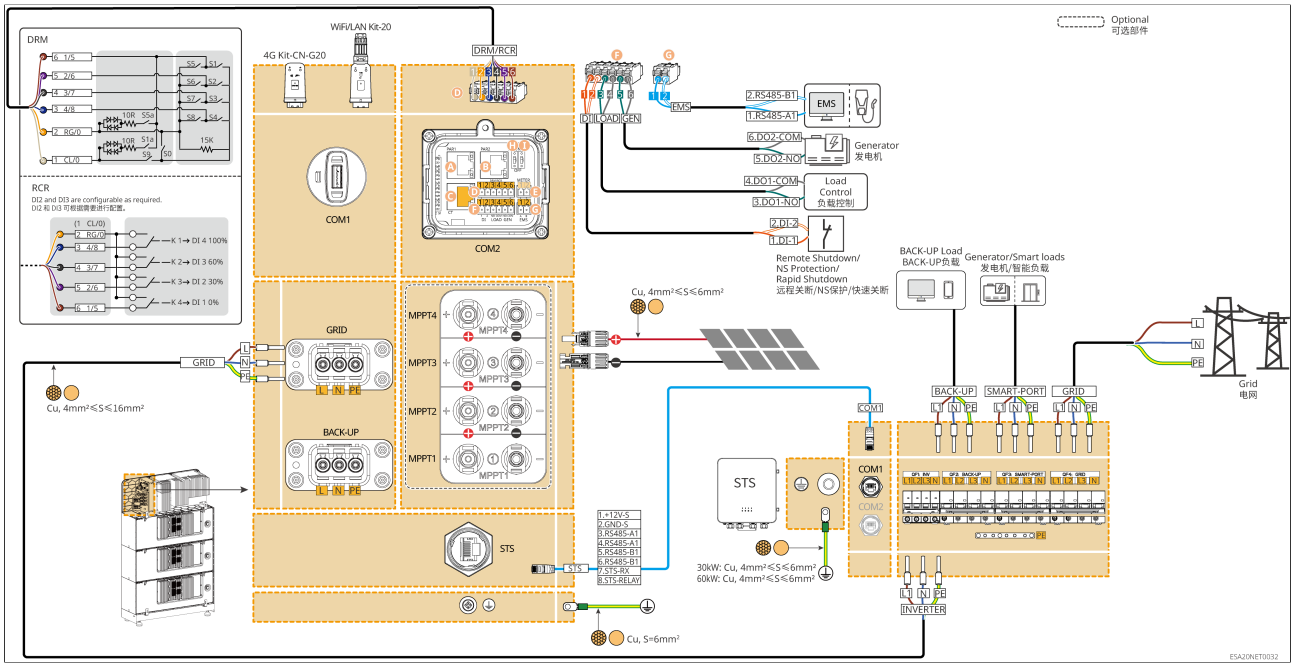


Figure32 Common scenario 6: Networking diagram of the inverter with STS for whole-home backup power

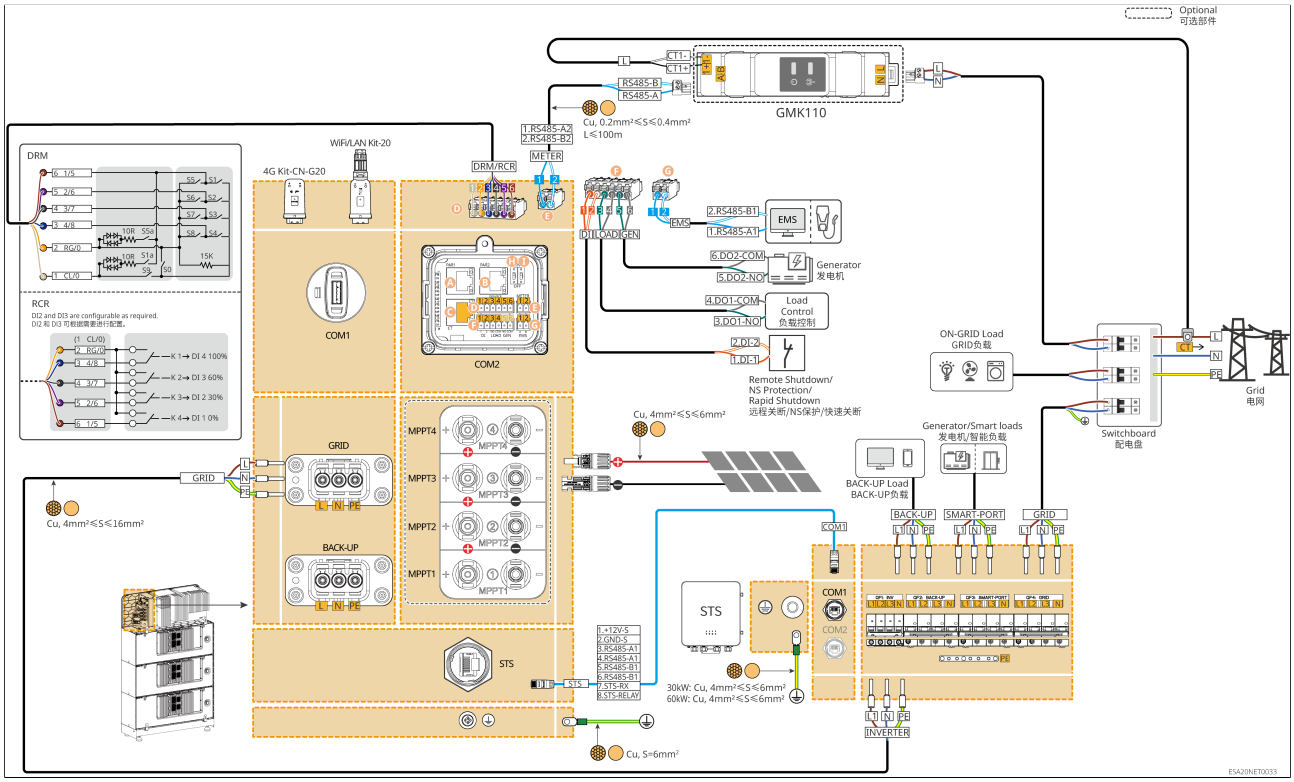


Figure33 Common scenario 7: Networking diagram of the inverter with STS for partial backup power

Detailed wiring diagram of the inverter parallel system

The following figures focus on wiring related to parallel operation. For wiring

requirements of other ports, refer to the single-unit system.

Inverter parallel connection with GMK110 networking

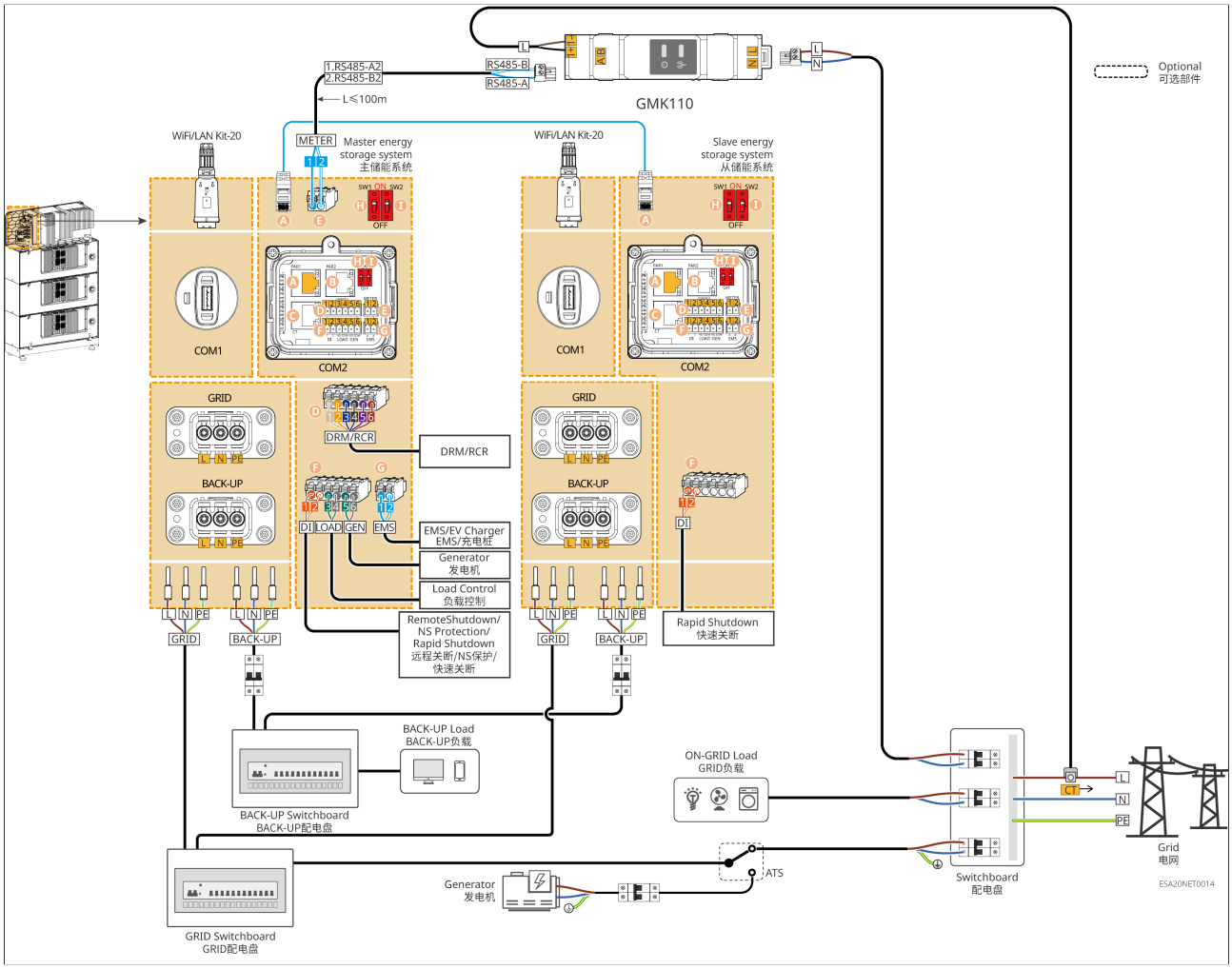


Figure34 Common scenario 8: Networking diagram of inverter parallel connection with GMK110

Inverter parallel connection with GM330 networking

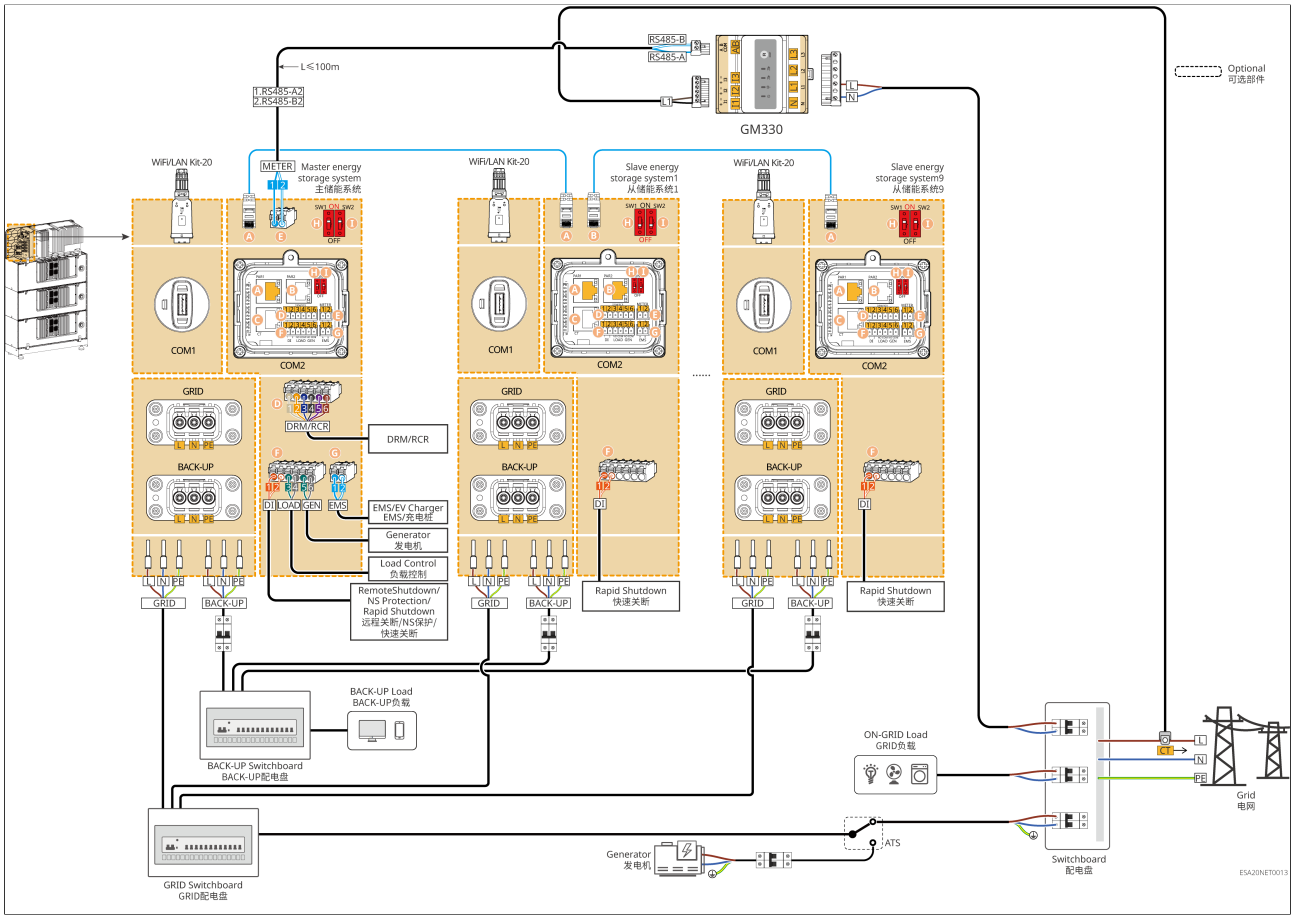


Figure35 Common scenario 9: Networking diagram of inverter parallel connection with GM330

Inverter parallel connection with GMK330 supports a maximum of two inverters in parallel. For meter wiring, refer to 'Networking with GMK330 meter' in the single-unit system.

5.3.2 Microgrid Scenario

Detailed wiring diagram of the inverter single-unit system

- In the Microgrid Scenario, generator connection is not supported.
- The manual transfer switch is optional; select whether to install it based on actual usage scenarios.
- In the Microgrid Scenario, if output power limiting is required for the grid-connected inverter, connect meters or CTs and other devices separately.

Networking with built-in meter + GM330 meter

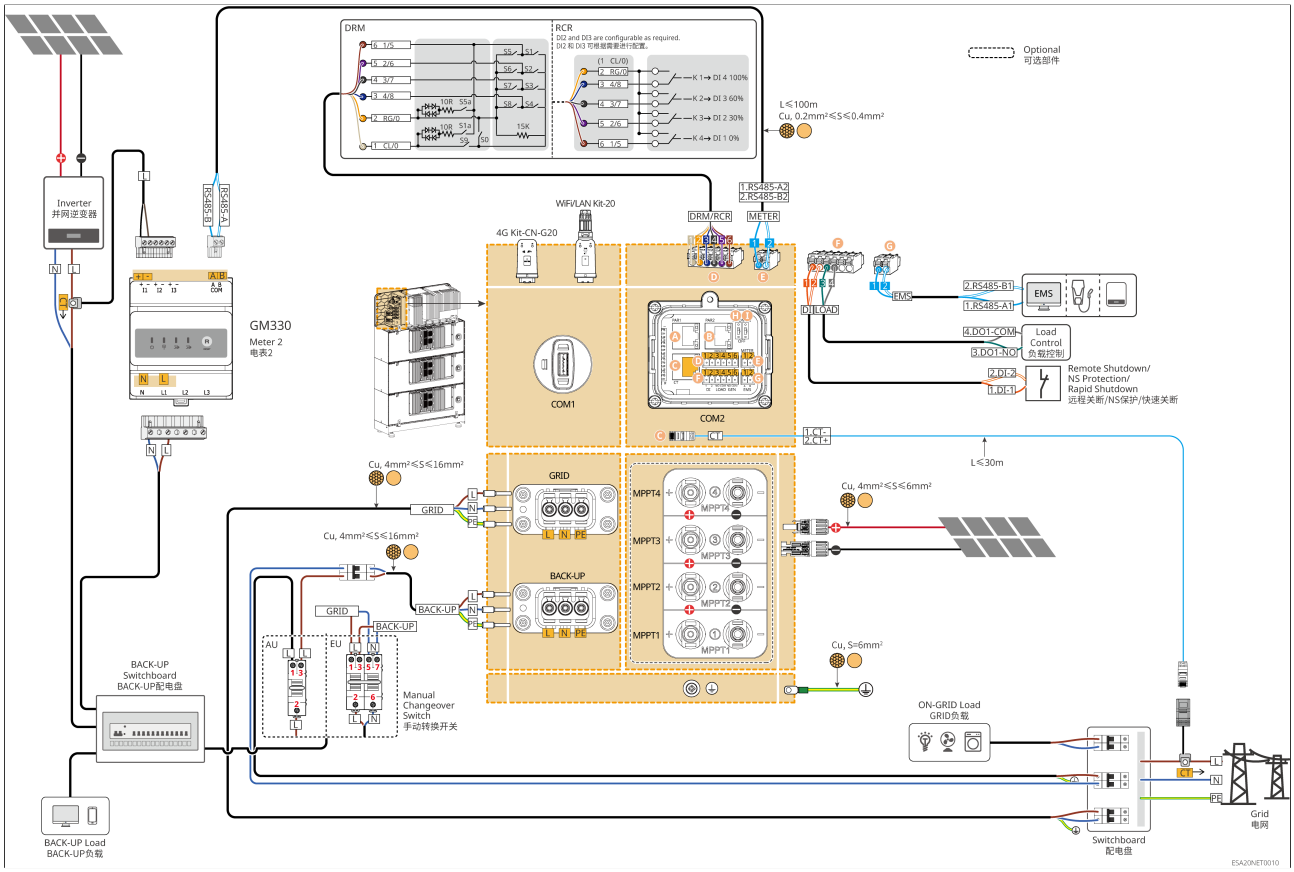


Figure36 Microgrid Scenario 1: Networking diagram of built-in meter + GM330 meter

GMK110 + GMK110 networking

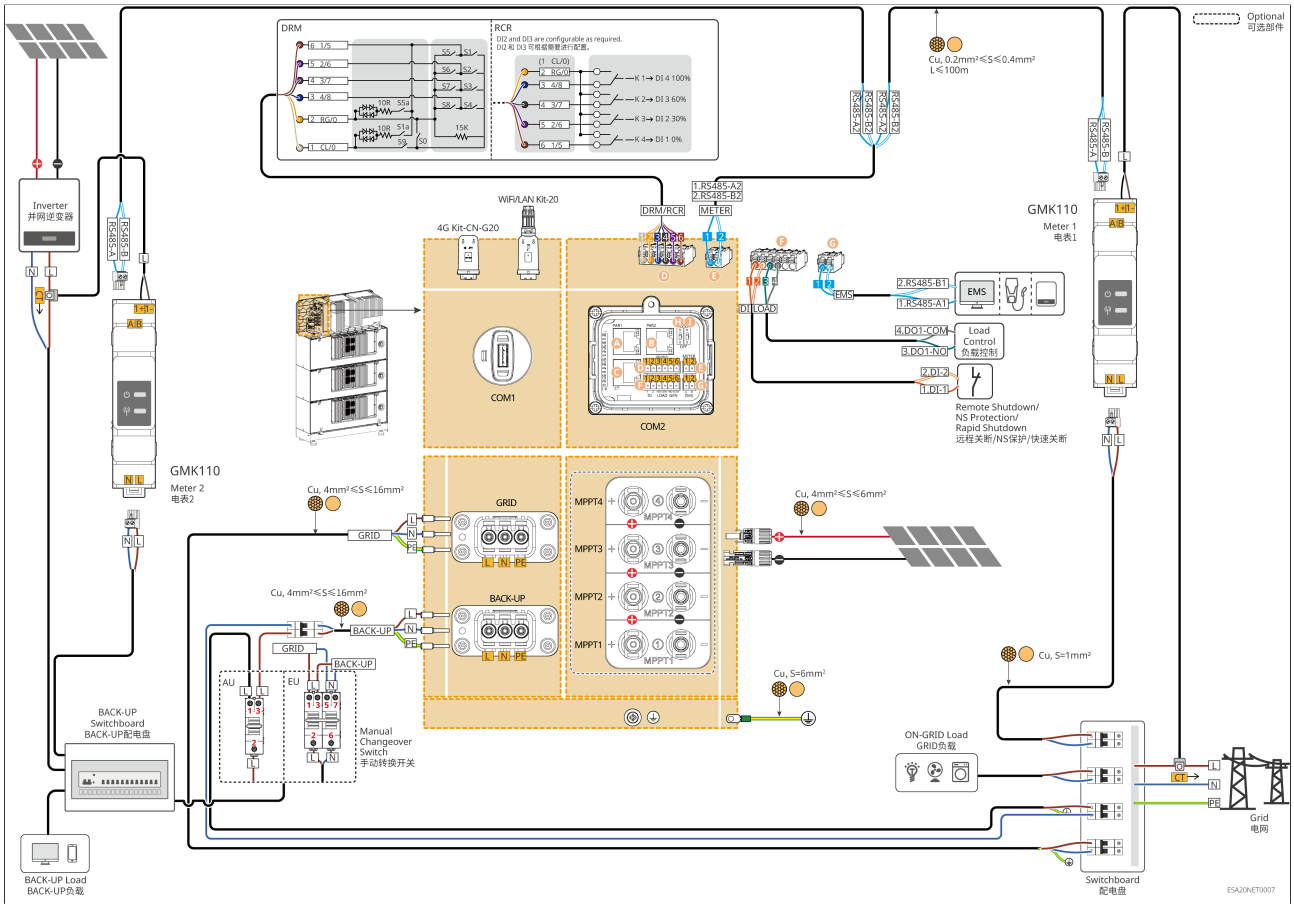


Figure37 Microgrid Scenario 2: GMK110 + GMK110 networking diagram

Microgrid Scenario: inverter networking with static transfer switch cabinet

In the Microgrid Scenario, the partial backup power networking diagram with STS uses GMK110 as an example meter. For wiring of other meter models, refer to the wiring instructions in the common scenarios.

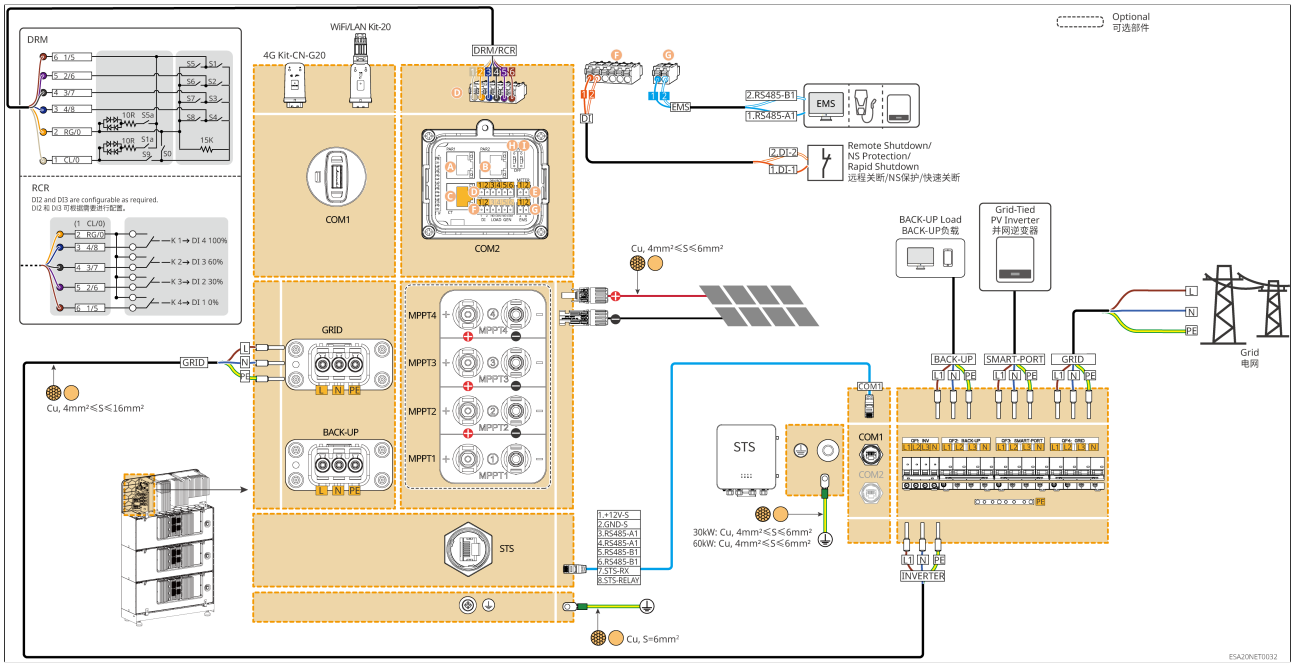


Figure38 Microgrid Scenario 4: Inverter with STS whole-home backup power networking diagram

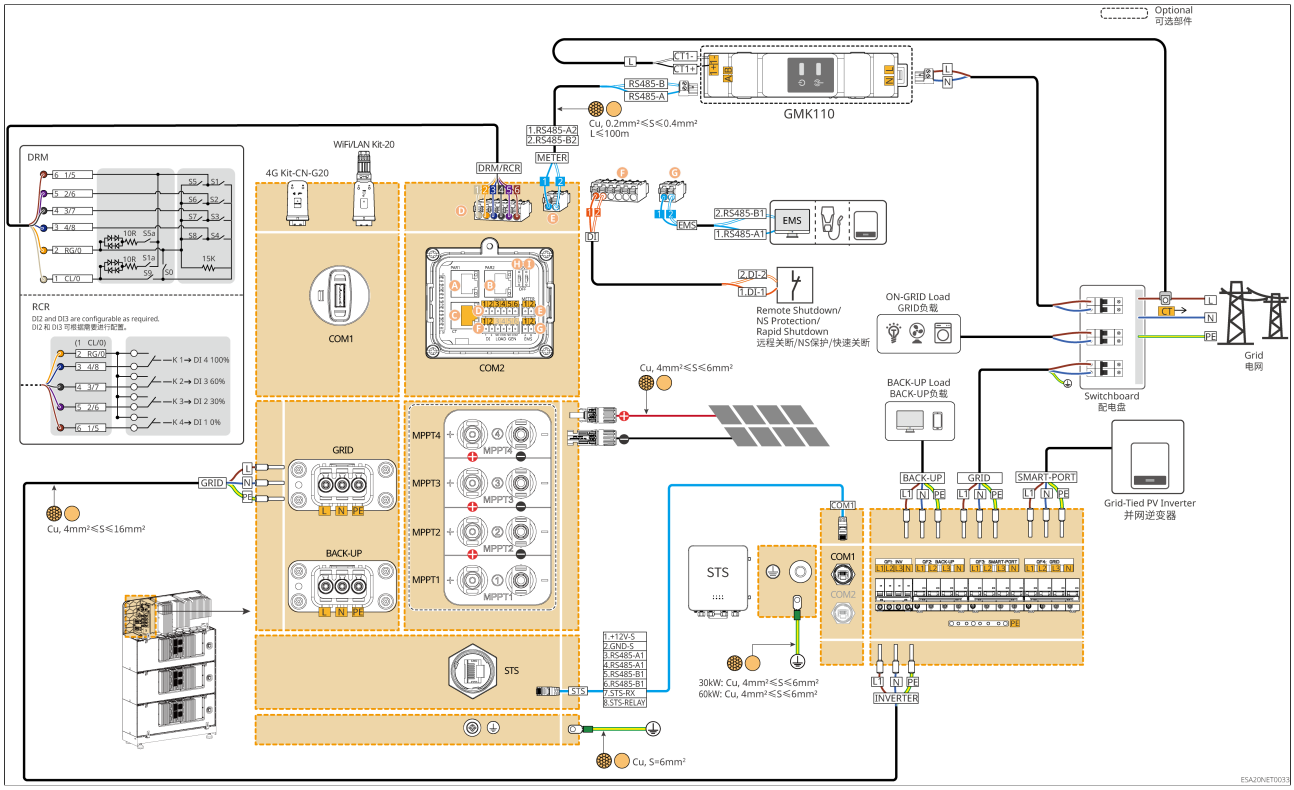


Figure39 Microgrid Scenario 5: Inverter with STS partial backup power networking diagram

Detailed wiring diagram of the inverter parallel system

In Microgrid Scenario, the parallel connection meter is illustrated using GM330 as an

example; for wiring methods of other meter models, please refer to the general scenario parallel connection instructions.

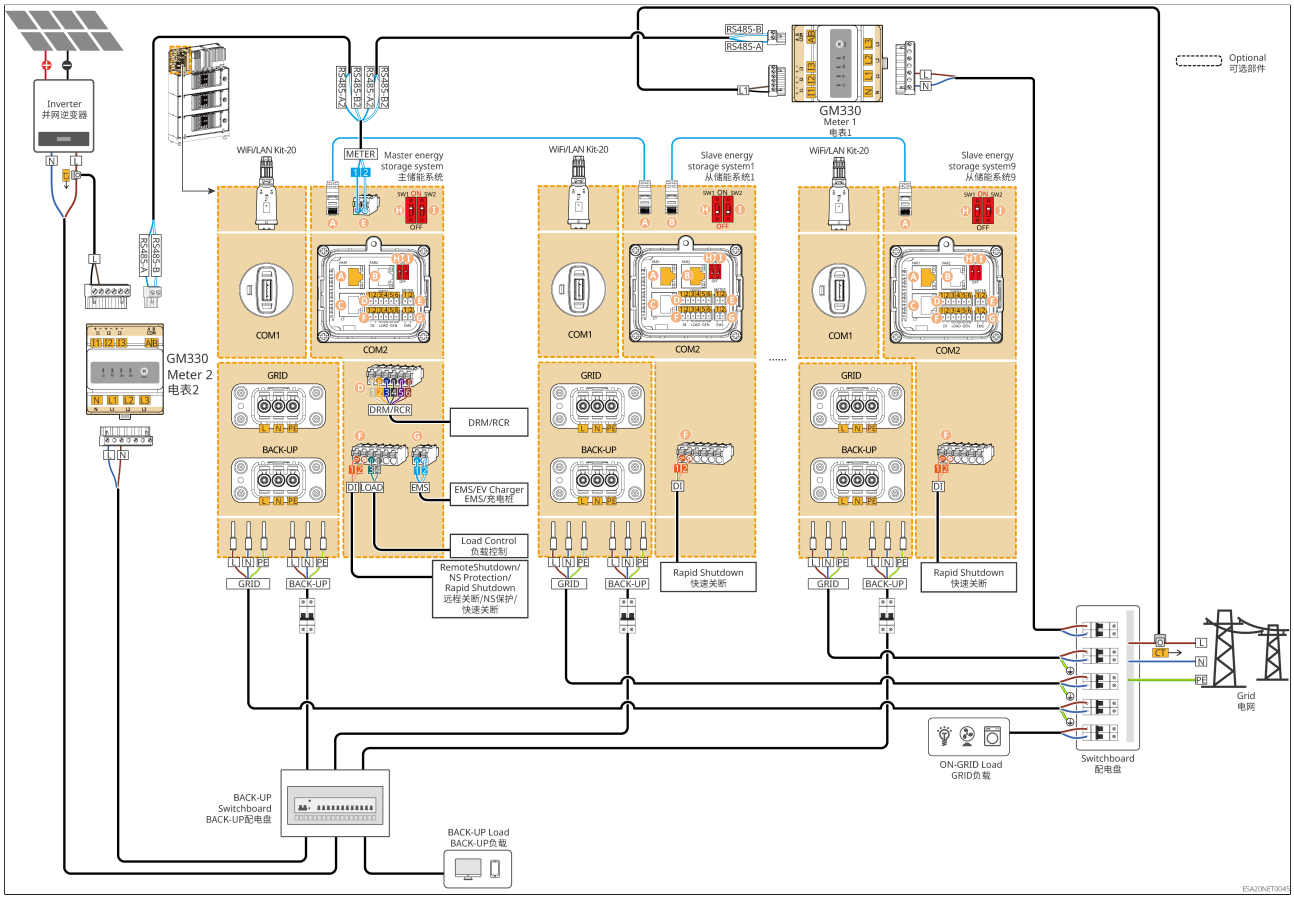


Figure40 Microgrid Scenario 6: Parallel Networking Diagram with GM330

5.3.3 Coupling Scenario

Detailed wiring diagram of the inverter single-unit system

- The manual transfer switch is optional; select whether to install it based on actual usage scenarios.
- In coupling scenarios, if the grid-connected inverter requires output power limiting, please separately connect a meter or CT and other devices.

Built-in Meter + GMK110 Meter Group

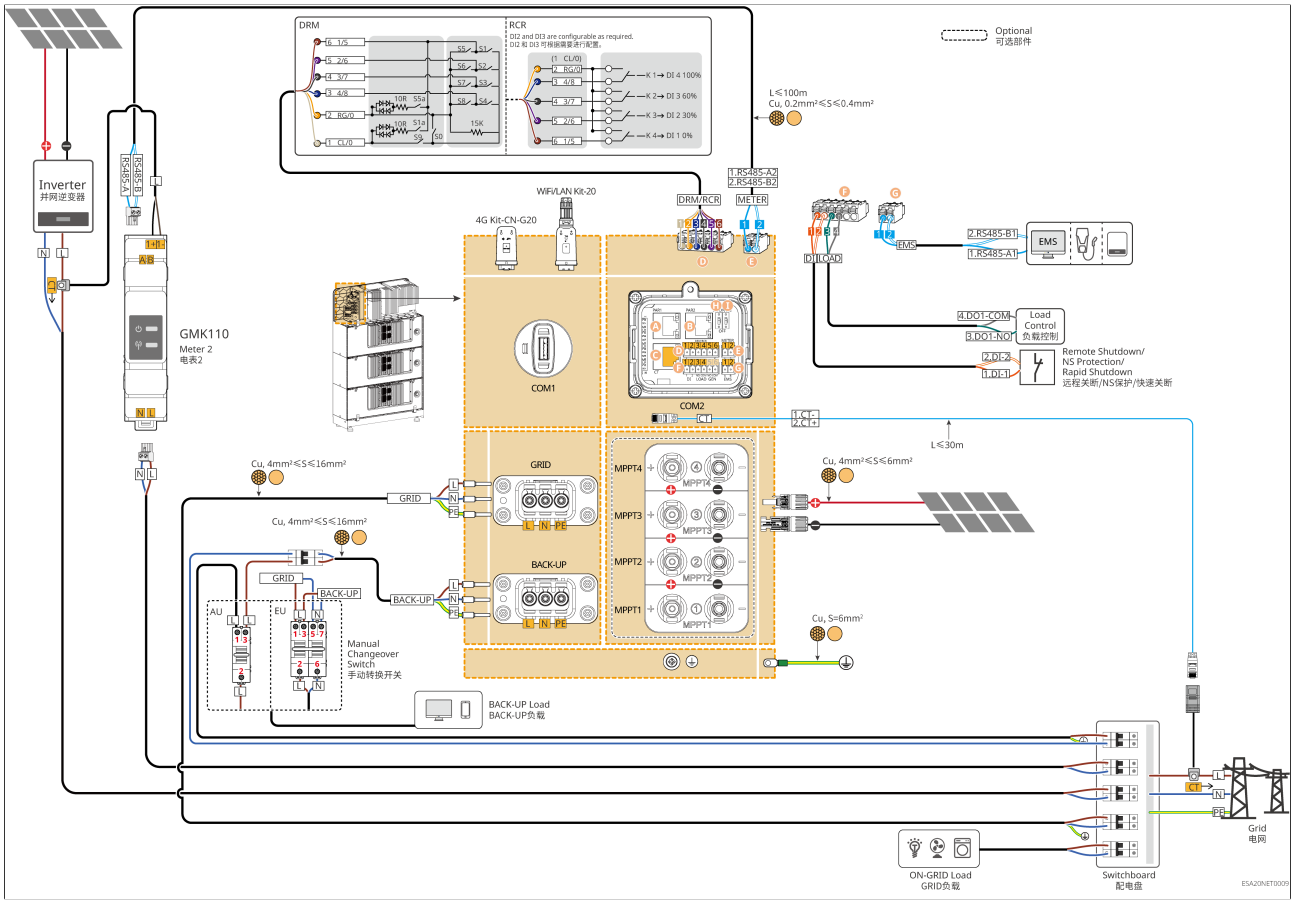


Figure41 Coupling Scenario 1: Built-in Meter + GMK110 Meter Networking Diagram

GM330+GM330 Meter Networking

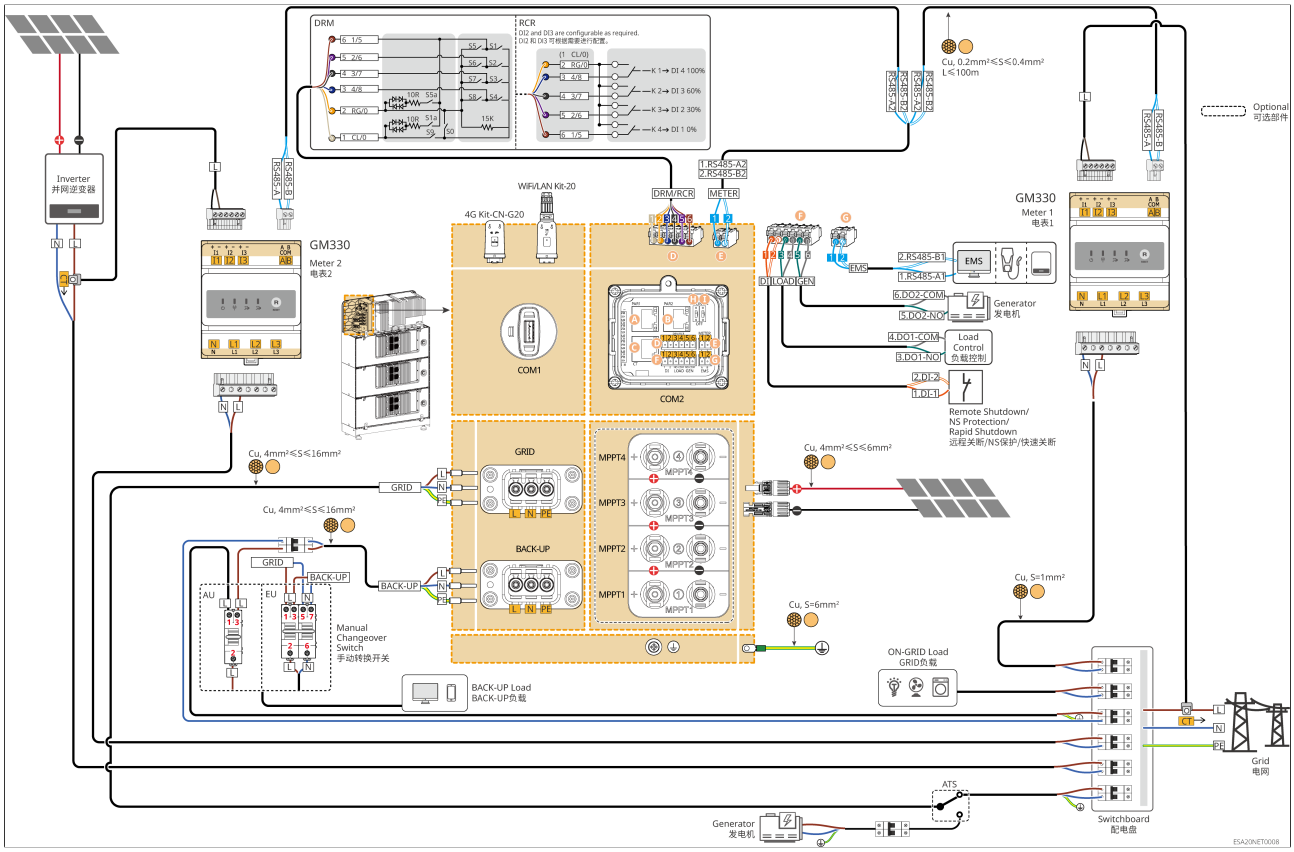


Figure42 Coupling Scenario 2: GM330+GM330 Meter Networking Diagram

Coupling Scenario: Inverter with Static Transfer Switch Cabinet (STS) Networking Diagram

In the coupling scenario, in the STS partial backup power networking diagram, the meters are illustrated using GMK110+GMK110 as an example; for wiring methods of other meter models, please refer to the general scenario wiring instructions.

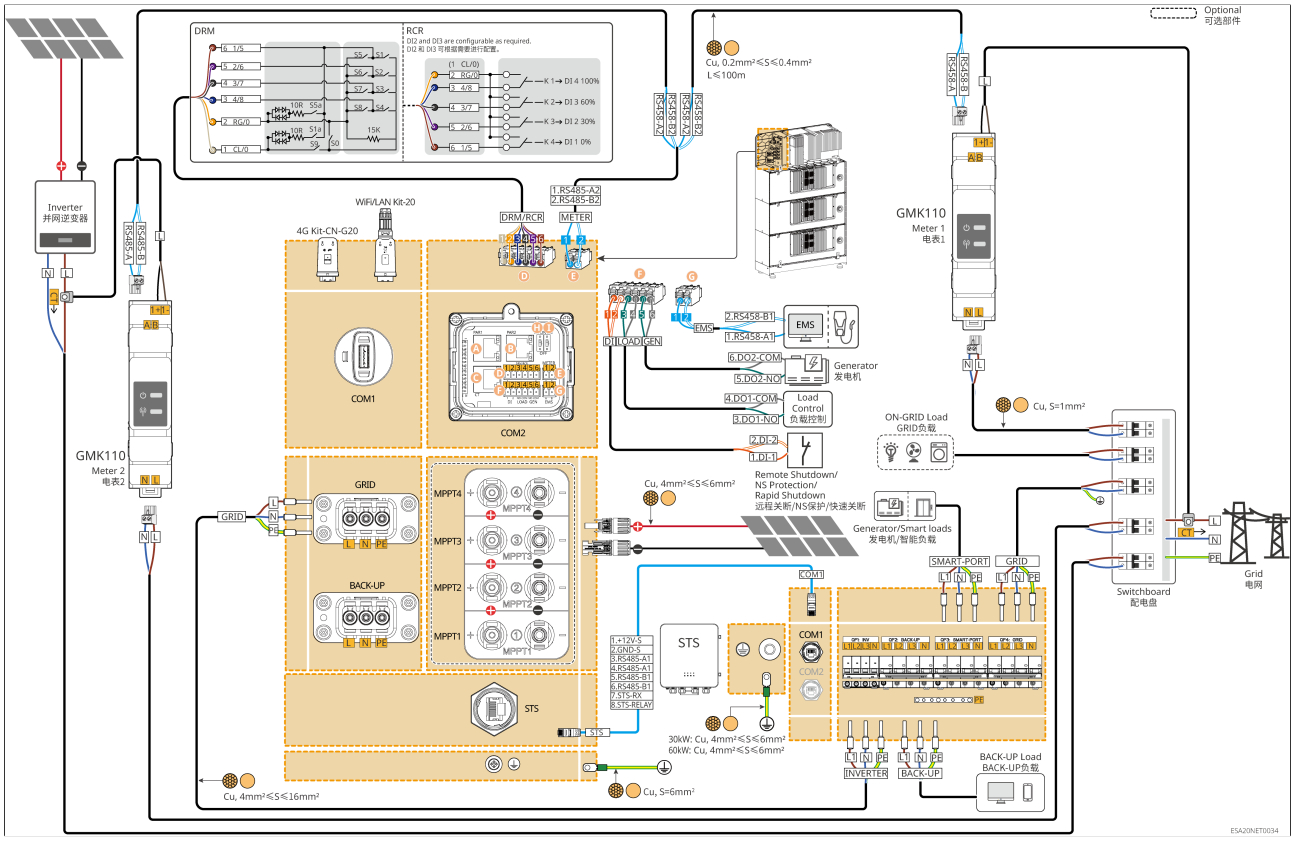


Figure43 Coupling Scenario 3: Inverter with STS Partial Backup Power Networking Diagram

Detailed wiring diagram of the inverter parallel system

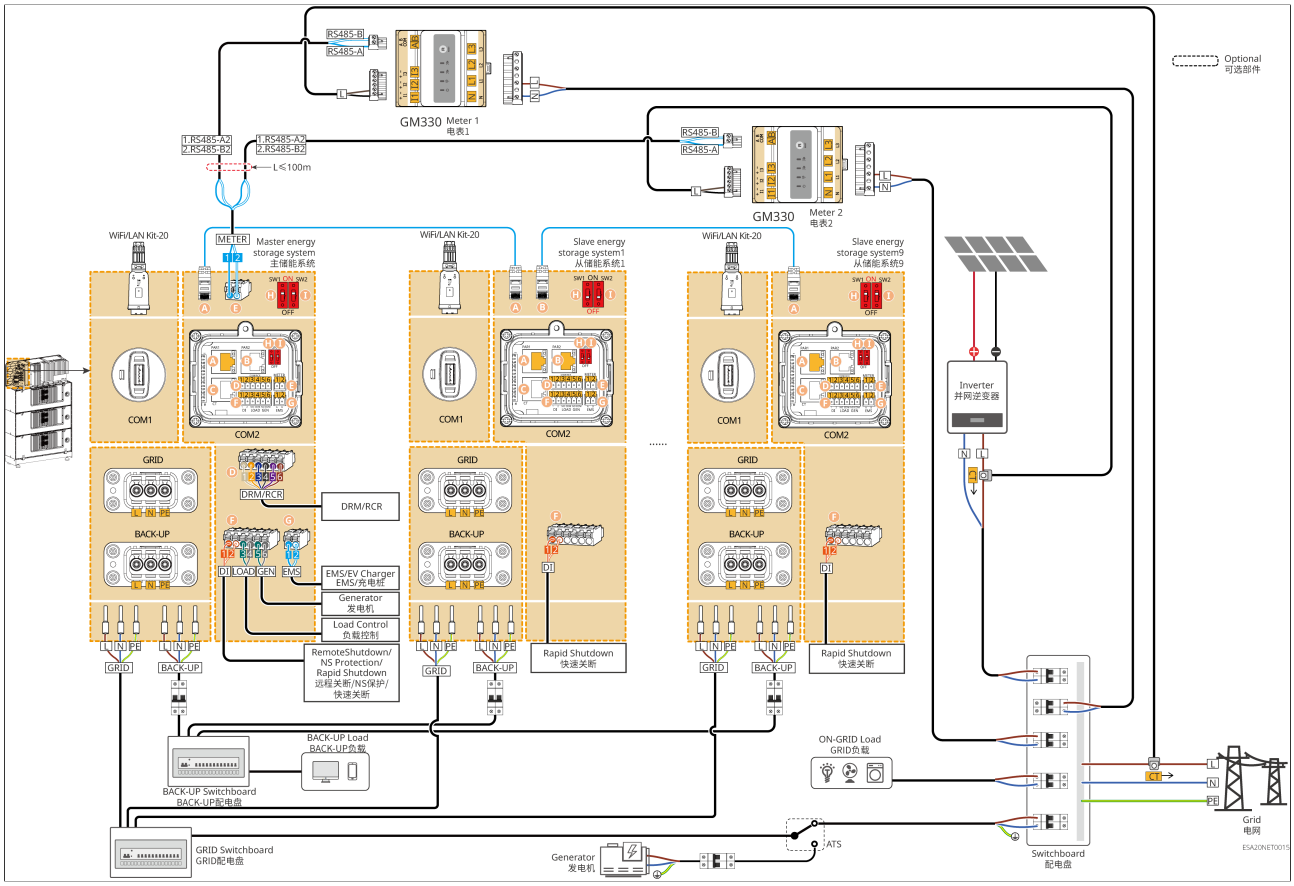


Figure44 Coupling Scenario 4: Parallel Networking Diagram with GM330

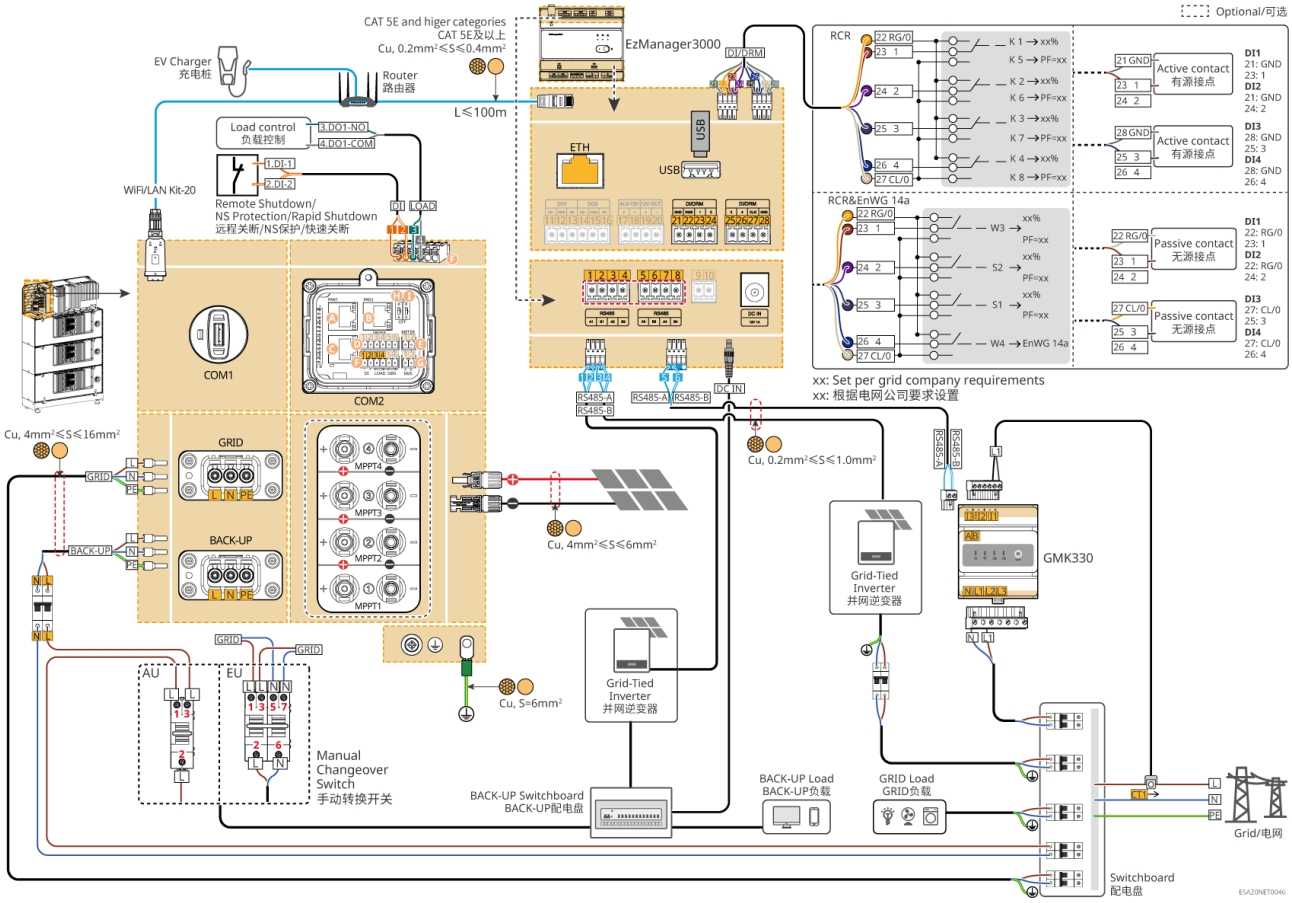
In coupling scenarios, the parallel connection meter is illustrated using GM330 as an example; for wiring methods of other meter models, please refer to the general scenario parallel connection instructions.

5.3.4 Used with the Ezmanager3000 Scenario

NOTE
Do not connect a generator when the inverter is used with EzManager3000.

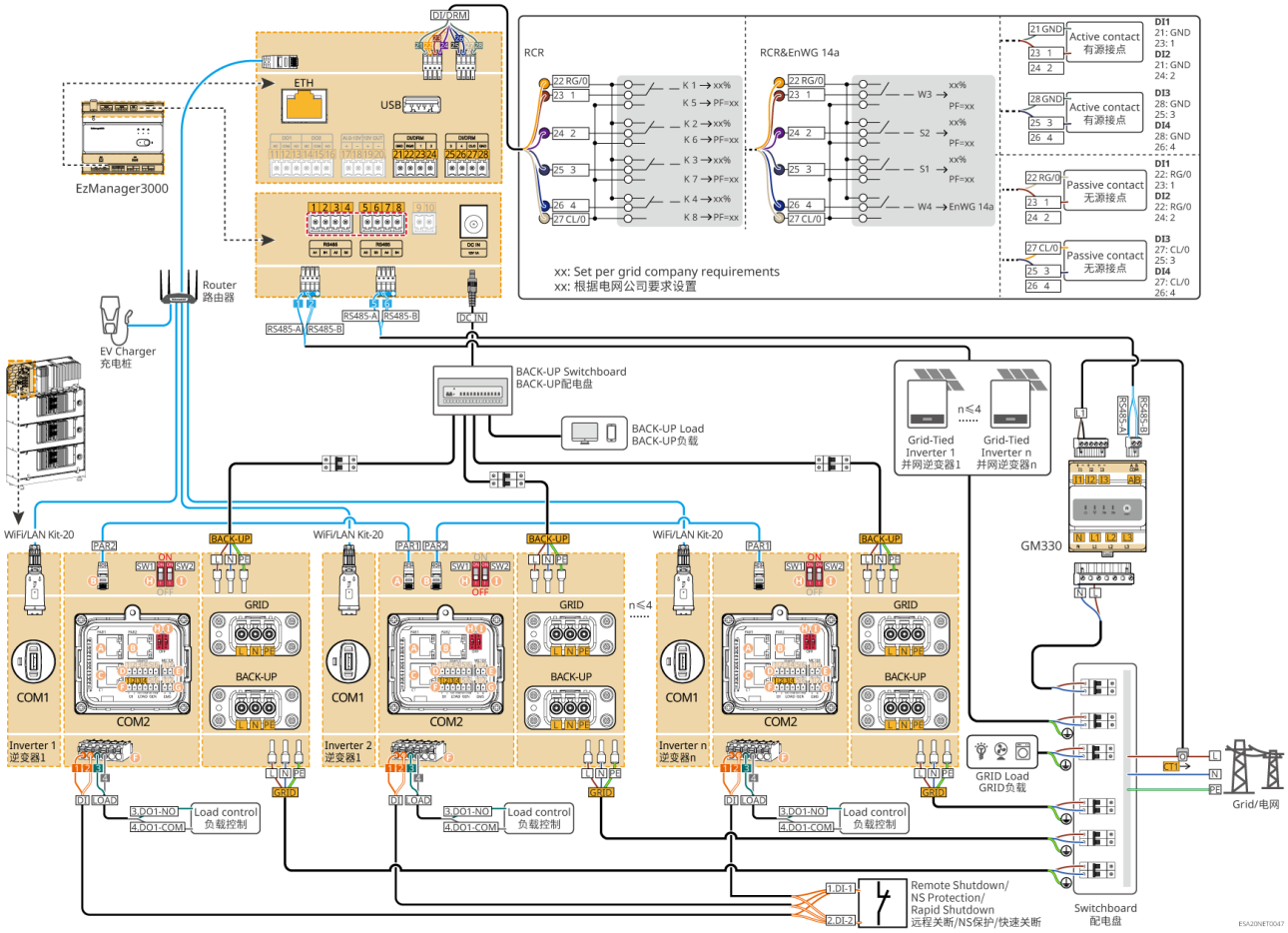
Wiring for a standalone inverter system

The diagram below uses the GMK330 as an example. For wiring instructions for other meter models, see the "Meter Wiring" section.



Wiring for a parallel inverter system

The diagram below uses the GM330 as an example. For wiring instructions for other meter models, see the "Meter Wiring" section.



5.4 Material Preparation

Warning

- It is forbidden to connect loads between the inverter and the AC Switch directly connected to the inverter.
- Each inverter must be equipped with an AC output circuit breaker. Multiple inverters must not be connected to one AC circuit breaker simultaneously.
- To ensure that the inverter can be safely disconnected from the grid in the event of an abnormality, connect an AC circuit breaker on the AC side of the inverter. Select an appropriate AC circuit breaker according to local regulations.
- When the inverter is powered on, the BACK-UP AC port is live. If maintenance on the BACK-UP load is required, power off the inverter; otherwise, electric shock may occur.
- For cables used in the same system, it is recommended that the cable conductor material, cross-sectional area, length, etc. are consistent.
  - BACK-UP AC cable of each inverter
  - GRID AC line of each inverter
- When a single inverter is connected to the grid, it supports connecting a generator via an ATS switch to switch between grid and generator power supply. The ATS switch is connected to the grid by default.

5.4.1 Switch Requirements

No.	Circuit Breaker	Recommended Specifications	Procurement Method	Remarks
1	GRIDCircuit Breaker BACK-UPCircuit Breaker	Recommended configuration for partial backup scenarios: • Nominal Voltage≥230Vac • The Rated Current requirements are as follows: ◦ GW3K-EHA-G20：20A ◦ GW3.6K-EHA-G20：20A ◦ GW5K-EHA-G20：32A ◦ GW6K-EHA-G20：40A ◦ GW8K-EHA-G20：50A	Provided by the customer	During actual selection, you may also choose a circuit breaker that complies with local installation codes based on the actual operating current.

No.	Circuit Breaker	Recommended Specifications	Procurement Method	Remarks
		◦ GW9.999K-EHA-G20：63A ◦ GW10K-EHA-G20：63A ◦ GW3K-BHA-G20：20A ◦ GW3.6K-BHA-G20：20A ◦ GW5K-BHA-G20：32A ◦ GW6K-BHA-G20：40A ◦ GW8K-BHA-G20：50A ◦ GW9.999K-BHA-G20：63A ◦ GW10K-BHA-G20：63A Recommended configuration for whole-home backup scenarios: • Nominal Voltage≥230Vac • The Rated Current requirements are as follows: ◦ GW3K-EHA-G20：63A ◦ GW3.6K-EHA-G20：63A ◦ GW5K-EHA-G20：63A ◦ GW6K-EHA-G20：63A ◦ GW8K-EHA-G20：63A ◦ GW9.999K-EHA-G20：63A ◦ GW10K-EHA-G20：63A ◦ GW3K-BHA-G20：63A ◦ GW3.6K-BHA-G20：63A ◦ GW5K-BHA-G20：63A		

No.	Circuit Breaker	Recommended Specifications	Procurement Method	Remarks
		◦ GW6K-BHA-G20：63A ◦ GW8K-BHA-G20：63A ◦ GW9.999K-BHA-G20：63A ◦ GW10K-BHA-G20：63A Note: If the inverter BACK-UP port is not used, select a suitable ON-GRID circuit breaker according to the maximum grid-connected current.		
2	ATS switch	For the same model, the specifications of the ATS switch and the GRID circuit breaker are identical.	Provided by the customer	Single inverter only
3	Residual Current Device (RCD)	RCD installation and RCD specification selection: An external Type A RCD with a residual operating current of ≥300 mA is recommended on the inverter AC output side (for inverter capacities <30 kVA, select a residual operating current of 300 mA; for inverter capacities ≥30 kVA, select a residual operating current of 10 mA/kVA).	Provided by the customer	During actual equipment selection, you can also choose an RCD with a suitable rating based on local regulatory requirements. For example, in Chile, local regulations require an RCD with a residual operating current of no

No.	Circuit Breaker	Recommended Specifications	Procurement Method	Remarks
				more than 30 mA to be installed between the inverter and the grid for inverters rated at 5 kVA or less. However, note that due to the PV panels, the lower the residual operating current of the RCD, the more prone it is to nuisance tripping in adverse conditions such as rainy or overcast weather.
4	(Optional) Manual Transfer Switch	• Nominal Voltage≥230Vac • Rated Current:63A	• Provided by the customer • Shipped with the inverter (Australia only)	Single inverter only

5.4.2 Cable Preparation

No.	Cable	Recommended Specifications	Procurement Method
1	Inverter Enclosure Protective Ground Wire	Single-core outdoor copper cable • Single-core outdoor copper cable • Conductor Cross-Sectional Area:S=5.2mm²-6mm²	Provided by the customer
		STS Protective Grounding: • Conductor Cross-Sectional Area: ◦ GW30K-STS-G10：10-16mm² ◦ GW60K-STS-G10：16-25mm²	
2	PVDC Cable	EHA models only: • Industry-standard outdoor PV cable • Conductor Cross-Sectional Area:4mm²-6mm² • Cable Outer Diameter:5.9mm-8.8mm	Provided by the customer

No.	Cable	Recommended Specifications	Procurement Method
3	AC Cable	• Inverter AC Input/Output Cable (BACK UP/ON GRID）： • Conductor Cross-Sectional Area:4mm²-16mm² ◦ GW3K-EHA-G20, GW3.6K-EHA-G20: 4mm²-16mm² ◦ GW5K-EHA-G20, GW6K-EHA-G20: 6mm²-16mm² ◦ GW8K-EHA-G20, GW9.999K-EHA-G20, GW10K-EHA-G20: 10mm²-16mm² ◦ GW3K-BHA-G20, GW3.6K-BHA-G20: 4mm²-16mm² ◦ GW5K-BHA-G20, GW6K-BHA-G20: 6mm²-16mm² ◦ GW8K-BHA-G20, GW9.999K-BHA-G20, GW10K-BHA-G20: 10mm²-16mm² • Outer Diameter of Multicore Outdoor Copper Cable:10mm-21mm	Provided by the customer
4	STS Power Cable	• Multicore Outdoor Copper Cable • SMART-PORT AC cable, BACK-UP AC cable, GRID AC cable ◦ Conductor Cross-Sectional Area: ▪ GW30K-STS-G10：14-25mm² ▪ GW60K-STS-G10：16-25mm² ◦ Cable Outer Diameter: 10-32mm	Provided by the customer
5	Smart meter power cable	• Outdoor copper-core cable • Conductor Cross-Sectional Area:1mm²	Provided by the customer

No.	Cable	Recommended Specifications	Procurement Method
6	MeterRS485Communication Cable	• Shielded Twisted Pair • Conductor Cross-Sectional Area:0.2mm²-0.4mm²	Provided by the customer
7	EMS or EV Charger RS485Communication Cable		
8	Remote Shutdown andNS ProtectionCommunication Cable	• Shielded Cable Compliant with Local Standards • Conductor Cross-Sectional Area:0.2mm²-0.4mm² • Cable Outer Diameter:5mm-8mm	Provided by the customer
9	Load Control and Diesel Generator ControlDOCommunication Cable		
10	RCR/DREDsignal cable		
11	CTCommunication Cable	Standard straight-through Ethernet cable: • RJ45 shielded connector • CAT 5E or higher-grade straight-through shielded Ethernet cable • The connector specifications must match the Ethernet cable specifications	Provided by the customer

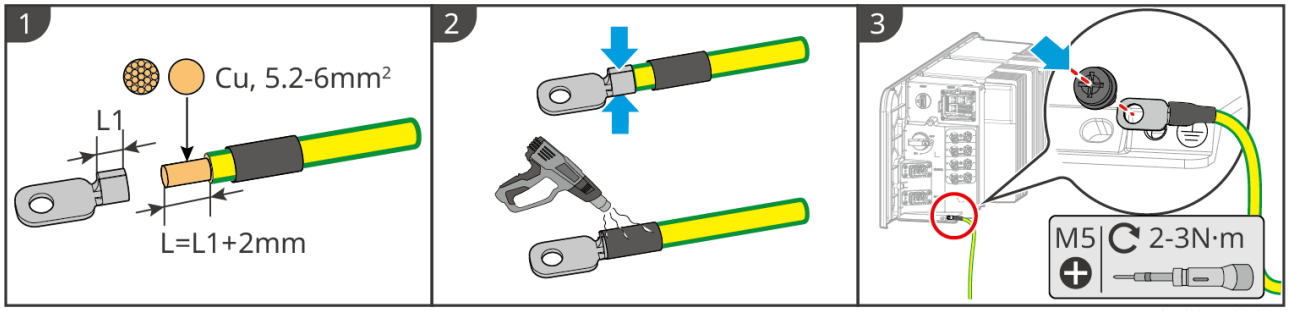
No.	Cable	Recommended Specifications	Procurement Method
12	Inverter parallel communication cable	Standard straight-through Ethernet cable: • RJ45 shielded connector • CAT 5E or higher-grade straight-through shielded Ethernet cable ◦ For CAT 5E or CAT 6E, a length of no more than 5 m is recommended ◦ For CAT 7E, a length of no more than 10 m is recommended • The connector specifications must match the Ethernet cable specifications	Provided by the customer
13	STS communication cable	Standard straight-through Ethernet cable: • RJ45 shielded connector • CAT 5E or higher-grade straight-through shielded Ethernet cable • The connector specifications must match the Ethernet cable specifications	Connect to the inverter's STS communication port: supplied with the STS
Note: The cable specifications recommended in the table are for reference only. When selecting cables, the effects of factors such as ambient installation temperature, installation method, number of parallel runs, voltage drop, and thermal stability must be considered comprehensively, and the ampacity must be adjusted using the applicable correction factors. The selected cable must meet the following requirement: cable ampacity ≥ overcurrent protection device rated current ≥ maximum rated current			

5.5 Connect The Protection Ground Wire

Warning

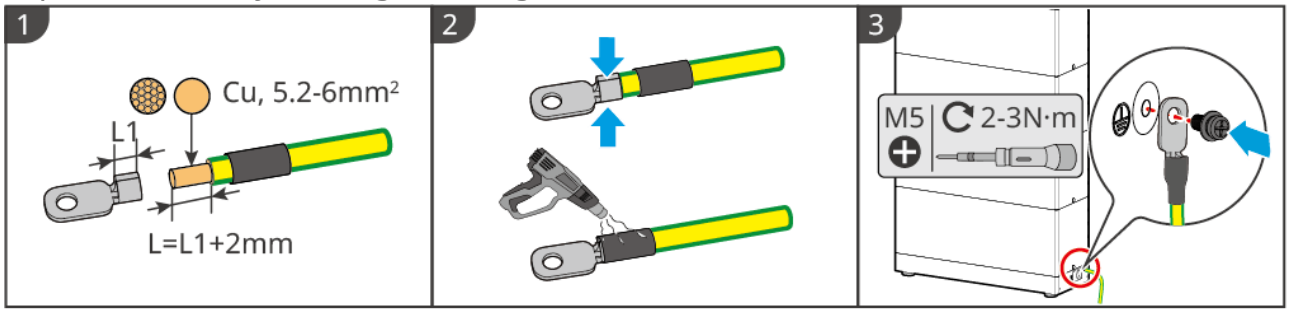
- The Protection grounding of the chassis enclosure cannot replace the Protection ground wire of the AC output port. When wiring, ensure that the Protection ground wires at both locations are reliably connected.
- To improve the corrosion resistance of the terminal, it is recommended to apply silicone or paint on the outside of the grounding terminal for protection after the Protection ground wire connection and installation is completed.
- When installing equipment, the Protection ground wire must be installed first; when removing equipment, the Protection ground wire must be removed last.
- Battery grounding is integrated into the blind-mate connector connected to the inverter. The system is grounded uniformly through the inverter, so no separate grounding of the battery is required during installation. If separate expansion is required, please ground the expanded Battery BANK separately.

Energy storage system grounding:



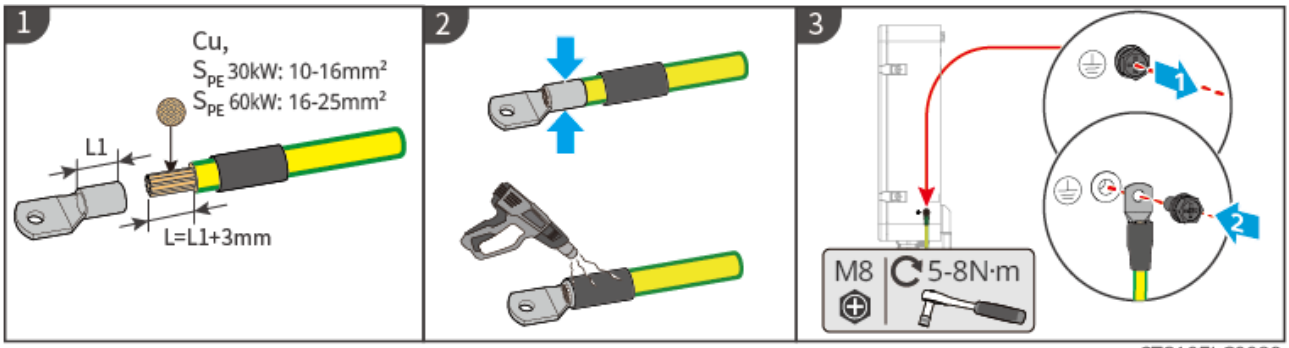
ESA20ELC0001

Expanded Battery BANK grounding:



BAT20ELC0003

STS grounding:



STS10ELC0029

5.6 Connect PV Cables

⚠Danger

- Do not connect the same PV string to multiple inverters; otherwise, the inverter may be damaged.
- Before connecting the PV strings to the inverter, please confirm the following information; otherwise, the inverter may be permanently damaged, and in severe cases, fire may cause personal injury and property damage.
  1. Please ensure that the Max. MPPT Short Circuit Current and Max. Input Voltage of each MPPT circuit are within the allowable range of the inverter.
  2. Please ensure that the positive pole of the PV string is connected to PV+ of the inverter, and the negative pole of the PV string is connected to PV- of the inverter.

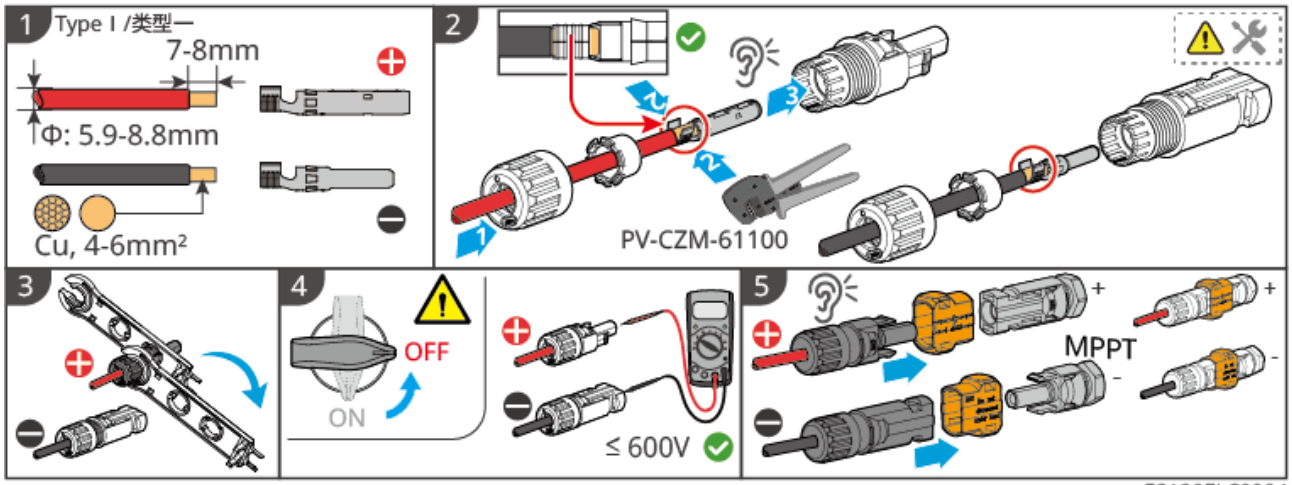
⚠Warning

- PV string output does not support grounding. Before connecting the PV string to the inverter, ensure that the minimum insulation resistance of the PV string to ground meets the minimum insulation impedance requirement (R = Max. Input Voltage / 30mA).
- After completing the DC cable connection, ensure that the cable connections are firm and not loose.
- Use a multimeter to measure the positive and negative poles of the DC cables to ensure that the polarity is correct, with no reverse connection, and that the voltage is within the allowable range.

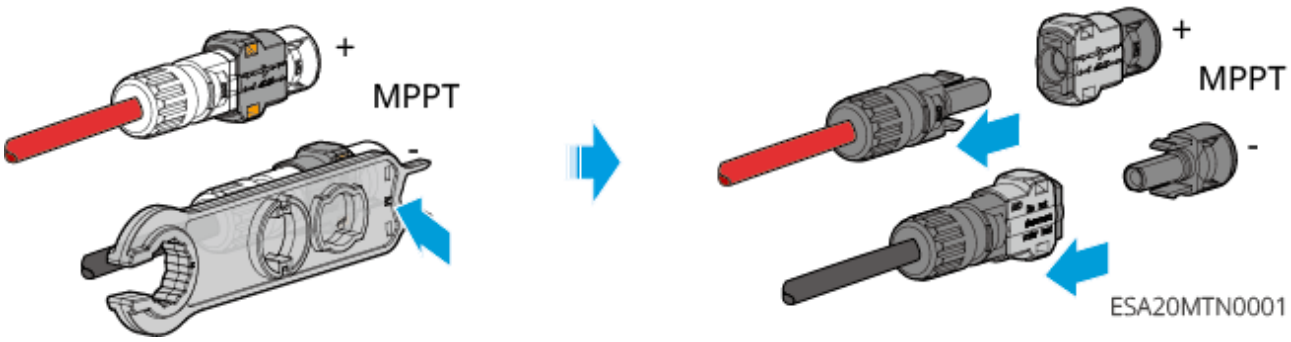
Note

- The two PV strings in each MPPT must use the same model, same number of panels, same tilt angle, and same azimuth angle to ensure maximum Efficiency.
- PV cable connection is only for EHA models; BHA models have no PV connection port.

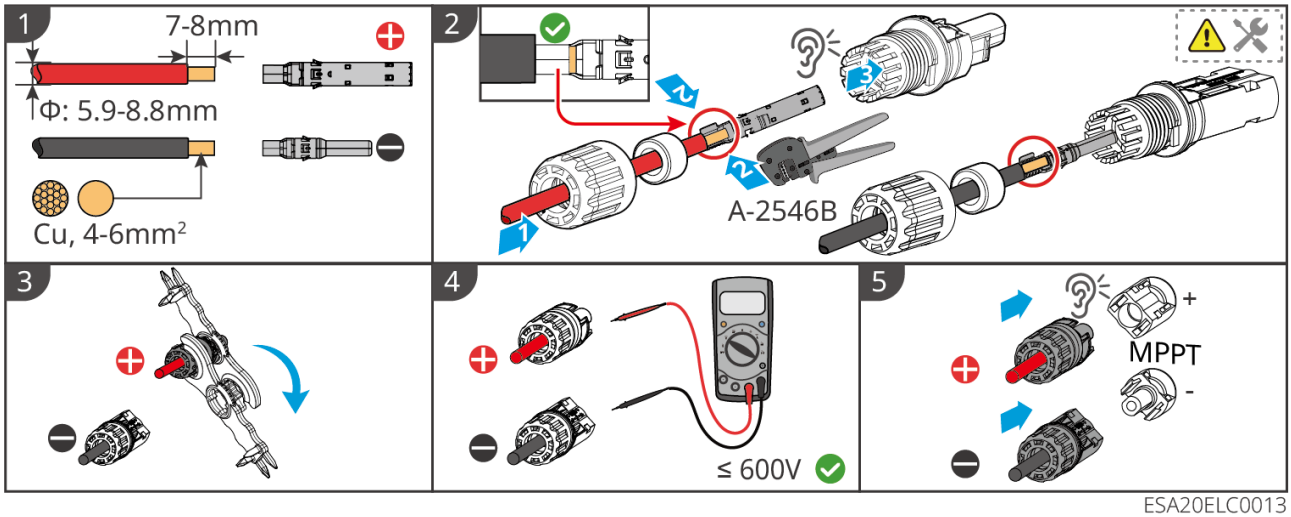
Type 1:



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

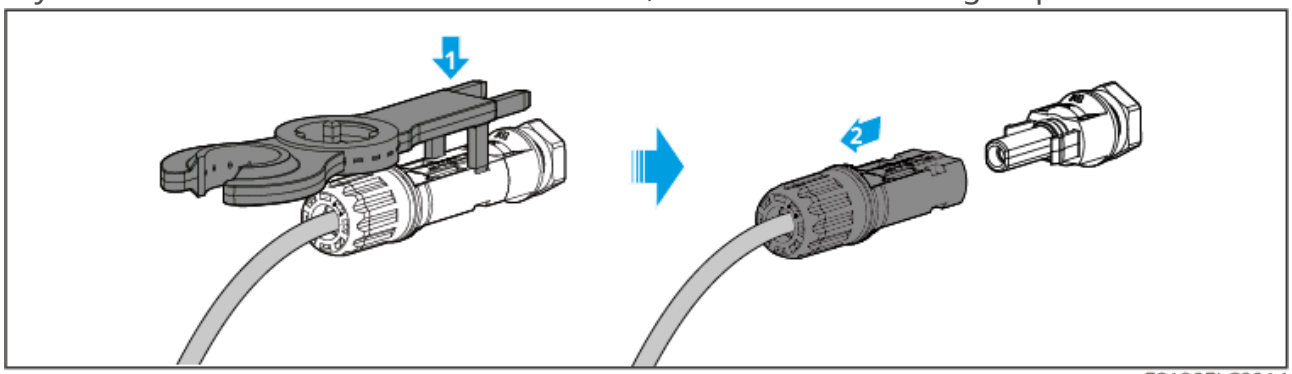


Type 2:



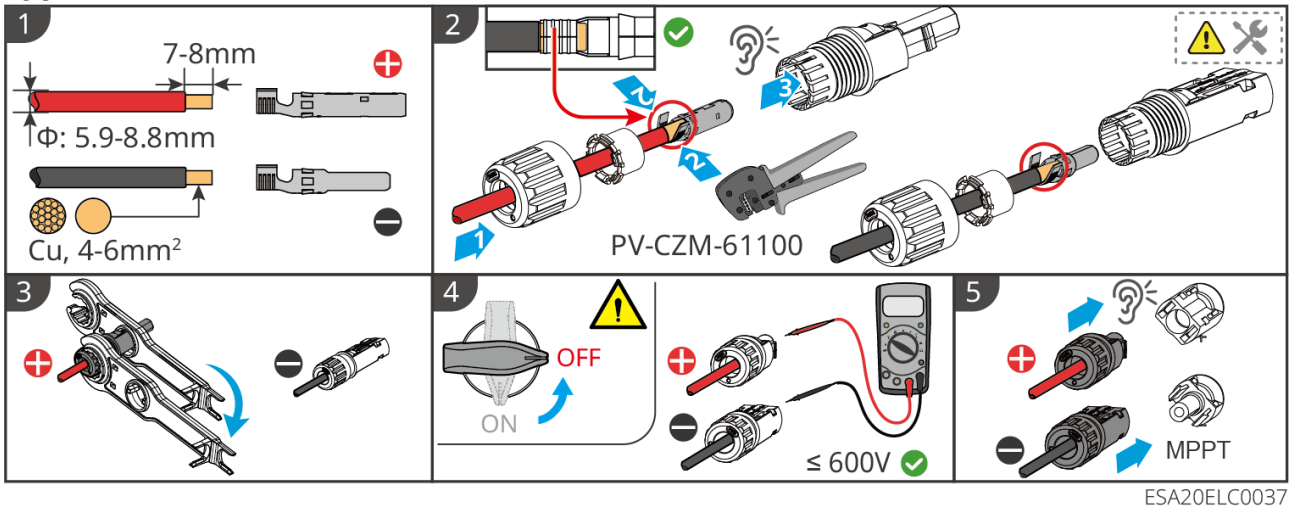
ESA20ELC0013

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



ESA20ELC0014

Type 3:



ESA20ELC0037

5.7 Connect The Battery Expansion Cable

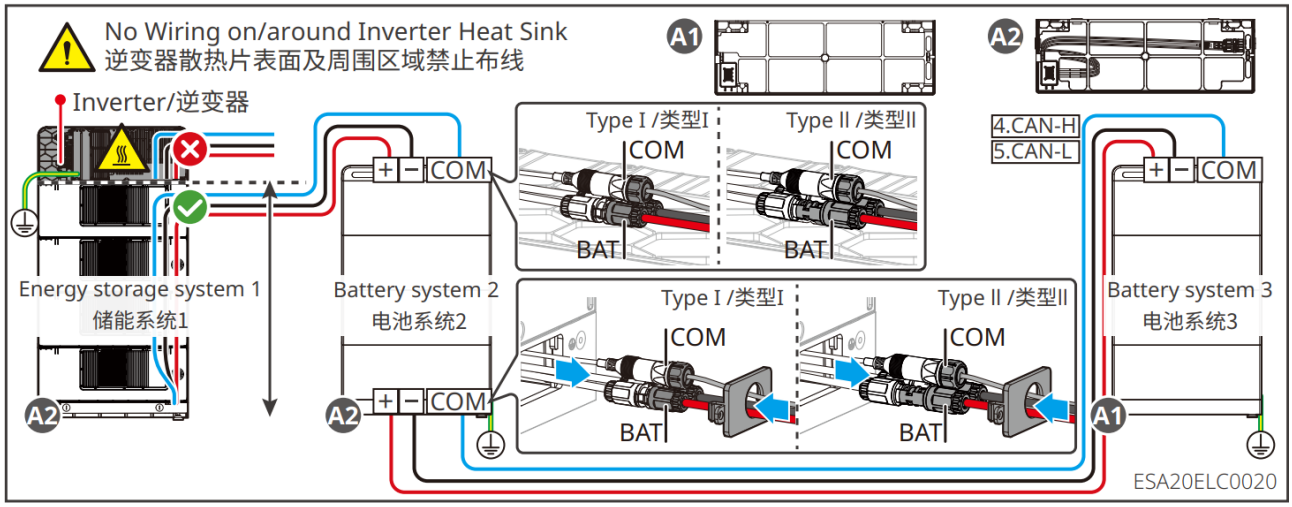
Danger

- Do not connect loads between the inverter and the battery.
- When connecting battery cables, use insulated tools to prevent accidental electric shock or Battery Short Circuit.
- Please ensure that the battery open-circuit voltage is within the inverter's allowable range.
- Between batteries, choose whether to configure a DC Switch based on local laws and regulations.
- Do not route cables on or around the inverter heat sink surface to prevent overheating and damage to the wiring harness.

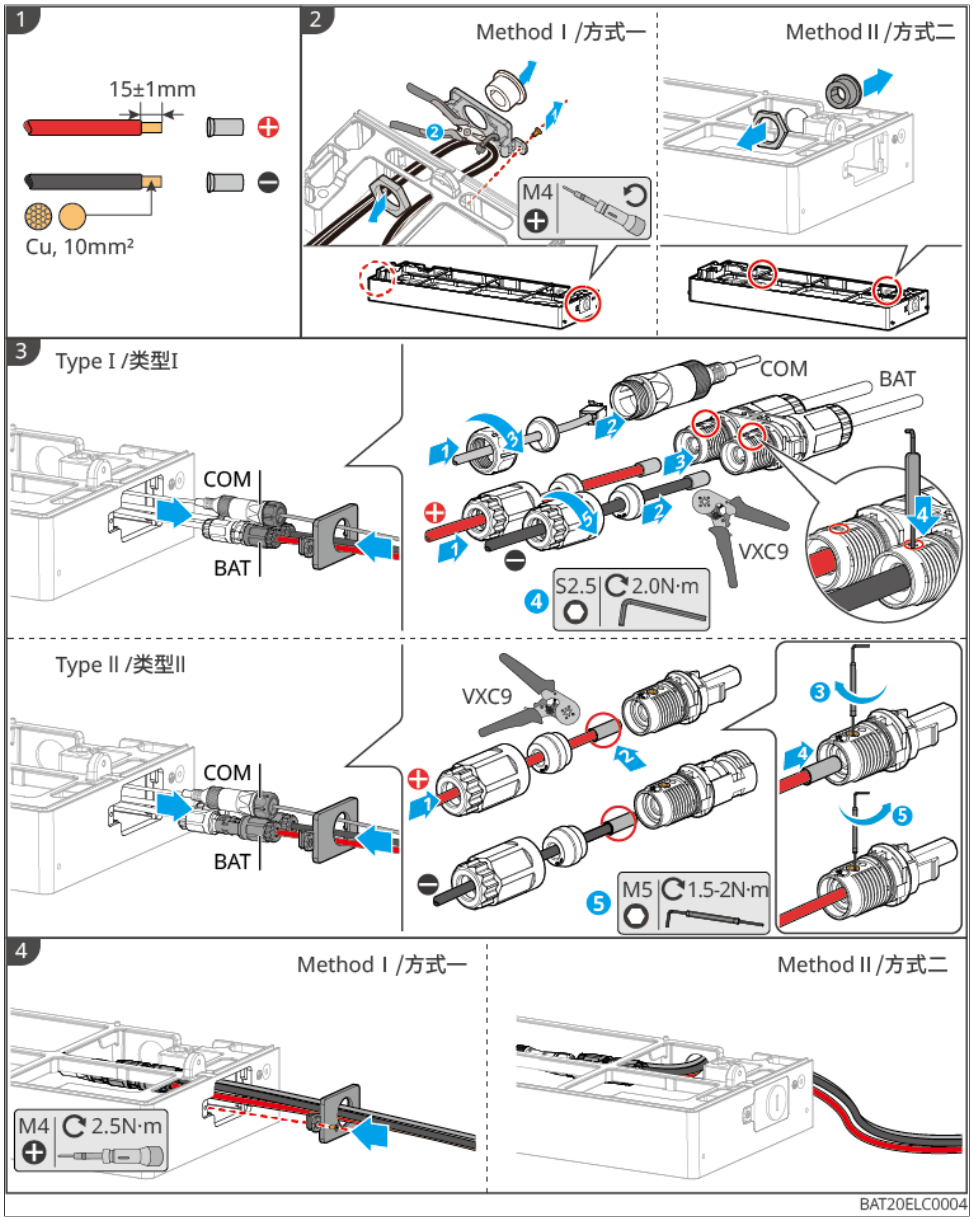
Energy Storage System Expansion Overview

A1: Base shipped with the inverter

A2: Mounting base with parallel ports



Method for making the battery system expansion wiring harness



5.8 Connect AC Cables

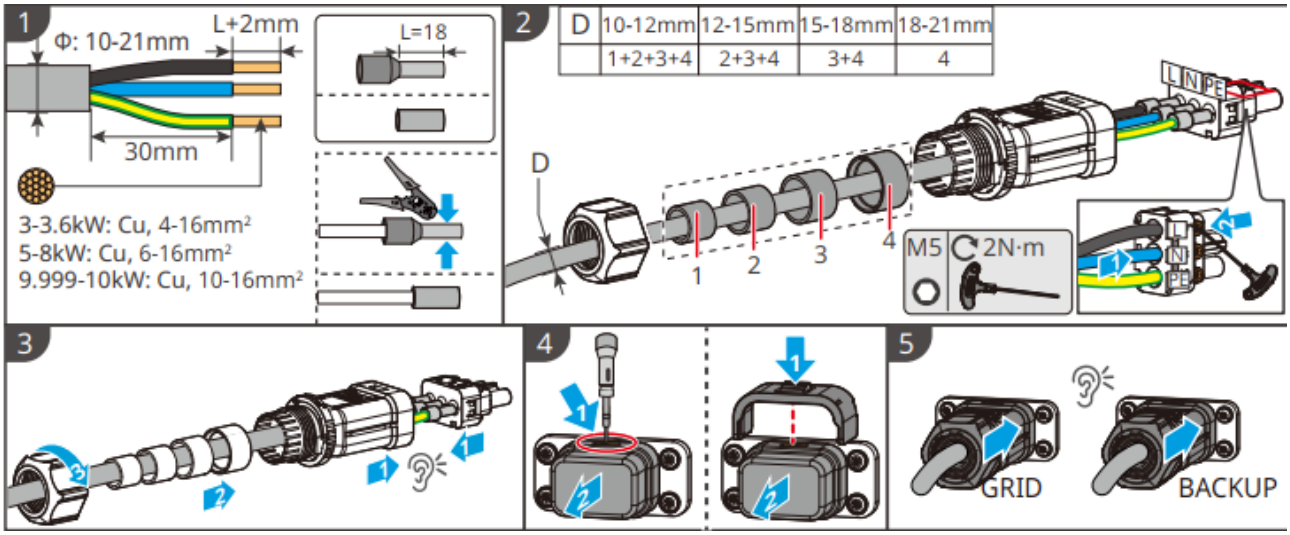
⚠Warning

- The inverter integrates a Residual Current Monitoring Unit (RCMU) to prevent residual current from exceeding the specified value. When the inverter detects a leakage current greater than the allowable value, it will quickly disconnect from the grid.
- When wiring, the AC cables must fully match the "BACKUP" and "GRID" grounding ports of the AC terminals. Incorrect cable connection will cause equipment damage.
- Ensure that the conductor core is fully inserted into the terminal wiring hole without exposure.
- Ensure that the insulating plate at the AC terminal is firmly fastened and not loose.
- Ensure that the cables are securely connected; otherwise, the terminals may overheat during operation and cause equipment damage.

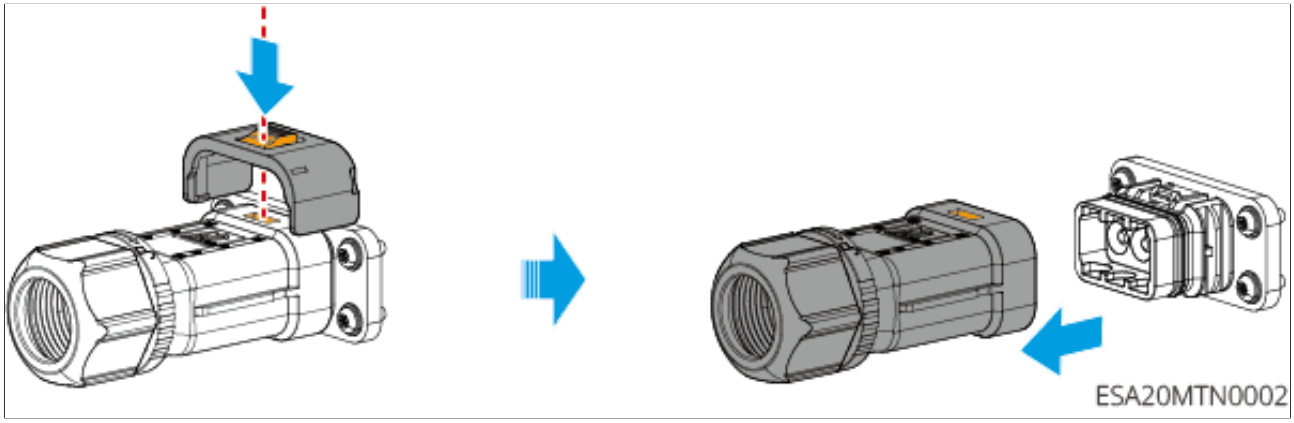
Note

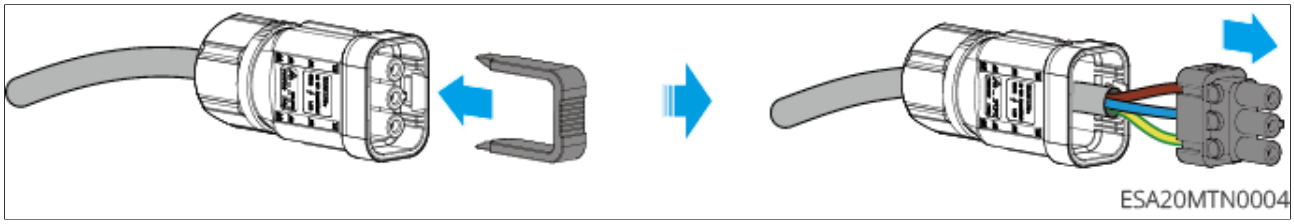
- When crimping AC cables, it is recommended to use a crimping tool with a hexagonal (six-sided) or higher crimping shape.
- After system installation is complete and wiring is confirmed correct, under normal operation, the BACK-UP port of the energy storage inverter should supply power to critical household loads.
- After AC wiring is complete, turn the manual transfer switch to the "BACK-UP" position to engage it. The manual transfer switch comes with a fixed lock clip. Decide whether to install it based on actual conditions. If installation is needed, reserve at least 35 mm of space on both left and right sides of the switch to facilitate installation and removal of the padlock accessory.
- STS is an optional accessory. If needed, refer to the wiring method below for connection.

5.8.1 Connecting the Inverter AC Cable

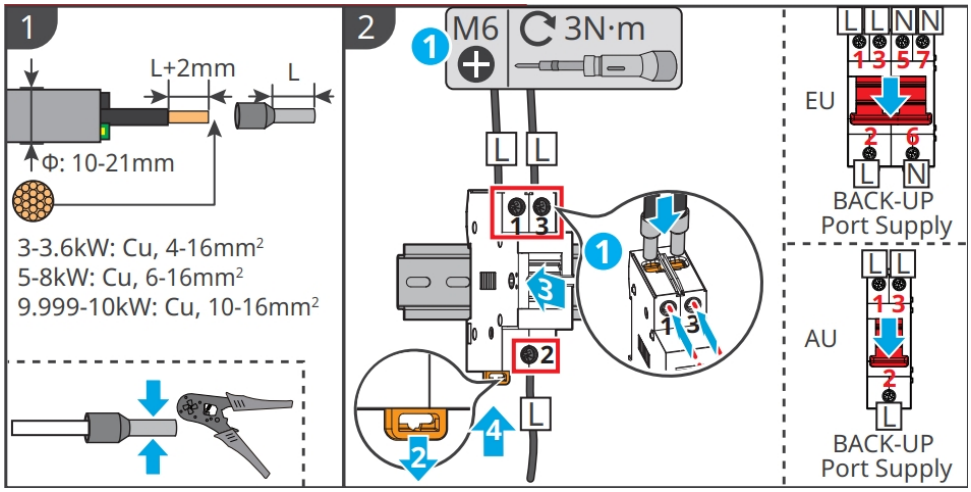


To disassemble the AC terminal, refer to the following steps:





(Optional) Connecting a manual transfer switch



5.8.2 Connect STS Power Cables

⚠Warning

- To ensure that STS can be safely disconnected from the grid in the event of an abnormality, connect an AC Switch between STS and the grid. Select an appropriate AC Switch according to local regulations.
- Ensure that STS is correctly connected to devices such as the inverter, grid, BACK-UP load, or generator. Incorrect connection may cause equipment damage.
- When wiring, the AC cables must fully match the L1, L2, L3, N, and PE ports of the AC terminal. Incorrect cable connection may cause power outage.
- Ensure that the conductor core is fully inserted into the terminal wiring hole without exposure.
- Ensure that the insulating plate at the AC terminal is firmly fastened and not loose.
- Ensure that the cables are securely connected; otherwise, the terminals may overheat during operation and cause equipment damage.

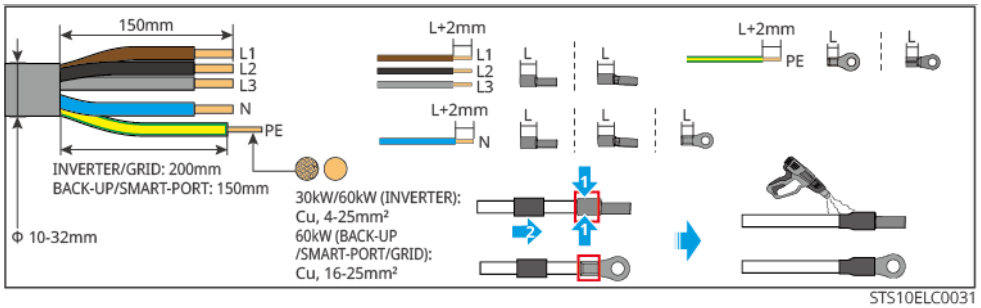


Figure45 Cable Preparation

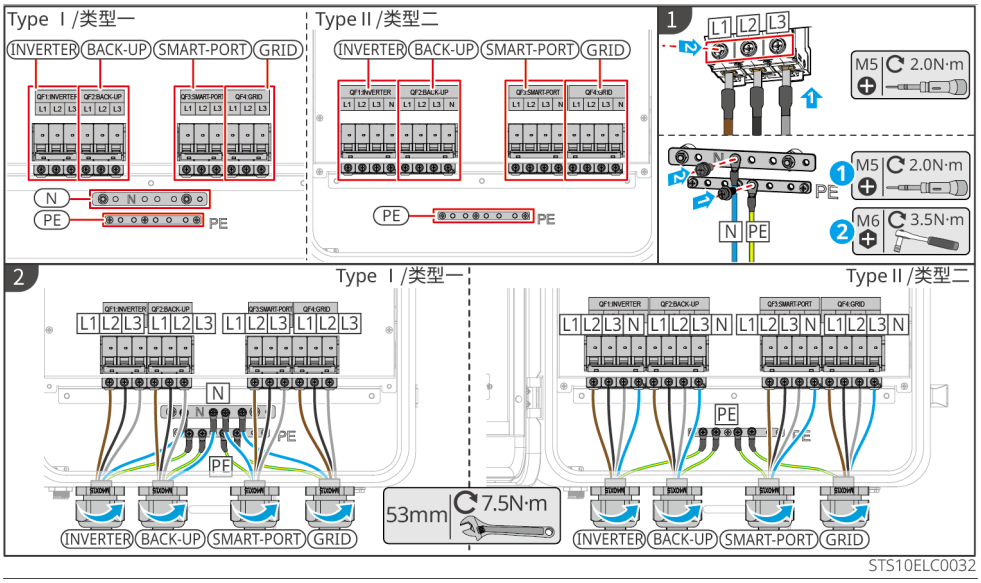


Figure46 30 kW model cable connection

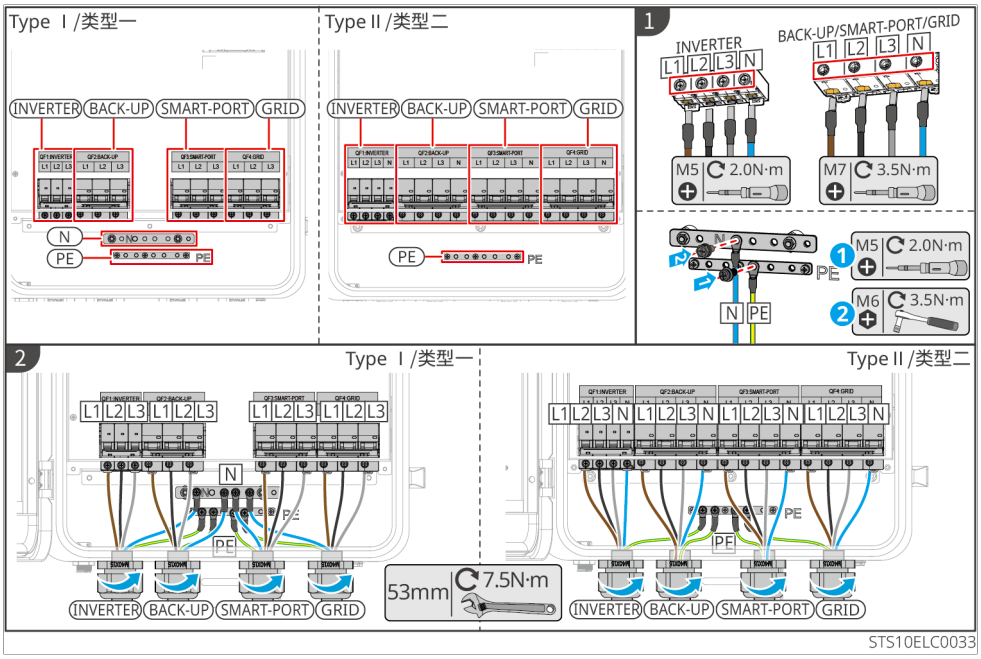


Figure47 60 kW model cable connection

5.9 Connect Meter Cables

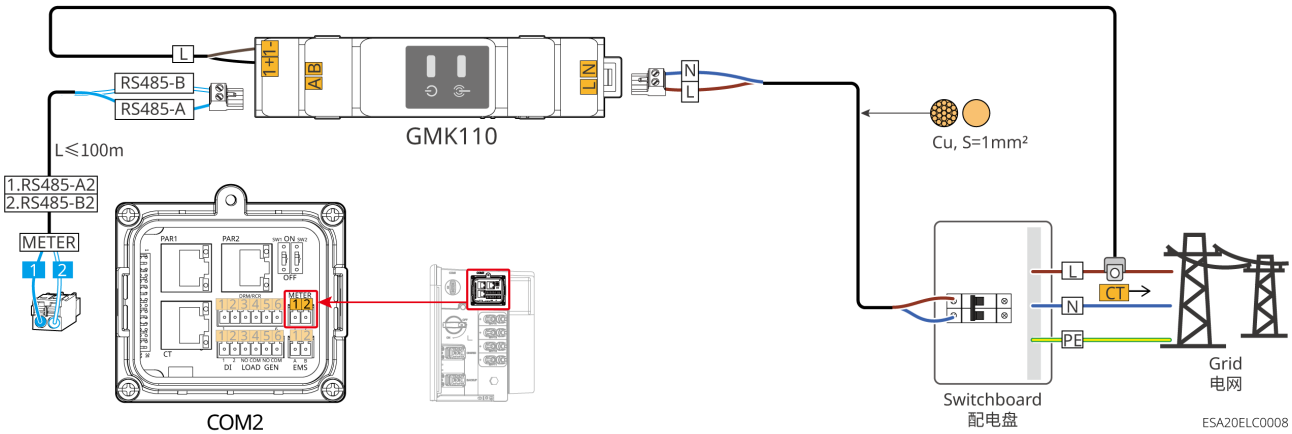
Note

- If there is a need for Parallel Networking of multiple inverters, please consult the manufacturer to purchase the electricity meter separately.
- Please ensure that the CT connection direction and phase sequence are correct; otherwise, monitoring data may be incorrect.
- Ensure that all cables are connected correctly and securely without looseness. Improper wiring may cause poor contact or damage to the meter.
- In areas with risk of lightning, if the meter cable length exceeds 10 m and the cable is not routed in grounded metal conduit, it is recommended to install an external lightning protection device.

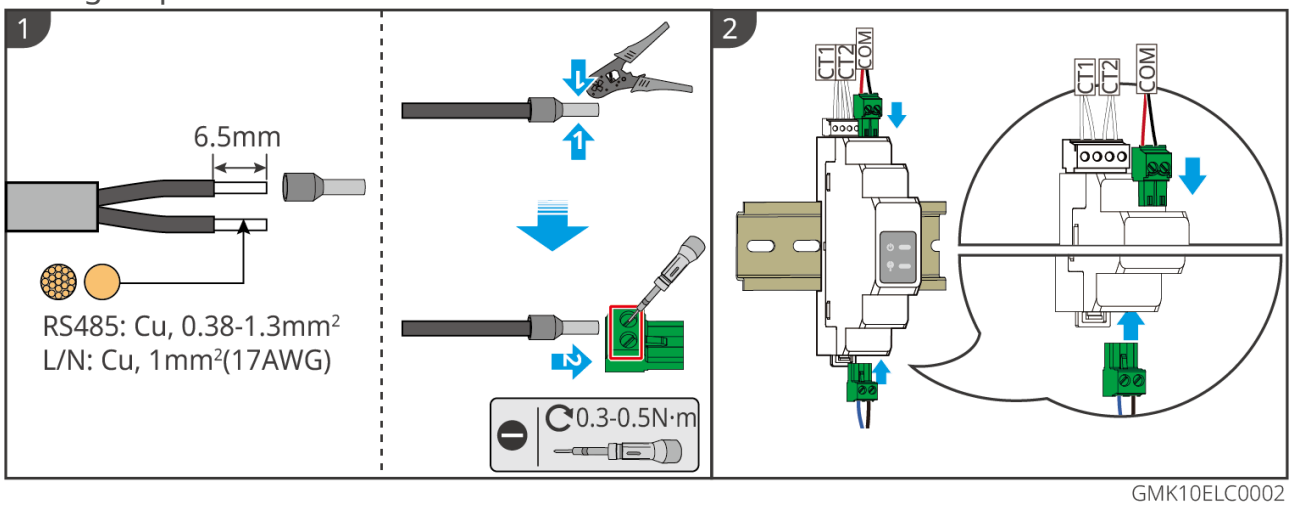
GMK110 electricity meter wiring

Note

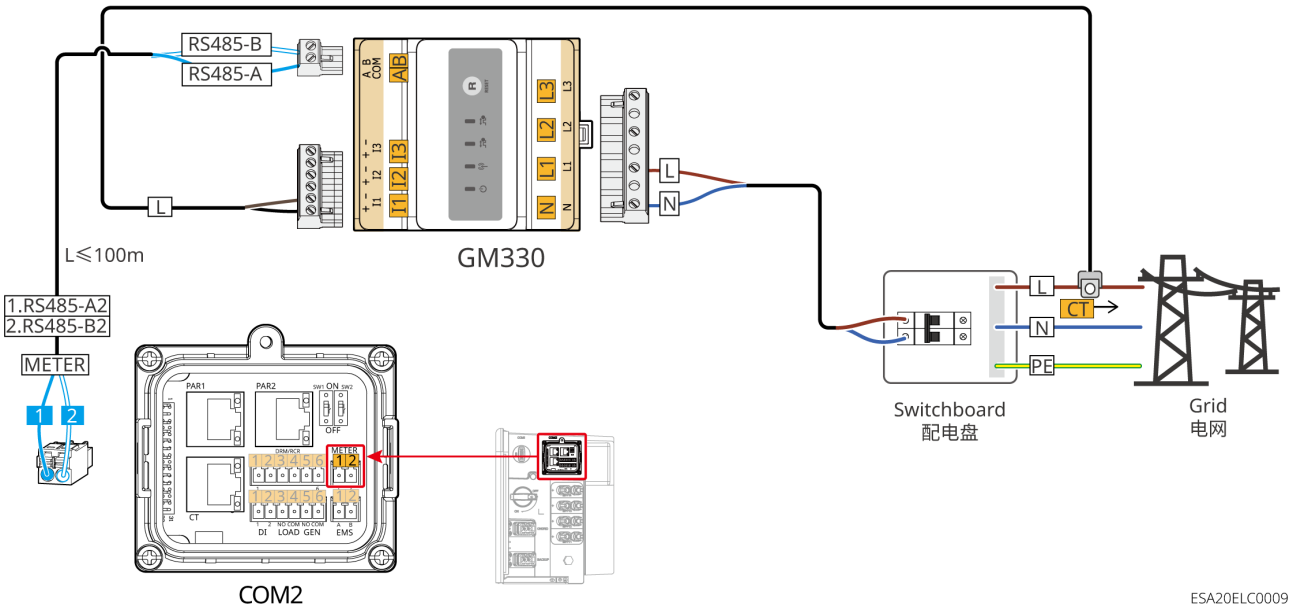
- The outer diameter of the AC power cable must be smaller than the CT aperture to ensure that the AC power cable can pass through the CT.
- To ensure CT current detection accuracy, the CT cable length is recommended not to exceed 30m.
- Do not use a network cable as the CT cable; otherwise, the meter may be damaged due to excessive current.
- The CTs provided by the equipment manufacturer may vary slightly in size and appearance depending on the model, but the installation and wiring methods are the same.



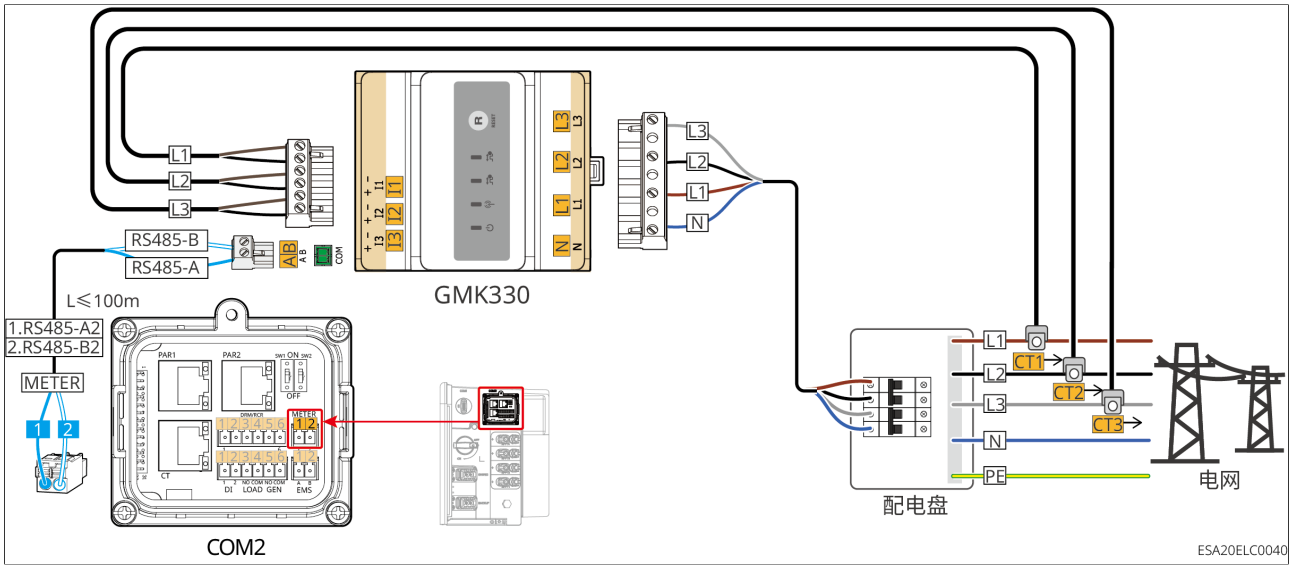
Wiring Steps



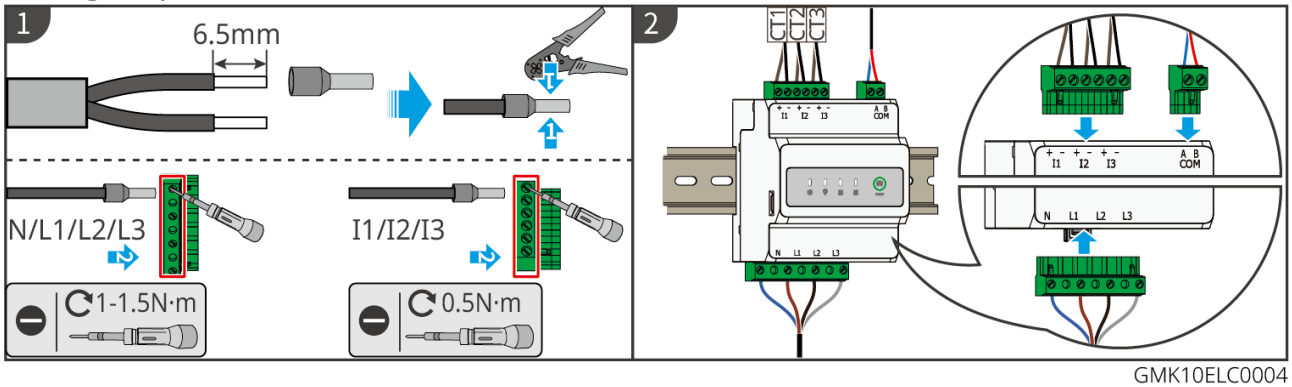
GM330 meter wiring



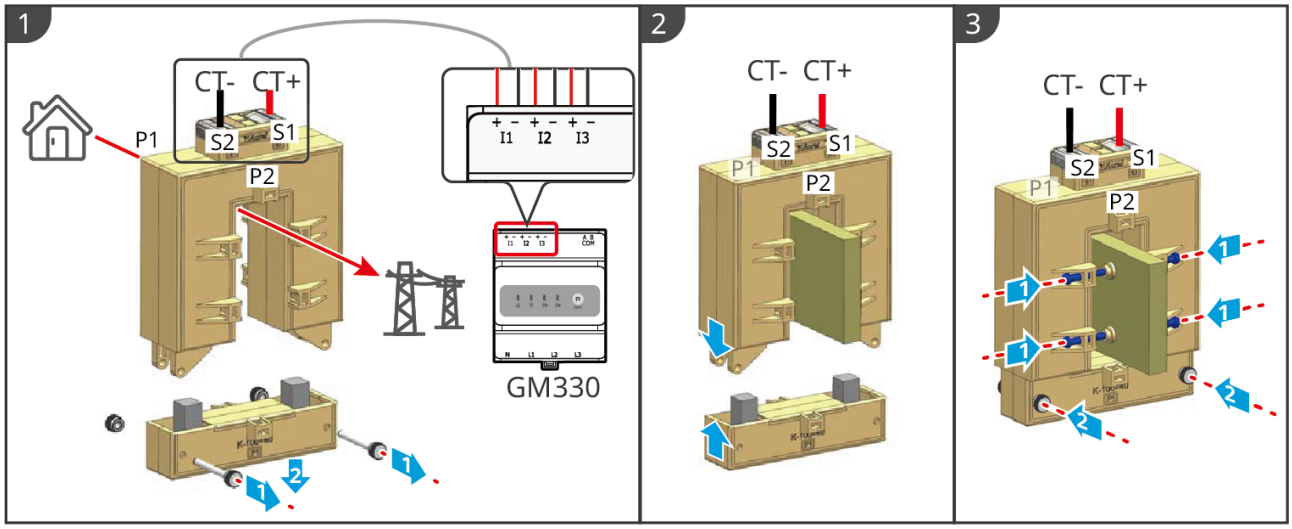
GMK330 meter wiring



Wiring Steps

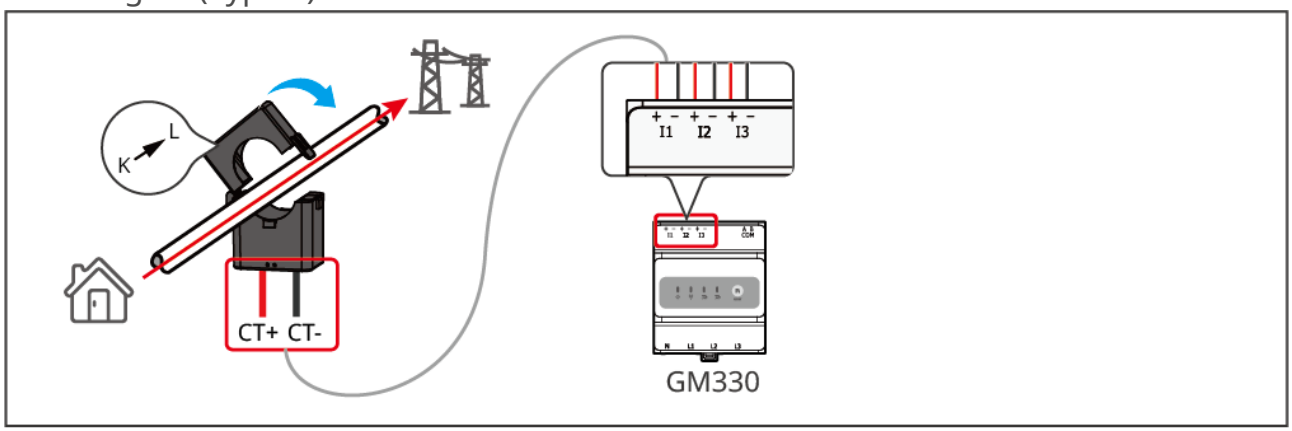


Installing CT (Type 1)



GMK10ELC0006

Installing CT (Type 2)



GMK10ELC0007

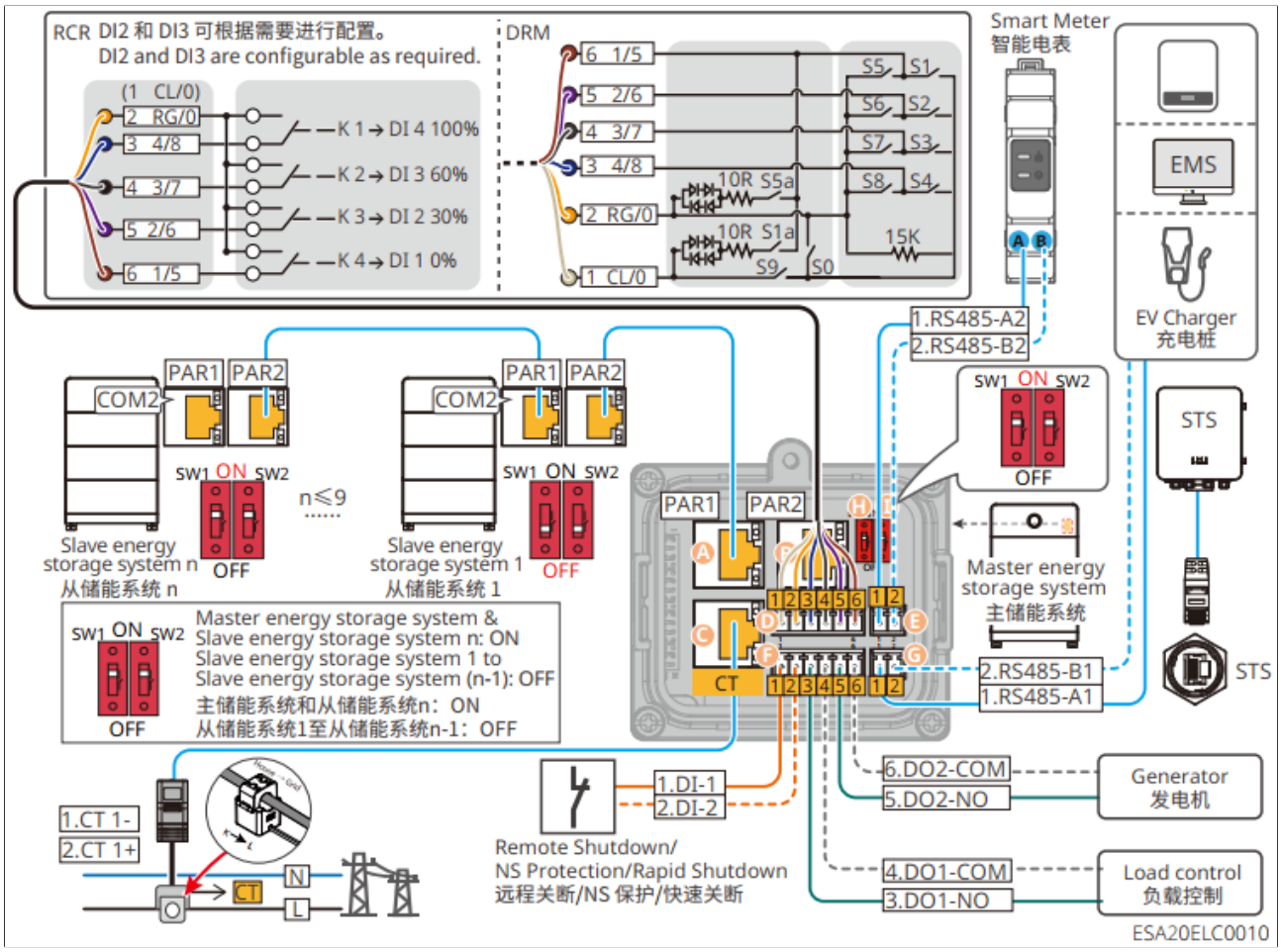
5.10 Connect The Communication Cable

5.10.1 Connecting the Inverter Communication Cable

NOTICE

- When using the inverter's built-in meter, use the CT supplied with the unit.
- Connect the CT according to the direction indicated on the meter. Reverse connection may trigger a CT reverse fault.
- To use theDRED、RCRor Remote Shutdown function, enable the function in theAppafter completing the wiring.
- If the inverter isDREDNot Connected to aAppdevice or Remote Shutdown device, do not enable this function in the app; otherwise, the inverter cannot operate in grid-connected mode.
- In a parallel system, to enable the DRED and RCR functions, connect the DRED and RCR communication cables to the master inverter only.
- To maintain the inverter's ingress protection rating, do not remove the waterproof plugs from unused communication ports on the inverter.
- InverterDOsignal communication port; can be connected to dry contact A. Signal specifications:Max≤24Vdc,1A。
- The inverter communication function is optional. Select it according to the actual application.
- The inverter supports connection to a mobile phone or web interface via 4G, Bluetooth, Wi-Fi, or LAN, enabling configuration of device parameters and viewing of operating and fault information for timely monitoring of system status.
- In a parallel system, install a WiFi/LAN Kit-20 on both the master and slave inverters, and use 4G Kit-CN-G20 or 4G Kit-G20 smart communication sticks to establish the network.
- In a parallel system, set the DIP switches on the first and last inverters to ON, and set the DIP switches on all other inverters to OFF.
- When using the 4G Kit-CN-G20:
  - To set up Parallel Networking, contact GoodWe to purchase a WiFi/LAN Kit-20.
  - A Micro-SIM card for China is supplied as standard, with China Mobile as the carrier. Ensure that the device is installed in an area covered by the carrier's signal. If local China Mobile coverage is unavailable, contact the carrier to improve the signal.
  - Supports connection to third-party monitoring platforms via the MQTT communication protocol.
- The 4G Kit-CN-G20 is an LTE device with a single antenna, suitable for applications with low data transmission rate requirements.

Communication Functions

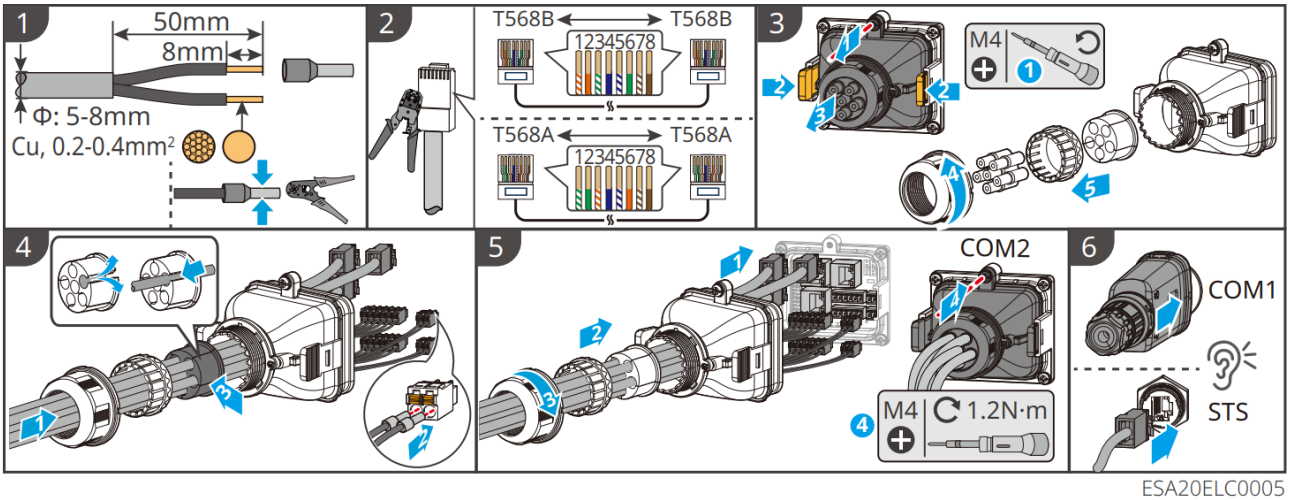


Port (silkscreen label)		Function	Description
A	PAR1	Parallel communication port 1	Parallel communication port.
B	PAR2	Parallel communication port 2	
C	CT	CTconnection port	Connect theCTcommunication cable only when using the inverter's built-in meter.

Port (silkscreen label)		Function	Description
D	DRM/RCR	RCR、DREDorEnWG 14afunction connection port	• RCR （Ripple Control Receiver): Provides anRCRsignal control port to meet grid dispatch requirements in Europe. • DRED （Demand Response Enabling Device): Provides aDREDsignal control port to meetDERDCertification requirements in regions such as Australia.
E	METER	Meter connection port	Connect an external smart meter viaRS485communication.
F	DI	Remote Shutdown/NS protection/Rapid Shutdown	• For connecting an external Remote Shutdown or local NS protection device; disabled by default. • In a Rapid Shutdown system, the Rapid Shutdown transmitter works with the receiver to rapidly shut down the system. The receiver maintains module output by receiving signals from the transmitter. The transmitter can be installed externally or integrated into the inverter. In an emergency, enable the external trigger device to stop the transmitter, thereby shutting down the modules.
	LOAD	Load Control	• Supports connection to dry-contact signals for functions such as load control.DOcontact rating:24V DC@1A, NO/COMnormally open contact. • Supports connecting anSG Readyheat pump, which is controlled via dry-contact signals.

Port (silkscreen label)		Function	Description
	GEN	Diesel Generator Control port	Supports input of generator control signals to start and stop the generator. Generator connection is not supported in a Microgrid Scenario.
G	EMS	EMS/EV chargercommunication port/GoodWe grid-tied inverter	• Connects to a third-party EMS device for energy control; • Connects to a GoodWe EV charger; • Connects to a GoodWe grid-tied inverter.
H	SW1	Parallel operation DIP switch	In multi-inverter parallel operation, set the parallel operation DIP switches on the first and last inverters to ON and those on all other inverters to OFF.
I	SW2		

Communication cable connection method



ESA20ELC0005

5.10.2 Connect STS Communication Cables

Note

- When connecting the communication cable to the inverter, use the communication cable shipped with the product.
- The communication cable shipped with the product is 10 m long. If this length is insufficient, prepare a standard network cable of CAT 5E or higher specification, and use the RJ45 plugs shipped with the product to crimp the cable.
- The length of a self-made communication cable must not exceed 100 m; otherwise, communication abnormalities may occur.
- When making a self-made communication cable, cut the communication cable shipped with the product, and install its waterproof ring on the self-made cable.
- After connecting the communication cable, ensure waterproof Protection.
- COM2 port function is reserved. Do not remove the waterproof cover.

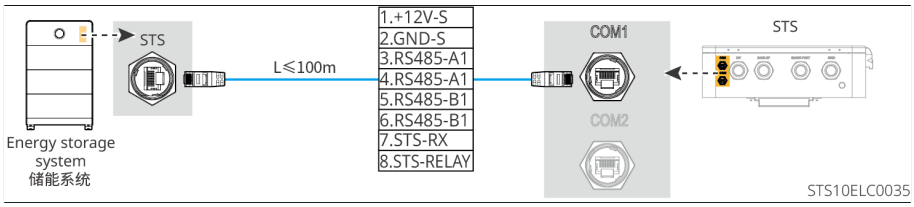


Figure48 Wiring Overview

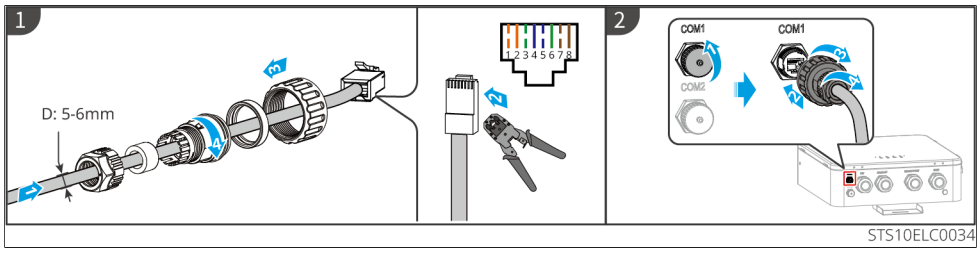
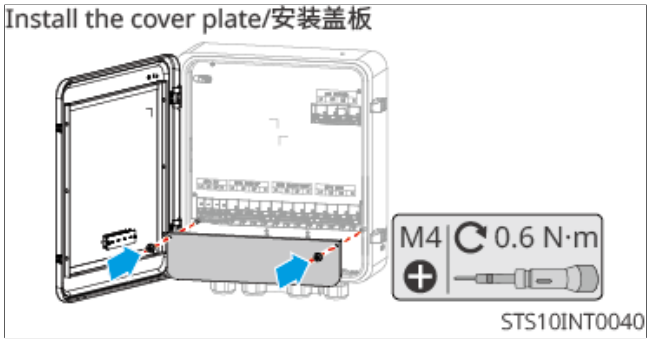


Figure49 Wiring Steps

6 Install STS Cover



7 System Trial Operation

7.1 Pre-Power-on System Check

No.	Check Items
1	The equipment is installed securely, the installation position is convenient for operation and maintenance, the installation space is conducive to ventilation and heat dissipation, and the installation environment is clean and tidy.
2	Protection ground wire, DC cable, AC cable, and communication cable are connected correctly and securely.
3	Cable bundling meets routing requirements, is reasonably distributed, and has no damage.
4	For unused cable feed-through holes and ports, be sure to use the matching terminals from the accessories for reliable connection, and seal them.
5	Ensure that used cable feed-through holes are sealed.
6	The voltage and frequency at the inverter grid connection point meet the grid connection requirements.

7.2 System Power-On

⚠Warning

- Battery black start: When there is no PV generation in the photovoltaic system and the grid is abnormal, if the inverter cannot work normally, the battery black start function can be used to force the battery to discharge and start the inverter. The inverter can then operate in off-grid mode, with the battery supplying power to the load.
- After the battery system starts, ensure that the inverter and the battery system communicate normally within 15 minutes. If they fail to communicate normally, the battery system switch will automatically open, powering off the battery system.
- In a standalone scenario, when the inverter is operating normally, switch the manual transfer switch to the BACK-UP position to engage, and the inverter's BACK-UP port supplies power to the load.
- PVstrings and the“5”are only applicable to the EHA series.

Power on

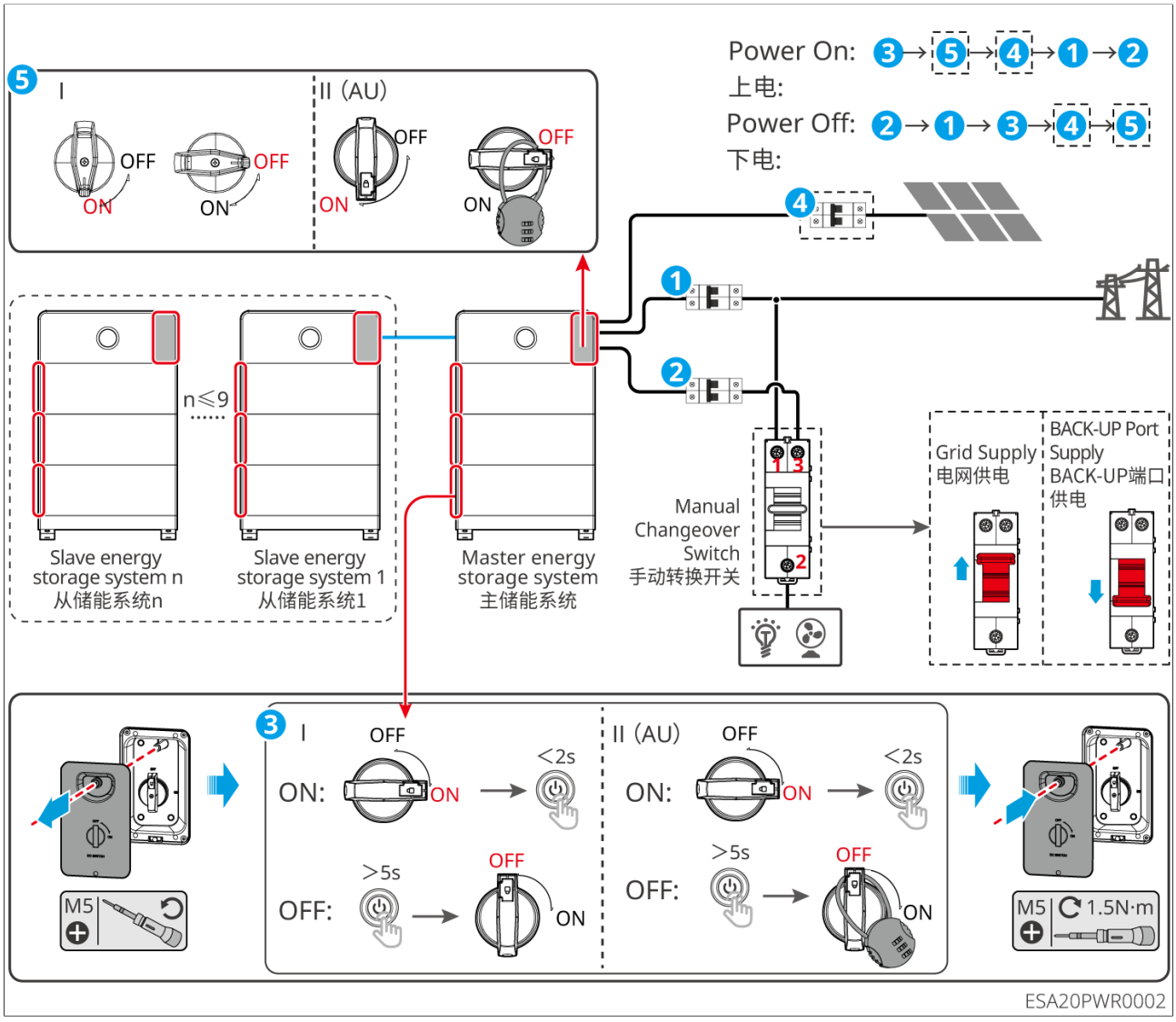


Figure50 System Power-On

1. Close the battery power switch and briefly press the multi-function button on the battery. When there are multiple batteries in the system, close the power switches of all batteries. Briefly press the multi-function button on any one battery to start all batteries.
2. Close the DC Switch of the inverter.
3. Optionally, close thePVmodule-to-inverter circuit breaker.
4. Close the ON-GRIDcircuit breaker.
5. Close theBACK-UPcircuit breaker. In a standalone scenario, before closing the BACK-UP circuit breaker, first switch the manual transfer switch to the BACK-UP position to engage, and the inverter's BACK-UP port supplies power to the load.

Power on with the static transfer switch cabinet

During inverter shutdown for maintenance, if the load on the STS BACK-UP port needs to be kept powered, close the BYPASS switch so that the mains supplies power directly to the load.

⚠Danger

- Be sure to follow the BYPASS switch closing sequence; otherwise, there is a risk of electric shock.
- When the BYPASS switch is closed, QF1 must be open; otherwise, there is a risk of electric shock.
- After the switchover is complete, close the cabinet door.
- Do not discard the circlip.

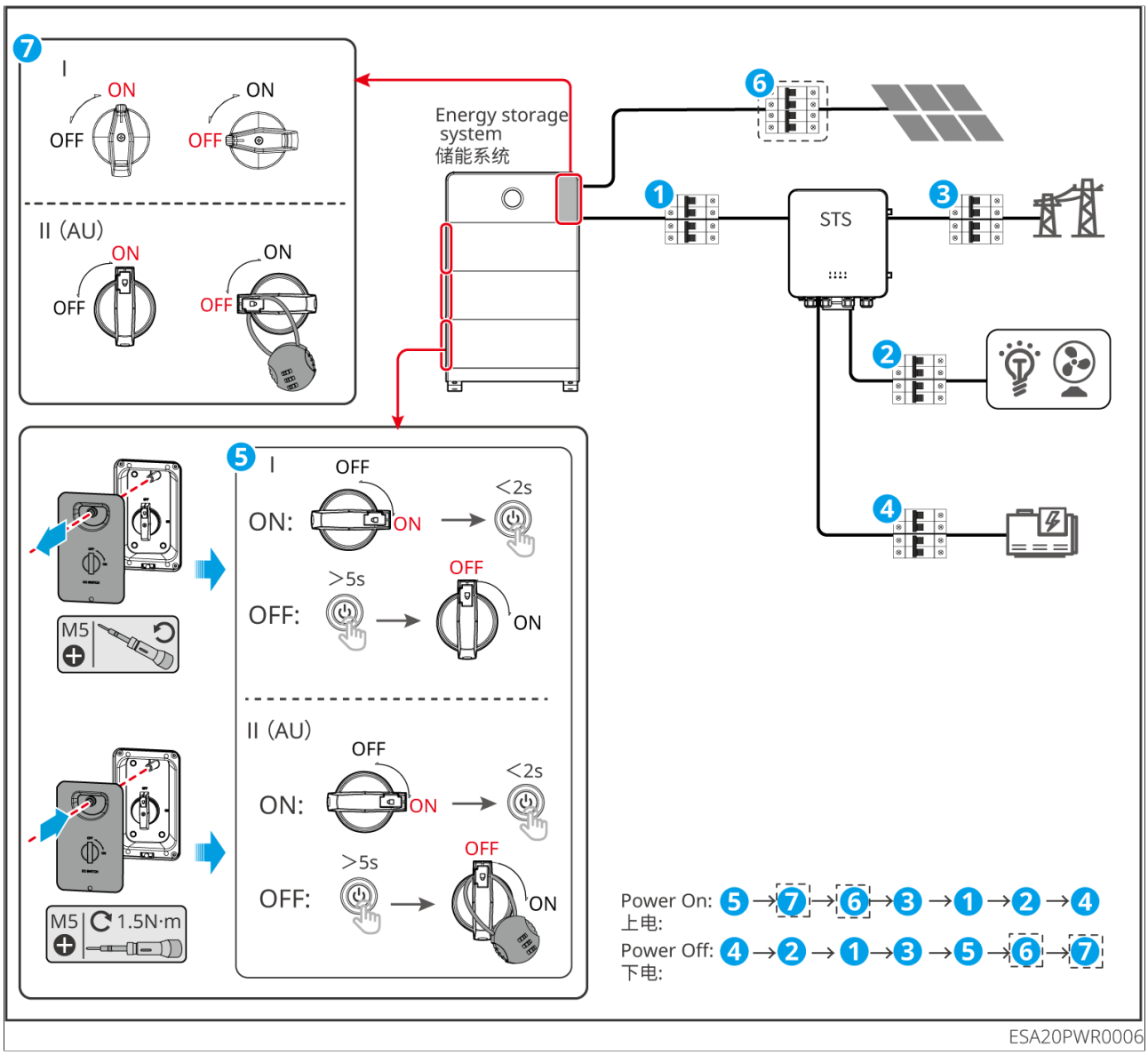


Figure51 Power on with the static transfer switch cabinet

1. Close the battery power switch and briefly press the multi-function button on the battery. When there are multiple batteries in the system, close the power switches of all batteries. Briefly press the multi-function button on any one battery to start all batteries.
2. Close the DC Switch of the inverter.
3. Close thePVmodule-to-inverter circuit breaker.
4. Close the STS GRIDcircuit breaker.
5. Close the STS INV circuit breaker.
6. Close the STS BACK-UP circuit breaker.

7. Close the STS SMART-PORT circuit breaker.

Close the STS BYPASS switch

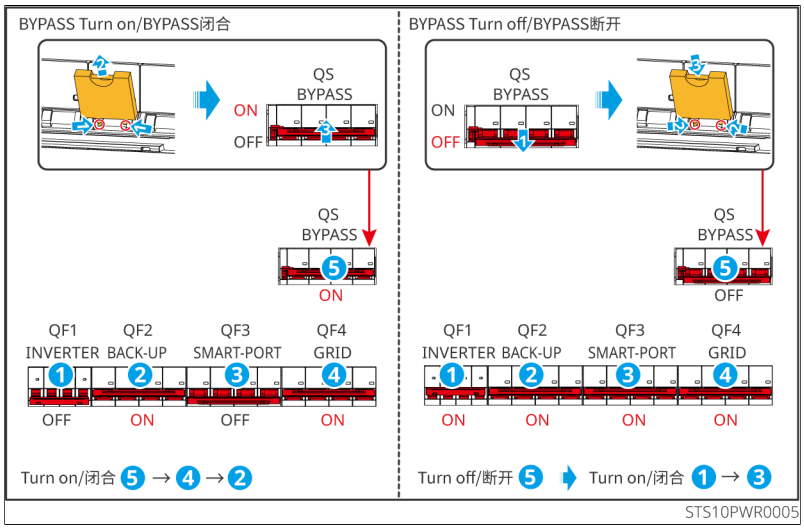


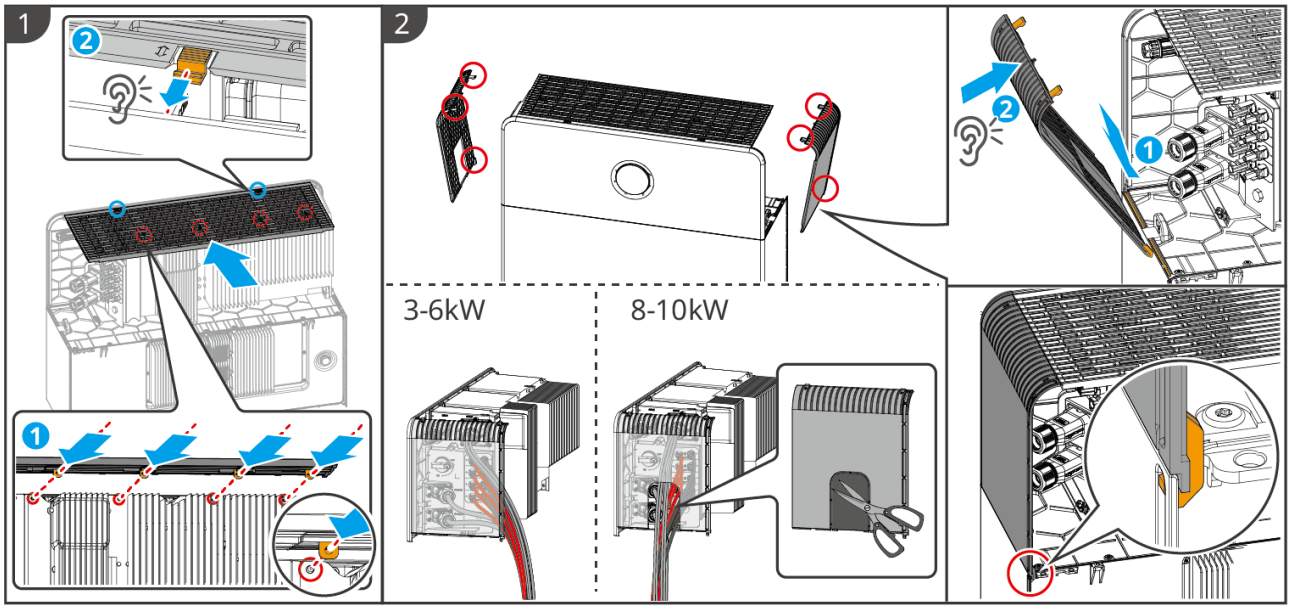
Figure52 Close the BYPASS switch

1. Open all circuit breakers: QF1-QF4 open, QS1 open and locked
2. Power off the inverter and wait for 5 minutes.
3. Keep QS1 open and locked → remove the circlip → close QS1
4. Operate QS1 to the circlip lock position and keep it engaged and locked
5. Close the GRID circuit breaker QF4
6. Close the BACK-UP circuit breaker QF2

Battery black start

1. Close the battery power switch. When there are multiple batteries in the system, close the power switches of all batteries.
2. Close the DC Switch of the inverter.
3. Optionally, close thePVmodule-to-inverter circuit breaker.
4. Close the ON-GRIDcircuit breaker.
5. Close the BACK-UP circuit breaker.
6. After all batteries are powered on, wait 15 seconds, then press and hold the multi-function button of any battery for 2 seconds to force the battery to discharge and activate the inverter.

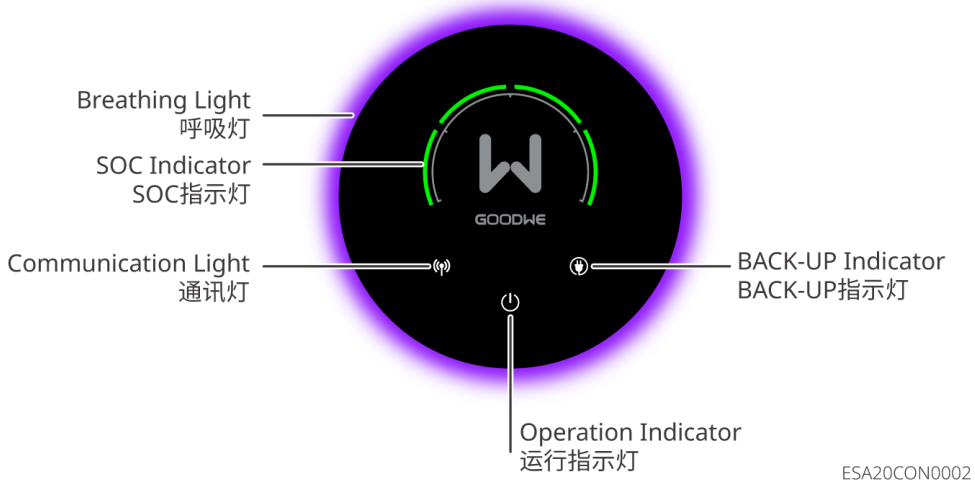
7.3 Install Protective Cover



ESA20INT0006

7.4 Indicator Light Introduction

7.4.1 Inverter Indicator Light



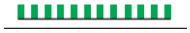
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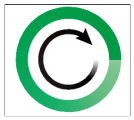
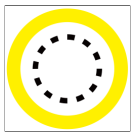
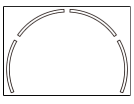
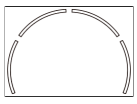
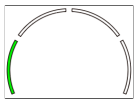
Breathing Light:

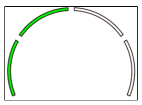
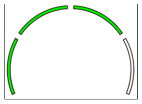
- When the system is upgrading, the Breathing Light is a green marquee light. The head of the marquee light is brightest and the tail is dimmest. The length of the marquee light and the upgrade percentage are affected by the SEMS++ App

settings and the device operating status.

- Except during inverter upgrade, system fault, and inverter power-off, the Breathing Light status is affected by the App settings on the SEMS+ App. To make settings, refer to the SEMS+ App user manual.

Indicator light	Indicator light status	Breathing Light status	Description
		• 3 min / Always on: The blue-purple marquee light stays on. • Always off: Not lit	The inverter is powered on and in standby mode.
			Inverter starting up, in self-test mode
		• 3 min: The blue-purple breathing light turns off after 3 min. • Always on in App: The blue-purple breathing light stays on. • Always off in App: Not lit	Inverter is operating normally in grid-tied power generation or off-grid mode
		Red flashing	System fault
		Off	The inverter is powered off.
		/	Inverter monitoring module is resetting
			No connection established between inverter and communication terminal
			Communication failure between communication terminal and cloud server
			Inverter monitoring normal

Indicator light	Indicator light status	Breathing Light status	Description
			Inverter monitoring module not started
			Grid abnormal, inverter BACK-UP port power supply normal
			Grid normal, inverter BACK-UP port power supply normal
			BACK-UP port has no power supply
			System upgrade
			System fault
			System Overload
			Battery has no charge
			Steady on: Charging Blinking: Discharging Battery SOC: 0% < SOC ≤ 25%

Indicator light	Indicator light status	Breathing Light status	Description
			Steady on: Charging Blinking: Discharging Battery SOC: 25% < SOC ≤ 50%
			Steady on: Charging Blinking: Discharging Battery SOC: 50% < SOC ≤ 75%
			Steady on: Charging Blinking: Discharging Battery SOC: 75% < SOC ≤ 100%

7.4.2 Battery Indicator Light

Button indicator light

No.	 Green light	 Red light	Battery system status	Description
1	Solid on	--	System operating normally.	Run
2	Blinking1time/S		System ready	Standby
	Blinking3time/S	--	PCSComm Loss	--
3	Blinking1time/2S	--	System alarm	Includes Level2faults in the fault list, where under-voltage faults are at Levels2and3and4(when applicable)

No.	Green light	Red light	Battery system status	Description
4	--	Solid on	System fault	In the fault list, Level3and above faults (under-voltage fault at Level5is always on)

7.4.3 STS Indicator

Indicator light	Status	Description
		Grid port voltage normal
		Grid port no voltage
		Backup port voltage normal
		Backup port no voltage
		SMART-PORT port voltage normal
		SMART-PORT port no voltage
		Device fault
		Device no fault

7.4.4 Smart Meter Indicator Light

GM330

Type	Status	Description
Power light	Solid on	The meter is powered on, no RS485 communication.
	Blinking	The meter is powered on, RS485 communication is normal.
	Off	The meter is powered off.
Communication light	Off	Reserved
	Blinking	Press and hold the Reset button for ≥5s, the power light and the Buy/Export Energy light flash: the meter resets.
	Solid on	Buy electricity from the grid
	Blinking	Export Energy to the grid

Type	Status	Description
Buy/Export Energy Light 	Off	Do not buy electricity, do not Export Energy
	Reserved	

GMK110

Type	Status	Description
Power light 	Solid on	The meter is powered on.
	Off	The meter is powered off.
Communication light 	Blinking	Meter communication is normal.
	Off	Meter communication is abnormal or not established.

7.4.5 Smart Communication Stick Indicator

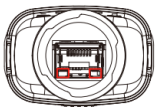
- **WiFi/LAN Kit-20**

NOTICE

- Double-click the Reload button to enable Bluetooth. The communication indicator will start flashing once. Connect to the App within 5 minutes; otherwise, Bluetooth will turn off automatically.
- The communication indicator flashes once only after Bluetooth is enabled by double-clicking the Reload button.

Indicator Lights	Status	Description
Power Indicator 		Steady on: The smart communication stick is powered on.
		Off: The smart communication stick is not powered on

Indicator Lights	Status	Description
Communication Indicator		Steady on: Communication is normal in Wi-Fi or LAN mode.
		Flashes once: Bluetooth is enabled on the smart communication stick, waiting to connect to the app.
		Flashes twice: The smart communication stick is Not Connected to the router.
		Flashes four times: The smart communication stick is communicating normally with the router, but is Not Connected to the server
		Flashes six times: The smart communication stick is identifying connected devices.
		Off: The smart communication stick is resetting its software or is not powered on.

Indicator Lights	Color	Status	Description
LAN Port Communication Indicator 	Green	Steady On	100 Mbps wired network connection is normal.
		Off	• The Ethernet cable is Not Connected. • 100 Mbps wired network connection is abnormal. • 10 Mbps wired network connection is normal.
	Yellow	Steady On	10/100 Mbps wired network connection is normal; no communication data is being transmitted or received.
		Flashing	Communication data is being transmitted or received.
		Off	The Ethernet cable is Not Connected.

Button	Description
Reload	Press and hold for 0.5–3 seconds to reset the smart communication stick.

Button	Description
	Press and hold for 6–20 seconds to restore the smart communication stick to factory settings.
	Double-click quickly to enable the Bluetooth signal (available for 5 minutes only).

- **4G Kit-CN-G20 & 4G Kit-G20**

Indicator Lights	Indicator Status	Description
		Steady on = The Smart Communication Stick is powered on.
		Off = The Smart Communication Stick is not powered on.
		Steady on = The Smart Communication Stick is connected to the server and communication is normal.
		Single flash = The Smart Communication Stick is in Bluetooth advertising mode. 【1】
		Double flash = The Smart Communication Stick is Not Connected to the communications base station.
		Four flashes = The Smart Communication Stick is connected to the communications base station but Not Connected to the server.
		Six flashes = Communication between the Smart Communication Stick and the inverter is disconnected.
		Off = The Smart Communication Stick is resetting its software or is not powered on.
Button	**Description**	
RELOAD	Double-click to enable Bluetooth advertising on the Smart Communication Stick. 【1】	
	Press and hold for 0.5–3 s to restart the Smart Communication Stick.	
	Press and hold for 6–20 s to restore the Smart Communication Stick to factory settings.	

[1]Applicable only to the 4G Kit-G20.

8 System Commissioning And Plant Monitoring

8.1 Use the SEMS+ App for Device Commissioning and Plant Monitoring

The SEMS+ App is software used for remote plant monitoring or on-site device commissioning. It supports installers and plant owners:

- Monitor plant operation remotely and set operating parameters for the plant and devices.
- Connect to devices on site to view device operation and set device parameters.

Download and Install the SEMS+ App
Phone requirements:

- Phone operating system requirements: Android 7.0 or later, iOS 15.1 or later.
- The phone supports a web browser and can connect to the Internet.
- The phone supports WLAN/Bluetooth.

Download methods:
Method 1:
Search for SEMS+ in the Google Play, App Store, Huawei, Honor, Xiaomi, OPPO, and vivo app stores to download and install it.



SEMS0163

Method 2:
Scan the QR code below to download and install it.



SEMS0164

For detailed functions, see the SEMS+ App User Manual. The user manual can be obtained from the official website or by scanning the QR code below.

SEMS+ App User Manual

8.2 Device Commissioning and Plant Monitoring via SEMS+ WEB

SEMS+ WEB is a monitoring platform that can communicate via WiFi or LAN. The following are common functions of SEMS+ WEB:

1. Manage organization or user information, etc.
2. Add and monitor plant information, etc.
3. Maintain devices.

For detailed functions, please refer to the SEMS+ WEB User Manual.

SEMS+ WEB User Manual

9 System Maintenance

9.1 System Power-Off

⚠Danger

- When performing operation and maintenance on equipment in the system, power off the system. Operating equipment with power on may cause equipment damage or electric shock hazards.
- After the equipment is powered off, it takes time for the internal components to discharge. Wait until the equipment is fully discharged according to the time requirements on the label.
- To restart the battery, use the air switch to power it on for restart.
- When the inverter is powered off for maintenance, STS QF1 INV must be disconnected; otherwise, there may be a risk of electric shock.
- When shutting down the battery system, strictly comply with the battery system power-off requirements to prevent damage to the battery system.

⚠Warning

In single-unit scenarios, when the inverter is powered off for maintenance or fails, to ensure normal operation of the load, move the manual transfer switch to the grid side to engage, so that the grid supplies power to the load.

Note

- To ensure effective protection of the battery system, keep the cover of the battery system switch closed. If the battery system switch is not used for a long time, secure it with screws.
- When the circuit breaker is open, all live parts in the positive and negative circuits are cut off, the equipment is in a safe power-off condition, with no exposed hazardous live parts, and human contact poses no risk of electric shock.
- If the system is equipped with a Static Transfer Switch (STS), after power-off is completed, close the upper cover of the STS.
- PVstrings and the“5”are only applicable to the EHA series.

Power-off

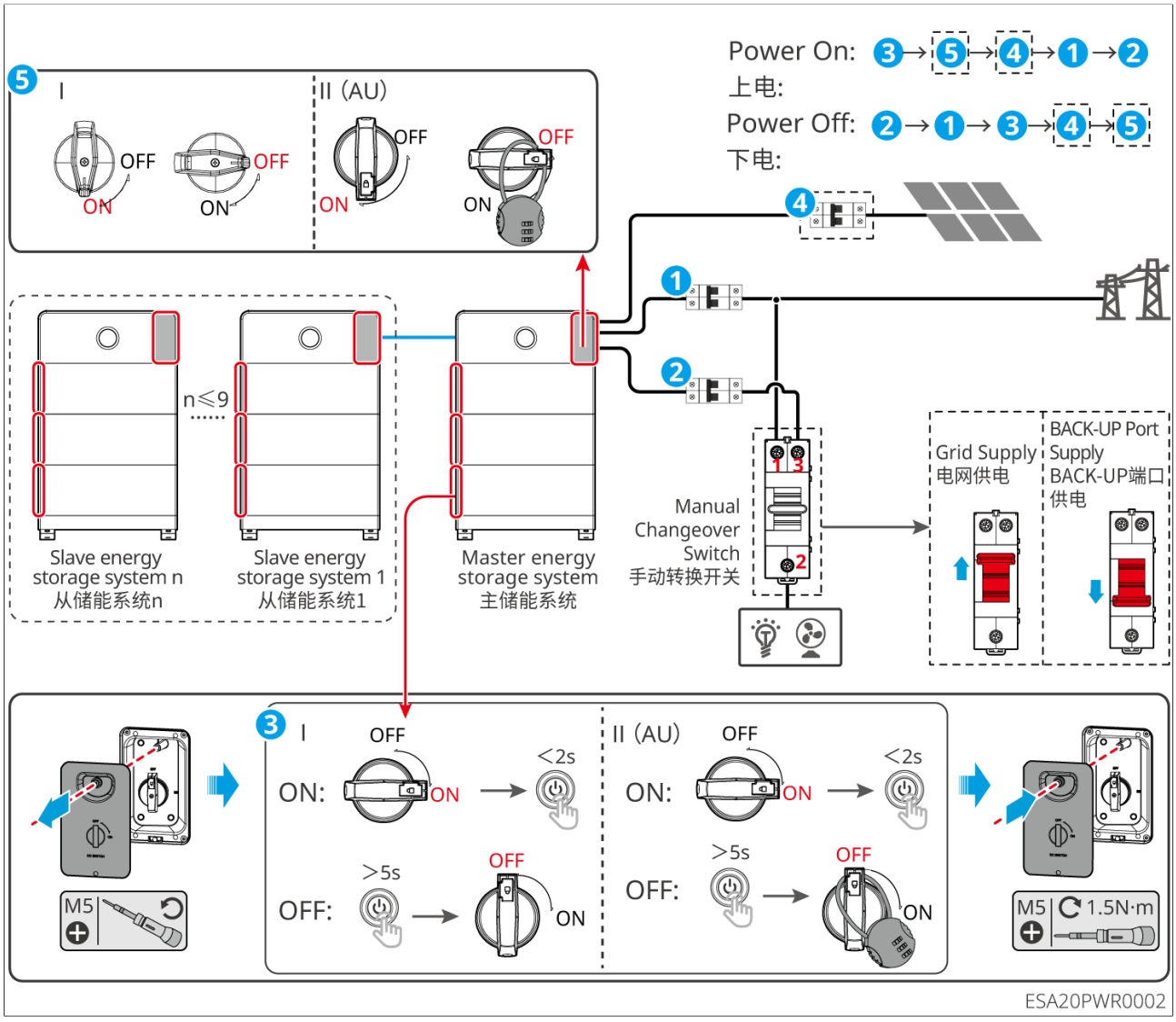


Figure53 System Power-Off

1. Disconnect the BACK-UP circuit breaker.
2. Disconnect the ON-GRID circuit breaker.
3. Press and hold any battery multi-function button for 5 seconds to power off the battery system. If the system contains multiple batteries, this operation will power off all batteries without the need to operate them one by one. Finally, rotate the battery system switch to the OFF position.
4. (Optional) Disconnect the circuit breaker between the PV modules and the inverter.
5. Disconnect the inverter's DC Switch. In single-unit scenarios, after the inverter DC Switch is disconnected, move the manual transfer switch to the grid side to engage, and the grid supplies power to the load.

Power off with the static transfer switch cabinet

After the inverter is powered on and resumes operation, disconnect the BYPASS switch, and the load switches back to inverter power supply.

⚠Danger

- Be sure to operate in the BYPASS switch disconnection sequence; otherwise, there may be a risk of electric shock.
- When the BYPASS switch is closed, STS QF1 INV must be disconnected; otherwise, there may be a risk of electric shock.
- Do not discard the circlip.

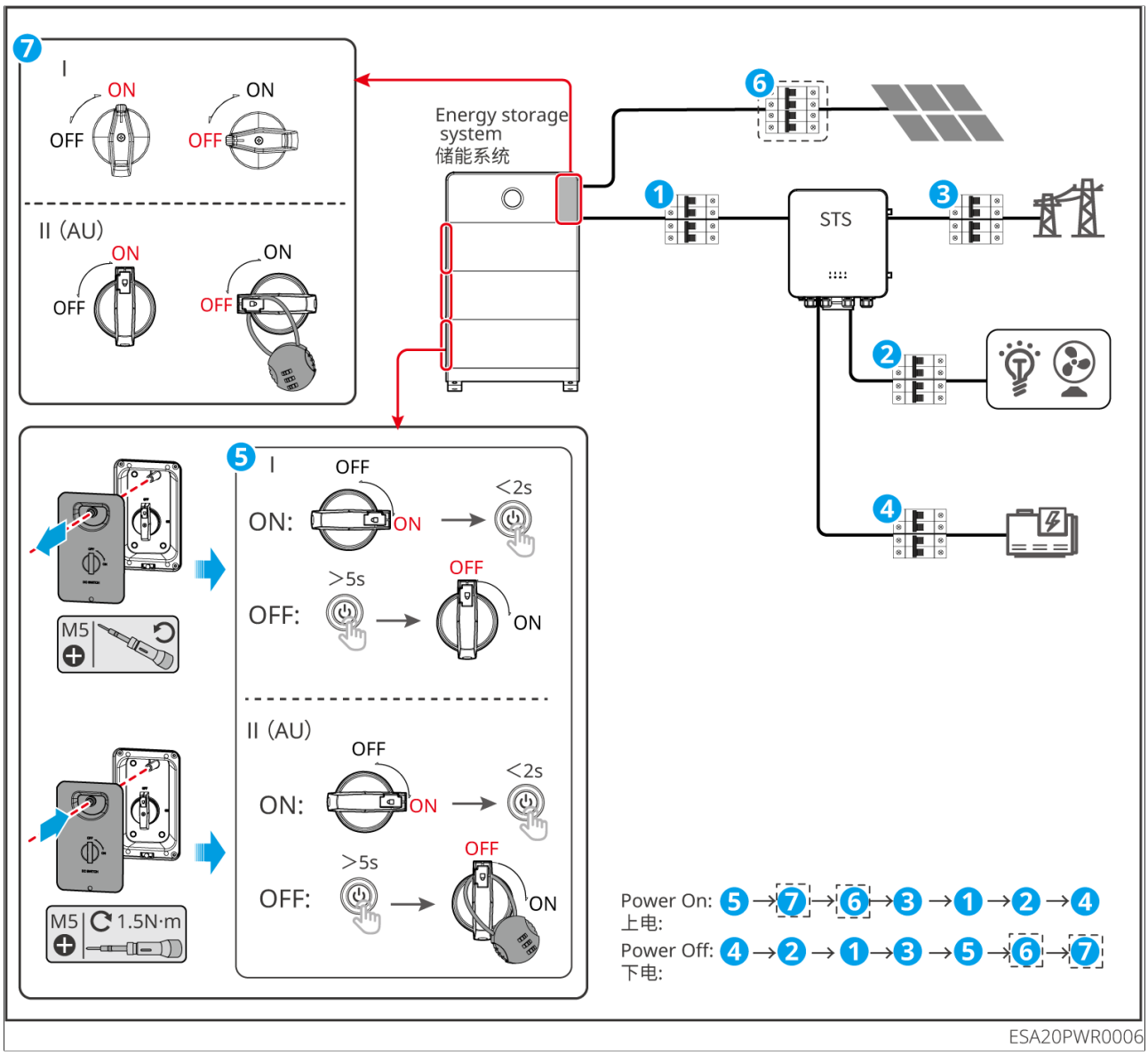


Figure54 Power off with the static transfer switch cabinet

1. Disconnect the STS SMART-PORT circuit breaker.
2. Disconnect the STS BACK-UP circuit breaker.
3. Disconnect the STS INV circuit breaker.
4. Close the STS GRIDcircuit breaker.
5. Press and hold the multi-function button on any battery for5seconds to power off the battery system. If the system contains multiple batteries, this operation will power off all batteries without the need to operate them one by one. Finally, disconnect the battery system switch.
6. (Optional)Close thePVmodules and the inverter.

7. Disconnect the inverter's DC Switch.

Disconnect the STS BYPASS switch

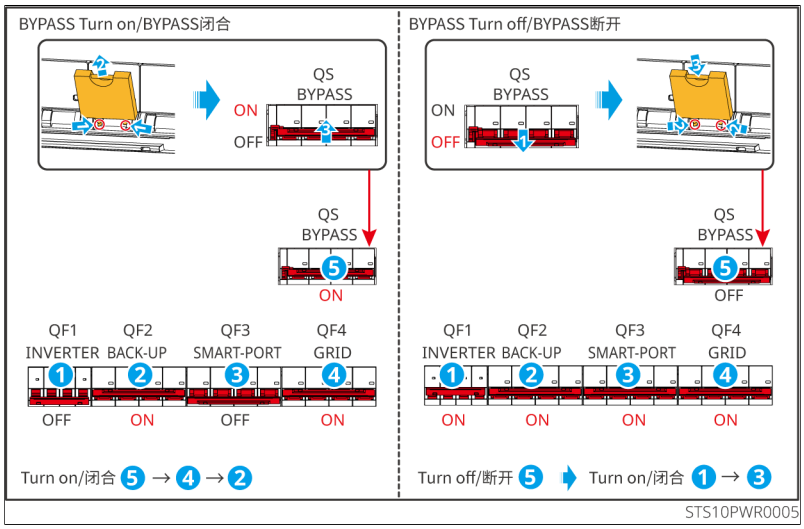


Figure55 **Disconnect the BYPASS switch**

1. Current status: GRID bypass supplies BACK-UP; QF3 and QF1 are open; QF4, QF2, and QS1 are closed
2. Disconnect QS1 → Use the retaining clip to set QS1 to the locked state (to prevent misoperation)
3. Disconnect QF4 and QF2: At this point, QF1–QF4 and QS1 are all open
4. Power on the inverter
5. Refer to the power-on sequence and close QF1-QF4 in order

9.2 Equipment Dismantling

Danger

- Ensure that the equipment is powered off.
- When operating equipment, wear personal protective equipment.
- When removing wiring terminals, use standard removal tools to avoid damaging the terminals or equipment.
- Unless otherwise specified, the equipment removal procedure is the reverse of the installation procedure and will not be repeated in this document.

1. Power off the system.
2. Mark the types of cables connected in the system with labels.
3. Disconnect the connection cables of the inverter, battery, and smart meter in the system, such as DC cables, AC cables, communication cables, and Protection ground wires.
4. Remove equipment such as the smart communication stick, inverter, battery, and smart meter.
5. Store the equipment properly. If it is to be put into use later, ensure that the storage conditions meet the requirements.

9.3 Equipment Disposal

When the equipment can no longer be used and needs to be scrapped, dispose of it in accordance with the electrical waste disposal requirements of the laws and regulations of the country/region where the equipment is located. Do not dispose of the equipment as household waste.

9.4 Regular Maintenance

⚠Warning

- If you discover any issues that may affect the battery or the energy storage inverter system, contact after-sales personnel. Do not disassemble the equipment without authorization.
- If you find that the copper wires inside the conductive cable are exposed, do not touch it. High voltage hazard. Contact after-sales personnel. Do not disassemble the equipment without authorization.
- If any other emergency occurs, contact after-sales personnel immediately, operate under their guidance, or wait for after-sales personnel to operate on site.

Maintenance Content	Maintenance Method	Maintenance Cycle	Maintenance Purpose
System Cleaning	Check whether the heat sink, fan, and air inlet/outlet vents have foreign objects or dust. Check whether the installation space meets the requirements and check whether there is debris piled up around the equipment.	Once every half year	Prevent heat dissipation failures.
System Installation	Check whether the equipment is installed securely and whether the fastening screws are loose. Check whether the equipment appearance is damaged or deformed.	Once every half year to once every year	Confirm the stability of the equipment installation.
Electrical Connection	Check whether the electrical connections are loose, whether the cable appearance is damaged, and whether copper exposure occurs.	Once every half year to once every year	Confirm the reliability of electrical connections.
Sealing Performance	Check whether the sealing of the cable entry holes meets the requirements. If the gaps are too large or not sealed, reseal them.	Once a year	Confirm that the machine is sealed and the waterproof performance is intact.
Battery Maintenance	If the battery has not been used for a long time or is not fully charged, it is recommended to charge the battery regularly.	Once/15 days	Protection of battery service life.

9.5 Failure

Note
The fault content in the manual is updated from time to time. Faults may vary slightly depending on the model. Please refer to the real-time display on the device for details.

9.5.1 View Detailed Fault/Alarm Information

All fault and alarm details of the energy storage system are displayed in [SEMS+ App] and [SEMS+ WEB]. If your product malfunctions and you do not see the relevant fault information in [SEMS+ App] and [SEMS+ WEB], please contact the after-sales service center.

- SEMS+ App

1. Open the SEMS+ App and log in with any account.
2. Through [Power Station] > [Alarm], you can view fault information for all power stations.
3. Click a specific fault name to view fault details, occurrence time, possible causes, and solutions.

- SEMS+ WEB

1. Open SEMS+ WEB and log in with any account.
2. On the power station details screen, click [Alarm] to view all alarm information for the current power station.

9.5.2 Fault Information And Handling Methods

Please troubleshoot according to the following methods. If the troubleshooting methods cannot help you, please contact the after-sales service center.
When contacting the after-sales service center, please collect the following information to facilitate quick problem resolution.

1. Product information, such as serial number, software version, device installation time, fault occurrence time, fault occurrence frequency, etc.
2. Device installation environment, such as weather conditions, whether modules are blocked or shaded, etc. It is recommended to provide photos, videos, and other files of the installation environment to assist in problem analysis.

3. Grid conditions.

If a problem not listed here occurs, or if following the instructions still cannot prevent the problem or abnormality, stop the system operation immediately and contact your dealer immediately.

No.	Failure	Solutions
1	Unable to search for the Smart Communication Stick wireless signal	1. Please ensure that no other devices are connected to the Smart Communication Stick wireless signal. 2. Please ensure that the App has been upgraded to the latest version. 3. Ensure the Smart Communication Stick is powered normally and the blue signal light is flashing or steady on. 4. Ensure the smart device is within the communication range of the Smart Communication Stick. 5. Refresh the device list in the App. 6. Restart the inverter.
2	Unable to connect to the Smart Communication Stick wireless signal	1. Please ensure that no other devices are connected to the Smart Communication Stick wireless signal. 2. Restart the inverter or communication stick, and try to connect to the Smart Communication Stick wireless signal again. 3. Ensure that Bluetooth has been successfully paired with encryption.
3	Unable to find the router SSID	1. Place the router closer to the Smart Communication Stick, or add a WiFi repeater to enhance the WiFi signal. 2. Reduce the number of devices connected to the router.

No.	Failure	Solutions
4	After all configurations are completed, the Smart Communication Stick fails to connect to the router.	1. Restart the inverter. 2. Check whether the network name, encryption method, and password in the WiFi configuration are the same as those of the router. 3. Restart the router. 4. Place the router closer to the Smart Communication Stick, or add a WiFi repeater to enhance the WiFi signal.
5	After all configurations are completed, the Smart Communication Stick fails to connect to the server.	Restart the router and the inverter.

9.5.2.1 Inverter Faults

9.5.2.1.1 Troubleshooting (Fault Codes F01–F40)

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F01	Grid Power Outage	1. Grid power outage. 2. The AC cable or AC Switch is disconnected.	1. The alarm will clear automatically once grid power is restored. 2. Check whether the AC cable or AC Switch is disconnected.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F02	Grid Overvoltage Protection	The grid voltage exceeds the permitted range, or the duration of the high voltage exceeds the high-voltage ride-through setting.	1. If this occurs occasionally, it may be due to a brief grid abnormality. The inverter will resume normal operation once it detects that the grid is normal; no manual intervention is required. 2. If this occurs frequently, check whether the grid voltage is within the permissible range. If not, contact the local utility. If it is, the Grid Overvoltage Protection threshold must still be adjusted only after obtaining approval from the local utility. 3. If normal operation does not resume for an extended period, check that the AC-side circuit breaker and output cables are properly connected.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F03	Grid Undervoltage Protection	The grid voltage is below the permissible range, or the duration of the low voltage exceeds the low-voltage ride-through setting.	1. If this occurs occasionally, it may be due to a brief grid abnormality. The inverter will resume normal operation once it detects that the grid is normal; no manual intervention is required. 2. If this occurs frequently, check whether the grid voltage is within the permissible range. If not, contact the local utility. If it is, the Grid Undervoltage Protection threshold must still be adjusted only after obtaining approval from the local utility. 3. If normal operation does not resume for an extended period, check that the AC-side circuit breaker and output cables are properly connected.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F04	Grid Rapid Overvoltage Protection	An abnormal grid voltage measurement or an excessively high voltage has triggered a fault.	1. If this occurs occasionally, it may be due to a brief grid abnormality. The inverter will resume normal operation once it detects that the grid is normal; no manual intervention is required. 2. If this occurs frequently, check whether the grid voltage is within the permissible range. If not, contact the local utility. If it is, the Grid Undervoltage Protection threshold must still be adjusted only after obtaining approval from the local utility. 3. If normal operation does not resume for an extended period, check that the AC-side circuit breaker and output cables are properly connected.
F05	10minOvervoltage Protection	The rolling average grid voltage over10minexceeds the range specified by the applicable safety standards.	Check whether the grid voltage has remained high for an extended period. If this occurs frequently, check whether the grid frequency is within the permissible range. If not, contact the local utility. If it is, the grid10minOvervoltage Protection threshold must still be adjusted only after obtaining approval from the local utility.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F06	Grid Overfrequency	Grid abnormality: The actual grid frequency is higher than the requirements of the local grid standard.	1. If this occurs occasionally, it may be due to a brief grid abnormality. The inverter will resume normal operation once it detects that the grid is normal; no manual intervention is required. 2. If this occurs frequently, check whether the grid frequency is within the permissible range. If not, contact the local utility. If it is, the Grid Overfrequency threshold must still be adjusted only after obtaining approval from the local utility.
F07	Grid Underfrequency	Grid abnormality: The actual grid frequency is lower than the requirements of the local grid standard.	1. If this occurs occasionally, it may be due to a brief grid abnormality. The inverter will resume normal operation once it detects that the grid is normal; no manual intervention is required. 2. If this occurs frequently, check whether the grid frequency is within the permissible range. If not, contact the local utility. If it is, the Grid Underfrequency threshold must still be adjusted only after obtaining approval from the local utility.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F08	Grid Frequency Instability	Grid abnormality: The rate of change of the actual grid frequency does not comply with the local grid standard.	1. If this occurs occasionally, it may be due to a brief grid abnormality. The inverter will resume normal operation once it detects that the grid is normal; no manual intervention is required. 2. If this occurs frequently, check whether the grid frequency is within the permissible range. If not, contact the local utility.
F09	Anti-islanding Protection	The grid has been disconnected, but the load is sustaining the grid voltage. Grid connection is stopped in accordance with safety protection requirements.	1. If this occurs occasionally, it may be due to a brief grid abnormality. The inverter will resume normal operation once it detects that the grid is normal; no manual intervention is required. 2. If this occurs frequently, check whether the grid frequency is within the permissible range. If not, contact the local utility.
F10	Voltage Ride-Through Undervoltage Fault	Grid abnormality: The duration of the abnormal grid voltage exceeds the specified high-/low-voltage ride-through duration.	1. If this occurs occasionally, it may be due to a brief grid abnormality. The inverter will resume normal operation once it detects that the grid is normal; no manual intervention is required. 2. If this occurs frequently, check whether the grid voltage and frequency are within the permissible ranges and stable. If not, contact the local utility.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F11	HVRT Overvoltage	Grid abnormality: The duration of the abnormal grid voltage exceeds the specified high-/low-voltage ride-through duration.	1. If this occurs occasionally, it may be due to a brief grid abnormality. The inverter will resume normal operation once it detects that the grid is normal; no manual intervention is required. 2. If this occurs frequently, check whether the grid voltage and frequency are within the permissible ranges and stable. If not, contact the local utility.
F12	30mAGfciProtection	During inverter operation, the input-to-ground insulation resistance decreases.	1. If this occurs occasionally, it may be caused by a temporary abnormality in the external wiring. Normal operation will resume once the fault is cleared; no manual intervention is required. 2. If this occurs frequently or does not clear for an extended period, check whether the insulation resistance from the PV strings to ground is too low.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F13	60mAGfciProtection	During inverter operation, the input-to-ground insulation resistance decreases.	1. If this occurs occasionally, it may be caused by a temporary abnormality in the external wiring. Normal operation will resume once the fault is cleared; no manual intervention is required. 2. If this occurs frequently or does not clear for an extended period, check whether the insulation resistance from the PV strings to ground is too low.
F14	150mAGfciProtection	During inverter operation, the input-to-ground insulation resistance decreases.	1. If this occurs occasionally, it may be caused by a temporary abnormality in the external wiring. Normal operation will resume once the fault is cleared; no manual intervention is required. 2. If this occurs frequently or does not clear for an extended period, check whether the insulation resistance from the PV strings to ground is too low.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F15	GfciGradual-Change Protection	During inverter operation, the input-to-ground insulation resistance decreases.	1. If this occurs occasionally, it may be caused by a temporary abnormality in the external wiring. Normal operation will resume once the fault is cleared; no manual intervention is required. 2. If this occurs frequently or does not clear for an extended period, check whether the insulation resistance from the PV strings to ground is too low.
F16	DCILevel 1 Protection	The DC component of the inverter output current exceeds the limit allowed by safety regulations or the default limit of the device.	1. If the abnormality is caused by an external fault, the inverter will automatically resume normal operation after the fault is cleared; no manual intervention is required. 2. If this alarm occurs frequently and affects normal power generation at the plant, contact your distributor or after-sales service center.
F17	DCILevel 2 Protection	The DC component of the inverter output current exceeds the limit allowed by safety regulations or the default limit of the device.	1. If the abnormality is caused by an external fault, the inverter will automatically resume normal operation after the fault is cleared; no manual intervention is required. 2. If this alarm occurs frequently and affects normal power generation at the plant, contact your distributor or after-sales service center.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F18	Low Insulation Resistance	1. The PV string is short-circuited to protective earth. 2. The PV string is installed in a persistently humid environment, and the insulation resistance of the wiring to ground is poor. 3. The insulation resistance to ground of the battery port wiring is low.	1. Check the resistance between the PV strings/battery port and protective earth. If a short circuit is found, locate and rectify the short-circuit point. 2. Check whether the inverter's protective earth wire is connected correctly. 3. If you confirm that the resistance is indeed below the default value in rainy or overcast conditions, use the Appto reset the inverter's“Insulation Resistance Protection Threshold”。 For inverters in the Australian and New Zealand markets,an insulation resistance fault can also trigger the following alarms: 1. The inverter is equipped with a buzzer. When a fault occurs, the buzzer sounds continuously for1minute; if the fault is not resolved, the buzzer sounds again every30minutes. 2. If the inverter is added to a monitoring platform and alarm notifications are configured, alarm messages can be sent to the customer by email.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F19	Grounding Abnormal	1. The inverter's protective earth wire is Not Connected. 2. When the PV string output is grounded, no isolation transformer is connected on the inverter output side.	1. Check whether the inverter's protective earth wire is properly connected. 2. If the PV string output is grounded, check whether an isolation transformer is connected on the inverter output side.
F20	Hard Power Limit Protection	Abnormal Load Fluctuation	1. If the abnormality is caused by an external fault, the inverter will automatically resume normal operation after the fault is cleared; no manual intervention is required. 2. If this alarm occurs frequently and affects normal power generation at the plant, contact your distributor or after-sales service center.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F21	Internal Comm Loss	SecondaryDSP1communication timeout-MainDSP, secondaryDSP2communication timeout-MainDSP, secondaryDSP2communication timeout-SecondaryDSP1, mainDSPcommunication timeout-SecondaryDSP1, mainDSPcommunication timeout-SecondaryDSP2or secondaryDSP1communication timeout-SecondaryDSP2: 1. The chip is not powered on 2. The chip program version is incorrect	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
		MainDSPcanmodule error, secondaryDSP1can module error, or secondaryDSP2can module error: 1. Frame format error 2. Parity error 3. can busoffline 4. HardwareCRCcheck error 5. Control bit is set to receive (transmit) during transmission (reception) 6. Transmission to a prohibited unit	
F22	Generator waveform detection fault	1. This fault will remain displayed when the generator is Not Connected; 2. When the generator is operating, this fault is triggered if the generator fails to meet safety requirements.	
F23	Abnormal generator connection		
F24	Generator voltage too low		
F25	Generator voltage too high		

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F26	Generator frequency too low		1. Ignore this fault if no generator is connected; 2. This fault may occur normally when the generator has a fault. After the generator recovers, wait for a while and the fault will clear automatically; 3. This fault will not affect normal operation in off-grid mode 4. When the generator and grid are both connected and safety requirements are met, the grid takes priority for grid-connected operation.
F27	Generator frequency too high		
F28	Parallel operationI/O self-test abnormality	Parallel communication cable not securely connected or parallelIOchip damaged	Check that the parallel communication cable is securely connected, then check whether theIOchip is damaged. If so, replace theIOchip.
F29	Paralell Grid Line Reversed	The grid wiring on some units is reversed relative to the others	Reconnect the grid wiring.
F30	AC HCT check Abnormal	Abnormal sampling by the AC sensor	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F31	GFCI HCT Check Abnormal	Abnormal sampling by the leakage current sensor	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F32	Inverter Internal Failure	Inverter fault	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F33	FlashR/W Abnormal	Possible causes: flashcontent has changed;flashhas reached the end of its service life;	1. Upgrade to the latest firmware version; 2. Contact your dealer or after-sales service center.
F34	AFCI Check Failure	During the arc detection self-check, the arc detection module failed to detect an Arc Failure	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F35	Cabinet Overtemperature	Cabinet Overtemperature, possible causes: 1. The inverter is installed in a poorly ventilated location. 2. Ambient Overtemperature. 3. The internal fans are operating abnormally.	1. Check whether the inverter installation location is well ventilated and whether the ambient temperature exceeds the maximum permitted ambient temperature range. 2. If ventilation is inadequate or Ambient Overtemperature occurs, improve ventilation and heat dissipation. 3. If ventilation and ambient temperature are both normal, contact your dealer or after-sales service center.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F36	Bus Overvoltage	BUSovervoltage, possible causes: 1. PVvoltage too high; 2. Abnormal inverterBUSvoltage sampling; 3. The isolation performance of the dual-split transformer downstream of the inverter is poor, causing the two inverters to interfere with each other when connected to the grid. A DC overvoltage fault is reported when one inverter connects to the grid;	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F37	PVInput Overvoltage	PVinput voltage too high, possible causes: Incorrect PV array configuration: too many PV modules are connected in series in a string, causing the string's open-circuit voltage to exceed the inverter's maximum operating voltage	Check the series configuration of the corresponding PV array string to ensure that its open-circuit voltage does not exceed the inverter's maximum operating voltage. The inverter alarm will clear automatically once the PV array is configured correctly.
F38	PVcontinuous hardware overcurrent	1. Improper module configuration 2. Hardware damage	Disconnect the AC output-side switch and the DC input-side switch,5minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F39	PVcontinuous software overcurrent	1. Improper module configuration 2. Hardware damage	Disconnect the AC output-side switch and the DC input-side switch,5minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F40, F98	String Reverse Connection(String1-n) n: Determine based on the actual number of strings connected to the inverter	PVString Reverse Connection	Check whether the string is connected in reverse polarity.

9.5.2.1.2 Troubleshooting (Fault Codes F41–F80)

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F41	Generator Port Overload	1. Off-grid output exceeds the limits specified in the datasheet 2. Short circuit on the off-grid side 3. Off-grid terminal voltage is too low 4. When used as a high-load port, the load exceeds the limits specified in the datasheet	Check the off-grid output voltage, current, power, and other data, and identify the cause of the issue.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F42, F164,F165	DC Arcing Failure(String1-n) n: Determine based on the actual number of strings connected to the inverter	1. DC-side terminals are loose; 2. Poor contact at the DC-side terminals; 3. The conductor in the DC cable is damaged, causing poor contact	1. After the inverter reconnects to the grid, check whether the voltage or current on any input has dropped abnormally or fallen to zero; 2. Check that the DC-side terminals are securely connected.
F43	Grid Waveform Abnormal	Grid abnormality: A fault is triggered when grid voltage detection is abnormal.	1. If this occurs occasionally, it may be due to a brief grid abnormality. The inverter will resume normal operation once it detects that the grid is normal; no manual intervention is required. 2. If this occurs frequently, check whether the grid voltage and frequency are within the permissible ranges and stable. If not, contact the local utility.
F44	Grid Phase Loss	Grid abnormality: A single-phase voltage dip has occurred.	1. If this occurs occasionally, it may be due to a brief grid abnormality. The inverter will resume normal operation once it detects that the grid is normal; no manual intervention is required. 2. If this occurs frequently, check whether the grid voltage and frequency are within the permissible ranges and stable. If not, contact the local utility.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F45	Grid Voltage Imbalance	The difference between grid phase voltages is too large.	1. If this occurs occasionally, it may be due to a brief grid abnormality. The inverter will resume normal operation once it detects that the grid is normal; no manual intervention is required. 2. If this occurs frequently, check whether the grid voltage and frequency are within the permissible ranges and stable. If not, contact the local utility.
F46	Grid Phase Sequence Failure	Abnormal wiring between the inverter and the grid: incorrect phase sequence	1. Check that the phase sequence of the wiring between the inverter and the grid is correct. The fault clears automatically once the wiring is corrected (for example, by swapping any two phase wires). 2. If the wiring is correct but the fault persists, contact your distributor or after-sales service center.
F47	Grid Rapid Shutdown Protection	Rapidly shuts down output when a grid power outage is detected	The fault clears automatically once grid power is restored.
F48	Grid Neutral Wire Loss (Split-phase grid)	Split-Phase Grid Neutral Wire Loss	1. The alarm will clear automatically once grid power is restored. 2. Check whether the AC cable or AC Switch is disconnected.
F49	L-PE Short Circuit	Output phase-to-PEimpedance is low or short-circuited	Measure the output phase-to-PEimpedance to locate and repair the point with low impedance.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F50	DCVLevel 1 Protection	Abnormal Load Fluctuation	1. If the abnormality is caused by an external fault, the inverter will automatically resume normal operation after the fault is cleared; no manual intervention is required. 2. If this alarm occurs frequently and affects normal power generation at the plant, contact your distributor or after-sales service center.
F51	DCVLevel 2 Protection	Abnormal Load Fluctuation	
F52	Multiple leakage current (GFCI) faults causing shutdown	North American safety regulations prohibit automatic recovery after multiple faults. Manual recovery or waiting24his required	Check whether the PV string-to-ground impedance is too low.
F53	Multiple DC arc (AFCI) faults causing shutdown	North American safety regulations prohibit automatic recovery after multiple faults. Manual recovery or waiting24his required	1. After the inverter reconnects to the grid, check whether the voltage or current on any input has dropped abnormally or fallen to zero; 2. Check that the DC-side terminals are securely connected.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F54	External communication link lost	Communication with an external inverter device has been lost. Possible causes include a power supply issue with the external device, incompatible Communication Protocols, or the required external device not being configured.	The determination depends on the actual model and detection enable settings. External devices unsupported by some models will not be detected.
F55	Back-upOutput Overload	Prevent the inverter from continuously outputting power under Overload conditions.	Disconnect some off-grid loads to reduce the inverter's off-grid output power.
F56	Back-upOutput Overvoltage	Prevent load damage caused by inverter output overvoltage.	1. If this occurs occasionally, it may be caused by load switching and requires no manual intervention. 2. If this occurs frequently, contact your dealer or after-sales service center.
F57	ExternalBox Failure	The wait for theBoxrelay to switch takes too long when switching from on-grid to off-grid	1. Check whether theBoxis operating normally; 2. Check whether theBoxcommunication wiring is correct;
F58	CTLoss	CTconnection cable disconnected (required by Japanese safety regulations)	Check whether theCTwiring is correct;

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F59	Parallel operationCANParalell CAN Comm Abnormal	Parallel communication cable is not securely connected, or a unit is offline	Check that all units are powered on and that the parallel communication cable is securely connected
F60	Parallel operationBack-upConnected in Reverse	Some units have theirbackupline connected in reverse compared with the others	Reconnect thebackupline.
F61	Inverter Soft Start Failure	Inverter Soft Start Failure during off-grid cold start	Check whether the inverter module is damaged.
F62	AC HCT Failure	HCTsensor is abnormal	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F63	GFCI HCT Failure	Leakage current sensor is abnormal	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F64	Inverter Internal Failure	Inverter fault	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F65	AC Terminal Overtemperature	AC Terminal Overtemperature. Possible causes: 1. The inverter is installed in a poorly ventilated location. 2. Ambient Overtemperature. 3. The internal fans are operating abnormally.	1. Check whether the inverter installation location is well ventilated and whether the ambient temperature exceeds the maximum permitted ambient temperature range. 2. If ventilation is inadequate or Ambient Overtemperature occurs, improve ventilation and heat dissipation. 3. If ventilation and ambient temperature are both normal, contact your dealer or after-sales service center.
F66	INVModule Overtemperature	Inverter module overtemperature. Possible causes: 1. The inverter is installed in a poorly ventilated location. 2. Ambient Overtemperature. 3. The internal fans are operating abnormally.	1. Check whether the inverter installation location is well ventilated and whether the ambient temperature exceeds the maximum permitted ambient temperature range. 2. If ventilation is inadequate or Ambient Overtemperature occurs, improve ventilation and heat dissipation. 3. If ventilation and ambient temperature are both normal, contact your dealer or after-sales service center.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F67	BoostModule Overtemperature	BoostModule Overtemperature. Possible causes: 1. The inverter is installed in a poorly ventilated location. 2. Ambient Overtemperature. 3. The internal fans are operating abnormally.	1. Check whether the inverter installation location is well ventilated and whether the ambient temperature exceeds the maximum permitted ambient temperature range. 2. If ventilation is inadequate or Ambient Overtemperature occurs, improve ventilation and heat dissipation. 3. If ventilation and ambient temperature are both normal, contact your dealer or after-sales service center.
F68	AC Capacitor Overtemperature	Output filter capacitor overtemperature. Possible causes: 1. The inverter is installed in a poorly ventilated location. 2. Ambient Overtemperature. 3. The internal fans are operating abnormally.	1. Check whether the inverter installation location is well ventilated and whether the ambient temperature exceeds the maximum permitted ambient temperature range. 2. If ventilation is inadequate or Ambient Overtemperature occurs, improve ventilation and heat dissipation. 3. If ventilation and ambient temperature are both normal, contact your dealer or after-sales service center.
F69	PV IGBT short-circuit fault	Possible causes: 1. IGBTshort circuit 2. Inverter sampling circuit is abnormal	

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F70	PV IGBTOpen Circuit	1. Software issue prevents PWM output: 2. Drive circuit is abnormal: 3. IGBTopen circuit	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F71	NTCAbnormal	NTCtemperature sensor is abnormal	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F72	PWM Abnormal	PWMAbnormal waveform detected	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F73	CPUInterrupt Abnormal	CPUInterrupt anomaly detected	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F74	Microelectronics fault	Function Safety detected an anomaly	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F75	PV HCTFailure	boostCurrent sensor abnormal	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F76	1.5VBaseline Abnormality	Reference circuit failure	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F77	0.3VBaseline Abnormality	Reference circuit failure	
F78	CPLDVersion Identification Error	CPLDVersion Identification Error	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F79	CPLDCommunication Fault	CPLDandDSPcommunication data error or timeout	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F80	Model recognition failure	Fault related to Model Recognition Error	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.

9.5.2.1.3 Fault Handling (Fault Codes F81–F121)

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F81	P-Bus Overvoltage	BUSovervoltage, possible causes: 1. PVvoltage too high; 2. Abnormal inverterBUSvoltage sampling; 3. The isolation performance of the dual-split transformer downstream of the inverter is poor, causing the two inverters to interfere with each other when connected to the grid. A DC overvoltage fault is reported when one inverter connects to the grid;	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F82	N-Bus Overvoltage		
F83	Bus Overvoltage (secondaryCPU1)		

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F84	P-Bus Overvoltage (secondaryCPU1)	BUSovervoltage, possible causes: 1. PVvoltage too high; 2. Abnormal inverterBUSvoltage sampling; 3. The isolation performance of the dual-split transformer downstream of the inverter is poor, causing the two inverters to interfere with each other when connected to the grid. A DC overvoltage fault is reported when one inverter connects to the grid;	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F85	N-Bus Overvoltage (secondaryCPU1)		
F86	Bus Overvoltage (secondaryCPU2)		Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F87	P-Bus Overvoltage (secondaryCPU2)		

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F88	N-Bus Overvoltage (secondaryCPU2)	BUSovervoltage, possible causes: 1. PVvoltage too high; 2. Abnormal inverterBUSvoltage sampling; 3. The isolation performance of the dual-split transformer downstream of the inverter is poor, causing the two inverters to interfere with each other when connected to the grid. A DC overvoltage fault is reported when one inverter connects to the grid;	
F89	P-Bus Overvoltage(CPLD)		Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F90	N-Bus Overvoltage(CPLD)	BUSovervoltage, possible causes: 1. PVvoltage too high; 2. Abnormal inverterBUSvoltage sampling; 3. The isolation performance of the dual-split transformer downstream of the inverter is poor, causing the two inverters to interfere with each other when connected to the grid. A DC overvoltage fault is reported when one inverter connects to the grid;	
F91	FlyCap Software Overvoltage	Flying capacitor overvoltage, possible causes: 1. PVvoltage too high; 2. Abnormal inverter flying capacitor voltage sampling;	Disconnect the AC output-side switch and the DC input-side switch,5minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F92	FlyCap Hardware Overvoltage		

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F93	FlyCap Undervoltage	FlyCap Undervoltage, possible causes: 1. PVenergy is insufficient; 2. Abnormal inverter flying capacitor voltage sampling;	Disconnect the AC output-side switch and the DC input-side switch,5minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F94	FlyCap Precharge Failure	FlyCap Precharge Failure, possible causes: 1. PVenergy is insufficient; 2. Abnormal inverter flying capacitor voltage sampling;	Disconnect the AC output-side switch and the DC input-side switch,5minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F95	FlyCap Precharge Abnormal	1. Control loop parameters are unreasonable 2. Hardware damage	Disconnect the AC output-side switch and the DC input-side switch,5minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F96, F97	String overcurrent(String1-n) n: Determine based on the actual number of strings connected to the inverter	Possible causes: 1. String overcurrent; 2. String current sensor fault	Disconnect the AC output-side switch and the DC input-side switch,5minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F99, F100	String loss(String1-n) n: Determine based on the actual number of strings connected to the inverter	String fuse open (if applicable)	Check whether the fuse is open.
F101	Battery1Precharge Failure	Battery1precharge circuit fault (e.g., precharge resistor burned out)	Check whether the precharge circuit is functioning properly. After powering on the battery only, check whether the Battery Voltage matches the bus voltage. If they do not match, contact your dealer or service center.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F102	Battery1Relay Failure	Battery1relay is not operating properly	After powering on the battery, check whether the battery relay operates and whether a closing sound can be heard. If it does not operate, contact your dealer or service center.
F103	Battery1BAT1 Overvoltage	Battery1input voltage exceeds the rated range of the unit	Confirm that the Battery Voltage is within the unit's rated range.
F104	Battery2Precharge Failure	Battery2precharge circuit fault (e.g., precharge resistor burned out)	Check whether the precharge circuit is functioning properly. After powering on the battery only, check whether the Battery Voltage matches the bus voltage. If they do not match, contact your dealer or service center.
F105	Battery2Relay Failure	Battery2relay is not operating properly	After powering on the battery, check whether the battery relay operates and whether a closing sound can be heard. If it does not operate, contact your dealer or service center.
F106	Battery2BAT1 Overvoltage	Battery2input voltage exceeds the rated range of the unit	Confirm that the Battery Voltage is within the unit's rated range.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F107	On-grid PWM Sync Failure	Abnormality during grid connection with carrier synchronization	1. Check that the synchronization cable is connected properly 2. Check that the master/slave settings are correct; 3. Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side and DC input-side switches. If the fault persists, contact your dealer or after-sales service center.
F108	DSPCommunication Failure	-	-
F109	ExternalSTSFailure	Inverter andSTSconnection cable abnormality	Check that the wire sequence of the harness connecting the inverter andSTScorresponds one-to-one.
F110	Export Limit Protection	1. The inverter reports a grid disconnection error 2. meterCommunication is unstable 3. Reverse power flow occurs	1. Check whether the inverter has any other error messages. If so, take appropriate corrective action; 2. Check whether themeteris connected securely; 3. If this alarm occurs frequently and affects normal power generation at the plant, contact your distributor or after-sales service center.
F111	BypassOverload	-	-
F112	Black Start Failure	-	-
F113	Offgrid AC Ins Volt High	-	-

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F114	Relay Failure2	Relay abnormality, cause: 1. Relay abnormality (relay short circuit) 2. Relay sampling circuit abnormality. 3. Abnormal AC-side wiring (possible loose connection or short circuit)	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F115	SVGPrecharge Disabled	SVGPrecharge hardware failure	Contact your dealer or after-sales service center.
F116	NighttimeSVG PIDPrevention Failure	PIDprevention hardware abnormality	
F117	DSPVersion Identification Error	DSPsoftware version identification error	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F118	MOSContinuous Overvoltage	1. Software issue causes the inverter drive to shut down before the flyback drive: 2. Abnormal inverter drive circuit prevents startup: 3. PVvoltage too high; 4. Mosvoltage sampling;	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F119	Bus short-circuit fault	Hardware damage	If the inverter remains disconnected from the grid after aBUSshort-circuit fault occurs, contact your distributor or after-sales service center.
F120	Bus sampling abnormal	1. BUSvoltage sampling hardware fault	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F121	DCDC Sample Abnormal	1. BUSvoltage sampling hardware fault 2. Battery Voltage sampling hardware fault 3. DcrlyRelay Failure	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.

9.5.2.1.4 Fault Handling (Fault Codes F122–F171)

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F122	PVPV Input Mode Error	PVThere are three PV access modes. Taking a four-MPPT system as an example:MPPT: 1. Parallel mode: i.e.,AAAAmode(same-source mode），PV1-PV4same source,4stringPVconnected to the same PV module 2. Partially parallel mode: theAACCmode, in whichPV1andPV2are connected to a common source, andPV3andPV4are connected to a common source 3. Independent mode: i.e.,ABCDmode(different sources），PV1、PV2、PV3、PV4connected independently,4stringPVeach connected to a PV module This fault is reported if the actualPVaccess	Check whether thePVAccess Mode is set correctly (ABCD、AACC、AAAA). Set thePVAccess Mode 1. Confirm that each connectedPVinput is connected correctly; 2. If thePVinputs are connected correctly, use theAPPor the display to check whether the configured "PVAccess Mode" matches the actual access mode; 3. If the configured "PVAccess Mode" does not match the actual access mode, use theAPPor the display to set the "PVAccess Mode" to match the actual configuration. After completing the setting, disconnect thePVandACpower supplies and restart the inverter; 4. After completing the setting, if the current "PVAccess Mode" matches the actual access mode but this fault is still reported, contact your distributor or after-sales service center.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
		mode does not match thePVaccess mode configured on the device	
F123	Multi-channelPVphase error	PVInput mode setting error	Check whether thePVAccess Mode is set correctly (ABCD、AACC、AAAA). Set thePVAccess Mode 1. Confirm that each connectedPVinput is connected correctly; 2. If thePVinputs are connected correctly, use theAPPor the display to check whether the configured "PVAccess Mode" matches the actual access mode; 3. If the configured "PVAccess Mode" does not match the actual access mode, use theAPPor the display to set the "PVAccess Mode" to match the actual configuration. After completing the setting, disconnect thePVandACpower supplies and restart the inverter; 4. After completing the setting, if the current "PVAccess Mode" matches the actual access mode but this fault is still reported, contact your distributor or after-sales service center.
F124	Battery1BAT1 Reversed	Battery1positive and negative terminals reversed	Check that the battery polarity matches the polarity of the machine terminals.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F125	Battery2BAT 1 Reversed	Battery2positive and negative terminals reversed	Check that the battery polarity matches the polarity of the machine terminals.
F126	Abnormal Battery Connection	Abnormal Battery Connection	Check whether the battery is operating normally.
F127	BAT Overtemperature	Battery overtemperature. Possible causes: 1. The inverter is installed in a poorly ventilated location. 2. Ambient Overtemperature. 3. The internal fans are operating abnormally.	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F128	Ref Voltage Abnormal	Reference circuit failure	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F129	Cabinet Under Temperature	Cabinet Under Temperature. Possible cause: ambient temperature is too low.	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F130	AC-SideSPDFailure	AC-side surge protection device failure	Replace theAC-side surge protection device.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F131	DC-SideSPDFailure	DC-side surge protection device failure	Replace theDC-side surge protection device.
F132	Fan Abnormal	Fan Abnormal. Possible causes: 1. Abnormal fan power supply; 2. Mechanical failure(locked rotor）; 3. Fan aging and damage.	Disconnect the AC output-side switch and the DC input-side switch,5 minutes later, close the AC output-side switch and the DC input-side switch. If the fault persists, please contact your distributor or after-sales service center.
F133	External Fan Abnormal	External Fan Abnormal. Possible causes: 1. Abnormal fan power supply; 2. Mechanical failure(locked rotor）; 3. Fan aging and damage.	
F134	PIDAbnormal	PIDhardware failure orPVovervoltage caused thePIDto pause	PVcaused by overvoltagePIDThe pause warning requires no action,PIDA hardware fault can be cleared by turning thePIDswitch off and then back onPIDFault; replacePIDthe device.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F135	Trip-Switch Trip Warning	Possible causes: Overcurrent orPVreverse polarity caused the trip switch to open;	Contact your dealer or after-sales service center. The trip may have been caused by aPVshort circuit or reverse polarity. Check for historicalPVshort-circuit warnings or historicalPVreverse-polarity warnings. If any are present, have a service technician inspect the correspondingPVcondition. Once inspection is complete and no fault is found, manually close the trip switch, then clear this warning by clearing the historical fault via theAPPinterface.
F136	HistoricalPV IGBT Short-Circuit Warning	Possible causes: Overcurrent caused the trip switch to open;	Contact your dealer or after-sales service center. The service technician should use the historicalPVshort-circuit warning subcode to inspect the affectedBoosthardware and external strings for faults. Once the inspection is complete and no faults are found, clear this warning using the Clear Historical Faults operation in theAPPinterface.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F137, F138	HistoricalPV Reverse Polarity Warning(String1-n) (n: determine based on the actual number of strings supported by the inverter)	Possible causes: ThePVreverse polarity caused the trip switch to open;	Contact your dealer or after-sales service center. The service technician should use the historicalPVreverse polarity warning subcode to check whether the corresponding string is reverse-connected, and inspect thePVmodule configuration for voltage differences. Once the inspection is complete and no faults are found, clear this warning using the Clear Historical Faults operation in theAPPinterface.
F139	FlashR/W Error	Possible causes: 1. Flashcontent has changed; 2. Flashhas reached the end of its service life;	1. Upgrade to the latest firmware version; 2. Contact your dealer or after-sales service center.
F140	Meter Comm Loss	This warning may occur only when the Power Limit function is enabled. Possible causes: 1. The meter is not connected. 2. The communication cable between the meter and inverter is wired incorrectly.	Check the meter wiring and connect the meter correctly. If the fault persists after inspection, contact your dealer or after-sales service center.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F141	PVType Identification Failure	PVmodule identification hardware fault	Contact your dealer or after-sales service center.
F142	PV String Mismatch	PVString Mismatch: the open-circuit voltage configurations of two strings connected to the sameMPPTare different	Check the open-circuit voltages of the two strings, and connect strings with the same open-circuit voltage to the sameMPPT. A prolonged string mismatch presents a safety hazard.
F143	CTnot connected	CTnot connected	Check whether theCTwiring.
F144	CTReversed	CTReversed	Check whether theCTwiring.
F145	PE Loss	Ground wire not connected	Check the ground wire.
F146	PV String Terminal Overtemperature(String 1~8)	37176registerPVterminal temperature warning subcode1is set	-
F147	PV String Terminal Overtemperature(String 9~16)	37177registerPVterminal temperature warning subcode2is set	-
F148	PV String Terminal Overtemperature(String 17~20)	37178registerPVterminal temperature warning subcode3is set	-

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F149	HistoricalPV Reverse Polarity Warning(String33~48)	Possible causes: ThePVreverse polarity caused the trip switch to open;	Contact your dealer or after-sales service center. The service technician should use the historicalPVreverse polarity warning subcode to check whether the corresponding string is reverse-connected, and inspect thePVmodule configuration for voltage differences. Once the inspection is complete and no faults are found, clear this warning using the Clear Historical Faults operation in theAPPinterface.
F150	Battery1Voltage Low	Battery Voltage below the setpoint	-
F151	Battery2Voltage Low	Battery Voltage below the setpoint	-
F152	Low Voltage of Battery Power	In non-charging mode, the battery voltage is below the shutdown voltage	-
F153	Battery1Voltage High	-	-
F154	Battery2Voltage High	-	-

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F155	Online Low Insulation Resistance	1. The PV string is short-circuited to protective earth. 2. The PV string is installed in a persistently humid environment, and the insulation resistance of the wiring to ground is poor.	1. Check the insulation resistance between the PV strings and protective earth. If a short circuit is present, rectify the short-circuit fault. 2. Check whether the inverter's protective earth wire is connected correctly. 3. If the resistance is confirmed to be below the default value in rainy or overcast conditions, reset the "Insulation Resistance Protection Threshold."
F156	Micro-grid Overload Warning	backupport input current too high	No action is required if this occurs occasionally. If this alarm occurs frequently, contact your dealer or after-sales service center.
F157	Manual Reset	-	-
F158	Generator Phase Sequence Abnormal	-	-
F159	Multiplexed Port Configuration Abnormal	The multiplexed port(generator）is configured for a micro-grid or large load, but a generator is actually connected	Use theAPPto change the multiplexed(generator）port configuration.
F160	EMSForced Off-grid	EMSissued a forced off-grid command, but the off-grid function is not enabled	Enable the off-grid function.

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F161	Passive Anti-islanding Protection	-	-
F162	Grid Type Fault	The actual(()) does not match the configured grid code	Select the appropriate grid code according to the actual Type of Electrical Supply System.
F163	Grid Phase Instability	Grid fault: The rate of change of the grid voltage phase does not comply with local grid standards.	1. If this occurs occasionally, it may be due to a brief grid abnormality. The inverter will resume normal operation once it detects that the grid is normal; no manual intervention is required. 2. If this occurs frequently, check whether the grid frequency is within the permissible range. If not, contact the local utility.
F166	PV Terminal Overtemperature	PV Terminal Overtemperature; possible causes: 1. The inverter is installed in a poorly ventilated location. 2. Ambient Overtemperature. 3. The internal fans are operating abnormally.	

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F167	AC Terminal Overtemperature Warning	AC Terminal Overtemperature. Possible causes: 1. The inverter is installed in a poorly ventilated location. 2. Ambient Overtemperature. 3. The internal fans are operating abnormally.	1. Check whether the inverter installation location is well ventilated and whether the ambient temperature exceeds the maximum permitted ambient temperature range. 2. If ventilation is inadequate or Ambient Overtemperature occurs, improve ventilation and heat dissipation. 3. If ventilation and ambient temperature are both normal, contact your dealer or after-sales service center.
F168	Bat Terminal Overtemperature	Bat terminal overtemperature, possible causes: 1. The inverter is installed in a poorly ventilated location. 2. Ambient Overtemperature.	
F169	Bat Terminal Overtemperature Warning	Bat terminal overtemperature, possible causes: 1. The inverter is installed in a poorly ventilated location. 2. Ambient Overtemperature.	

Fault Code	Fault Name	Cause	Recommended Troubleshooting
F170	STS Overtemperature	STS overtemperature, possible causes: 1. The STS installation location is poorly ventilated. 2. Ambient Overtemperature.	
F171	Abnormal Inverter-to-Battery Wiring	Abnormal power cable connection between the battery and inverter	Check whether the power cable connection between the battery and inverter is normal.

9.5.2.1.5 Troubleshooting

Fault Name	Cause	Recommended Troubleshooting
Generator Failure	1. This fault will remain displayed when no generator is connected 2. This fault is triggered if the generator does not comply with safety regulations while operating	1. If no generator is connected, ignore this fault; 2. This fault is normal when the generator has a failure. After the generator recovers, wait for a while and the fault will clear automatically; 3. This fault does not affect normal operation in off-grid mode 4. When both the generator and grid are connected and safety requirements are met, the grid takes priority for grid-connected operation, and the system will operate in grid-connected mode.

Fault Name	Cause	Recommended Troubleshooting
BMS Status Bit Error	BMS Module Failure	Open the AC output-side switch and DC input-side switch. After 5 minutes, close the AC output-side switch and DC input-side switch. If the fault persists, contact your dealer or after-sales service center.
Ambient Overtemperature	1. Poor ventilation of the unit 2. Hot air recirculates to the ambient temperature measurement point	Open the AC output-side switch and DC input-side switch. After 5 minutes, close the AC output-side switch and DC input-side switch. If the fault persists, contact your dealer or after-sales service center.
PV Terminal Overtemperature	PV Terminal Overtemperature; possible causes: 1. The inverter installation location is poorly ventilated. 2. Ambient Overtemperature. 3. The internal fan is operating abnormally.	1. Check whether the inverter installation location is well ventilated and whether the ambient temperature exceeds the maximum permitted ambient temperature range. 2. If ventilation is inadequate or the Ambient Overtemperature condition occurs, improve ventilation and heat dissipation. 3. If ventilation and ambient temperature are both normal, contact your dealer or after-sales service center.
Bat Terminal Overtemperature	Bat terminal overtemperature, possible causes: 1. The inverter installation location is poorly ventilated. 2. Ambient Overtemperature.	1. Check whether the inverter installation location is well ventilated and whether the ambient temperature exceeds the maximum permitted ambient temperature range. 2. If ventilation is inadequate or the Ambient Overtemperature condition occurs, improve ventilation and heat dissipation. 3. If ventilation and ambient temperature are both normal, contact your dealer or after-sales service center.

Fault Name	Cause	Recommended Troubleshooting
AC Terminal Overtemperature Warning	AC Terminal Overtemperature. Possible causes: 1. The inverter installation location is poorly ventilated. 2. Ambient Overtemperature. 3. The internal fan is operating abnormally.	
Bat Terminal Overtemperature Warning	Bat terminal overtemperature, possible causes: 1. The inverter installation location is poorly ventilated. 2. Ambient Overtemperature.	1. Check whether the inverter installation location is well ventilated and whether the ambient temperature exceeds the maximum permitted ambient temperature range. 2. If ventilation is inadequate or the Ambient Overtemperature condition occurs, improve ventilation and heat dissipation. 3. If ventilation and ambient temperature are both normal, contact your dealer or after-sales service center.
Three-phase on-grid fault	Three-phase external wiring error	Reconnect the wiring.
External STS Failure	Abnormal inverter-to-STS cable connection	Check that the wire sequence of the harness connecting the inverter and STS matches pin to pin.

Fault Name	Cause	Recommended Troubleshooting
Parallel Comm Timeout Shutdown	In parallel operation, if a slave fails to communicate with the master for more than400seconds	Check that the parallel communication harness is securely connected and that slave addresses are not duplicated.
Three-phase off-grid phase loss fault	Phase loss in the three-phase system	1. Check whether all inverters are powered on. 2. Check whether an inverter is connected to each phase of the three-phase system.
EPO	The external hardware EPO button was triggered, or an EPO command was issued remotely	1. If Remote Shutdown was triggered intentionally, this can be ignored. 2. If it was not triggered intentionally,please contact your dealer or after-sales service center.

Fault Name	Cause	Recommended Troubleshooting
High concentration of combustible gas	The combustible gas detection device automatically triggers an alarm when the concentration reaches 20% LEL or higher.	1. When a fault occurs, the unit automatically opens the air damper to exhaust gas and reduce the concentration. The fault clears automatically when the concentration remains below 5% LEL for 15 minutes. 2. If a cluster-level Fire Fighting Failure is triggered after a fault occurs, the air damper will close automatically. The damper status is checked within 30 seconds to ensure that cluster-level fire protection is carried out in an enclosed space. 3. Please contact your dealer or after-sales service center.
Inconsistent control and feedback signals for opening the combustible gas device air damper	The control signal for opening the air damper does not match the feedback signal	1. Check that the harness signal connections are correct. 2. Please contact your dealer or after-sales service center.
One-touch shutdown	Check in the app whether the one-touch shutdown function is enabled	Disable one-touch shutdown.
Offline shutdown	-	-
Remote shutdown	-	-

Fault Name	Cause	Recommended Troubleshooting
On-Grid SPD Fault	-	1. Try restarting the unit and check whether the fault clears; 2. If the fault persists after restarting, please contact your dealer or after-sales service center.
Off-Grid SPD Fault	-	1. Try restarting the unit and check whether the fault clears; 2. If the fault persists after restarting, please contact your dealer or after-sales service center.
Child Node Communication Failure	Internal Comm Abnormal	1. Try restarting the unit and check whether the fault clears; 2. If the fault persists after restarting, please contact your dealer or after-sales service center.
Dehumidifier Communication Failure	Communication link between the dehumidifier and the LC control box is abnormal	1. Check the communication cable harness and see if the fault is cleared; 2. Try restarting the unit and check whether the fault clears; 3. If the fault persists after restarting, contact your dealer or an after-sales service center.

Fault Name	Cause	Recommended Troubleshooting
Combustible Gas Detector Communication Failure	1. The combustible gas detector was not properly configured at the factory with the 485 address set to 2. 2. Communication link between the combustible gas detector and the LC control box is abnormal	1. Check the communication cable harness and see if the fault is cleared; 2. Try restarting the unit and check whether the fault clears; 3. Use the method provided by the combustible gas detector manufacturer to check whether the device address is 2. If not, change it; 4. If the fault persists after restarting, contact your dealer or an after-sales service center.
DG Communication Failure	Communication link between the control board and the DG is abnormal	1. Check the communication cable harness and see if the fault is cleared; 2. Try restarting the unit and see if the fault is cleared; 3. If the fault persists after restarting, contact your dealer or an after-sales service center.
Battery Over Voltage	1. Individual cell voltage is too high 2. Voltage sensing cable is faulty	Record the fault symptoms, restart the battery, and wait a few minutes to see if the fault clears. If the problem persists after restarting, contact the after-sales service center.
	1. Total battery voltage is too high 2. Voltage sensing cable is faulty	
Battery Undervoltage	1. Individual cell voltage is too low 2. Voltage sensing cable is faulty	

Fault Name	Cause	Recommended Troubleshooting
	1. Total battery voltage is too low 2. Voltage sensing cable is faulty	
Battery Overcurrent	1. Charging current is too high, or battery current limiting is abnormal: sudden changes in temperature and voltage 2. Inverter response is abnormal	
	Battery discharge current is too high	
Battery Overtemperature	1. Ambient Overtemperature 2. Temperature sensor is faulty	
Battery Undertemperature	1. Ambient temperature is too low 2. Temperature sensor is faulty	
Battery Terminal Overtemperature	High pole temperature	

Fault Name	Cause	Recommended Troubleshooting
Battery Imbalance	1. At different stages, the battery limits its power output when the temperature difference is too large, thereby limiting the charge and discharge current. This issue is therefore generally unlikely to occur. 2. Cell capacity degradation can result in excessive internal resistance, causing a significant temperature rise under Overcurrent and thus a large temperature difference. 3. Poor cell tab welds can cause the cell temperature to rise too quickly under Overcurrent. 4. Temperature measurement issue; 5. Loose power cable connection	

Fault Name	Cause	Recommended Troubleshooting
	1. Cells have aged unevenly 2. A slave board chip issue can also cause an excessive cell voltage difference; 3. A cell balancing issue on the slave board can also cause an excessive cell voltage difference 4. Wiring harness issue	
Insulation Resistance	Insulation resistance failure	Check that the ground wire is connected properly, then restart the battery. If the issue persists after restarting, contact the after-sales service center.
Pre-charging Failure Fault	Pre-charging Failure	This indicates that during pre-charging, the voltage across the pre-charge MOSFET remains above the specified threshold. Power the unit off and restart it, then check whether the fault persists. Check that the wiring is correct and that the pre-charge MOSFET is not damaged.
Acquisition cable fault	The battery acquisition cable is making poor contact or is disconnected	Check the wiring, then restart the battery. If the issue persists after restarting, contact the after-sales service center.

Fault Name	Cause	Recommended Troubleshooting
	The cell voltage acquisition cable is making poor contact or is disconnected	Check the wiring, then restart the battery. If the issue persists after restarting, contact the after-sales service center.
	The cell temperature acquisition cable is making poor contact or is disconnected	
	The current measurement discrepancy between the two channels is excessive, or the current acquisition circuit is abnormal	
	The voltage measurement discrepancy between the two channels, or between the MCU and AFE, is excessive, or the voltage acquisition circuit is abnormal	
	The temperature acquisition circuit is abnormal, making poor contact, or disconnected	

Fault Name	Cause	Recommended Troubleshooting
	Level 5 overvoltage or level 5 overtemperature has blown the three-terminal fuse	The three-terminal fuse has blown. Contact the after-sales service center to replace the main control board.
Relay or MOSFET overtemperature	Relay or MOSFET overtemperature	This fault indicates that the MOSFET temperature has exceeded the specified threshold. Power the unit off and leave it idle for 2 hours to allow the temperature to return to normal.
Shunt overtemperature	Shunt overtemperature	This fault indicates that the shunt temperature has exceeded the specified threshold. Power the unit off and leave it idle for 2 hours to allow the temperature to return to normal.
BMS1 Other Fault 1 (Residential Energy Storage)	Relay or MOSFET open circuit	1. Update the software, power off and leave the unit idle for 5 minutes, then restart it and check whether the fault persists; 2. If the fault persists, replace the battery pack
	Relay or MOSFET short circuit	1. Update the software, power off and leave the unit idle for 5 minutes, then restart it and check whether the fault persists; 2. If the fault persists, replace the battery pack
	Communication failure between the master cluster and slave cluster, or inconsistencies between the cells in different clusters	1. Check the battery information and software version of the slave unit, and verify that the communication cable to the master unit is connected properly. 2. Update the software.

Fault Name	Cause	Recommended Troubleshooting
	The battery system return-path wiring harness is faulty, preventing the interlock signal circuit from being completed.	Check that the termination resistor is installed correctly.
	Communication failure between the BMS and PCS.	1. Verify that the communication interface pinout between the inverter and the connected battery is correct; 2. Contact the after-sales service center to review the backend data and verify that the inverter and battery software versions are compatible.
	Fault in the communication harness between the BMS master controller and slave controller.	1. Check the wiring and restart the battery; 2. Update the battery software. If the issue persists after restarting, contact the after-sales service center.
	Communication lost between the master and slave chips.	
	Circuit breaker or shunt trip malfunction.	1. Leave the system powered off for 5 minutes, then restart it and check whether the fault persists; 2. Check the blind-mate connectors at the bottom of the PACK and PCU for loose or bent communication pins;
	MCU self-test failed.	Update the software and restart the battery. If the issue persists after restarting, contact the after-sales service center.

Fault Name	Cause	Recommended Troubleshooting
	1. The software version is too old, or the BMS board is damaged. 2. A large number of inverters are connected in parallel, causing excessive inrush current during battery pre-charge.	1. Update the software and check whether the fault persists. 2. If the inverters are connected in parallel, black-start the battery before starting the inverters.
	Internal MCU fault.	Update the software and restart the battery. This fault is generally caused by a damaged MCU or external component. If the issue persists after restarting, contact the after-sales service center.
	The master controller current exceeds the specified threshold.	1. Leave the system powered off for 5 minutes, then restart it and check whether the fault persists; 2. Check whether the inverter power setting is too high, causing the bus load to be exceeded;
	Cell inconsistency among paralleled battery clusters.	Verify that the cells in the paralleled battery clusters are consistent.
	Positive and negative terminals of the paralleled battery clusters are reversed.	Check whether the positive and negative terminals of the paralleled battery clusters are reversed.

Fault Name	Cause	Recommended Troubleshooting
	A severe overtemperature, overvoltage, or similar condition has triggered the fire suppression system.	Contact the after-sales service center.
Air Conditioner Failure	Air conditioner fault	Try restarting the system. If the fault persists, contact the after-sales service center.
	Cabinet door not closed	Check that the cabinet door is properly closed
	Supply voltage too high	Check that the supply voltage meets the air conditioner's input voltage requirements. Once confirmed, restore power.
	Insufficient supply voltage	
	No voltage input	
	Unstable supply voltage	
	Unstable compressor voltage	Try restarting the system. If the fault persists, contact the after-sales service center.
	Sensor has a poor connection or is damaged	
	Air conditioner fan fault	
	Abnormal voltage or current detected inside the DCDC converter	See the specific DC Failure details.

Fault Name	Cause	Recommended Troubleshooting
BMS1 Other Fault 2 (residential energy storage)	DCDC Overload or heatsink temperature too high, etc.	
	Abnormal cell data acquisition or inconsistent aging levels	Please contact the after-sales service center.
	Fan did not operate as expected	Please contact the after-sales service center.
	Output terminal screws are loose or have poor contact	1. Shut down the battery and check the wiring and output terminal screws 2. After confirming, restart the battery and check whether the fault persists. If it does, contact the after-sales service center.
	Battery has been in use for too long or cells are severely damaged	Please contact the after-sales service center to replace the pack.
	1. The software version is too old, or the BMS board is damaged. 2. A large number of inverters are connected in parallel, causing excessive inrush current during battery pre-charge.	1. Upgrade the software and check whether the fault persists. 2. For a parallel configuration, black-start the battery before starting the inverter.
	Heating film damaged	Please contact the after-sales service center.

Fault Name	Cause	Recommended Troubleshooting
	The three-terminal fuse for the heating film has blown, disabling the heating function	Please contact the after-sales service center.
	Software model, cell type, and hardware model do not match	Check that the software model, SN, cell type, and hardware model are consistent. If they are not, contact the after-sales service center.
	Thermal management board communication disconnected	1. Leave the system powered off for 5 minutes, then restart it and check whether the fault persists; 2. If the fault persists, contact after-sales service to replace the pack.
	Pack fan fault signal triggered	
DCDC fault	Output port voltage too high	Check the output port voltage. If it is normal but the fault does not clear after restarting the battery, contact the after-sales service center.
	The DCDC module detected that the Battery Voltage exceeds the maximum charging voltage	Stop charging and discharge the battery to below 90% SOC, or leave it idle for 2 hours. If this does not resolve the issue and the fault persists after restarting, contact the after-sales service center.
	Heatsink temperature too high	Leave the battery idle for 1 hour and wait for the heatsink temperature to drop. If this does not resolve the issue and the fault persists after restarting, contact the after-sales service center.

Fault Name	Cause	Recommended Troubleshooting
	Battery discharge current is too high	Check whether the load exceeds the battery's discharge capacity. Turn off the load or stop PCS operation for 60 seconds. If this does not resolve the issue and the fault persists after restarting, contact the after-sales service center.
	The positive and negative power cables at the output port are reversed at the parallel-connected battery or PCS	Turn off the battery manual switch, check that the output port wiring is correct, and restart the battery.
	Output power relay failed to close	Check that the output port wiring is correct and that there is no short circuit. If this does not resolve the issue and the fault persists after restarting, contact the after-sales service center.
	Power device temperature too high	Leave the battery idle for 1 hour and wait for the temperature of the internal power devices to drop. If this does not resolve the issue and the fault persists after restarting, contact the after-sales service center.
	Relay welded closed	If the fault persists after restarting, contact the after-sales service center.
Battery Rack Circulating Current Failure	1. Cell imbalance 2. First power-up not followed by a full-charge calibration	Record the fault symptoms, restart the battery, and wait a few minutes to see if the fault clears. If the problem persists after restarting, contact the after-sales service center.

Fault Name	Cause	Recommended Troubleshooting
BMS1 Other Fault 3 (Utility-Scale)	Communication failure with the Linux module	1. Check that the communication connection is normal 2. Upgrade the software and restart the battery to check whether the fault persists. If it does, contact the after-sales service center.
	Cell temperature rising too rapidly	Cell abnormality; contact after-sales service to replace the pack.
	SOC below 10%	Charge the battery.
	SN entry does not comply with the rules	Check whether the SN length is correct. If it is incorrect, contact the after-sales service center.
	1. Daisy-chain communication fault within the battery cluster 2. Inconsistent cell aging across battery clusters	1. Check the connection of the battery pack in the individual cluster 2. Check the usage of each battery cluster, such as cumulative charge/discharge capacity and cycle count 3. Please contact the after-sales service center.
	Excessive humidity inside the pack	-
	Fuse open	Contact after-sales service to replace the pack.
	Low battery charge	Charge the battery.
BMS1 Other Fault 4 (Utility-Scale Energy Storage)	Circuit breaker abnormality	Contact after-sales service to replace the pack.
	External equipment fault	Contact after-sales service to replace the pack.
Contactor Failure 1	-	-

Fault Name	Cause	Recommended Troubleshooting
Contactor Failure 2	-	-
Overload Protection (Ksic)	Continuous Overload (>690 kVA) for 10 s	Please contact the after-sales service center.
Overload Protection (Smart Port	Continuous Overload (>690 kVA) for 10 s	Please contact the after-sales service center.
Overcurrent Protection (Ksic)	-	-
Overcurrent Protection (Smart Port)	-	-
Master AC On Meter Comm Error	1. The meter may not be connected to the master unit 2. The meter communication cable may be loose	1. Check whether the meter is connected to the master unit 2. Check whether the meter communication cable is loose
Parallel Slave Meter Error	The meter is connected to a slave unit	The unit connected to the meter is configured as the master
Slave AC On Timeout with Master	1. The slave address is incorrectly configured 2. The slave communication cable is loose	1. Check whether any slave addresses are duplicated 2. Check whether the parallel communication cable is loose

9.5.2.2 Battery Fault

No.	Fault name	Fault cause	Fault handling suggestions
1	BMS1 Rack1 total voltage too high warning /BMS1 RACK1 Total voltage is too high warning	1. Battery system voltage too high 2. Voltage sampling line abnormal	1. Discharge the battery to check whether the fault persists; 2. If the fault does not clear, contact the after-sales service center.
2	BMS1 Rack1 total voltage too low warning /BMS1 RACK1 Total voltage is too low warning	1. Battery system voltage too low 2. Voltage sampling line abnormal	1. Charge the battery and let it rest to check whether the fault persists. When the inverter has charging conditions, restarting the battery can trigger forced charging. 2. Check the inverter operation to determine whether it is not charging the battery due to issues such as the operating mode; try charging the battery through the inverter and observe whether the fault clears. 3. If the fault does not clear, contact the after-sales service center.

No.	Fault name	Fault cause	Fault handling suggestions
3	BMS1 Rack1 cell voltage too high warning /BMS1 RACK1 Cell voltage is too high warning	1. Single cell voltage too high 2. Voltage sampling line abnormal	1. Discharge the battery and let it rest to check whether the fault persists; 2. If the fault does not clear, contact the after-sales service center.
4	BMS1 Rack1 cell voltage too low warning /BMS1 RACK1 Cell voltage is too low warning	1. Single cell voltage too low 2. Voltage sampling line abnormal	1. Charge the battery and let it rest to check whether the fault persists; 2. Check the inverter operation to determine whether it is not charging the battery due to issues such as the operating mode; try charging the battery through the inverter and observe whether the fault clears 3. If the fault does not clear, contact after-sales.

No.	Fault name	Fault cause	Fault handling suggestions
5	BMS1 Rack1 charging temperature too high warning /BMS1 RACK1 Charging temperature is too high warning	1. Ambient Overtemperature 2. Temperature sensor abnormal	1. Stop charging and discharging and let it rest to check whether the fault persists; 2. If the fault does not clear, contact the after-sales service center.
6	BMS1 Rack1 discharging temperature too high warning /BMS1 RACK1 Discharging temperature is too high warning	1. Ambient Overtemperature 2. Temperature sensor abnormal	1. Stop charging and discharging and let it rest to check whether the fault persists; 2. If the fault does not clear, contact after-sales.

No.	Fault name	Fault cause	Fault handling suggestions
7	BMS1 Rack1 charging temperature too low warning /BMS1 RACK1 Charging temperature is too low warning	1. Ambient temperature too low 2. Temperature sensor abnormal	1. Check the cell temperature in the background. If the minimum temperature is above -20°C, set the battery to discharge to raise the cell temperature. 2. If the temperature is below -20°C, turn off the battery and place it in a warm environment, and use it after the cell temperature recovers. 3. If none of the above works, contact the after-sales service center.

No.	Fault name	Fault cause	Fault handling suggestions
8	BMS1 RACK1 Discharging temperature is too low warning/ BMS1 RACK1 Discharging temperature is too low warning	1. Ambient temperature too low 2. Temperature sensor abnormal	1. Check the cell temperature in the background. If the minimum temperature is above -20°C, set the battery to discharge to raise the cell temperature. 2. If the temperature is below -20°C, turn off the battery and place it in a warm environment, and use it after the cell temperature recovers. 3. If none of the above works, contact the after-sales service center.
9	BMS1 RACK1 Charge overcurrent warning/ BMS1 RACK1 Charge overcurrent warning	1. Charging Current is too large, battery current limiting is abnormal: temperature and voltage values change abruptly. 2. Inverter response abnormal	1. Stop charging and let it stand to see if the fault persists; 2. Check whether the inverter is set to too high power, causing it to exceed the battery's rated operating current; 3. If overcurrent persists, contact the after-sales service center.

No.	Fault name	Fault cause	Fault handling suggestions
10	BMS1 RACK1 Discharge overcurrent warning/ BMS1 RACK1 Discharge overcurrent warning	1. Discharge current is too large, battery current limiting is abnormal: temperature and voltage values change abruptly. 2. Inverter response abnormal	1. Stop discharging and let it stand to see if the fault persists; 2. Check whether the inverter is set to too high power, causing it to exceed the battery's rated operating current; 3. If overcurrent persists, contact the after-sales service center.
11	BMS1 RACK1 Insulation resistance is too low warning/ BMS1 RACK1 Insulation resistance is too low warning	Insulation resistance damaged or abnormal contact.	Check whether the ground wire is properly connected, restart the battery. If the problem still exists after restart, contact the after-sales service center.

No.	Fault name	Fault cause	Fault handling suggestions
12	BMS1 RACK1 Cell excessive temperature differentials warning/ BMS1 RACK1 Cell excessive temperature differentials warning	1. In different stages where the temperature difference is too large, the battery will limit the battery power, that is, limit the charging and discharging current. Therefore, this problem is generally unlikely to occur. 2. Cell capacity degradation causes excessive internal resistance, and when Overcurrent occurs, the temperature rise is large, making the temperature difference large. 3. Poor welding of cell tabs causes the cell to heat up too quickly during Overcurrent. 4. Temperature sampling issue; 5. Loose power wire connection.	Power off, restart the battery, and wait for 2 hours. If the problem is not resolved, contact the after-sales service center.

No.	Fault name	Fault cause	Fault handling suggestions
13	BMS1 RACK1 Post temperature is too high warning/ BMS1 RACK1 Post temperature is too high warning	Post temperature is too high	1. Stop charging and discharging and let it rest to check whether the fault persists; 2. If the fault does not clear, contact the after-sales service center.
14	BMS1 RACK1 Cell excessive voltage differentials warning/ BMS1 RACK1 Cell excessive voltage differentials warning	1. Inconsistent cell aging degree. 2. Slave board chip issues can also cause excessive cell voltage differentials; 3. Slave board balancing issues can also cause excessive cell voltage differentials. 4. Caused by wiring harness issue.	1. Stop charging and discharging and let it rest to check whether the fault persists; 2. If the fault does not clear, contact the after-sales service center.
15	BMS1 RACK1 PCS Comm Loss warning/ BMS1 RACK1 PCS communication loss warning	BMS and PCS communication abnormal	Check whether the communication wire connection between the battery and the inverter is intact.
16	BMS1 RACK1 DCDC warning/ BMS1 RACK1 DCDC warning	Abnormal voltage or current exists inside the DCDC.	Upgrade the software, restart the battery. If the problem still exists after restart, please contact the after-sales service center.

No.	Fault name	Fault cause	Fault handling suggestions
17	BMS1 RACK1 Heat film MOS adhesion warning/ BMS1 RACK1 Heat film MOS adhesion warning	The heat film MOS is damaged.	Please contact the after-sales service center.
18	BMS1 RACK1 Heat film MOS open warning/ BMS1 RACK1 Heat film MOS open warning	The heating circuit is abnormal.	Please contact the after-sales service center.
19	BMS1 RACK1 Total voltage is too high fault/ BMS1 RACK1 Total voltage is too high fault	1. Battery system voltage too high 2. Voltage sampling line abnormal	1. Discharge the battery to check whether the fault persists; 2. If the fault does not recover, please contact the after-sales service center.
20	BMS1 RACK1 Total voltage is too low fault/ BMS1 RACK1 Total voltage is too low fault	1. Battery system voltage too low 2. Voltage sampling line abnormal	1. Charge the battery and let it rest to check whether the fault persists; 2. Check the inverter operation to determine whether it is not charging the battery due to issues such as the operating mode; try charging the battery through the inverter and observe whether the fault clears. 3. If the fault does not recover, please contact the after-sales service center.

No.	Fault name	Fault cause	Fault handling suggestions
21	BMS1 RACK1 Cell voltage is too high fault/ BMS1 RACK1 Cell voltage is too high fault	1. Single cell voltage too high 2. Voltage sampling line abnormal	1. Discharge the battery and let it rest to check whether the fault persists; 2. If the fault does not recover, please contact the after-sales service center.
22	BMS1 RACK1 Cell voltage is too low fault/ BMS1 RACK1 Cell voltage is too low fault	1. Single cell voltage too low 2. Voltage sampling line abnormal.	1. Charge the battery and let it rest to check whether the fault persists; 2. Check the inverter operation to determine whether it is not charging the battery due to issues such as the operating mode; try charging the battery through the inverter and observe whether the fault clears. 3. If the fault does not recover, please contact the after-sales service center.
23	BMS1 RACK1 Charging temperature is too high fault/ BMS1 RACK1 Charging temperature is too high fault	1. Ambient Overtemperature 2. Temperature sensor abnormal.	1. Place the battery in a cool place, shut it down and let it stand for 30 minutes, then restart and check whether the fault persists; 2. If the fault persists, please contact the after-sales service center.

No.	Fault name	Fault cause	Fault handling suggestions
24	BMS1 RACK1 Discharging temperature is too high fault/ BMS1 RACK1 Discharging temperature is too high fault	1. Ambient Overtemperature 2. Temperature sensor abnormal.	1. Place the battery in a cool place, shut it down and let it stand for 30 minutes, then restart and check whether the fault persists; 2. If the fault persists, please contact the after-sales service center.
25	BMS1 RACK1 Charging temperature is too low fault/ BMS1 RACK1 Charging temperature is too low fault	1. Ambient temperature too low 2. Temperature sensor abnormal	1. Check the cell temperature in the background. If the minimum temperature is above -20°C, set the battery to discharge to raise the cell temperature. 2. If the temperature is below -20°C, turn off the battery and place it in a warm environment, and use it after the cell temperature recovers. 3. If none of the above works, contact the after-sales service center.

No.	Fault name	Fault cause	Fault handling suggestions
26	BMS1 RACK1 Discharging temperature is too low fault BMS1 RACK1 Discharging temperature is too low fault	1. Ambient temperature too low 2. Temperature sensor abnormal	1. Check the cell temperature in the background. If the minimum temperature is above -20°C, set the battery to discharge to raise the cell temperature. 2. If the temperature is below -20°C, turn off the battery and place it in a warm environment, and use it after the cell temperature recovers. 3. If none of the above works, contact the after-sales service center.
27	BMS1 RACK1 Charge overcurrent fault/ BMS1 RACK1 Charge overcurrent fault	1. Charging Current is too large, battery current limiting is abnormal: temperature and voltage values change abruptly. 2. Inverter response abnormal	1. Shut down and let it stand for 5 minutes, then restart and check whether the fault persists; 2. Check whether the inverter is set to too high power, causing it to exceed the battery's rated operating current; 3. If overcurrent persists, contact the after-sales service center.

No.	Fault name	Fault cause	Fault handling suggestions
28	BMS1 RACK1 Discharge overcurrent fault/ BMS1 RACK1 Discharge overcurrent fault	1. Discharge current is too large, battery current limiting is abnormal: temperature and voltage values change abruptly. 2. Inverter response abnormal	1. Shut down and let it stand for 5 minutes, then restart and check whether the fault persists; 2. Check whether the inverter is set to too high power, causing it to exceed the battery's rated operating current; 3. If overcurrent persists, contact the after-sales service center.
29	BMS1 RACK1 Insulation resistance is too low fault/ BMS1 RACK1 Insulation resistance is too low fault	Insulation resistance damaged or abnormal contact.	1. Check whether the ground wire is properly connected, and restart the battery; 2. Upgrade the software. If the problem still exists, please contact the after-sales service center.

No.	Fault name	Fault cause	Fault handling suggestions
30	BMS1 RACK1 Cell excessive temperature differentials fault/ BMS1 RACK1 Cell excessive temperature differentials fault	1. In different stages where the temperature difference is too large, the battery will limit the battery power, that is, limit the charging and discharging current. Therefore, this problem is generally unlikely to occur. 2. Cell capacity degradation causes excessive internal resistance, and when Overcurrent occurs, the temperature rise is large, making the temperature difference large. 3. Poor welding of cell tabs causes the cell to heat up too quickly during Overcurrent. 4. Temperature sampling issue; 5. Loose power wire connection.	Power off, restart the battery, and wait for 2 hours. If the problem is not resolved, contact the after-sales service center.

No.	Fault name	Fault cause	Fault handling suggestions
31	BMS1 RACK1 Post temperature is too high fault/ BMS1 RACK1 Post temperature is too high fault	Post temperature is too high	1. Shut down and let it stand for 30 minutes, then restart and check whether the fault persists; 2. If the fault persists, please contact the after-sales service center.
32	BMS1 RACK1 Cell excessive voltage differentials fault/ BMS1 RACK1 Cell excessive voltage differentials fault	1. Inconsistent cell aging degree. 2. Slave board chip issues can also cause excessive cell voltage differentials; 3. Slave board balancing issues can also cause excessive cell voltage differentials 4. Caused by wiring harness issue.	Power off, restart the battery, and wait for 2 hours. If the problem is not resolved, contact the after-sales service center.
33	BMS1 RACK1 Relay or MOS short-circuit fault/ BMS1 RACK1 Relay or MOS short-circuit fault	MOS short-circuit	1. Upgrade the software, power off and let it sit for 5 minutes, then restart and see whether the fault persists; 2. If it persists, contact the after-sales service center.

No.	Fault name	Fault cause	Fault handling suggestions
34	BMS1 RACK1 Relay or MOS open-circuit fault/ BMS1 RACK1 Relay or MOS open-circuit fault	MOS open-circuit	1. Upgrade the software, power off and let it sit for 5 minutes, then restart and see whether the fault persists; 2. If it persists, contact the after-sales service center.
35	BMS1 RACK1 Pre-charging Failure fault/ BMS1 RACK1 The precharge failed fault	The voltage across the precharge MOS always exceeds the specified threshold,	1. Upgrade the software, power off and let it sit for 5 minutes, then restart and see whether the fault persists; 2. If it persists, contact the after-sales service center.
36	BMS1 RACK1 Acquisition line fault/ BMS1 RACK1 Acquisition line fault	The battery acquisition line has poor contact or is disconnected.	Power off, check the wiring, re-stack the battery, and if the problem persists after restart, contact the after-sales service center.
37	BMS1 RACK1 Relay or MOS temperature is too high fault/ BMS1 RACK1 Relay or MOS temperature is too high fault	Relay or MOS overtemperature	1. Upgrade the software, power off and let it sit for 30 minutes, then restart and see whether the fault persists; 2. If it persists, contact the after-sales service center.

No.	Fault name	Fault cause	Fault handling suggestions
38	BMS1 RACK1 Shunt temperature is too high fault/ BMS1 RACK1 Diverter temperature is too high fault	Shunt overtemperature	1. Upgrade the software, power off and let it sit for 30 minutes, then restart and see whether the fault persists; 2. If it persists, contact the after-sales service center.
39	BMS1 RACK1 Slave MCU communication fault/ BMS1 RACK1 Slave MCU communication fault	Communication between the master and slave chips is lost	1. Check the wiring and restart the battery, 2. Upgrade the battery; if the problem still exists after restart, contact the after-sales service center.
40	BMS1 RACK1 BMU communication fault/ BMS1 RACK1 BMU communication fault	The communication wiring harness between the BMS master controller and slave controller is abnormal	1. Check the wiring and restart the battery, 2. Upgrade the battery; if the problem still exists after restart, contact the after-sales service center.
41	BMS1 RACK1 Micro-electronics fault/ BMS1 RACK1 Micro-electronics fault	Internal MCU fault	Upgrade the software, restart the battery, and if the problem still exists after restart, contact the after-sales service center.

No.	Fault name	Fault cause	Fault handling suggestions
42	BMS1 RACK1 Hardware Overcurrent fault/ BMS1 RACK1 Hardware overcurrent fault	1. The software version is too low or the BMS board is damaged 2. The number of paralleled inverters is large, causing excessive impact on the battery during pre-charging	1. Upgrade the software and observe whether the fault persists. 2. If it is a parallel configuration, black-start the battery first, then start the inverter.
43	BMS1 RACK1 Application Software Failure/ BMS1 RACK1 Application software fault	MCU self-test failed	Upgrade the software, restart the battery, and if the problem still exists after restart, contact the after-sales service center.
44	BMS1 RACK1 Parallel RACK fault/ BMS1 RACK1 Parallel RACK fault	Abnormal communication between the master and slave clusters, or inconsistent cells between clusters	1. Check the battery information and software version of the slave, and whether the communication cable connection with the master is normal 2. Upgrade the software
45	BMS1 RACK1 DCDC fault/ BMS1 RACK1 DCDC fault	DCDC Overload or heatsink temperature too high, etc.	Upgrade the software, restart the battery, and if the problem still exists after restart, contact the after-sales service center.

No.	Fault name	Fault cause	Fault handling suggestions
46	BMS1 RACK1 Inconsistent cell fault BMS1 RACK1 Inconsistent cell fault	1. Abnormal cell identification 2. Stacking of different types of cells	Check the cell type
47	BMS1 RACK1 output port over temperature fault/ BMS1 RACK1 The output port over temperature fault	Output port screws are loose or have poor contact	1. Turn off the battery, check the wiring and output port screws. 2. After confirmation, restart the battery and observe whether the fault persists. If it does, contact the after-sales service center.
48	BMS1 RACK1 SOH too low fault/ BMS1 RACK1 SOH too low fault	The battery has been used for too long, or the cells are severely damaged	Replace the pack
49	BMS1 RACK1 heating film three-terminal fault/ BMS1 RACK1 Heating film MOS Three-terminal fault	Heating film MOS damaged	Please contact the after-sales service center.

10 Technical Parameters

10.1 Inverter Parameters

Technical Data	GW3K-EHA-G20	GW3.6K-EHA-G20	GW5K-EHA-G20
Battery Side			
Battery Type	$LiFePO_4$	$LiFePO_4$	$LiFePO_4$
Nominal Battery Voltage (V)	380	380	380
Battery Voltage Range (V)	350~550	350~550	350~550
Start-up Voltage (V)*1	380	380	380
Number of Battery Input	1	1	1
Max. Continuous Charging Current (A)	11.9	14.3	19.8
Max. Continuous Discharging Current (A)	8.7	10.5	14.5
Max. Charging Power (kW)	4.5	5.4	7.5
Max. Discharging Power (kW)	3.3	3.96	5.5
PV Side			
Max. Input Power (kW)	6	7.2	10

Technical Data	GW3K-EHA-G20	GW3.6K-EHA-G20	GW5K-EHA-G20
Max. Input Voltage (V)*2	600	600	600
MPPT Operating Voltage Range (V)*3	40~560	40~560	40~560
MPPT Voltage Range at Nominal Power (V)	150~500	150~500	170~500
Start-up Voltage (V)	50	50	50
Nominal Input Voltage (V)	400	400	400
Max. MPPT Current (A)	20	20	20
Max. MPPT Short Circuit Current (A)	26	26	26
Max. Backfeed Current to The Array (A)	0	0	0
Number of MPPTs	2	2	2
Number of Strings per MPPT	1/1	1/1	1/1
AC Side (On-grid)			
Nominal Power (kW)	3	3.6	5
Nominal Apparent Power to Grid (kVA)	3	3.6	5
Max. Apparent Power to Grid (kVA)	3	3.6	5

Technical Data	GW3K-EHA-G20	GW3.6K-EHA-G20	GW5K-EHA-G20
Nominal Apparent Power from Grid (kVA)	3	3.6	5
Max. Apparent Power from Grid (kVA)*4	6	7.2	10
Nominal Voltage (V)	220/230/240，L/N/PE	220/230/240，L/N/PE	220/230/240，L/N/PE
Voltage Range (V)	170~280	170~280	170~280
Nominal Frequency (Hz)	50/60	50/60	50/60
Frequency Range (Hz)	45~55 / 55~65	45~55 / 55~65	45~55 / 55~65
Max. Current to Grid (A)	13.7 at 220V 13.1 at 230V 12.5 at 240V	16.4 at 220V 15.7 at 230V 15 at 240V	22.8 at 220V 21.8 at 230V 20.9 at 240V
Max. Current From Grid (A)*4	27.3 at 220V 26.1 at 230V 25 at 240V	32.8 at 220V 31.4 at 230V 30 at 240V	45.5 at 220V 43.5 at 230V 41.7 at 240V
Nominal Current From Grid (A)	13.7 at 220V 13.1 at 230V 12.5 at 240V	16.4 at 220V 15.7 at 230V 15 at 240V	22.8 at 220V 21.8 at 230V 20.9 at 240V
Max. Output Fault Current (Peak and Duration) (A)	96 at 3μs	96 at 3μs	96 at 3μs
Inrush Current (Peak and Duration) (A)	96 at 3μs	96 at 3μs	96 at 3μs

Technical Data	GW3K-EHA-G20	GW3.6K-EHA-G20	GW5K-EHA-G20
Nominal Current (A)	13.7 at 220V 13.1 at 230V 12.5 at 240V	16.4 at 220V 15.7 at 230V 15 at 240V	22.8 at 220V 21.8 at 230V 20.9 at 240V
Power Factor	~1 (Adjustable from 0.8 leading to 0.8 lagging)	~1 (Adjustable from 0.8 leading to 0.8 lagging)	~1 (Adjustable from 0.8 leading to 0.8 lagging)
THDi	<3%	<3%	<3%
Maximum Output Overcurrent Protection (A)	96	96	96
Type of Voltage	a.c.	a.c.	a.c.
Back-up Side			
Nominal Output Apparent Power (kVA)	3	3.6	5
Max. Output Apparent Power (kVA)	3.0 (6.0, 10s)	3.6 (7.2, 10s)	5.0 (10.0, 10s)
Max. Output Apparent Power (Bypass) (kVA)	6	7.2	10
Nominal Output Current (A)	13.7 at 220V 13.1 at 230V 12.5 at 240V	16.4 at 220V 15.7 at 230V 15 at 240V	22.8 at 220V 21.8 at 230V 20.9 at 240V
Max. Output Current (A)*5	13.7 at 220V 13.1 at 230V 12.5 at 240V	16.4 at 220V 15.7 at 230V 15 at 240V	22.8 at 220V 21.8 at 230V 20.9 at 240V
Max. Output Current (Bypass) (A)*5	27.3	32.8	45.5

Technical Data	GW3K-EHA-G20	GW3.6K-EHA-G20	GW5K-EHA-G20
Max. Fault Current (Peak and Duration) (A)	96 at 3μs	96 at 3μs	96 at 3μs
Inrush Current (Peak and Duration) (A)	96 at 3μs	96 at 3μs	96 at 3μs
Max. Output Overcurrent Protection (A)	96	96	96
Nominal Output Voltage (V)	220/230/240，L/N/PE	220/230/240，L/N/PE	220/230/240，L/N/PE
Nominal Output Frequency (Hz)	50/60	50/60	50/60
THDv (@Linear Load)	<3%	<3%	<3%
Efficiency			
Max. Efficiency	97.6%	97.6%	97.6%
European Efficiency	96.5%	96.5%	96.8%
Max. Battery to AC Efficiency	98.0%	98.0%	98.0%
Protection			
PV String Current Monitoring	Integrated	Integrated	Integrated
PV Insulation Resistance Detection	Integrated	Integrated	Integrated
Residual Current Monitoring	Integrated	Integrated	Integrated

Technical Data	GW3K-EHA-G20	GW3.6K-EHA-G20	GW5K-EHA-G20
PV Reverse Polarity Protection	Integrated	Integrated	Integrated
Battery Reverse Polarity Protection	Integrated	Integrated	Integrated
Anti-islanding Protection	Integrated	Integrated	Integrated
AC Overcurrent Protection	Integrated	Integrated	Integrated
AC Short Circuit Protection	Integrated	Integrated	Integrated
AC Overvoltage Protection	Integrated	Integrated	Integrated
DC Surge Protection	Type II	Type II	Type II
AC Surge Protection	Type II	Type II	Type II
RSD	Optional	Optional	Optional
AFCI	Integrated	Integrated	Integrated
Remote Shutdown	Integrated	Integrated	Integrated
General Data			
Operating Temperature Range (℃)	-35~+60 (Derating at +40)	-35~+60 (Derating at +40)	-35~+60 (Derating at +40)
Operating Environment	Outdoor	Outdoor	Outdoor
Relative Humidity	0~95%	0~95%	0~95%

Technical Data	GW3K-EHA-G20	GW3.6K-EHA-G20	GW5K-EHA-G20
Max. Operating Altitude (m)	4000 (>2000 derating)	4000 (>2000 derating)	4000 (>2000 derating)
Cooling Method	Natural convection	Natural convection	Natural convection
User Interface	LED, WLAN+APP	LED, WLAN+APP	LED, WLAN+APP
Communication with BMS	CAN	CAN	CAN
Communication	RS485, WiFi+LAN+Bluetooth, 4G+Bluetooth(Optional)	RS485, WiFi+LAN+Bluetooth, 4G+Bluetooth(Optional)	RS485, WiFi+LAN+Bluetooth, 4G+Bluetooth(Optional)
Communication Protocols	Modbus-RTU, Modbus-TCP	Modbus-RTU, Modbus-TCP	Modbus-RTU, Modbus-TCP
Weight (kg)	24	24	24
Dimension (W×H×D mm)	800*300*270	800*300*270	800*300*270
Noise Emission (dB)	≤30	≤30	≤30
Topology	Non-isolated	Non-isolated	Non-isolated
Power Self-consumption at Night (W)	≤10	≤10	≤10
Ingress Protection Rating	IP66	IP66	IP66
DC Connector	MC4	MC4	MC4
AC Connector	plug & play terminal	plug & play terminal	plug & play terminal

Technical Data	GW3K-EHA-G20	GW3.6K-EHA-G20	GW5K-EHA-G20
Environmental Category	4K4H	4K4H	4K4H
Pollution Degree	III （Outside of the inverter）	III （Outside of the inverter）	III （Outside of the inverter）
Overvoltage Category	DC II / AC III	DC II / AC III	DC II / AC III
Protective Class	I	I	I
Storage Temperature (℃)	-40~+70	-40~+70	-40~+70
Decisive Voltage Class (DVC)	Battery: A PV: C AC: C Com: A	Battery: A PV: C AC: C Com: A	Battery: A PV: C AC: C Com: A
Mounting Method	Wall/Floor Mounted	Wall/Floor Mounted	Wall/Floor Mounted
Active Anti-islanding Method	SMS(Slip-mode frequency) +AFD	SMS(Slip-mode frequency) +AFD	SMS(Slip-mode frequency) +AFD
Country of Manufacture	China	China	China
Certification			
Grid Standard	IEC/EN 61000-6-1/-2/-3/-4, IEC/EN 62920, CISPR 11, EN 55011, AS/NZS 61000.6.3/.4, AS 61000.6.4		
Safety Regulation	IEC62109-1/-2, IEC 63037		
EMC	IEC/EN 61000-6-1/-2/-3/-4		

Technical Data	GW6K-EHA-G20	GW8K-EHA-G20	GW9.999K-EHA-G20	GW10K-EHA-G20
Battery Side				

Technical Data	GW6K-EHA-G20	GW8K-EHA-G20	GW9.999K-EHA-G20	GW10K-EHA-G20
Battery Type	$LiFePO_4$	$LiFePO_4$	$LiFePO_4$	$LiFePO_4$
Nominal Battery Voltage (V)	380	380	380	380
Battery Voltage Range (V)	350~550	350~550	350~550	350~550
Start-up Voltage (V)*1	380	380	380	380
Number of Battery Input	1	1	1	1
Max. Continuous Charging Current (A)	23.7	31.6	35.6	35.6
Max. Continuous Discharging Current (A)	17.4	23.2	29	29
Max. Charging Power (kW)	9	12	13.5	13.5
Max. Discharging Power (kW)	6.6	8.8	11	11
PV Side				
Max. Input Power (kW)	12	16	20	20
Max. Input Voltage (V)*2	600	600	600	600

Technical Data	GW6K-EHA-G20	GW8K-EHA-G20	GW9.999K-EHA-G20	GW10K-EHA-G20
MPPT Operating Voltage Range (V)*3	40~560	40~560	40~560	40~560
MPPT Voltage Range at Nominal Power (V)	210~500	170~500	190~500	190~500
Start-up Voltage (V)	50	50	50	50
Nominal Input Voltage (V)	400	400	400	400
Max. MPPT Current (A)	20	20	20	20
Max. MPPT Short Circuit Current (A)	26	26	26	26
Max. Backfeed Current to The Array (A)	0	0	0	0
Number of MPPTs	2	4	4	4
Number of Strings per MPPT	1/1	1/1/1/1	1/1/1/1	1/1/1/1
AC Side (On-grid)				
Nominal Power (kW)	6	8	9.999	10

Technical Data	GW6K-EHA-G20	GW8K-EHA-G20	GW9.999K-EHA-G20	GW10K-EHA-G20
Nominal Apparent Power to Grid (kVA)	6	8	9.999	10
Max. Apparent Power to Grid (kVA)	6	8	9.999	10
Nominal Apparent Power from Grid (kVA)	6	8	9.999	10
Max. Apparent Power from Grid (kVA)*4	12	14.5	14.5	14.5
Nominal Voltage (V)	220/230/240, L/N/PE	220/230/240, L/N/PE	220/230/240, L/N/PE	220/230/240, L/N/PE
Voltage Range (V)	170~280	170~280	170~280	170~280
Nominal Frequency (Hz)	50/60	50/60	50/60	50/60
Frequency Range (Hz)	45~55 / 55~65	45~55 / 55~65	45~55 / 55~65	45~55 / 55~65
Max. Current to Grid (A)	27.3 at 220V 26.1 at 230V 25 at 240V	36.4 at 220V 34.8 at 230V 33.4 at 240V	43.5 at 220V 43.5 at 230V 41.7 at 240V	43.5 at 220V 43.5 at 230V 41.7 at 240V
Max. Current From Grid (A)*4	50 at 220V 50 at 230V 50 at 240V	63 at 220V 63 at 230V 60.5 at 240V	63 at 220V 63 at 230V 60.5 at 240V	63 at 220V 63 at 230V 60.5 at 240V

Technical Data	GW6K-EHA-G20	GW8K-EHA-G20	GW9.999K-EHA-G20	GW10K-EHA-G20
Nominal Current From Grid (A)	27.3 at 220V 26.1 at 230V 25 at 240V	36.4 at 220V 34.8 at 230V 33.4 at 240V	45.5 at 220V 43.5 at 230V 41.7 at 240V	45.5 at 220V 43.5 at 230V 41.7 at 240V
Max. Output Fault Current (Peak and Duration) (A)	96 at 3μs	120 at 3μs	120 at 3μs	120 at 3μs
Inrush Current (Peak and Duration) (A)	96 at 3μs	120 at 3μs	120 at 3μs	120 at 3μs
Nominal Current (A)	27.3 at 220V 26.1 at 230V 25 at 240V	36.4 at 220V 34.8 at 230V 33.4 at 240V	43.5 at 220V 43.5 at 230V 41.7 at 240V	43.5 at 220V 43.5 at 230V 41.7 at 240V
Power Factor	~1 (Adjustable from 0.8 leading to 0.8 lagging)	~1 (Adjustable from 0.8 leading to 0.8 lagging)	~1 (Adjustable from 0.8 leading to 0.8 lagging)	~1 (Adjustable from 0.8 leading to 0.8 lagging)
THDi	<3%	<3%	<3%	<3%
Maximum Output Overcurrent Protection (A)	96	120	120	120
Type of Voltage	a.c.	a.c.	a.c.	a.c.
Back-up Side				
Nominal Output Apparent Power (kVA)	6	8	10	10

Technical Data	GW6K-EHA-G20	GW8K-EHA-G20	GW9.999K-EHA-G20	GW10K-EHA-G20
Max. Output Apparent Power (kVA)	6.0(12.0, 10s)	8.0(16.0, 10s)	10.0(20.0, 10s)	10.0(20.0, 10s)
Max. Output Apparent Power (Bypass) (kVA)	12	14.5	14.5	14.5
Nominal Output Current (A)	27.3 at 220V 26.1 at 230V 25 at 240V	36.4 at 220V 34.8 at 230V 33.4 at 240V	43.5 at 220V 43.5 at 230V 41.7 at 240V	43.5 at 220V 43.5 at 230V 41.7 at 240V
Max. Output Current (A)*5	27.3 at 220V 26.1 at 230V 25 at 240V	36.4 at 220V 34.8 at 230V 33.4 at 240V	43.5 at 220V 43.5 at 230V 41.7 at 240V	43.5 at 220V 43.5 at 230V 41.7 at 240V
Max. Output Current (Bypass) (A)*5	50	63	63	63
Max. Fault Current (Peak and Duration) (A)	96 at 3μs	120 at 3μs	120 at 3μs	120 at 3μs
Inrush Current (Peak and Duration) (A)	96 at 3μs	120 at 3μs	120 at 3μs	120 at 3μs
Max. Output Overcurrent Protection (A)	96	120	120	120
Nominal Output Voltage (V)	220/230/240, L/N/PE	220/230/240, L/N/PE	220/230/240, L/N/PE	220/230/240, L/N/PE

Technical Data	GW6K-EHA-G20	GW8K-EHA-G20	GW9.999K-EHA-G20	GW10K-EHA-G20
Nominal Output Frequency (Hz)	50/60	50/60	50/60	50/60
THDv (@Linear Load)	<3%	<3%	<3%	<3%
Efficiency				
Max. Efficiency	97.6%	97.5%	97.5%	97.5%
European Efficiency	97.0%	96.8%	96.8%	96.8%
Max. Battery to AC Efficiency	98.0%	97.8%	97.8%	97.8%
Protection				
PV String Current Monitoring	Integrated	Integrated	Integrated	Integrated
PV Insulation Resistance Detection	Integrated	Integrated	Integrated	Integrated
Residual Current Monitoring	Integrated	Integrated	Integrated	Integrated
PV Reverse Polarity Protection	Integrated	Integrated	Integrated	Integrated
Battery Reverse Polarity Protection	Integrated	Integrated	Integrated	Integrated

Technical Data	GW6K-EHA-G20	GW8K-EHA-G20	GW9.999K-EHA-G20	GW10K-EHA-G20
Anti-islanding Protection	Integrated	Integrated	Integrated	Integrated
AC Overcurrent Protection	Integrated	Integrated	Integrated	Integrated
AC Short Circuit Protection	Integrated	Integrated	Integrated	Integrated
AC Overvoltage Protection	Integrated	Integrated	Integrated	Integrated
DC Surge Protection	Type II	Type II	Type II	Type II
AC Surge Protection	Type II	Type II	Type II	Type II
RSD	Optional	Optional	Optional	Optional
AFCI	Integrated	Integrated	Integrated	Integrated
Remote Shutdown	Integrated	Integrated	Integrated	Integrated
General Data				
Operating Temperature Range (℃)	-35~+60 (Derating at +40)	-35~+60 (Derating at +40)	-35~+60 (Derating at +40)	-35~+60 (Derating at +40)
Operating Environment	Outdoor	Outdoor	Outdoor	Outdoor
Relative Humidity	0~95%	0~95%	0~95%	0~95%

Technical Data	GW6K-EHA-G20	GW8K-EHA-G20	GW9.999K-EHA-G20	GW10K-EHA-G20
Max. Operating Altitude (m)	4000 (>2000 derating)	4000 (>2000 derating)	4000 (>2000 derating)	4000 (>2000 derating)
Cooling Method	Natural convection	Natural convection	Natural convection	Natural convection
User Interface	LED, WLAN+APP	LED, WLAN+APP	LED, WLAN+APP	LED, WLAN+APP
Communication with BMS	CAN	CAN	CAN	CAN
Communication	RS485, WiFi+LAN+Bluetooth, 4G+Bluetooth(Optional)	RS485, WiFi+LAN+Bluetooth, 4G+Bluetooth(Optional)	RS485, WiFi+LAN+Bluetooth, 4G+Bluetooth(Optional)	RS485, WiFi+LAN+Bluetooth, 4G+Bluetooth(Optional)
Communication Protocols	Modbus-RTU, Modbus-TCP	Modbus-RTU, Modbus-TCP	Modbus-RTU, Modbus-TCP	Modbus-RTU, Modbus-TCP
Weight (kg)	24	26	26	26
Dimension (W×H×D mm)	800*300*270	800*300*270	800*300*270	800*300*270
Noise Emission (dB)	≤30	≤35	≤35	≤35
Topology	Non-isolated	Non-isolated	Non-isolated	Non-isolated
Power Self-consumption at Night (W)	≤10	≤10	≤10	≤10
Ingress Protection Rating	IP66	IP66	IP66	IP66

Technical Data	GW6K-EHA-G20	GW8K-EHA-G20	GW9.999K-EHA-G20	GW10K-EHA-G20
DC Connector	MC4	MC4	MC4	MC4
AC Connector	plug & play terminal	plug & play terminal	plug & play terminal	plug & play terminal
Environmental Category	4K4H	4K4H	4K4H	4K4H
Pollution Degree	III （Outside of the inverter）	III （Outside of the inverter）	III （Outside of the inverter）	III （Outside of the inverter）
Overvoltage Category	DC II / AC III	DC II / AC III	DC II / AC III	DC II / AC III
Protective Class	I	I	I	I
Storage Temperature (℃)	-40~+70	-40~+70	-40~+70	-40~+70
Decisive Voltage Class (DVC)	Battery: A PV: C AC: C Com: A	Battery: A PV: C AC: C Com: A	Battery: A PV: C AC: C Com: A	Battery: A PV: C AC: C Com: A
Mounting Method	Wall/Floor Mounted	Wall/Floor Mounted	Wall/Floor Mounted	Wall/Floor Mounted
Active Anti-islanding Method	SMS(Slip-mode frequency) +AFD	SMS(Slip-mode frequency) +AFD	SMS(Slip-mode frequency) +AFD	SMS(Slip-mode frequency) +AFD
Country of Manufacture	China	China	China	China
Certification				

Technical Data	GW6K-EHA-G20	GW8K-EHA-G20	GW9.999K-EHA-G20	GW10K-EHA-G20
Grid Standard	IEC/EN 61000-6-1/-2/-3/-4, IEC/EN 62920, CISPR 11, EN 55011, AS/NZS 61000.6.3/.4, AS 61000.6.4			
Safety Regulation	IEC62109-1/-2, IEC 63037			
EMC	IEC/EN 61000-6-1/-2/-3/-4			

*1: If there's no PV, start-up voltage will be 380V.
*2: When the input voltage is 560V-600V, the inverter will enter standby mode, and the voltage returns to 560V to enter the normal operation state.
*3: Please refer to the user manual for the MPPT Voltage Range at Nominal Power.
*4: GOODWE ESA series has internal bypass 63A passthrough ability to supprt whole home backup solution. If the customer don't want to do any breaker upgrade, the main breaker size in GoodWe commissioning APP can be set as previous breaker size.
*5: If the Back-up port is not used, select an appropriate circuit breaker based on the AC Max. Output Current.

Technical Data	GW3K-BHA-G20	GW3.6K-BHA-G20	GW5K-BHA-G20
Battery Side			
Battery Type	Li-ion	Li-ion	Li-ion
Nominal Voltage (V)	380	380	380
Voltage Range (V)	350~550	350~550	350~550
Start-up Voltage (V)	380	380	380
Number of Battery Inputs	1	1	1
Max. Continuous Charging Current (A)	7.9	9.5	13.2
Max. Continuous Discharging Current (A)	8.7	10.5	14.5
Max. Charging Power (kW)	3	3.6	5

Technical Data	GW3K-BHA-G20	GW3.6K-BHA-G20	GW5K-BHA-G20
Max. Discharging Power (kW)	3.3	3.96	5.5
Short-time withstand current (A)	980	980	980
AC Side (On-grid)			
Rated Power (kW)	3	3.6	5
Max. Power (kW)	3	3.6	5
Rated Apparent Power from Grid (kVA)	3	3.6	5
Rated Apparent Power to Grid (kVA)	3	3.6	5
Max. Apparent Power to Grid (kVA)	3	3.6	5
Max. Apparent Power from Grid (kVA)	6	7.2	10
Nominal Voltage (V)	220/230/240，L/N/PE	220/230/240，L/N/PE	220/230/240，L/N/PE
Voltage Range (V)	170~280	170~280	170~280
Nominal Frequency (Hz)	50/60	50/60	50/60
Frequency Range (Hz)	45~55 / 55~65	45~55 / 55~65	45~55 / 55~65
Rated Current From Grid (A)	13.7 @220V 13.1 @230V 12.5 @240V	16.4 @220V 15.7 @230V 15 @240V	22.8 @220V 21.8 @230V 20.9 @240V
Rated Current to Grid (A)	13.7 @220V 13.1 @230V 12.5 @240V	16.4 @220V 15.7 @230V 15 @240V	22.8 @220V 21.8 @230V 20.9 @240V
Max. Current From Grid (A)*1	27.3 @220V 26.1 @230V 25 @240V	32.8 @220V 31.4 @230V 30 @240V	45.5 @220V 43.5 @230V 41.7 @240V

Technical Data	GW3K-BHA-G20	GW3.6K-BHA-G20	GW5K-BHA-G20
Max. Current to Grid (A)	13.7 @220V 13.1 @230V 12.5 @240V	16.4 @220V 15.7 @230V 15 @240V	22.8 @220V 21.8 @230V 20.9 @240V
Max. Output Fault Current (Peak and Duration) (A)	96A@3μs	96A@3μs	96A@3μs
Inrush Current (Peak and Duration) (A)	96A@3μs	96A@3μs	96A@3μs
Power Factor	0.8 leading ... 0.8 lagging	0.8 leading ... 0.8 lagging	0.8 leading ... 0.8 lagging
THDi	<3%	<3%	<3%
Maximum Output Overcurrent Protection (A)	96	96	96
Short-time withstand current (A)	80	80	80
Type of Voltage	a.c.	a.c.	a.c.
Back-up Side			
Rated Apparent Power (kVA)	3	3.6	5
Max. Apparent Power (kVA)	Off-grid: 3.0 (6.0, 10s) On-grid: 6	Off-grid: 3.6 (7.2, 10s) On-grid: 7.2	Off-grid: 5.0 (10.0, 10s) On-grid: 10
Nominal Voltage (V)	220/230/240，L/N/PE	220/230/240，L/N/PE	220/230/240，L/N/PE
Nominal Frequency (Hz)	50/60	50/60	50/60
Frequency Range (Hz)	45~55 / 55~65	45~55 / 55~65	45~55 / 55~65
Rated Current (A)	13.7 @220V 13.1 @230V 12.5 @240V	16.4 @220V 15.7 @230V 15 @240V	22.8 @220V 21.8 @230V 20.9 @240V

Technical Data	GW3K-BHA-G20	GW3.6K-BHA-G20	GW5K-BHA-G20
Max. Current (A)	Off-grid: 13.7 @220V 13.1 @230V 12.5 @240V On-grid: 27.3	Off-grid: 16.4 @220V 15.7 @230V 15 @240V On-grid: 32.8	Off-grid: 22.8 @220V 21.8 @230V 20.9 @240V On-grid: 45.5
Max. Fault Current (Peak and Duration) (A)	96A@3μs	96A@3μs	96A@3μs
Inrush Current (Peak and Duration) (A)	96A@3μs	96A@3μs	96A@3μs
Maximum Output Overcurrent Protection (A)	96	96	96
THDv (@Linear Load)	<3%	<3%	<3%
On/Off-grid Switching Time（ms）	<10	<10	<10
Efficiency			
Max. Battery to AC Efficiency	98.0%	98.0%	98.0%
Protection			
Residual Current Monitoring	Integrated	Integrated	Integrated
Battery Reverse Polarity Protection	Integrated	Integrated	Integrated
Anti-islanding Protection	Integrated	Integrated	Integrated
AC Overcurrent Protection	Integrated	Integrated	Integrated
AC Short Circuit Protection	Integrated	Integrated	Integrated
AC Overvoltage Protection	Integrated	Integrated	Integrated
AC Surge Protection	Type II	Type II	Type II

Technical Data	GW3K-BHA-G20	GW3.6K-BHA-G20	GW5K-BHA-G20
Remote Shutdown	Integrated	Integrated	Integrated
General Data			
Operating Temperature Range (℃)	-35~+60 (Derating at +40)	-35~+60 (Derating at +40)	-35~+60 (Derating at +40)
Operating Environment	Outdoor	Outdoor	Outdoor
Relative Humidity	0~95%	0~95%	0~95%
Max. Operating Altitude (m)	4000 (>2000 derating)	4000 (>2000 derating)	4000 (>2000 derating)
Cooling Method	Natural convection	Natural convection	Natural convection
User Interface	LED, WLAN+APP	LED, WLAN+APP	LED, WLAN+APP
Communication with BMS	CAN	CAN	CAN
Communication	RS485, WiFi+LAN+Bluetooth, 4G+Bluetooth(Optional)	RS485, WiFi+LAN+Bluetooth, 4G+Bluetooth(Optional)	RS485, WiFI+LAN+Bluetooth
Communication Protocols	Modbus-RTU, Modbus-TCP	Modbus-RTU, Modbus-TCP	Modbus-RTU, Modbus-TCP
Weight (kg)	16.9	16.9	16.9
Dimension (W×H×D mm)	800*300*270	800*300*270	800*300*270
Noise Emission (dB)	≤30	≤30	≤30
Topology	Non-isolated	Non-isolated	Non-isolated
Power Self-consumption at Night (W)	≤10	≤10	≤10
Ingress Protection Rating	IP66	IP66	IP66
AC Connector	VACONN Terminal	VACONN Terminal	VACONN Terminal
Environmental Category	4K4H	4K4H	4K4H

Technical Data	GW3K-BHA-G20	GW3.6K-BHA-G20	GW5K-BHA-G20
Pollution Degree	IV （Outside of the inverter）	IV （Outside of the inverter）	IV （Outside of the inverter）
Overvoltage Category	DC II / AC III	DC II / AC III	DC II / AC III
Protective Class	I	I	I
Storage Temperature (℃)	-40~+70	-40~+70	-40~+70
Decisive Voltage Class (DVC)	Battery: A AC: C Com: A	Battery: A AC: C Com: A	Battery: A AC: C Com: A
Mounting Method	Wall/Floor Mounted	Wall/Floor Mounted	Wall/Floor Mounted
Active Anti-islanding Method	SMS(Slip-mode frequency) +AFD	SMS(Slip-mode frequency) +AFD	SMS(Slip-mode frequency) +AFD
Country of Manufacture	China	China	China
Certification			
Grid Standard	Please refer to the official website		
Safety Regulation			
EMC			

Technical Data	GW6K-BHA-G20	GW8K-BHA-G20	GW9.999K-BHA-G20	GW10K-BHA-G20
Battery Side				
Battery Type	Li-ion	Li-ion	Li-ion	Li-ion
Nominal Voltage (V)	380	380	380	380
Voltage Range (V)	350~550	350~550	350~550	350~550
Start-up Voltage (V)	380	380	380	380

Technical Data	GW6K-BHA-G20	GW8K-BHA-G20	GW9.999K-BHA-G20	GW10K-BHA-G20
Number of Battery Inputs	1	1	1	1
Max. Continuous Charging Current (A)	15.8	21.1	26.4	26.4
Max. Continuous Discharging Current (A)	17.4	23.2	29	29
Max. Charging Power (kW)	6	8	9.999	10
Max. Discharging Power (kW)	6.6	8.8	11	11
Short-time withstand current (A)	980	980	980	980
AC Side (On-grid)				
Rated Power (kW)	6	8	9.999 @230V	10
Max. Power (kW)	6	8	9.999 @230V	10
Rated Apparent Power from Grid (kVA)	6	8	9.999 @230V	10
Rated Apparent Power to Grid (kVA)	6	8	9.999 @230V	10
Max. Apparent Power to Grid (kVA)	6	8	9.999 @230V	10

Technical Data	GW6K-BHA-G20	GW8K-BHA-G20	GW9.999K-BHA-G20	GW10K-BHA-G20
Max. Apparent Power from Grid (kVA)	12	14.5	14.5 @230V	14.5
Nominal Voltage (V)	220/230/240，L/N/PE	220/230/240，L/N/PE	220/230/240，L/N/PE	220/230/240，L/N/PE
Voltage Range (V)	170~280	170~280	170~280	170~280
Nominal Frequency (Hz)	50/60	50/60	50/60	50/60
Frequency Range (Hz)	45~55 / 55~65	45~55 / 55~65	45~55 / 55~65	45~55 / 55~65
Rated Current From Grid (A)	27.3 @220V 26.1 @230V 25 @240V	36.4 @220V 34.8 @230V 33.4 @240V	45.5 @220V 43.5 @230V 41.7 @240V	45.5 @220V 43.5 @230V 41.7 @240V
Rated Current to Grid (A)	27.3 @220V 26.1 @230V 25 @240V	36.4 @220V 34.8 @230V 33.4 @240V	43.5 @220V 43.5 @230V 41.7 @240V	43.5 @220V 43.5 @230V 41.7 @240V
Max. Current From Grid (A)*1	50 @220V 50 @230V 50 @240V	63 @220V 63 @230V 60.5 @240V	63 @220V 63 @230V 60.5 @240V	63 @220V 63 @230V 60.5 @240V

Technical Data	GW6K-BHA-G20	GW8K-BHA-G20	GW9.999K-BHA-G20	GW10K-BHA-G20
Max. Current to Grid (A)	27.3 @220V 26.1 @230V 25 @240V	36.4 @220V 34.8 @230V 33.4 @240V	43.5 @220V 43.5 @230V 41.7 @240V	43.5 @220V 43.5 @230V 41.7 @240V
Max. Output Fault Current (Peak and Duration) (A)	96A@3μs	120A@3μs	120A@3μs	120A@3μs
Inrush Current (Peak and Duration) (A)	96A@3μs	120A@3μs	120A@3μs	120A@3μs
Power Factor	0.8 leading ... 0.8 lagging	0.8 leading ... 0.8 lagging	0.8 leading ... 0.8 lagging	0.8 leading ... 0.8 lagging
THDi	<3%	<3%	<3%	<3%
Maximum Output Overcurrent Protection (A)	96	120	120	120
Short-time withstand current (A)	80	80	80	80
Type of Voltage	a.c.	a.c.	a.c.	a.c.
Back-up Side				
Rated Apparent Power (kVA)	6	8	10 @230V	10

Technical Data	GW6K-BHA-G20	GW8K-BHA-G20	GW9.999K-BHA-G20	GW10K-BHA-G20
Max. Apparent Power (kVA)	Off-grid: 6.0 (12.0, 10s) On-grid: 12	Off-grid: 8.0 (16.0, 10s) On-grid: 14.5	Off-grid: 10.0 @230V(20.0, 10s @230V) On-grid: 14.5 @230V	Off-grid: 10.0 (20.0, 10s) On-grid: 14.5
Nominal Voltage (V)	220/230/240，L/N/PE	220/230/240，L/N/PE	220/230/240，L/N/PE	220/230/240，L/N/PE
Nominal Frequency (Hz)	50/60	50/60	50/60	50/60
Frequency Range (Hz)	45~55 / 55~65	45~55 / 55~65	45~55 / 55~65	45~55 / 55~65
Rated Current (A)	27.3 @220V 26.1 @230V 25 @240V	36.4 @220V 34.8 @230V 33.4 @240V	43.5 @220V 43.5 @230V 41.7 @240V	43.5 @220V 43.5 @230V 41.7 @240V
Max. Current (A)	Off-grid: 27.3 @220V 26.1 @230V 25 @240V On-grid: 50	Off-grid: 36.4 @220V 34.8 @230V 33.4 @240V On-grid: 63	Off-grid: 43.5 @220V 43.5 @230V 41.7 @240V On-grid: 63	Off-grid: 43.5 @220V 43.5 @230V 41.7 @240V On-grid: 63
Max. Fault Current (Peak and Duration) (A)	96A@3μs	120A@3μs	120A@3μs	120A@3μs

Technical Data	GW6K-BHA-G20	GW8K-BHA-G20	GW9.999K-BHA-G20	GW10K-BHA-G20
Inrush Current (Peak and Duration) (A)	96A@3μs	120A@3μs	120A@3μs	120A@3μs
Maximum Output Overcurrent Protection (A)	96	120	120	120
THDv (@Linear Load)	<3%	<3%	<3%	<3%
On/Off-grid Switching Time（ms）	<10	<10	<10	<10
Efficiency				
Max. Battery to AC Efficiency	98.0%	97.8%	97.8%	97.8%
Protection				
Residual Current Monitoring	Integrated	Integrated	Integrated	Integrated
Battery Reverse Polarity Protection	Integrated	Integrated	Integrated	Integrated
Anti-islanding Protection	Integrated	Integrated	Integrated	Integrated
AC Overcurrent Protection	Integrated	Integrated	Integrated	Integrated
AC Short Circuit Protection	Integrated	Integrated	Integrated	Integrated
AC Overvoltage Protection	Integrated	Integrated	Integrated	Integrated
AC Surge Protection	Type II	Type II	Type II	Type II

Technical Data	GW6K-BHA-G20	GW8K-BHA-G20	GW9.999K-BHA-G20	GW10K-BHA-G20
Remote Shutdown	Integrated	Integrated	Integrated	Integrated
General Data				
Operating Temperature Range (℃)	-35~+60 (Derating at +40)	-35~+60 (Derating at +40)	-35~+60 (Derating at +40)	-35~+60 (Derating at +40)
Operating Environment	Outdoor	Outdoor	Outdoor	Outdoor
Relative Humidity	0~95%	0~95%	0~95%	0~95%
Max. Operating Altitude (m)	4000 (>2000 derating)	4000 (>2000 derating)	4000 (>2000 derating)	4000 (>2000 derating)
Cooling Method	Natural convection	Natural convection	Natural convection	Natural convection
User Interface	LED, WLAN+APP	LED, WLAN+APP	LED, WLAN+APP	LED, WLAN+APP
Communication with BMS	CAN	CAN	CAN	CAN
Communication	RS485, WiFi+LAN+Bluetooth, 4G+Bluetooth(Optional)	RS485, WiFi+LAN+Bluetooth, 4G+Bluetooth(Optional)	RS485, WiFi+LAN+Bluetooth, 4G+Bluetooth(Optional)	RS485, WiFi+LAN+Bluetooth, 4G+Bluetooth(Optional)
Communication Protocols	Modbus-RTU, Modbus-TCP	Modbus-RTU, Modbus-TCP	Modbus-RTU, Modbus-TCP	Modbus-RTU, Modbus-TCP
Weight (kg)	16.9	17.7	17.7	17.7

Technical Data	GW6K-BHA-G20	GW8K-BHA-G20	GW9.999K-BHA-G20	GW10K-BHA-G20
Dimension (W×H×D mm)	800*300*270	800*300*270	800*300*270	800*300*270
Noise Emission (dB)	≤30	≤35	≤35	≤35
Topology	Non-isolated	Non-isolated	Non-isolated	Non-isolated
Power Self-consumption at Night (W)	≤10	≤10	≤10	≤10
Ingress Protection Rating	IP66	IP66	IP66	IP66
AC Connector	VACONN Terminal	VACONN Terminal	VACONN Terminal	VACONN Terminal
Environmental Category	4K4H	4K4H	4K4H	4K4H
Pollution Degree	IV （Outside of the inverter）	IV （Outside of the inverter）	IV （Outside of the inverter）	IV （Outside of the inverter）
Overvoltage Category	DC II / AC III	DC II / AC III	DC II / AC III	DC II / AC III
Protective Class	I	I	I	I
Storage Temperature (℃)	-40~+70	-40~+70	-40~+70	-40~+70
Decisive Voltage Class (DVC)	Battery: A AC: C Com: A	Battery: A AC: C Com: A	Battery: A AC: C Com: A	Battery: A AC: C Com: A

Technical Data	GW6K-BHA-G20	GW8K-BHA-G20	GW9.999K-BHA-G20	GW10K-BHA-G20
Mounting Method	Wall/Floor Mounted	Wall/Floor Mounted	Wall/Floor Mounted	Wall/Floor Mounted
Active Anti-islanding Method	SMS(Slip-mode frequency) +AFD	SMS(Slip-mode frequency) +AFD	SMS(Slip-mode frequency) +AFD	SMS(Slip-mode frequency) +AFD
Country of Manufacture	China	China	China	China
Certification				
Grid Standard	Please refer to the official website			
Safety Regulation				
EMC				

*1: GOODWE ESA series has internal bypass 63A passthrough ability to supprt whole home backup solution. If the customer don't want to do any breaker upgrade, the main breaker size in GoodWe commissioning APP can be set as previous breaker size.

10.2 Battery Technical Data

Technical Data	GW5.1-BAT-D-G20	GW8.3-BAT-D-G20	GW5.1-BAT-D-G21	GW8.3-BAT-D-G21
Rated Energy (kWh)	5.12	8.32	5.12	8.32
Usable Energy (kWh)*1	5	8	5	8
Battery Type	LFP ($LiFePO_4$)			
Operating Voltage Range (V) (single phase system)	350~550			

Technical Data	GW5.1-BAT-D-G20	GW8.3-BAT-D-G20	GW5.1-BAT-D-G21	GW8.3-BAT-D-G21
Operating Voltage Range (V) (three phase system)	700~950			
Max. Input Current (System) (A)	12	19	12	19
Max. Output Current (System) (A)	13.2	21	13.2	21
Max. Input Power (System) (kW)*2	5	8	5	8
Max. Output Power (System) (kW)*2	5	8	5	8
Peak.Output Power (System) (kW)*2	7.5 @10s	12 @10s	7.5 @10s	12 @10s
Charging Temperature Range (°C)	-18~55		2~55	
Discharging Temperature Range (°C)	-20~55		-20~55	
Relative Humidity	5-95%			
Max. Operating Altitude (m)	4000			
Noise Emission (dB)	≤29			
Communication	CAN			
Weight (kg)	57.5±1	79±1	57.5±1	79±1
Dimensions (W×H×D mm)	800*326*270			
Optional Function Configuration	heating		/	
Ingress Protection	IP66			

Technical Data		GW5.1-BAT-D-G20	GW8.3-BAT-D-G20	GW5.1-BAT-D-G21	GW8.3-BAT-D-G21
Storage Temperature (℃)		-20 ~55			
Max. Storage time		12 months (-20℃~35℃)			
		6 months (35℃~45℃)			
Scalability		12 pcs			
Mounting Method		Floor stacked / Wall-mounted			
Cycle Life*3		≥8000			
Country of Manufacture		China			
Standard and Certification	Safety	IEC62619, IEC60730, EN62477，IEC63056，IEC62040，CE, CEC, VDE2510			
	EMC	CE, RCM			
	Transportation	UN38.3,ADR			

*1: Test conditions, 100% DOD (cell 2.85~3.6V voltage range), 0.2P charge & discharge at 25±2 °C for battery system at the beginning of life. Usable energy is defined by its initial design value. Actual available energy may vary depending on charge/discharge rate, environmental conditions (e.g. temperature), transport and storage factors.
*2: Max. Input Power /Max. Output Power/Peak.Output Power derating will occur related to Temperature and SOC.
*3: Based on test data under specific laboratory conditions.

Technical Data	GW6.0-BAT-D-G20	GW9.0-BAT-D-G20
Battery Type	LFP (LiFePO4)	
Rated Capacity (Ah)	314Ah	
Rated Energy (kWh)	6	9
Usable Energy (kWh)*1	5.8	8.7

Technical Data	GW6.0-BAT-D-G20	GW9.0-BAT-D-G20
Nominal Voltage(V) (Battery)	19.2	28.8
Voltage Range(V) (Battery)	16.2~21.9	24.3~32.8
Operating Voltage Range (V) (single phase system)	350~550	
Operating Voltage Range (V) (three phase system)	700~950	
Max. Input Current (System) (A)	7.1	10.7
Max. Output Current (System) (A)	7.9	11.8
Max. Input Power (System) (kW)*2	3	4.5
Max. Output Power (System) (kW)*2	3	4.5
Peak Output Power (System) (kW)*2	4.5 (10s)	6.75 (10s)
Charging Temperature Range(℃)	-20~55	
Discharging Temperature Range (℃)	-20~55	
Relative Humidity	4-100%	
Max. Operating Altitude (m)	4000	
Noise Emission (dB)	≤27	
Communication	CAN	
Weight (kg)	61±1	77±1
Useable Extinguishing Agent	CO_2, H_2O	
Crucial Material	$LiFePO_4$, C, Cu, $LiPF_6$, Al, $(C_3H_6)_n$	
Ingress Protection	IP66	
Protective Class	Ⅰ	
Dimensions (W×H×D mm)	800*326*270	

Technical Data		GW6.0-BAT-D-G20	GW9.0-BAT-D-G20
Function Configuration		Heating (Integrated); Aerosol fire extinguishing (Integrated)	
Storage Temperature (℃)		-20 ~55	
Max. Storage time		12 months (-20℃~35℃) 6 months (35℃~45℃)	
Scalability*3		12P	
Mounting Method		Floor stacked / Wall-mounted / Grounded	
Cycle Life*4		≥10000	
Country of Manufacture		China	
Standard and Certification	Safety	IEC62619, IEC60730, EN62477, IEC63056, IEC62040, CE, CEC, Regulation 2023/1542 , VDE2510-50	
	EMC	CE, RCM	
	Transportation	UN38.3 ADR	

*1: Test conditions, 100% DOD (cell 2.85~3.6V voltage range), 0.2P charge & discharge at 25±2 °C for battery system at the beginning of life. Usable energy is defined by its initial design value. Actual available energy may vary depending on charge/discharge rate, environmental conditions (e.g. temperature), transport and storage factors.
*2: Max. Input Power /Max. Output Power/Peak.Output Power derating will occur related to Temperature and SOC.
*3: For single-column stacked installations, the maximum number of parallel units is 6.
*4: Based on test data under specific laboratory conditions.

10.3 STS Technical Data

Technical Data	GW30K-STS-G10	GW60K-STS-G10
Grid side		

Technical Data	GW30K-STS-G10	GW60K-STS-G10
Nominal Voltage (V)	220/380,230/400,240/415 , 3L/N/PE	220/380,230/400,240/415 , 3L/N/PE
Voltage Range (V)	114~280 (according to local standard)	114~280 (according to local standard)
Nominal Frequency (Hz)	50/60	50/60
Frequency Range (Hz)	45~55 / 55~65	45~55 / 55~65
Rated. Current (A)	45.5@380V 43.5@400V 41.6@415V	91.0@380V 87.0@400V 83.4@415V
Max. Current (A)	63.0	100.0
Rated Power (kW)	30	60
Rated Conditional Short-circuit Current (kA)	1	1
Back-up side		
Nominal Voltage (V)	220/380,230/400,240/415 , 3L/N/PE	220/380,230/400,240/415 , 3L/N/PE
Voltage Range (V)	114~280 (according to local standard)	114~280 (according to local standard)
Nominal Frequency (Hz)	50/60	50/60
Frequency Range (Hz)	45~55 / 55~65	45~55 / 55~65
Rated. Current (A)	45.5@380V 43.5@400V 41.6@415V	91.0@380V 87.0@400V 83.4@415V
Max. Current (A)	63.0	100.0

Technical Data	GW30K-STS-G10	GW60K-STS-G10
Rated Output Power (kW)	30	60
Max. Bypass Current (A)*1	63.0	100.0
Rated Conditional Short-circuit Current (kA)	1	1
Smart Port side		
Nominal Voltage (V)	220/380,230/400,240/415 , 3L/N/PE	220/380,230/400,240/415 , 3L/N/PE
Voltage Range (V)	114~280 (according to local standard)	114~280 (according to local standard)
Nominal Frequency (Hz)	50/60	50/60
Frequency Range (Hz)	45~55 / 55~65	45~55 / 55~65
Rated. Current (A)	45.5@380V 43.5@400V 41.6@415V	91.0@380V 87.0@400V 83.4@415V
Max. Current (A)	63.0	100.0
Rated Power (kW)	30	60
Rated Conditional Short-circuit Current (kA)	1	1
Inverter side		
Nominal Voltage (V)	220/380,230/400,240/415 , 3L/N/PE	220/380,230/400,240/415 , 3L/N/PE
Voltage Range (V)	114~280 (according to local standard)	114~280 (according to local standard)

Technical Data	GW30K-STS-G10	GW60K-STS-G10
Nominal Frequency (Hz)	50/60	50/60
Frequency Range (Hz)	45~55 / 55~65	45~55 / 55~65
Rated. Current (A)	45.5@380V 43.5@400V 41.6@415V	45.5@380V 43.5@400V 41.6@415V
Max. Current (A)	63.0	100.0
Rated Power (kW)	30	30
Rated Conditional Short-circuit Current (kA)	1	1
General Data		
On/Off Grid Transfer Time (ms)	≤4	≤4
Operating Temperature Range (℃)	-35~+60	-35~+60
Storage Temperature (℃)	-40~+70	-40~+70
Relative Humidity	0 ~ 100%	0 ~ 100%
Pollution Degree	III	III
Max. Operating Altitude (m)	4000	4000
Cooling Method	Natural Convection	Natural Convection
Communication	RS485	RS485
Weight (kg)	12.5	15
Dimension (W×H×D mm)	506*590*180	506*590*180
Mounting Method	Wall Mounted	Wall Mounted
Noise Emission (dB)	35	35
Ingress Protection Rating	IP54	IP54

Technical Data	GW30K-STS-G10	GW60K-STS-G10
Anti-corrosion Class	C4L	C4L
Overvoltage Category	III	III
Protective Class	I	I
Certification		
Safety Regulation	IEC 61439-1、IEC 61439-2 EN 61439-1、EN 61439-1	IEC 61439-1、IEC 61439-2 EN 61439-1、EN 61439-1

10.4 Smart Meter Technical Parameters

10.4.1 GMK110

Technical Parameters			GMK110
	Application		Single-phase
Input parameters	Voltage	Nominal Voltage (V)	220
		Voltage Range (V)	85~288
		Nominal Voltage Frequency (Hz)	50/60
	Current	CT ratio	120A/40mA
		Number of CTs	1
Communication			RS485
Communication distance (m)			1000
User Interface			2LED
Accuracy	Voltage/Current		Class I
	Active energy		Class I
	Reactive energy		Class II
Power consumption (W)			＜5
Mechanical parameters	Dimensions (W x H x D mm)		19*85*67
	Weight (g)		50
	Mounting Method		DIN rail mounting

Technical Parameters		GMK110
Environmental Parameters	IP rating	IP20
	Operating Temperature Range (℃)	-30 ~ 60
	Storage Temperature Range (℃)	-30 ~ 60
	Relative Humidity (non-condensing)	0~95%
	Max. Operating Altitude (m)	3000

10.4.2 GM330

Technical Parameters		GM330
Measurement range	Type of Electrical Supply System	Three-phase, split-phase, single-phase
	Voltage Range L-L (Vac)	172~817
	Voltage Range L-N (Vac)	100~472
	Nominal Frequency (Hz)	50/60
	CT Ratio	nA:5A
Communication parameters	Communication method	RS485
	Communication distance (m/ft)	1000/3280
Accuracy parameters	Voltage/Current	Class 0.5
	Active Energy	Class 0.5
	Reactive Energy	Class 1
General Parameters	Dimensions (W × H × D mm/in)	72x85x72/2.83x3.35×2.83
	Housing	4 modules
	Weight (g/lb)	240/0.53
	Mounting Method	DIN Rail
	User Interface	4 LEDs, Reset Button
	Power Consumption (W)	≤5
Environmental Parameters	IP Rating	IP20
	Operating Temperature Range (℃/°F)	-30~+70/-22~+158
	Storage Temperature Range (℃/°F)	-30~70/-22~+158

Technical Parameters		GM330
	Relative Humidity (Non-condensing)	0~95%
	Max. Operating Altitude (m/ft)	3000/9842
Certification Parameters	Certificates	UL1741/ANSI

10.5 Smart Communication Stick Technical Parameters

10.5.1 WiFi/LAN Kit-20

Technical Parameters		WiFi/LAN Kit-20
Output voltage (V)		5
Power consumption (W)		≤2
Communication interface		USB
Communication parameters	Ethernet	10M/100Mbps auto-negotiation
	Wireless	IEEE 802.11 b/g/n @2.4 GHz
	Bluetooth	Bluetooth V4.2 BR/EDR and Bluetooth LE standards
Mechanical parameters	Dimensions (W × H × D mm)	48.3*159.5*32.1
	Weight (g)	82
	Ingress Protection Rating	IP65
	Mounting Method	USB port plug/unplug
Operating Temperature Range (℃)		-30~+60
Storage Temperature Range (℃)		-40~+70
Relative Humidity		0-95%
Max. Operating Altitude (m)		4000

10.5.2 4G Kit-CN-G20

Product model	4G Kit-CN-G20
Device management	
Maximum number of supported inverters	1

Product model	4G Kit-CN-G20
Power parameters	
Input voltage (V)	5
Power consumption (W)	≤4
Interface type	USB
Communication parameters	
4G/3G/2G	LTE-FDD：B1/B3/B5/B8 LTE-TDD：B34/B39/B40/B41
GNSS positioning	/
Bluetooth	Bluetooth V5.0
Mechanical parameters	
Dimensions (W × H × D mm)	48.3*95.5*32.1
Weight (g)	87
Indicator light	LED* 2
Mounting Method	Plug and play
SIM card size	Micro sim,15mm*12mm
Environmental Parameters	
Operating Temperature Range (℃)	-30~+65
Storage temperature range (℃)	-40~+70
Relative Humidity	0-100%
IP rating	IP66
Max. Operating Altitude (m)	4000
Safe service life (years)	5

10.5.3 4G Kit-G20

Product Model	4G Kit-G20
Device Management	
Maximum Number of Supported Inverters	1
Power Supply Parameters	
Input Voltage (V)	5
Power Consumption (W)	≤5
Interface	USB

Product Model	4G Kit-G20
Communication Parameters	
4G/3G/2G	LTE-FDD: B1/2/3/4/5/7/8/12/13/18/19/20/25/26/28/66 LTE-TDD: B34/38/39/40/41 WCDMA: B1/2/4/5/6/8/19 GSM/EDGE: B2/3/5/8
GNSS Positioning	/
Bluetooth	Bluetooth V5.0
Mechanical Parameters	
Dimensions (W×H×D, mm)	48.3*328*32.3 (including external antenna)
Weight (g)	100 (including external antenna)
Indicator Light	LED* 2
Mounting Method	Plug and Play
SIM Card Size	Micro sim, 15mm*12mm
Environmental Parameters	
Operating Temperature Range (℃)	-30~+65
Storage Temperature Range (℃)	-40~+70
Relative Humidity	0-100%
IP Rating	IP66
Max. Operating Altitude (m)	4000
Applicable Standards	
Certification	CE-RED（EN18031）、RCM

11 Ezmanager3000 Technical Specifications

Model	EzManager3000
Device Management	
Energy Storage Inverter	≤ 4
Grid-Tied Inverter	≤ 4
EV Charger	≤ 2
Heat Pump	1 (SG-Ready)
Shelly Devices	≤ 12
Power Supply	
Power Adapter	AC Input: 100~240V, 50/60Hz DC Output: 12V
DC Input (V)	12V
Power Consumption (W)	≤7
Communication Interfaces	
RS485	COM*4
LAN	1
WIFI	802.11 b/g/n
Bluetooth	Bluetooth 5.2
Digital/Analog Inputs/Outputs	DI*4、DO*2、CAN*1、AI*1
Power Output Port	12V, 100mA
Communication Protocols	
Ethernet	Modbus-TCP
RS485	Modbus-RTU
User Interface	
LED	LED*4
USB	USB 2.0*1
Mechanical Parameters	
Dimensions (W×H×D mm)	99*85.6*71
Weight (kg)	0.2
Mounting Method	Wall, DIN-Rail, or Desktop Mounting
Environmental Parameters	

Model	EzManager3000
Operating Temperature Range (℃)	-30~+60
Storage Temperature Range (℃)	-40~+70
Relative Humidity	0 ~ 95% (non-condensing)
Max. Operating Altitude (m)	3000
Ingress Protection Rating	IP20
Applicable Standards	
Certification	CE-RED（EN18031）、RCM

12 Appendix

12.1 FAQ

12.1.1 How to Perform Meter/CT Auxiliary Detection?

Meter Connect Check function can detect whether the meter CT is connected correctly and the current operating status of the meter and CT.

- Method 1:

1. Go to**[Home]** > **[Settings]** > **[Meter/CT Auxiliary Detection]**to enter the detection page.
2. Click Start Detection, wait for the detection to complete, and then view the detection results.

- Method 2:

1. Click > **[System Setup]** > **[Quick Setting]** > **[Meter/CT Assisted Test]**to enter the detection page.
2. Click Start Detection, wait for the detection to complete, and then view the detection results.

12.1.2 How to Upgrade The Device Version

Through the firmware information, you can view or upgrade:
The inverter's DSP version, ARM version, communication module software version, battery BMS version, DCDC version, etc.

- **Upgrade notification:**

When the user opens the App, an upgrade notification pops up on the home page, and the user can choose whether to upgrade. If the user chooses to upgrade, follow the on-screen instructions to complete the upgrade.

- **Regular upgrade:**

Go to**[Home]** > **[Settings]** > **[Firmware Information]**to enter the firmware information page.

Click Check for Updates. If a new version is available, follow the on-screen instructions to complete the upgrade.

- **Forced upgrade:**

The App pushes upgrade information. The user must upgrade according to the prompts, otherwise the App cannot be used. Follow the on-screen instructions to complete the upgrade.

Inverter Software Version Upgrade

- The inverter supports upgrading software viaUdisk.
- Before using aUdisk to upgrade the device, please contact the after-sales service center for the software upgrade package and upgrade method.

12.2 Terminology Explanation

- **Overvoltage Category Definition**
  - **Overvoltage Category I**: equipment connected to circuits with measures that limit transient Overvoltage to a relatively low level.
  - **Overvoltage Category II**: energy-consuming equipment supplied by fixed power distribution installations. Such equipment includes appliances, movable tools, and other household and similar loads. If there are special requirements for the reliability and suitability of such equipment, voltage category III is adopted.
  - **Overvoltage Category III**: equipment in fixed power distribution installations whose reliability and suitability must meet special requirements. Includes switching devices in fixed power distribution installations and industrial equipment permanently connected to fixed power distribution installations.
  - **Overvoltage Category IV**: equipment used at the power source of the distribution installation, including measuring instruments and upstream overcurrent Protection devices, etc.
- **Interpretation of Damp Location Categories**

Environmental Parameters	Level		
	3K3	4K2	4K4H
Temperature range	0~+40℃	-33~+40℃	-33~+40℃

Environmental Parameters	Level		
Humidity range	5% to 85%	15% to 100%	4% to 100%

- **Environmental Category Definition:**
  - **Outdoor inverter**: ambient air temperature range is -25~+60℃, suitable for Pollution Degree 3 environment;
  - **Indoor Type II inverter**: ambient air temperature range is -25~+40℃, suitable for Pollution Degree 3 environment;
  - **Indoor Type I inverter**: ambient air temperature range is 0~+40℃, suitable for Pollution Degree 2 environment;
- **Pollution Degree Category Definition**
  - **Pollution Degree 1**: No pollution or only dry non-conductive pollution;
  - **Pollution Degree 2**: Generally only non-conductive pollution occurs, but occasional temporary conductive pollution caused by condensation must be considered;
  - **Pollution Degree 3**: Conductive pollution exists, or non-conductive pollution becomes conductive due to condensation;
  - **Pollution Degree 4**: Persistent conductive pollution, such as pollution caused by conductive dust or rain and snow.

12.3 Battery SN Code Meaning



The 11th to 14th digits of the product SN code are the production time code.
The production date in the figure above is 2023-08-08.

- The 11th and 12th digits are the last two digits of the production year; for example, 2023 is represented as 23.
- The 13th digit is the production month; for example, August is represented as 8. The details are as follows:

Month	January to September	October	November	December
Month code	1~9	A	B	C

- The 14th digit is the production date, e.g., the 8th day is represented as 8; Numbers are preferred, e.g., 1~9 represent the 1st to 9th days, A represents the 10th day, and so on. The letters I and O are not used to avoid confusion. Details are as follows:

Production date	1	2	3	4	5	6	7	8	9
Code	1	2	3	4	5	6	7	8	9

Production date	10	11	12	13	14	15	16	17	18
Code	A	B	C	D	E	F	G	H	J

Production date	21	22	23	24	25	26	27	28	29
Code	M	N	P	Q	R	S	T	U	V

12.4 Safety Regulation Countries

No.	Safety Regulation Name	No.	Safety Regulation Name
Europe			
1	IT-CEI 0-21	56	IE-LV-72A
2	IT-CEI 0-16	57	IE-ESB-C&D(< 110kV)
3	DE LV with PV	58	IE-EirGrid-110kV
4	DE LV without PV	59	PT-D
5	DE-MV	60	EE
6	ES-A	61	NO
7	ES-B	62	FI-A

No.	Safety Regulation Name	No.	Safety Regulation Name
8	ES-C	63	FI-B
9	ES-D	64	FI-C
10	ES-island	65	FI-D
11	BE	66	UA-A1
12	FR-LV	67	UA-A2
13	FR-island-50Hz	68	EN 50549-1
14	FR-island-60Hz	69	EN 50549-2
15	type A-PL_V.1.1	70	DK-West-B-MVHV
16	type B-LV-PL_V.1.1	71	DK-East-B-MVHV
17	type C-PL_V.1.1	72	DK-West-C-MVHV
18	type D-PL_V.1.1	73	DK-East-C-MVHV
19	NL-16/20A	74	DK-West-D-MVHV
20	NL-A	75	DK-East-D-MVHV
21	NL-B	76	FR-Reunion
22	NL-C	77	BE-LV（>30kVA）
23	NL-D	78	BE-HV
24	SE-A	79	CH-B
25	SE MV	80	NI-G99-A
26	SK-A	81	NI-G99-B
27	SK-B	82	NI-G99-C
28	SK-C	83	NI-G99-D
29	HU	84	IE-LV-170kVA
30	CH-A	85	IE-MV&HV-200kVA

No.	Safety Regulation Name	No.	Safety Regulation Name
31	CY	86	DE-HV
32	GR	87	FR-MV
33	DK-West-A	88	CZ-A1/A2-09
34	DK-East-A	89	DE-EHV
35	DK-West-B	90	IE-EirGrid-400KV
36	DK-East-B	91	IE-EirGrid-220KV
37	AT < 1kV	92	IE-EirGrid-66KV
38	AT > 1kV	93	IE-ESB-B
39	BG	94	IE-ESB-D(≥110kV)
40	Czech	95	type B-MV-PL_V.1.1
41	CZ-A1-09	96	GB-G99-A HV
42	CZ-A2-09	97	GB-G99-B LV
43	CZ-B1/B2-09	98	GB-G99-C LV
44	CZ-C	99	UA-B
45	CZ-D	100	UA-C
46	RO-A	101	UA-D
47	RO-B	102	UK-G98
48	RO-D	103	UK-G99-A LV
49	GB-G98	104	UK-G99-B LV
50	GB-G99-A LV	105	UK-G99-C LV
51	GB-G99-B HV	106	CZ-A1
52	GB-G99-C HV	107	UK-A-MV
53	GB-G99-D	108	UK-B-MV

No.	Safety Regulation Name	No.	Safety Regulation Name
54	NI-G98	109	UK-C-MV
55	IE-LV-16/25A	-	-
Global			
1	60Hz-Default	6	IEC 61727-60Hz
2	50Hz-Default	7	Warehouse
3	127Vac-60Hz-Default	8	IEC61727-480Vac-60Hz
4	127Vac-50Hz-Default	9	IEC61727-480Vac-50Hz
5	IEC 61727-50Hz		
Americas			
1	Argentina-220V-LV	38	LUMAPR-2024-220Vac-3P
2	US-208Vac	39	LUMAPR-2024-240Vac-3P
3	US-240Vac	40	Cayman
4	Mexico-220Vac	41	Brazil-220Vac
5	Mexico-440Vac	42	Brazil-208Vac
6	US-480Vac	43	Brazil-230Vac
7	US-208Vac-3P	44	Brazil-240Vac
8	US-220Vac-3P	45	Brazil-254Vac
9	US-240Vac-3P	46	Brazil-127Vac
10	US-CA-208Vac	47	Brazil-ONS
11	US-CA-240Vac	48	Barbados
12	US-CA-480Vac	49	Chile-BT
13	US-CA-208Vac-3P	50	Chile-MT-A
14	US-CA-220Vac-3P	51	Chile MT-B
15	US-CA-240Vac-3P	52	Colombia

No.	Safety Regulation Name	No.	Safety Regulation Name
16	US-HI-208Vac	53	Colombia<0.25MW-208Vac-1P
17	US-HI-240Vac	54	Colombia<0.25MW-120Vac-3P
18	US-HI-480Vac	55	IEEE 1547-208Vac
19	US-HI-208Vac-3P	56	IEEE 1547-220Vac
20	US-HI-220Vac-3P	57	IEEE 1547-240Vac
21	US-HI-240Vac-3P	58	IEEE 1547-230Vac
22	US-Kauai-208Vac	59	Colombia<0.25MW-127Vac-3P
23	US-Kauai-240Vac	60	Colombia>5MW
24	US-Kauai-480Vac	61	Mexico-127V
25	US-Kauai-208Vac-3P	62	Mexico-240V
26	US-Kauai-220Vac-3P	63	US-O&R-208Vac
27	US-Kauai-240Vac-3P	64	US-O&R-240Vac
28	US-ISO-NE-208Vac	65	US-O&R-480Vac
29	US-ISO-NE-240Vac	66	US-O&R-208Vac-3P
30	US-ISO-NE-480Vac	67	US-O&R-220Vac-3P
31	US-ISO-NE-208Vac-3P	68	US-O&R-240Vac-3P
32	US-ISO-NE-220Vac-3P	69	Brazil-277Vac
33	US-ISO-NE-240Vac-3P	70	Chile-BT ≤9MW
34	LUMAPR-2024-208Vac	71	Chile-MT ≤9MW
35	LUMAPR-2024-240Vac	72	Chile > 9MW
36	LUMAPR-2024-480Vac	73	Mexico-277Vac
37	LUMAPR-2024-208Vac-3P		
Oceania			

No.	Safety Regulation Name	No.	Safety Regulation Name
1	Australia-A	4	Newzealand
2	Australia-B	5	Newzealand:2015
3	Australia-C	6	NZ-GreenGrid
Asia			
1	China A	33	Israel-MV
2	China B	34	Israel-HV
3	China higher voltage	35	Vietnam
4	China highest voltage	36	Malaysia-LV
5	China power station	37	Malaysia-MV
6	China Shandong	38	DEWA-LV
7	China Hebei	39	DEWA-MV
8	China PCS	40	Saudi Arabia-220V-LV
9	Taiwan	41	JP-690Vac-50Hz
10	Hong Kong	42	JP-690Vac-60Hz
11	China Northeast	43	Srilanka-MV/HV
12	Thailand-MEA	44	IEC 61727-127Vac-50Hz
13	Thailand-PEA	45	IEC 61727-127Vac-60Hz
14	Mauritius	46	JP-550Vac-50Hz
15	Korea	47	JP-550Vac-60Hz
16	India	48	India-Higher
17	India-CEA	49	JP-220Vac-50Hz
18	Pakistan	50	JP-220Vac-60Hz
19	Philippines	51	Saudi Arabia-127V-LV

No.	Safety Regulation Name	No.	Safety Regulation Name
20	Philippines-127Vac	52	Srilanka-LV >1MW
21	JP-200Vac-50Hz	53	China-YN
22	JP-200Vac-60Hz	54	GB/T 29319-LV
23	JP-440Vac-50Hz	55	GB/T 29319-MV
24	JP-440Vac-60Hz	56	Philippines-277Vac
25	JP-420Vac-50Hz	57	JP-360Vac-50Hz
26	JP-420Vac-60Hz	58	JP-360Vac-60Hz
27	JP-480Vac-50Hz	59	JP-320Vac-50Hz
28	JP-480Vac-60Hz	60	JP-320Vac-60Hz
29	Srilanka-LV<1MW	61	JP-340Vac-50Hz
30	Singapore	62	JP-340Vac-60Hz
31	Israel-OG	63	JP-380Vac-50Hz
32	Israel-LV	64	JP-380Vac-60Hz
Africa			
1	Mauritius	5	Ghana-LV
2	South Africa-LV	6	Ghana-HV
3	South Africa-B-MV	7	South Africa-A3-LV
4	South Africa-C-MV	8	Nigeria

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