V1.7-2026-10-23

Residential All-In-One Energy Storage System

ESA 5-30kW

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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NOTICE

Due to product version upgrades or other reasons, the content of this document is updated periodically. Unless otherwise agreed, the content of this document cannot replace the safety precautions on the product label. All descriptions in the document are for guidance only.

About This Manual

Over view

This document primarily introduces an energy storage system consisting of an inverter, a battery system, a static transfer switch cabinet (hereinafter referred to as STS), and a smart meter. It covers product information, installation and wiring, configuration, testing and commissioning, as well as troubleshooting and maintenance. Please read this manual carefully before installing or using the product to under stand safety information and familiarize yourself with the product's functions and features. This manual may be updated periodically; please visit the official website for the latest version and additional product information.

Applicable Products

The energy storage system includes the following products:

Product Type	Product Information	Description
inverter	GW5K-ETA-G20 GW6K-ETA-G20 GW8K-ETA-G20 GW9.999K-ETA-G20 GW10K-ETA-G20 GW12K-ETA-G20 GW15K-ETA-G20 GW20K-ETA-G20 GW25K-ETA-G20 GW29.999K-ETA-G20 GW30K-ETA-G20 GW5K-BTA-G20 GW6K-BTA-G20 GW8K-BTA-G20 GW9.999K-BTA-G20 GW10K-BTA-G20 GW12K-BTA-G20 GW15K-BTA-G20 GW20K-BTA-G20 GW25K-BTA-G20 GW29.999K-BTA-G20 GW30K-BTA-G20	Rated Output Power: 5 kW - 30 kW
battery system	GW5.1-BAT-D-G20 GW5.1-BAT-D-G21	Rated energy 5.12 kWh
	GW8.3-BAT-D-G20 GW8.3-BAT-D-G21	Rated energy 8.32kWh
	GW6.0-BAT-D-G20	Rated energy 6 kWh

Product Type	Product Information	Description
	GW9.0-BAT-D-G20	Rated energy 9kWh
Static Transfer Switch Cabinet (STS)	GW30K-STS-G10	Rated output power: 30 kW (grid side)
	GW60K-STS-G10	Rated output power: 60kW (grid side)
electricity meter	GMK330 GM330	In energy storage systems, the monitoring module can detect information such as operating voltage and current.
communication module	WiFi/LAN Kit-20	System operation information can be uploaded to the monitoring platform via WiFi or LAN signals.
	4G Kit-G20	The system operation information can be uploaded to the monitoring platform via 4G.

Symbol Definition

⚠DANGER
Indicates a highly potential danger that, if not avoided, will result in death or serious injury.
⚠WARNING
Indicates a moderately potential danger that, if not avoided, may result in death or serious injury.
⚠CAUTION
Indicates a low potential danger that, if not avoided, may result in moderate or minor injury.
NOTICE

Emphasizes and supplements the content, and may also provide tips or tricks for optimizing product use, helping you solve a problem or save your time.

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1 Safety Precautions

The safety precautions information contained in this document must always be followed when operating the device.

⚠WARNING
The device has been strictly designed and tested in accordance with safety regulations, but as an electrical device, before performing any operations on the device, relevant safety instructions must be followed. Improper operation may lead to serious injury or property damage.

1.1 General Safety

NOTICE

- This document may be updated periodically due to product version upgrades or other reasons. Unless otherwise agreed, its contents do not replace the safety precautions on product labels. All descriptions in this document are for guidance only.
- Before installing the equipment, read this document carefully to learn about the product and its 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 working on the equipment, use insulated tools and wear personal protective equipment to ensure personal safety. When handling electronic components, wear antistatic gloves, an antistatic wrist strap, and antistatic clothing to protect the equipment from electrostatic damage.
- Unauthorized disassembly or modification may damage the equipment, and such damage is not covered by the warranty.
- The equipment manufacturer shall not be liable for equipment damage or personal injury resulting from installation, use, or configuration of the equipment that does not comply with this document or the corresponding user manual.
- For more information about the product warranty, visit the official website:https://www.goodwe.com/warrantyrelated.html。

1.2 personnel requirements

NOTICE

To ensure safety, compliance, and efficiency throughout the entire process of equipment transportation, Installation, wiring, operation, and maintenance, operations must be performed by qualified personnel.

1. Qualified personnel include:
   - Personnel who have mastered knowledge of equipment working principles, system structure, risks and hazards, and have received professional operation training or possess extensive practical experience.
   - Personnel who have received relevant technical and safety training, possess certain operational experience, are aware of potential dangers specific tasks may pose to themselves, and can take protective measures to minimize risks to themselves and others.
   - Qualified electrical technicians meeting the regulatory requirements of the country/region.
   - Personnel holding a degree in electrical engineering/an advanced diploma in electrical discipline or equivalent/possessing professional qualifications in the electrical field, with at least 2/3/4 years of experience in testing and supervision 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 as required by the equipment's location.
3. Medium-voltage equipment operation must be performed by certified high-voltage electricians.
4. Equipment and component replacement is only permitted to be performed by authorized personnel.

1.3 System Safety

⚠DANGER

- Before making electrical connections, disconnect all upstream switches of the equipment to ensure that the equipment is completely de-energized. Operation with the equipment energized is strictly prohibited, as it may result in electric shock or other hazards.

- For equipment that supports PV string connection, the PV input terminals have weak surge current resistance. It is strictly prohibited to use a DC voltage source to power up directly through the PV port. If powering up from the PV port is required, follow the steps below. If the equipment is damaged due to improper operation, it is considered man-made damage and is not covered by the product warranty.
  1. First, limit the output current of the DC voltage source to within the maximum allowable input current range of the PV port.
  2. Then close the DC switch of the inverter.
  3. Finally, slowly raise the output voltage of the DC source from zero to the target value at a rate of ≤50V/s.
- To prevent personal injury or equipment damage caused by energized operation, a circuit breaker must be added on the voltage input side of the equipment.
- All operations such as transportation, storage, installation, operation, use, and maintenance must comply with applicable laws, regulations, standards, and specifications.
- The specifications of cables and components used for electrical connections shall comply with local laws, regulations, standards, and specifications.
- Please use the cable connectors provided with the equipment to connect the equipment cables. If other types of connectors are used, any equipment damage caused thereby shall not be the responsibility of the equipment manufacturer.
- Ensure that all cable connections of the equipment are correct, tight, and free of looseness. Improper wiring may result in poor contact or damage to the equipment.
- The protective earth conductor of the equipment must be securely connected.
- To protect the equipment and its components from damage during transportation, ensure that transport personnel are professionally trained. Record the operating steps during transportation and keep the equipment balanced to avoid dropping the equipment.
- The equipment is heavy. Assign personnel according to the equipment weight to prevent the equipment from exceeding the weight that personnel can carry, which may cause crushing injuries.
- Ensure that the equipment is placed stably and not tilted. Tipping of the equipment may cause equipment damage and personal injury.

⚠WARNING

- During equipment installation, avoid subjecting the wiring terminals to load-bearing stress, as this may damage the terminals.
- Avoid excessive tension on the cables, as this may lead to poor connections. Reserve an appropriate cable length during wiring to avoid keeping the cables taut.
- Properly secure and support cables to avoid prolonged stress on terminals or connectors caused by the cable's own weight, pulling force, bending force, torque, or other external mechanical stress.
- Ensure that the protective earth conductor is reliably connected and reserve an appropriate margin. In the event of accidental external mechanical stress such as tension, ensure that the protective earth conductor does not disconnect before other conductors.
- Cables of the same type should be bundled together. Cables of different types should be laid with a separation of at least 30mm, and mutual winding or crossing is prohibited.
- Use of cables in high-temperature environments may cause the insulation layer to age or be damaged. The distance between cables and heat-generating components or the periphery of heat source areas shall be at least 30mm.

1.3.1 PV String Safety

⚠WARNING

- Ensure the component frame and mounting system are properly grounded.
- After connecting the DC cables, ensure the cable connections are tight and secure with no 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 correct polarity, with no reverse connection; and that the voltage is within the permissible range.
- Use a multimeter to measure the DC cables to ensure correct polarity, with no reverse connection; the voltage should be lower than the maximum DC input voltage. Damage caused by reverse connection and overvoltage is not covered by the equipment manufacturer's warranty.
- The PV string output does not support grounding. Before connecting the PV string to the inverter, ensure the minimum insulation resistance to ground of the PV string meets the minimum insulation resistance requirement (R=Max. Input Voltage (V)/30mA).
- Do not connect the same PV string to multiple inverters, as this may damage the inverters.
- The PV modules used with the inverter must comply with IEC 61730 Class A standards.
- When the PV string input voltage or input current is high, it may cause the inverter output power to derate.

1.3.2 Inverter Safety

⚠WARNING

- Ensure that the voltage and frequency at the grid connection point comply with the inverter grid connection specifications.
- It is recommended to install protective devices such as circuit breakers or fuses on the AC side of the inverter. The protective device rating must be greater than 1.25 times the inverter's maximum AC output current.
- If the inverter triggers arc fault alarms less than 5 times within 24 hours, the alarm can be cleared automatically. After the 5th arc fault alarm, the inverter will shut down for protection. The inverter can only resume normal operation after the fault is cleared.
- If no battery is configured in the photovoltaic system, the BACK-UP function is not recommended, as it may cause a risk of system power interruption.
- When grid voltage and frequency fluctuate, the inverter output power may be derated.

1.3.3 Battery Safety

⚠DANGER

- Before operating any devices in the system, ensure that the devices are powered off to avoid the risk of electric shock. During device operation, strictly adhere to all safety precautions in this manual and the safety labels on the devices.
- Do not disassemble, modify, or repair the battery without official authorization from the device manufacturer. Otherwise, it may cause electric shock or device damage, and any losses incurred are beyond the manufacturer’s liability.
- Do not impact, pull, drag, squeeze, or step on the device, and do not place the battery in fire, as the battery may explode.
- Do not place the battery in high-temperature environments. Ensure there are no heat sources near the battery and that it is not exposed to direct sunlight. If the ambient temperature exceeds 60°C, it may cause a fire.
- Do not use the battery if it has obvious defects, cracks, damage, or other conditions. Battery damage may lead to electrolyte leakage.
- Do not move the battery system while it is operating. If battery replacement or addition is needed, contact the after-sales service center.
- Battery short circuits may cause personal injury. The instantaneous high current from a short circuit can release a large amount of energy, which may lead to a fire.
- To protect the battery pack and its components from damage during transportation, ensure that transport personnel are professionally trained. Record the operating steps during transportation and keep the device balanced to avoid dropping.
- The battery device is heavy. Assign personnel according to the device's weight to prevent it from exceeding the weight range that can be manually handled, which could cause injury to personnel.

⚠WARNING

- Battery current may be affected by factors such as temperature, Humidity, weather conditions, etc., which may cause current limiting and affect load capacity.
- If the battery cannot start, contact the after-sales service center as soon as possible. Otherwise, the battery may be permanently damaged.
- Regularly inspect and maintain the battery according to its maintenance requirements.
- Ensure that the battery system is not damaged during transportation and storage. Ensure that the device is placed stably and not tilted, as tipping may cause device damage and personal injury.

Emergency Response Measures

- Battery electrolyte leakage
  If a battery module leaks electrolyte, avoid contact with the leaking liquid or gas. Electrolyte is corrosive and contact may cause skin irritation and chemical burns. If accidental contact with the leaked substance occurs, 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: Wash the affected area thoroughly with soap and water and seek medical help immediately.
  - Ingestion: Induce vomiting and seek medical assistance immediately.
- Fire
  - When the battery temperature exceeds 150°C, there is a risk of fire. A battery fire may release toxic and harmful gases.
  - To prevent fire, ensure carbon dioxide or water fire extinguishing equipment is available near the device.
  - When extinguishing a fire, do not use ABC dry powder fire extinguishers. Firefighters must wear protective clothing and self-contained breathing apparatus.
- Battery triggers fire protection
  For batteries equipped with optional fire protection functionality, after the fire protection function is triggered, perform the following actions:
  - Immediately cut off the main power switch to ensure no current flows through the battery system.

- Conduct a preliminary visual inspection of the battery for any damage, deformation, leakage, or unusual odor. Check the battery casing, connectors, and cables.
- Use a temperature sensor to detect the battery and its ambient temperature to ensure there is no risk of overheating.
- Isolate and label the damaged battery, and dispose of it properly according to local regulations.

1.3.4 Smart Meter Safety

⚠WARNING

If the grid voltage fluctuation exceeds 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 protect it.

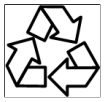
1.4 Description of Safety Symbols and Certification Marks

⚠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 Equipment with Wireless Communication Modules

Equipment with wireless communication modules sold in the European market must comply with 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 Equipment without Wireless Communication Modules (Except Battery)

Equipment without wireless communication modules that can be sold in the European market meets the requirements of the following directives:

- 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

The Battery sold in the European market complies with the following directives:

- 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)
  Our Battery products comply with the hazardous substance restriction requirements stipulated by this act.

More EUDeclaration of Conformity can be obtained fromOfficial WebsiteAcquisition.

2 System Introduction

2.1 System Overview

⚠WARNING

- The energy storage system is not suitable for connection to devices that rely on a stable power supply, such as life-sustaining medical equipment. Ensure that when the system is powered off, no personal injury can occur.
- If the residential storage integrated machine is in a high-temperature state or under BMS current limiting, the battery charging power may be limited, which may cause the system voltage to be too high and trigger overvoltage protection.
- The inverter only supports GoodWe brand batteries specified in this manual. If no battery is connected, it can only operate in grid-tied mode, and must be installed on the base provided in the package.
- In microgrid scenarios, the PV open-circuit voltage of the residential storage integrated machine is recommended to be < 0.85*PV maximum input voltage to avoid overvoltage protection triggered by excessive system voltage under harsh operating conditions.
- In microgrid scenarios, ensure that the over-frequency derating point of the grid-tied inverter is consistent with that of the residential storage integrated machine.
- In systems where the inverter operates completely off-grid, if the battery is exposed to prolonged low sunlight or rainy weather without timely recharging, over-discharge may occur, causing battery performance degradation or damage. To ensure long-term stable system operation, the battery should be prevented from being completely drained. Recommended measures are as follows:
  - When operating off-grid, set a minimum SOC protection threshold. It is recommended to set the off-grid battery SOC lower limit to 30%.
  - When the SOC approaches the protection threshold, the system will automatically enter load-limiting or protection mode.
  - If sunlight is insufficient for several consecutive days and the battery SOC is too low, the battery should be recharged in a timely manner through external energy sources (such as a generator or grid-assisted charging).

⚠WARNING

  - Regularly check the battery status to ensure it operates within a safe working range.
  - It is recommended to fully charge and discharge the battery once every six months to calibrate SOC accuracy.
- Connect the inverter to the APP and complete the corresponding battery parameter settings.
- Due to product version upgrades or other reasons, the document content may be updated from time to time. For the matching relationship between inverters and IoT products, please 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.Detailed System Wiring Diagram(Page 122).

NOTICE

- Whole-home backup power scenario: When the power grid is interrupted, the energy storage system can seamlessly take over all loads, ensuring continuous and stable power supply to the entire home and keeping all electrical equipment unaffected by grid fluctuations.
- In the whole-home backup power scenario, there is no need to connect an additional electricity meter or CT. Simply set “Meter Type” to “Built-in CT, no external meter or CT” in the App to enable the anti-reverse flow function.

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

BACK-UP Port Off-grid Load Capacity Description				
Inverter Model	GW5K-ETA-G20 GW6K-ETA-G20 GW8K-ETA-G20 GW9.999K-ETA-G20 GW10K-ETA-G20 GW12K-ETA-G20 GW15K-ETA-G20 GW20K-ETA-G20 GW5K-BTA-G20 GW6K-BTA-G20 GW8K-BTA-G20 GW9.999K-BTA-G20 GW10K-BTA-G20 GW12K-BTA-G20 GW15K-BTA-G20 GW20K-BTA-G20		GW25K-ETA-G20 GW29.999K-ETA-G20 GW30K-ETA-G20 GW25K-BTA-G20 GW29.999K-BTA-G20 GW30K-BTA-G20	
Load Type	Single-phase	Three-phase	Single-phase	Three-phase
Rated power of a single inductive load (kVA)	1.1	3.3	2.2	6.6
Total rated power of multiple inductive loads (kVA)	0.4*Pn/3	0.4*Pn	0.4*Pn/3	0.4*Pn
Capacitive load (kVA)	0.33*Pn/3	0.33*Pn	0.33*Pn/3	0.33*Pn
Half-wave load (kW)	2	-	3	-

BACK-UP Port Off-grid Load Capacity Description

Note:

- Pn: Rated output power of the inverter.
- Half-wave load: Some old or non-EMC-compliant household appliances (such as hairdryers and small heaters using half-wave rectification).
- If the total power of multiple inductive loads calculated based on rated power is less than the rated power of a single inductive load, the total rated power of multiple inductive loads shall be equal to the rated power of a single inductive load.
- If inductive loads are required, it is recommended to use a frequency converter.
- For parallel operation of 2 or more units, the allowable total rated power of inductive loads = rated power of a single inductive load × number of parallel units × 80%.

NOTICE

If you need to use the Static Transfer Switch (STS), please ensure the following:

1. When the SMART-PORT port is connected to non-critical loads, 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 the loads connected to the BACK-UP port continue to receive power during a grid outage, it is recommended that the total power of SMART-PORT port + BACK-UP Loads does not exceed the rated output power of the energy storage system.

2.1.1 General Scenarios

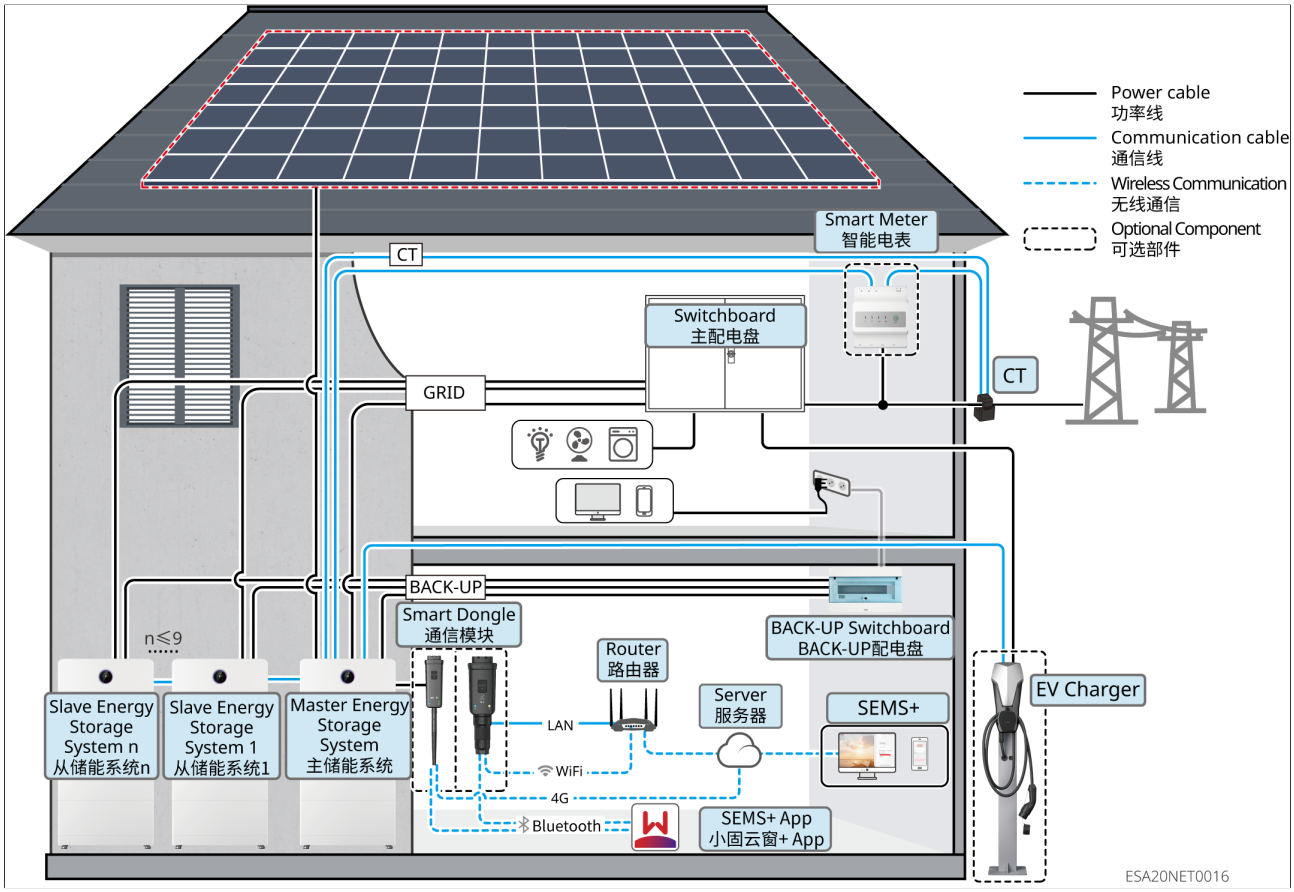


Figure1 General Scenario 1

Equipped with Static Transfer Switch (STS)

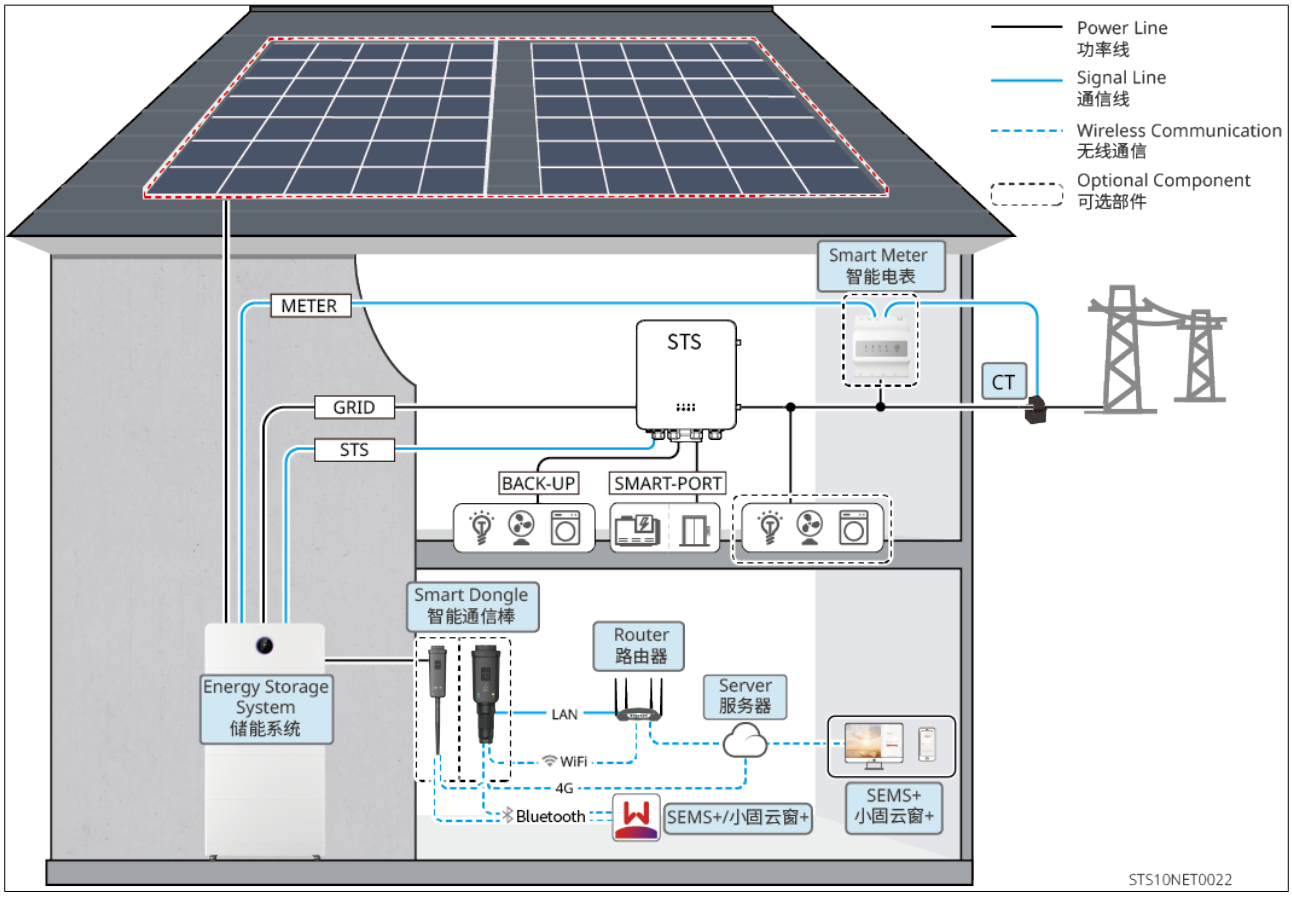


Figure2 General Scenario 2: With STS

Device Type	model	Description
hybrid inverter	GW5K-ETA-G20 GW6K-ETA-G20 GW8K-ETA-G20 GW9.999K-ETA-G20 GW10K-ETA-G20 GW12K-ETA-G20 GW15K-ETA-G20 GW20K-ETA-G20 GW25K-ETA-G20 GW29.999K-ETA-G20 GW30K-ETA-G20 GW5K-BTA-G20 GW6K-BTA-G20 GW8K-BTA-G20 GW9.999K-BTA-G20 GW10K-BTA-G20 GW12K-BTA-G20 GW15K-BTA-G20 GW20K-BTA-G20 GW25K-BTA-G20 GW29.999K-BTA-G20 GW30K-BTA-G20	• Only in single-inverter scenarios can GoodWe AC charging piles be connected. • The system supports up to 10 Inverters forming a parallel system, and supports mixed parallel connection of Inverters with different power ratings in both grid-tied and off-grid modes. When mixed, it is recommended to use a high-power Inverter as the master. Microgrid function is not supported in parallel mode. If more than 6 Inverters are paralleled, contact the after-sales service center. • Supports generator control and battery charging from the generator. If you need to connect a generator, use the GMK330 or GM330 Smart Meter. • In a parallel system, each Inverter must have a WiFi/LAN Kit-20 installed. • The following version requirements must be met during system networking: ◦ Inverter ARM software version V04.182 or later. ◦ Inverter DSP software version V02.2013 or later. ◦ In a parallel system, the DSP and ARM software versions must be matched, and the software versions of the master and slave Inverters must be consistent.

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 mixed. • The system supports 5-108kWh to meet different power and energy matching requirements. • The battery heating film is optional. The "Battery Heating" function can be enabled only on models configured with the heating film. Do not use batteries without a heating film at low temperatures; otherwise, the equipment may fail to operate. • The battery heating function is unavailable when GW5.1-BAT-D-G20, GW8.3-BAT-D-G20, GW6.0-BAT-D-G20, GW9.0-BAT-D-G20 and GW5.1-BAT-D-G21, GW8.3-BAT-D-G21 are mixed. • If the system requires battery mixing 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. If needed, contact GoodWe to purchase. • Supports connection of 1 hybrid inverter, diesel generator, load, and grid.
Smart Meter	Inverter built-in meter	
	GMK330 (purchased from GoodWe)	

Device Type	model	Description
	GM330 (purchased from GoodWe)	• Built-in meter: use the CT provided with the inverter. ◦ CT ratio: 120A:40mA. ◦ If the built-in meter of the Inverter does not meet usage requirements, contact a dealer to purchase a GMK330 or GM330 Smart Meter. • GMK330: CT is not replaceable; CT ratio: 120A:40mA. • GM330: The CT can be purchased from GoodWe or purchased separately. CT ratio requirement: nA/5A. ◦ nA: CT primary input current; n ranges from 200 to 5000. ◦ 5A: CT secondary output current. • If more than 2 Inverters are paralleled, or the wire diameter or measuring range of the standard CT does not meet the total current requirements of the on-site parallel system, use the GM330 Smart Meter.
Smart Dongle	WiFi/LAN Kit-20	• Applicable to single-Inverter networking and parallel-Inverter networking scenarios. • Bluetooth enables local configuration of device parameters and viewing of device operating information. WiFi or LAN uploads system operating information to the monitoring platform. • Please ensure that the firmware version of the Smart Dongle is V07 or later.

Device Type	model	Description
	4G Kit-G20	• Applicable to single-Inverter networking scenarios. • Bluetooth enables local configuration of device parameters and viewing of device operating information. 4G uploads system operating information to the monitoring platform.

2.1.2 Microgrid Scenario

When the on-grid inverter is connected to the BACK-UP port of the energy storage inverter, it is a microgrid scenario.

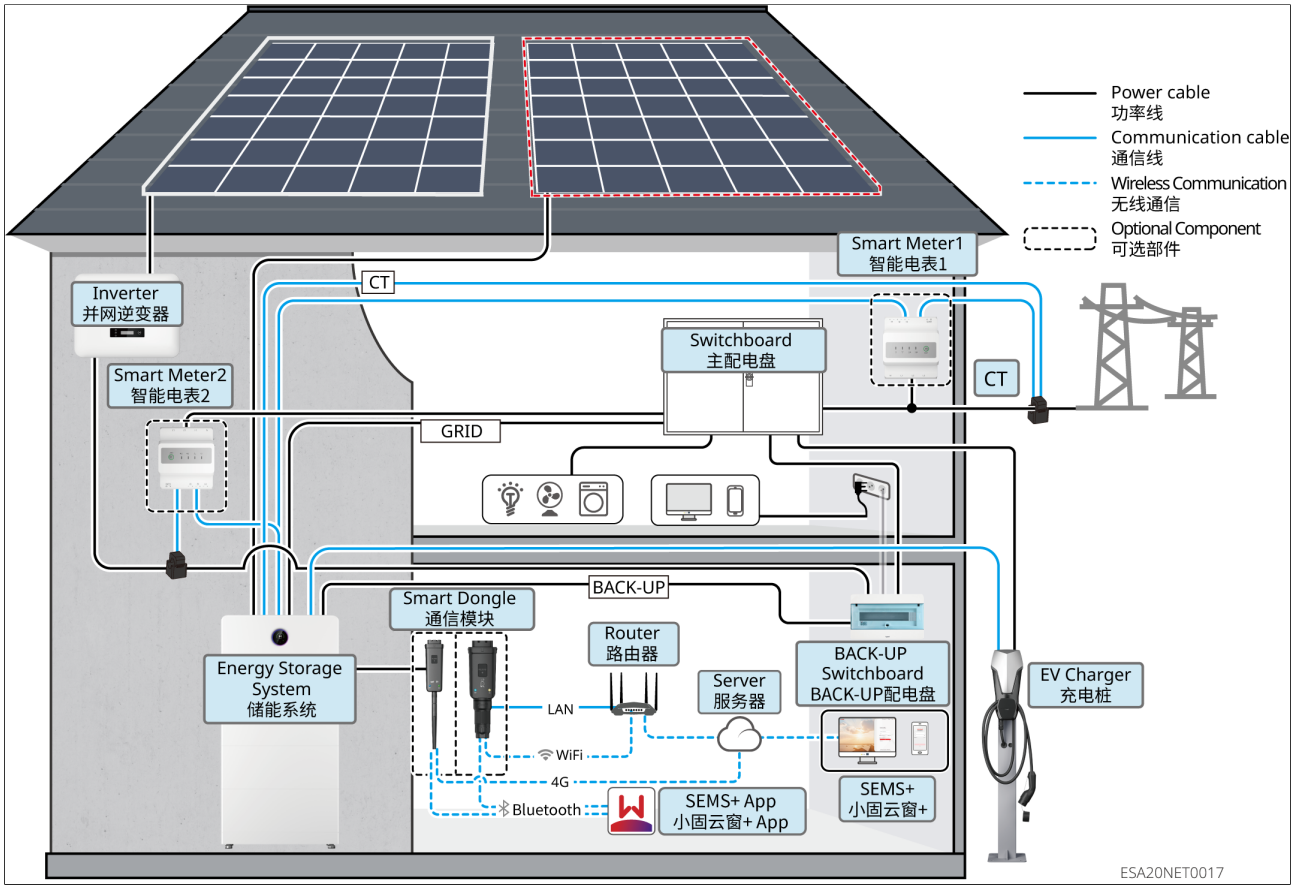


Figure3 Microgrid Scenario 1

with Static Transfer Switch Cabinet (STS)

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

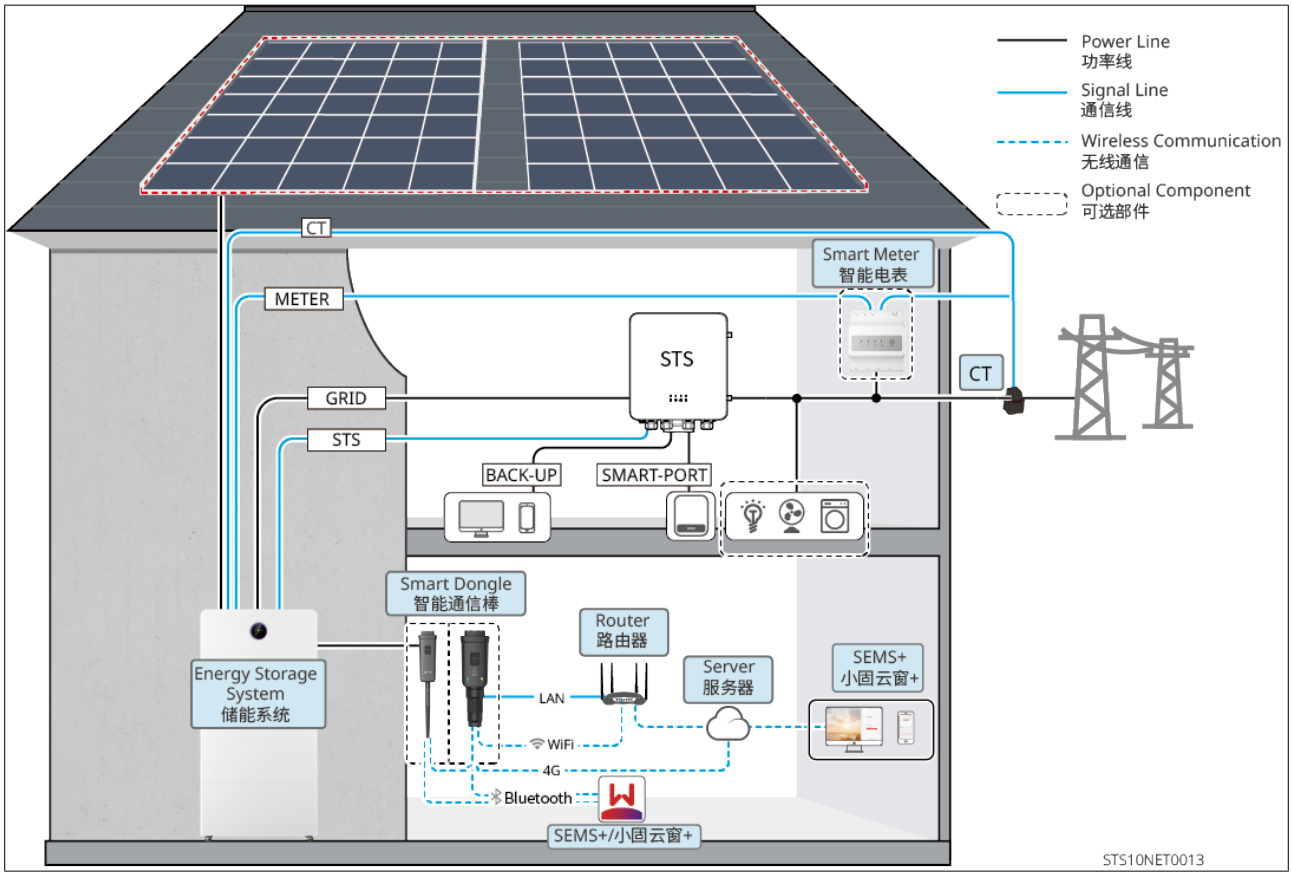


Figure4 Microgrid Scenario 2: with STS

Equipment Type	model	Description
energy storage inverter	GW5K-ETA-G20 GW6K-ETA-G20 GW8K-ETA-G20 GW9.999K-ETA-G20 GW10K-ETA-G20 GW12K-ETA-G20 GW15K-ETA-G20 GW20K-ETA-G20 GW25K-ETA-G20 GW29.999K-ETA-G20 GW30K-ETA-G20 GW5K-BTA-G20 GW6K-BTA-G20 GW8K-BTA-G20 GW9.999K-BTA-G20 GW10K-BTA-G20 GW12K-BTA-G20 GW15K-BTA-G20 GW20K-BTA-G20 GW25K-BTA-G20 GW29.999K-BTA-G20 GW30K-BTA-G20	• In the Microgrid Scenario, the system only supports the use of one energy storage inverter. • In the Microgrid Scenario, connecting generators is not supported. • During system networking, satisfy the following version requirements: ◦ Inverter ARM software version is 04.182 and above. ◦ Inverter DSP software version is 02.2013 or later.

Equipment 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 support mixed use. • System supports 5-108kWh to meet different power and energy matching requirements. • Battery heating film is optional; only models equipped with the heating film can enable the "Battery Heating" function. Batteries not equipped with the heating film should not be used in low-temperature environments, otherwise the equipment may fail to operate. • 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 Battery heating function is not available when used in combination. • If the system has battery mixing and split-type expansion requirements, ensure that the BMS software version is V06 or above and the DCDC version is V06 or above.
Static Transfer Switch Cabinet (STS)	GW30K-STS-G10 GW60K-STS-G10	• Optional. For usage, please contact Goodwe to purchase. • Supports connection of 1 energy storage inverter, diesel generator, load, and grid.
smart meter	Inverter built-in meter	
	GMK330 (purchased from GoodWe)	

Equipment Type	model	Description
	GM330 (purchased from Goodwe)	• Built-in meter: Please use the CT supplied with the inverter for connection. ◦ CT ratio: 120A:40mA ◦ When the built-in meter of the inverter does not meet the usage requirements, you can contact the dealer to purchase a GMK330 or GM330 smart meter. • GMK330: CT does not support replacement, CT ratio is 120A:40mA. • GM330: CT supports from GoodWe or self-purchase, CT ratio is nA:5A.
Smart Communication Stick	WiFi/LAN Kit-20	• Using Bluetooth signal for local configuration of device parameters and viewing device operation information, and uploading system operation information to the monitoring platform via WiFi or LAN. • Please ensure the firmware version of the smart communication stick is 07 or above.
	4G Kit-G20	• Using Bluetooth for local configuration of device parameters and viewing device operational information, and uploading system operation data to the monitoring platform via 4G.

Equipment Type	model	Description
grid-connected inverter	-	• Goodwe brand grid-tied inverters are recommended, and the use of third-party grid-tied inverters is supported. • In the Microgrid Scenario, please ensure that the rated output power of the grid-connected inverter ≤ the rated output power of the hybrid inverter. • When the microgrid system is in grid-connected state, if power limitation is required, please ensure: ◦ The energy storage inverter needs to be set in the grid power limit interface of the SEMS+ App. For the grid-tied inverter, please set it according to the actual tool used. ◦ To ensure that the grid-tied inverter can continuously generate power, it is necessary to adjust the output power of the hybrid inverter through the microgrid mode interface of the SEMS+ App. Note: Different grid-tied inverters have different output power control accuracy. Please set the grid-tied power limit parameter value according to the actual situation.

2.1.3 Coupling Scenarios

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

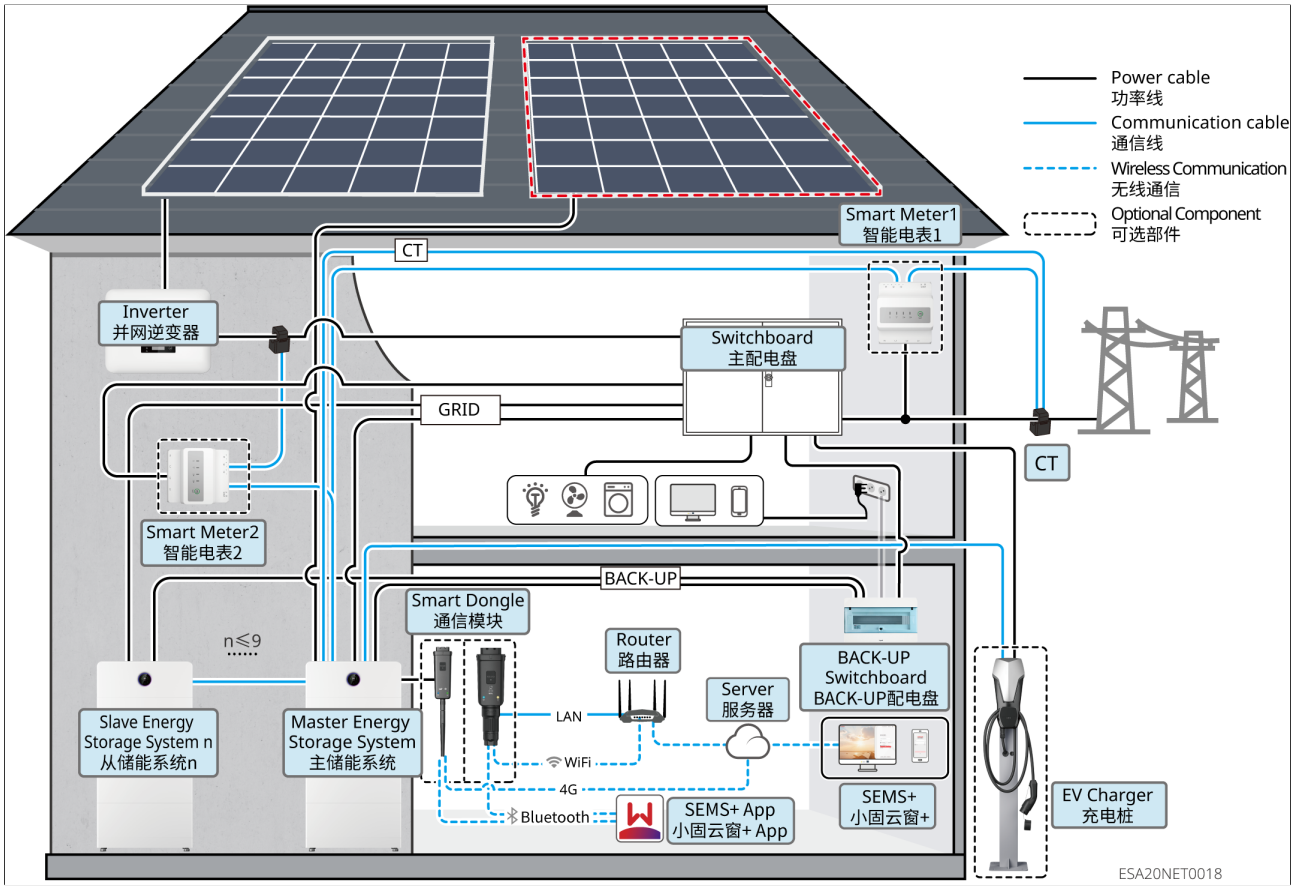


Figure5 Coupling scenario 1

Networking with static transfer switch cabinet (STS)

When a grid-connected inverter is connected to the GRID port of the static transfer switch cabinet (STS), this is a coupling scenario.

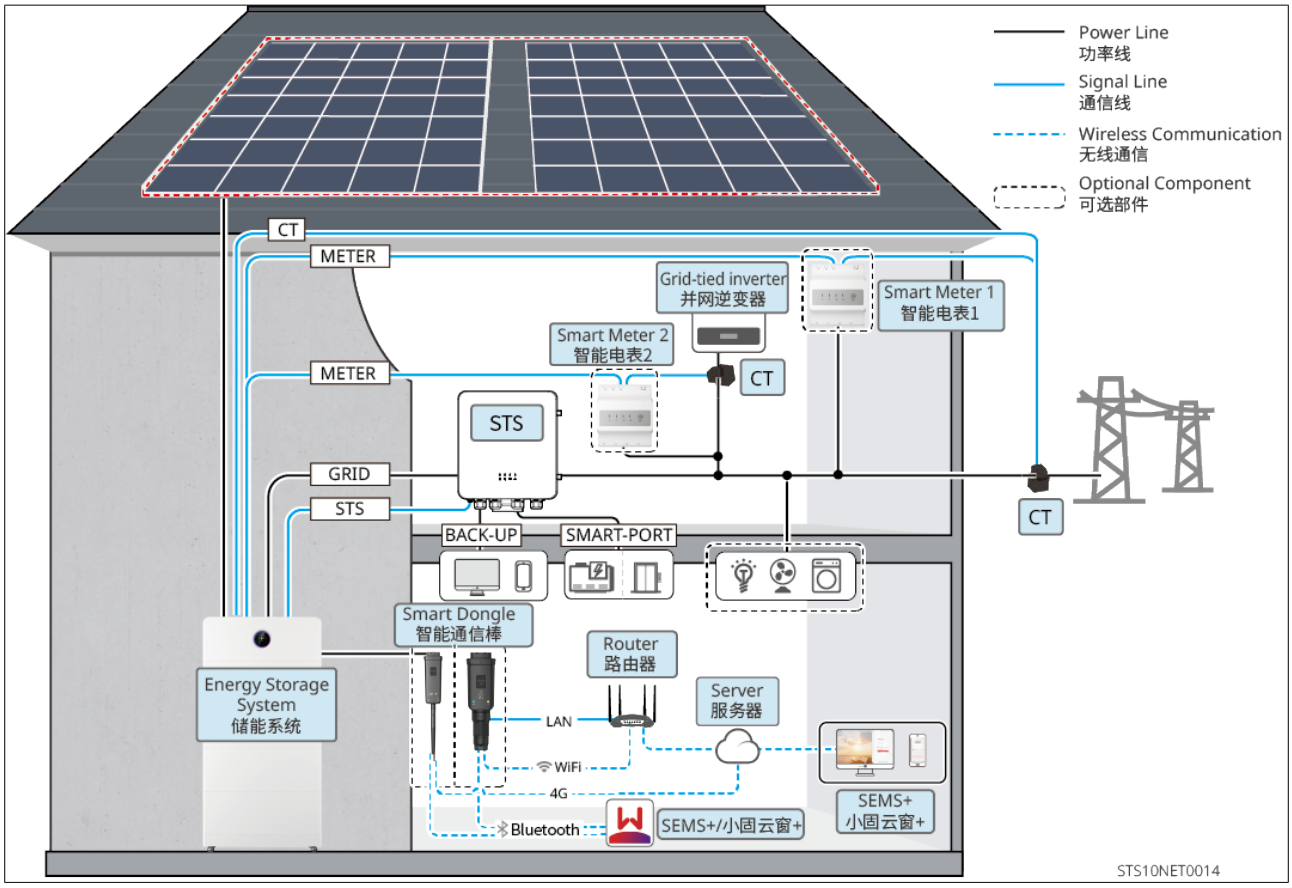


Figure6 Coupling scenario 2: With STS

Device Type	Model	Description
hybrid inverter	GW5K-ETA-G20 GW6K-ETA-G20 GW8K-ETA-G20 GW9.999K-ETA-G20 GW10K-ETA-G20 GW12K-ETA-G20 GW15K-ETA-G20 GW20K-ETA-G20 GW25K-ETA-G20 GW29.999K-ETA-G20 GW30K-ETA-G20 GW5K-BTA-G20 GW6K-BTA-G20 GW8K-BTA-G20 GW9.999K-BTA-G20 GW10K-BTA-G20 GW12K-BTA-G20 GW15K-BTA-G20 GW20K-BTA-G20 GW25K-BTA-G20 GW29.999K-BTA-G20 GW30K-BTA-G20	• Access to a GoodWe AC charging pile is supported in single-unit scenarios only. • The system supports a maximum of 10 inverters in a parallel system, and supports grid-tied/off-grid mixed parallel operation of inverters of different power ratings; when mixing, it is recommended to use a high-power inverter as the master. Microgrid function is not supported in parallel mode. If the number of parallel inverters exceeds 6, please contact the after-sales service center. • Supports generator control and battery charging from the generator. If a generator needs to be connected, use the GMK330 or GM330 Smart Meter. • In a parallel system, each inverter must be installed with a WiFi/LAN Kit-20. • The following version requirements must be met during system networking: ◦ Inverter ARM software version must be 04.182 or higher. ◦ Inverter DSP software version must be 02.2013 or higher. ◦ In a parallel system, the DSP and ARM software versions must be used together, and the software versions of the master and slave inverters must be consistent.

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 mixed. • The system supports 5-108kWh, meeting different power and energy matching requirements. • The battery heating film is optional. Only models equipped with the heating film can enable the "Battery Heating" function. Do not use batteries without the heating film in low-temperature environments; otherwise, the equipment may fail to operate. • The battery heating function is unavailable when mixing 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 . • If the system requires battery mixing and split-type expansion, ensure that the BMS software version is V06 or higher and the DCDC version is V06 or higher.
Static Transfer Switch Cabinet (STS)	GW30K-STS-G10 GW60K-STS-G10	• Optional. If needed, please contact GoodWe to purchase. • Supports connection to 1 hybrid inverter, diesel generator, load, and grid.
Smart Meter	Inverter built-in meter	
	GMK330 (purchased from GoodWe)	

Device Type	Model	Description
	GM330 (purchased from GoodWe)	• Built-in meter: Use the CT shipped with the unit to connect the inverter. ◦ CT ratio: 120A:40mA. ◦ When the inverter built-in meter is not adequate, contact a dealer or other source to purchase a GMK330 or GM330 Smart Meter. • GMK330: CT is not replaceable; CT ratio: 120A:40mA • GM330: CT can be purchased from GoodWe or purchased separately; CT ratio requirement: nA/5A ◦ nA: CT primary input current; n ranges from 200 to 5000 ◦ 5A: CT secondary output current • If the number of parallel inverters exceeds 2, or the wire gauge or range of the standard CT does not meet the total parallel current requirement on site, use the GM330 Smart Meter.
Smart Dongle	WiFi/LAN Kit-20	• Use Bluetooth signals for near-end configuration of device parameters and viewing of device operation information; upload system operation information to the monitoring platform via WiFi or LAN. • Ensure that the firmware version of the Smart Dongle is 07 or higher.
	4G Kit-G20	Use Bluetooth signals for near-end configuration of device parameters and viewing of device operation information; upload system operation information to the monitoring platform via 4G.

Device Type	Model	Description
grid-tied PV inverter	-	• GoodWe brand grid-tied PV inverters are recommended; third-party grid-tied PV inverters are supported. • In coupling scenarios, ensure that the rated output power of the grid-tied PV inverter is ≤ the rated output power of the hybrid inverter. • When the coupled system is in the grid-tied state and power limiting is required, ensure: The hybrid inverter must be configured through the grid-tied power limit interface of the SEMS+ App; the grid-tied PV inverter should be configured according to the actual tool used. Note: Different grid-tied PV inverters have different output power control accuracies. Set the grid-tied power limit parameter values based on actual conditions.

2.1.4 Ezmanager3000 Configuration

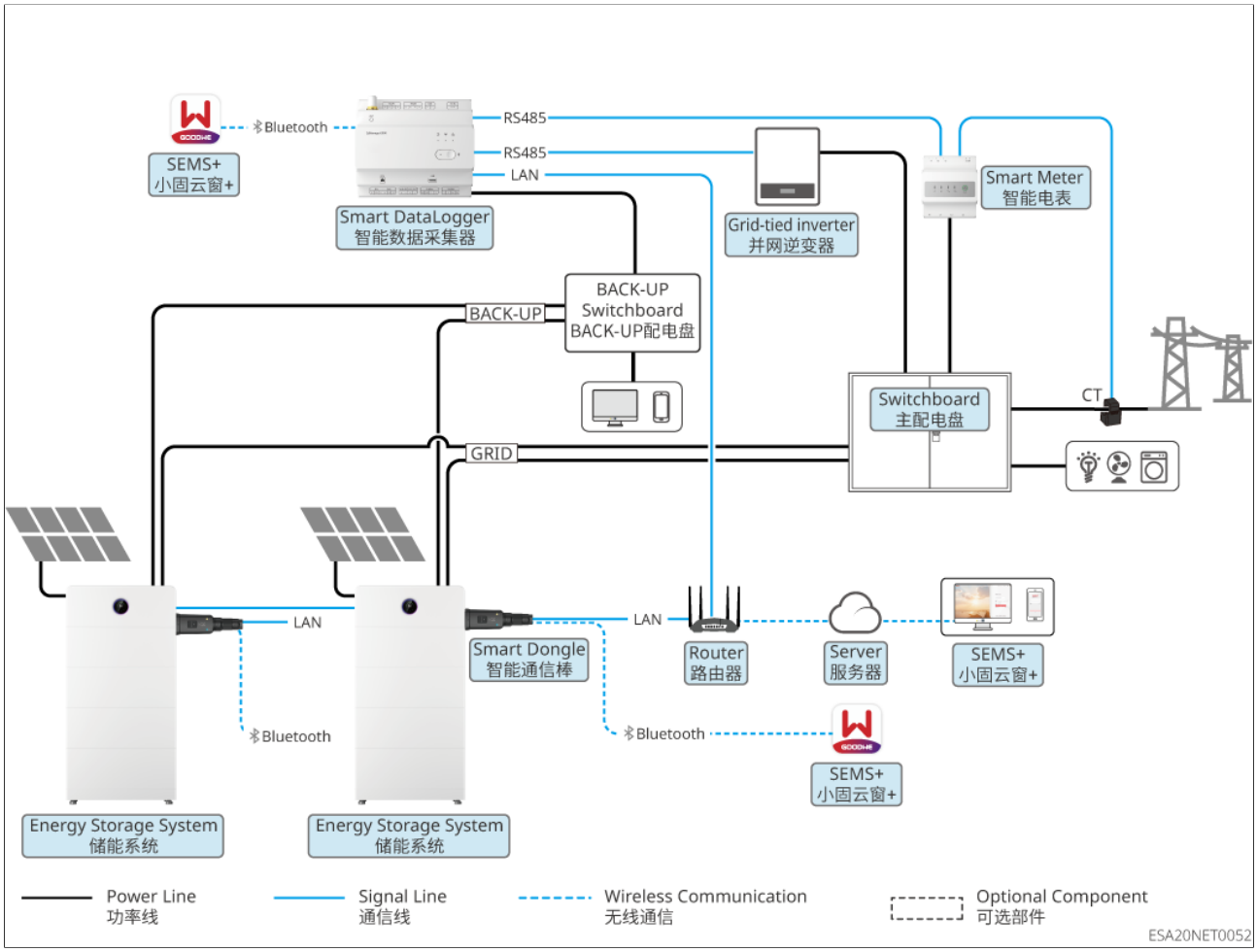


Figure7 Ezmanager3000 Configuration

Device Type	Model	Description
Energy Storage Inverter	GW5K-ETA-G20 GW6K-ETA-G20 GW8K-ETA-G20 GW9.999K-ETA-G20 GW10K-ETA-G20 GW12K-ETA-G20 GW15K-ETA-G20 GW20K-ETA-G20 GW25K-ETA-G20 GW29.999K-ETA-G20 GW30K-ETA-G20 GW5K-BTA-G20 GW6K-BTA-G20 GW8K-BTA-G20 GW9.999K-BTA-G20 GW10K-BTA-G20 GW12K-BTA-G20 GW15K-BTA-G20 GW20K-BTA-G20 GW25K-BTA-G20 GW29.999K-BTA-G20 GW30K-BTA-G20	• GoodWe AC EV chargers are supported only in a single-inverter configuration. • When using the system with EzManager3000, use an external meter and do not connect a generator. • Supports connection of up to four energy storage inverters and four grid-tied inverters. On/Off-grid parallel operation is supported for inverters in different power classes. • In a parallel system, a WiFi/LAN Kit-20 must be installed on each inverter. • The following software versions are required for system networking: ◦ The ARM software version of the energy storage inverter must be 05.198 or later. ◦ The DSP software version of the energy storage inverter must be 03.3012 or later. ◦ In a parallel system, the DSP and ARM software versions must be used in a compatible combination, and all master and slave inverters must have the same software versions.

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 matching requirements. • 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 mixed and used together. When mixed with certain models that are not equipped with a heating film, thebattery heating function is unavailable. • For systems requiring mixed battery use or split-type capacity expansion, ensure that the BMS software version is V06 or later and the DCDC version is V06 or later.

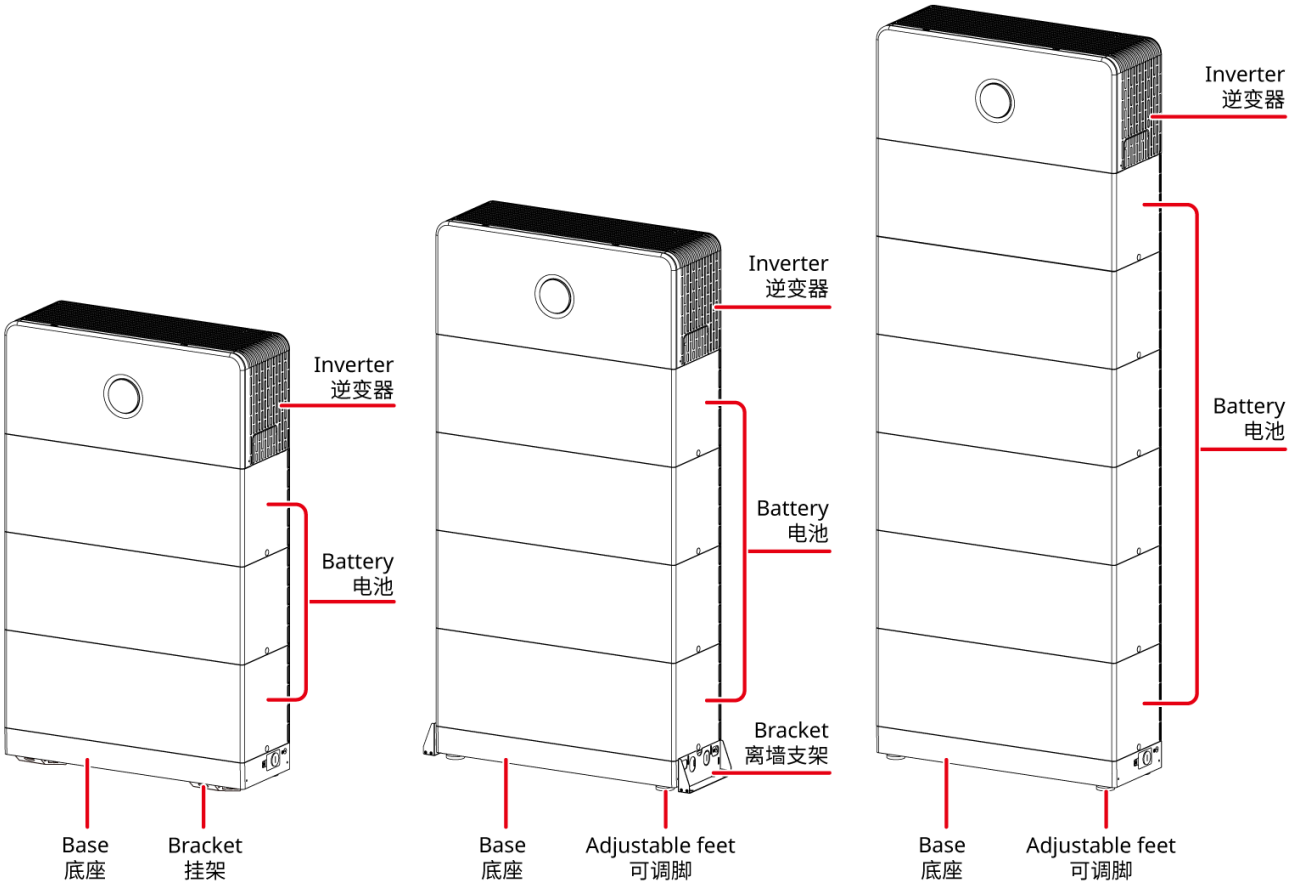
Device Type	Model	Description
Smart Data Logger	EzManager3000	EzManagersupports centralized management and dispatch of home energy. It supportsAIMode, Self-consumption, grid-connected power Power Control, and other plant-level power control functions to optimize energy at the plant level. • Connect smart meters, grid-tied inverters, and other devices via RS485. • If a third-party grid-connected 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 parallel inverters: EzManager3000 software version V04 or later .
Smart Meter	GMK330 (purchased from GoodWe)	

Device Type	Model	Description
	GM330 (purchased from GoodWe)	• GMK330: CT replacement is not supported; CT ratio: 120 A:40 mA • GM330: CTs can be purchased from GoodWe or sourced independently. Required CT ratio: nA/5A ◦ n A: CT primary-side input current; n ranges from 200 to 5000 ◦ 5 A: CT secondary-side output current • If more than two inverters are connected in parallel, or if the wire gauge or current range of the standard CT does not meet the total current requirements for parallel operation on 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 operating information locally, and use Wi-Fi or LAN to upload system operating information to the monitoring platform. • Ensure that the firmware version of the Smart Communication Stick is 07 or later.

2.2 Product Overview

2.2.1 Residential Energy Storage All-in-One (Three-Phase)

All-in-one residential energy storage unit adopts a blind-mate stacking connection method and integrates inverter and battery cells through a modular design.
All-in-one Residential Storage System Appearance Description:



The system supports battery capacity expansion, and the total battery capacity is determined by the quantity and specifications of battery modules. Configuration must strictly adhere to the restrictions specified in this section. System over all configuration description:

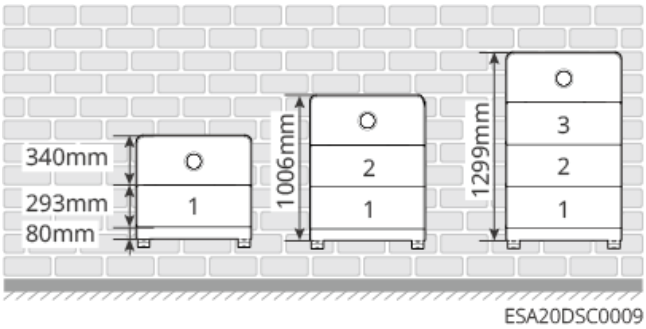
A: GW5.1-BAT-D-G20, GW5.1-BAT-D-G21, GW6.0-BAT-D-G20

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

Mounting Method	Number of Expansion Groups	single stack	Total number of batteries
ground-mounted installation	≤3 groups	Floor-Mounted Standoff Bracket ≤4 pieces Wall-mounted ≤6 units	≤12pcs
Wall-mounted Installation (A)	≤3 Groups	≤3pcs	≤9 units

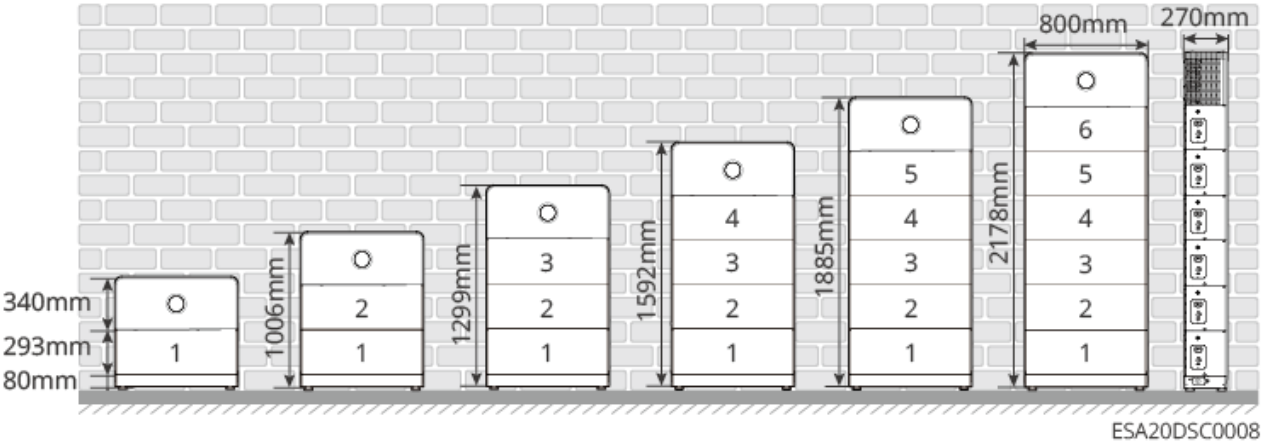
Mounting Method	Number of Expansion Groups	single stack	Total number of batteries
挂墙Installation (A/B/A+B)	≤3 sets	≤2 pieces	≤6piece
Note: expansion groups × stacks per group ≤ total system battery count.			

Wall Mounting

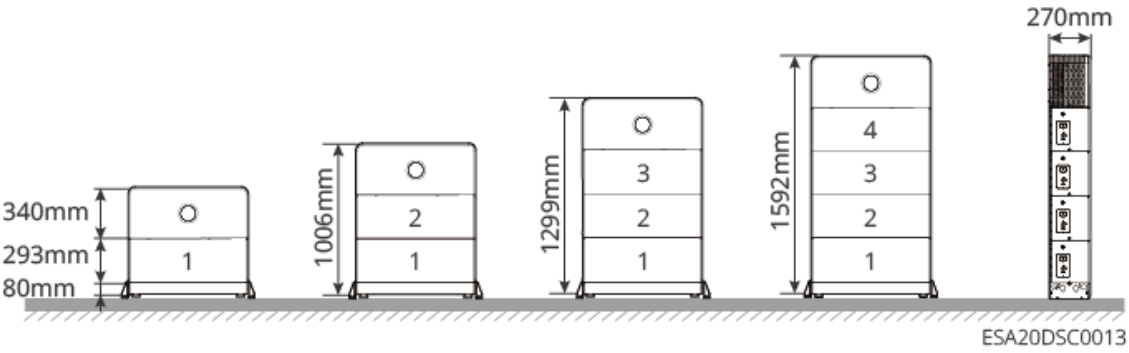


Floor Mounting

- wall-mounted

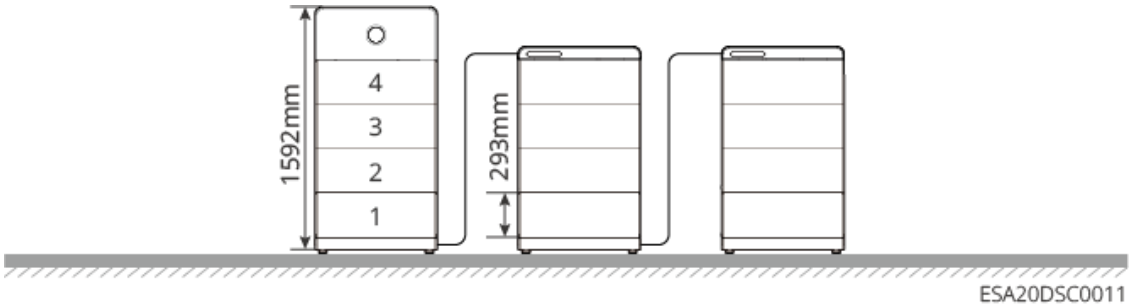


- wall-mounted installation

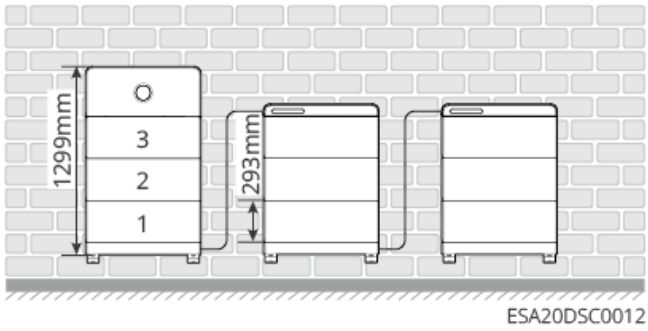


Battery Cluster Expansion Installation

- ground-mounted installation

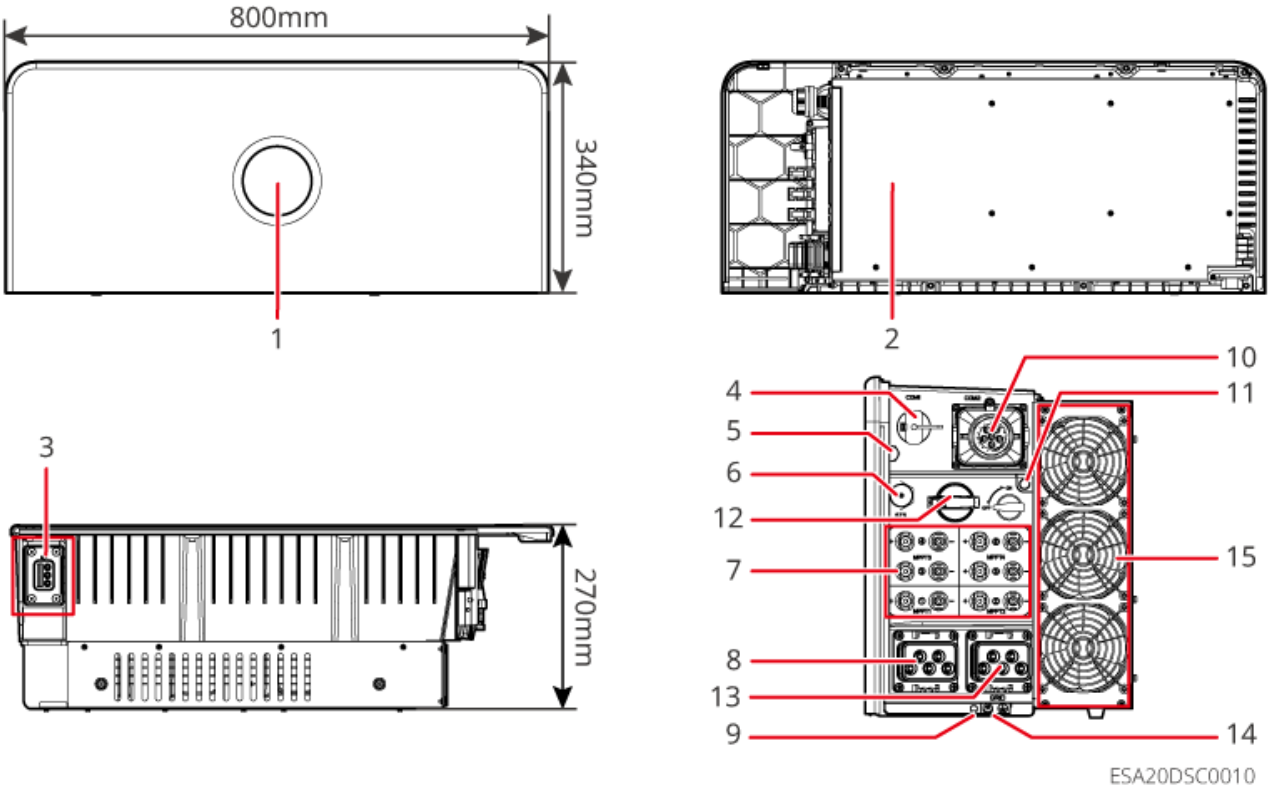


- Wall-mounted installation



Inverter Appearance Description:

In the photovoltaic system, the inverter controls and optimizes energy flow through an integrated energy management system. The electricity generated by the photovoltaic system can be supplied to loads, stored in batteries, or exported to the grid.

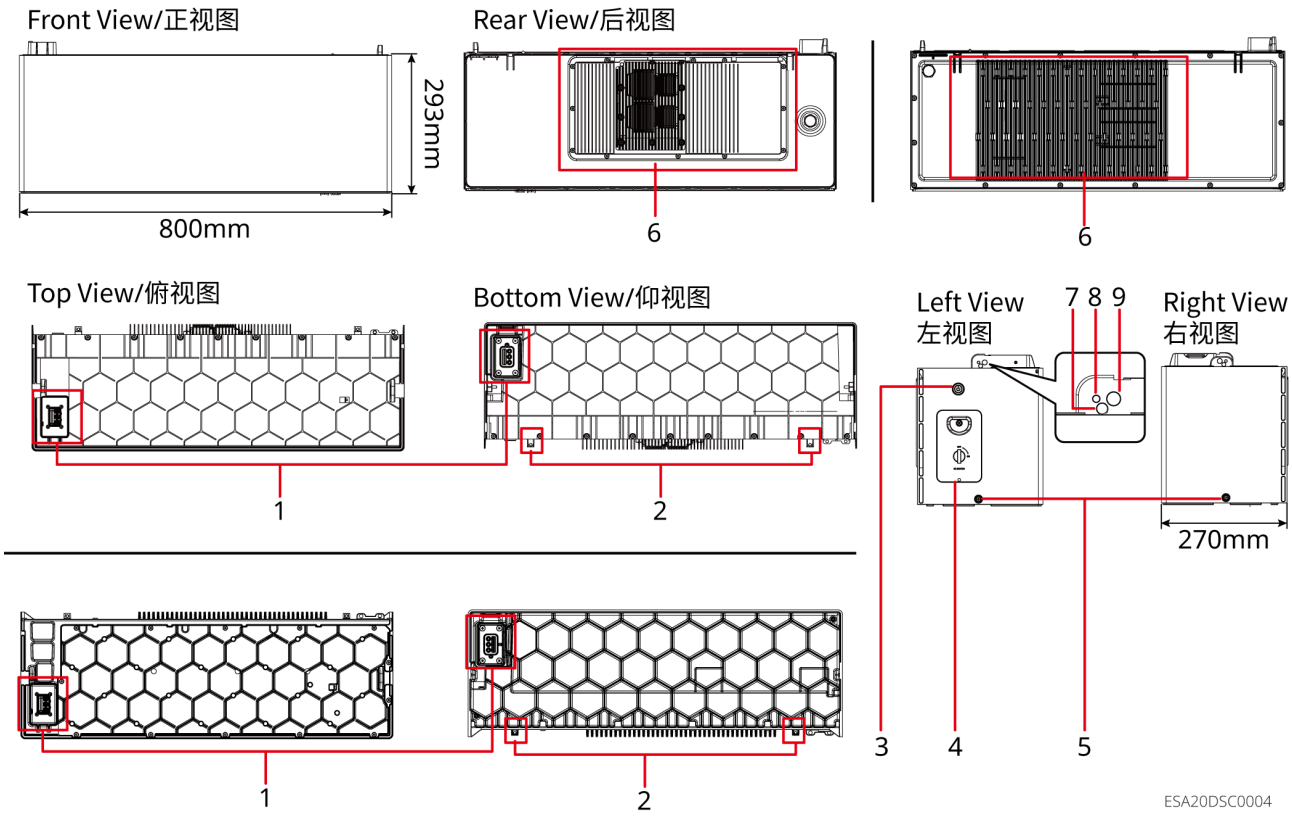


Serial Number	Component/Silkscreen	Description
1	indicator light	Indicates the operating status of the inverter.
2	heatsink	Inverter heat dissipation.
3	connector	Power and communication ports for inverter-to-battery connection.
4	Smart Communication Stick Connection Port	• Can be connected to a smart communication stick, such as WiFi/LAN or other communication modules. Please select the module type according to actual requirements. • Supports connecting a USB drive for Local Upgrade of the inverter software version.
5	breathing valve	-

Serial Number	Component/Silkscreen	Description
6	STS communication interface	Connect Static Transfer Switch Cabinet (STS).
7	PV Input Terminal	Only ETA models, BTA models do not have PV input terminals. • Connectable to PV module DC input line. • Number of PV input terminals: ◦ GW5K-ETA-G20，GW6K-ETA-G20，GW8K-ETA-G20：3 ◦ GW9.999K-ETA-G20，GW10K-ETA-G20，GW12K-ETA-G20，GW15K-ETA-G20，GW20K-ETA-G20，GW25K-ETA-G20，GW29.999K-ETA-G20，GW30K-ETA-G20：4
8	BACK-UP port	Connect AC line to critical load or grid-tied inverter.
9	battery fixing hole	Stationary inverter and battery
10	communication port	Connectable load control, CT, RS485, Remote Shutdown/Fast Shutdown, DRED (Australia)/RCR (Europe) and other communication lines.
11	Lifting bar mounting hole	Used for installing the hand lift bar. Use when handling inverter.
12	DC Switch	Only the ETA model has a DC switch; the BTA model does not. Control DC input connection or disconnection.
13	GRID port	Connect the AC lines to connect the inverter to the grid.
14	Protection earth terminal	Connect the box Protection earth wire.

Serial Number	Component/Silkscreen	Description
15	cooling fan	Inverter heat dissipation. The number of cooling fans is as follows: • GW5K-ETA-G20，GW6K-ETA-G20，GW8K-ETA-G20，GW5K-BTA-G20，GW6K-BTA-G20， GW8K-BTA-G20，GW9.999K-ETA-G20，GW10K-ETA-G20，GW12K-ETA-G20，GW15K-ETA-G20，GW20K-ETA-G20，GW9.999K-BTA-G20，GW10K-BTA-G20，GW12K-BTA-G20，GW15K-BTA-G20，GW20K-BTA-G20：1 • GW25K-ETA-G20，GW29.999K-ETA-G20，GW30K-ETA-G20，GW25K-BTA-G20，GW29.999K-BTA-G20，GW30K-BTA-G20：3

Battery System Appearance Description:
The battery system can store and release electricity according to the requirements of the photovoltaic energy storage system. The input and output ports of this energy storage system are both high voltage direct current.

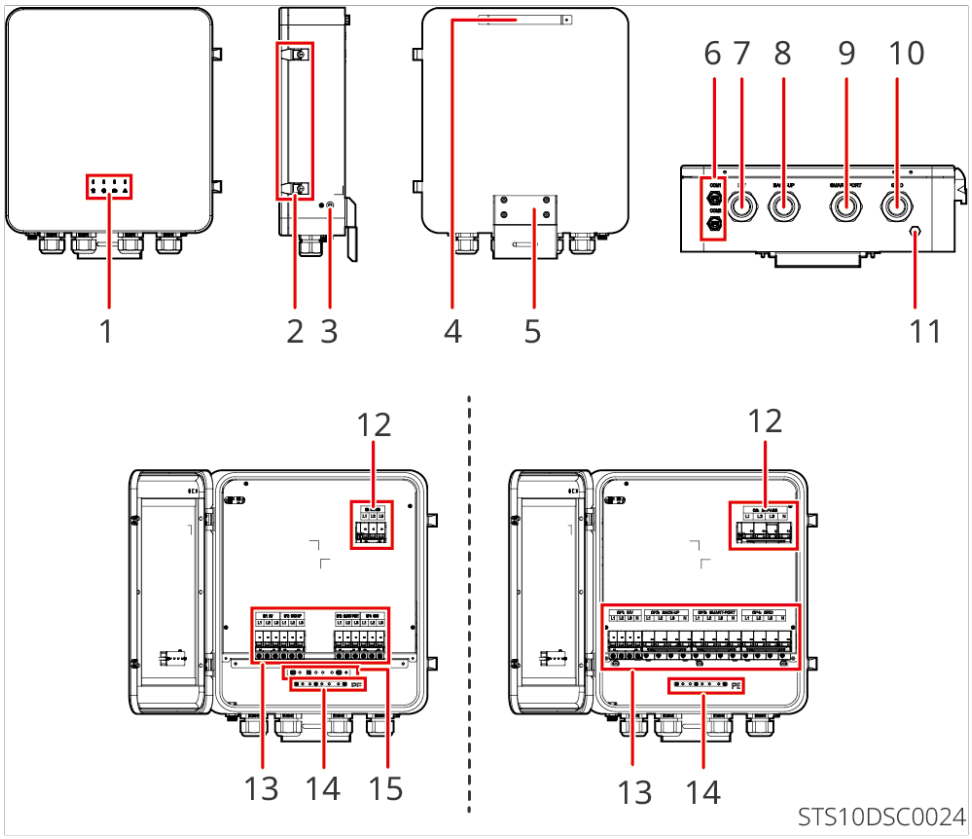


Serial Number	component	Description
1	connector	Power and communication ports for battery-to-battery and battery-to-inverter connections.
2	Anti-tilt bracket fixing hole	Used for fixing the battery to the wall.

Serial Number	component	Description
3	Multi-function button indicator light	• Indicate battery operating status. • Battery black start function: When the re is no PV power generation in the photovoltaic system and the grid is abnormal, the inverter cannot operate normally. At this time, long press the multifunction button for 2 seconds to start the battery system, activate the inverter, and make the inverter operate in off-grid mode, with the battery discharging to supply power to the load. • Battery power-off function: Long press the multi-function button for >5s to power off the battery system.
4	battery disconnect switch	Battery Power Input/Output Switch
5	battery compartment fixing hole	Fixation between two batteries.
6	heatsink	battery heat dissipation
7	battery lifting hole	For hoisting batteries. When stacking more than three battery modules, lifting tools shall be used for installation.
8	Battery or inverter mounting holes	Used for inter-battery fixing or inverter-to-battery fixing.
9	Lifting bar mounting hole	Used for installing the hand lift bar. For manual handling of batteries.

2.2.2 STS Appearance Description

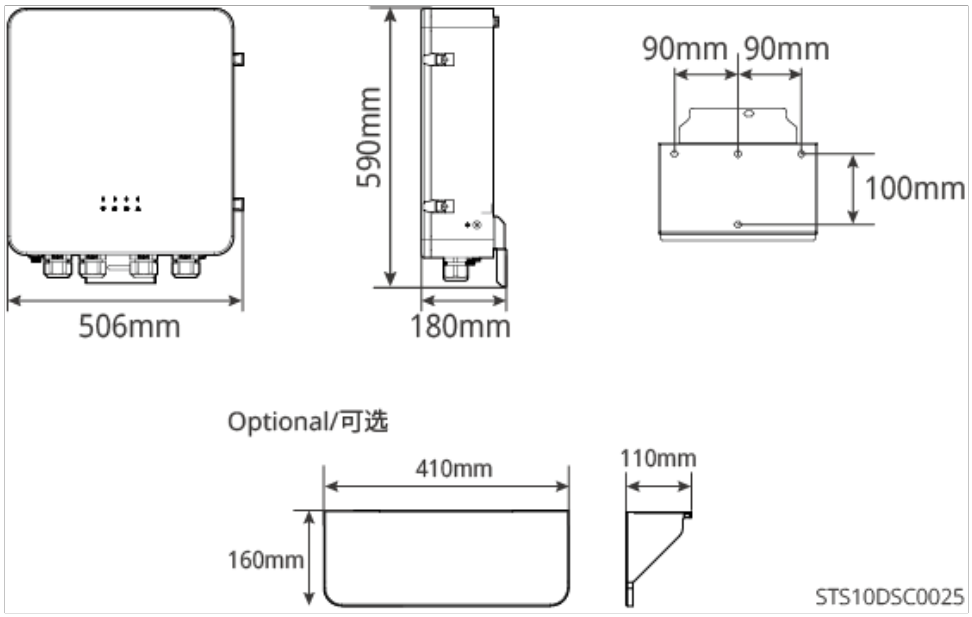
Appearance



Serial Number	Component Name	Description
1	indicator light	Equipment working status indication
2	Locking latch	Cabinet door used to open/close STS
3	Protection earth terminal	Used to connect the enclosure grounding wire
4	mounting bracket	Used for hanging the device on the backplate.
5	Fixed support bracket	for wall mounting and supporting equipment

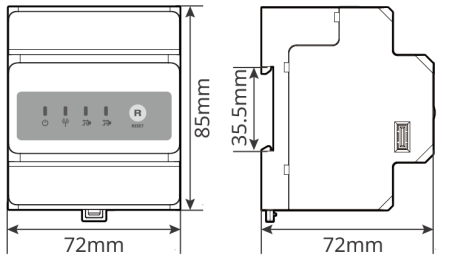
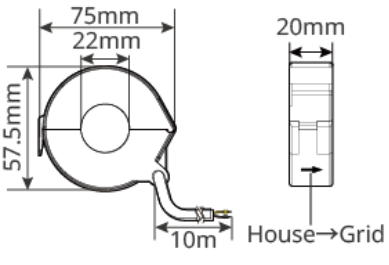
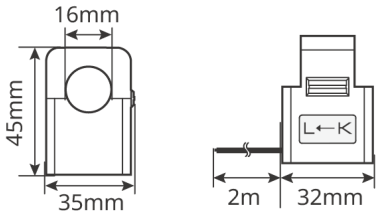
Serial Number	Component Name	Description
6	communication terminal	• COM1: Connect to inverter STS communication port. • COM2: Reserved
7	Inverter input cable entry	cable entry
8	BACK-UP Incoming Line Port	
9	Smart Port Inlet	
10	Grid inlet	
11	breathing valve	-
12	BYPASS switch	During inverter shutdown maintenance, if the STS BACK-UP port load needs to remain powered, close the BYPASS switch to supply the load directly from the mains; after the inverter is powered on and resumes operation, open the BYPASS switch to switch the load back to inverter supply.
13	circuit breaker and AC connection terminal	• INVERTER: Used for connecting the inverter • BACK-UP: for connecting BACKUP loads • SMART-PORT: Used to connect generators, large loads, or grid-tied inverters • GRID: used for connecting to the power grid
14	PE terminal block	Used for connecting the PE conductor.
15	Neutral terminal block (Australia only)	Used for connecting the neutral line

Dimension



2.2.3 Smart Meter

The Smart Meter measures and monitors electrical data in the photovoltaic energy storage system, such as: voltage, current, frequency, Power Factor, power, etc.

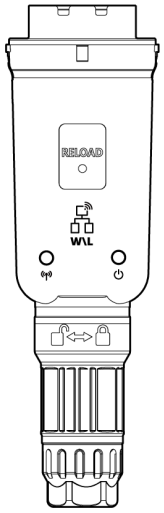
GM330&GMK330&CT		
		

No.	model	Applicable Scenarios
1	GM330	CT can be purchased from GoodWe or separately. CT ratio requirement: nA: 5A • nA: CT primary side input current, n range is 200-5000 • 5A: CT secondary side output current
2	GMK330	CT is shipped with the meter. CT ratio: • 120A: 40mA

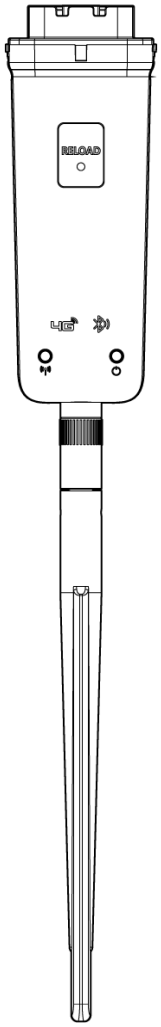
2.2.4 smart dongle

The smart dongle is mainly used for real-time transmission of various power generation data from inverters to remote monitoring platforms, and for connecting the smart dongle via an App for local device debugging.

WiFi/LAN Kit-20

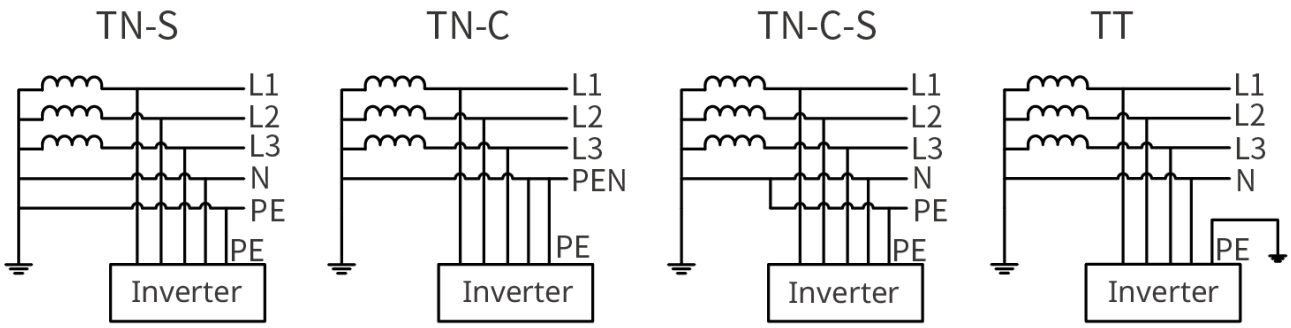


4G Kit-G20



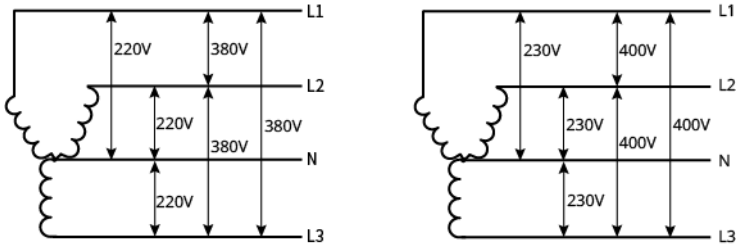
No.	model	Signal Type	Applicable Scenarios
1	WiFi/LAN Kit-20	WiFi, LAN, Bluetooth	Single-unit and multi-unit inverter scenarios
2	4G Kit-G20	4G, Bluetooth	Single-unit inverter scenarios.

2.3 Supported Grid Configurations



TNNET0003

Two-phase, three-wire grid:



TNNET0023

2.4 System Working Mode

NOTICE

To calibrate the battery management system (BMS), the system automatically performs a full battery charge after the initial installation and commissioning is completed. After this process ends, the system operates according to the set working mode.

Self-consumption

- Basic mode of system operation.
- PV generation supplies power to loads first, excess power charges the battery, and any remaining power is sold to the grid. When PV generation cannot meet load demand, the battery supplies power to loads; when battery power also cannot meet load demand, the grid supplies power to loads.

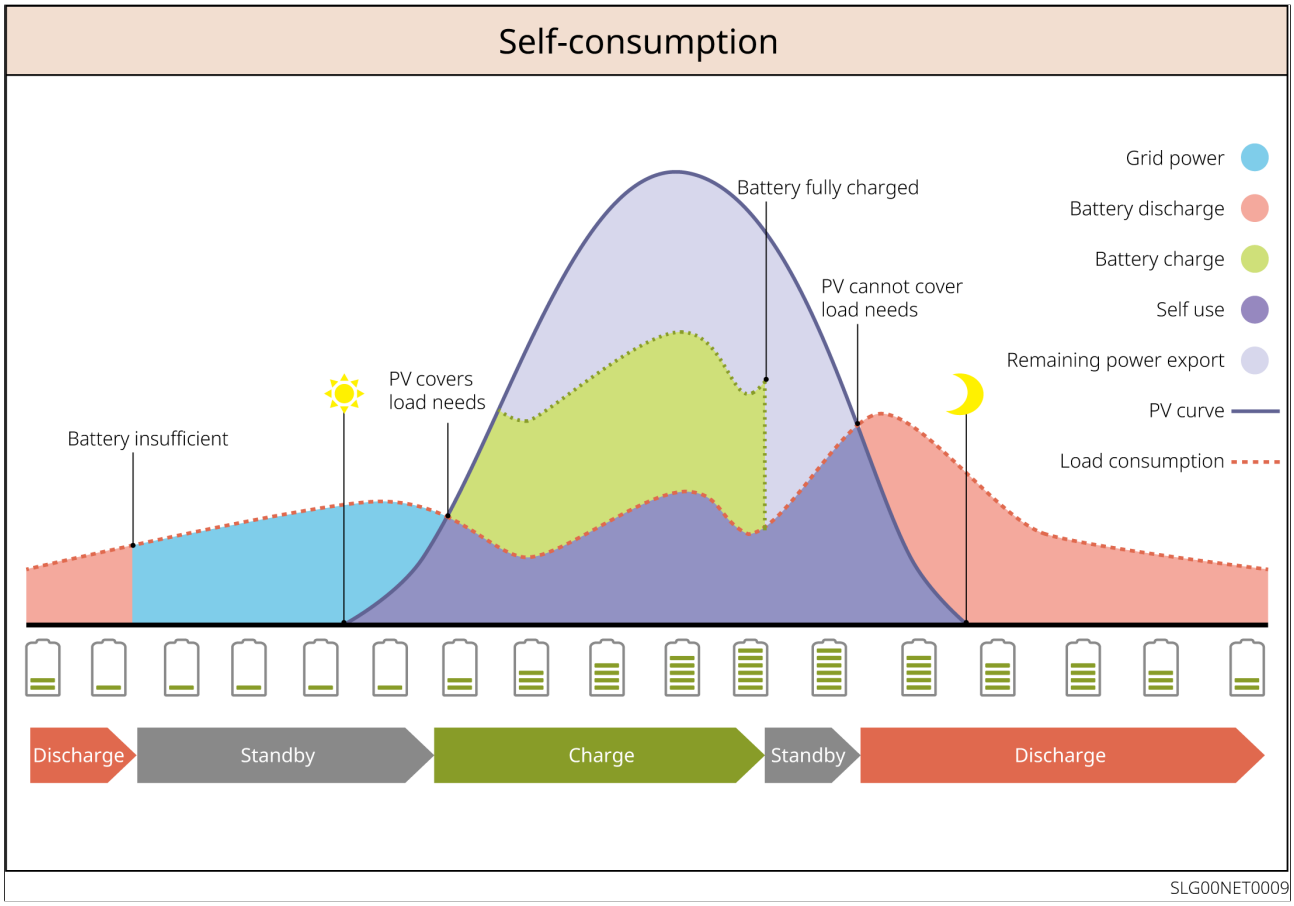


Figure8 Self-consumption

Backup Mode

- Recommended for areas with unstable grids.
- When the grid fails, the inverter switches to off-grid working mode, and the battery discharges to supply power to loads, ensuring that BACK-UP Loads remain powered; when the grid recovers, the inverter switches back to grid-tied operation.
- To ensure the battery SOC is sufficient for normal operation during off-grid conditions, the battery will be charged to the backup power SOC using PV or grid power while the system is grid-tied. If you need to charge the battery from the grid, ensure compliance with local grid laws and regulations.

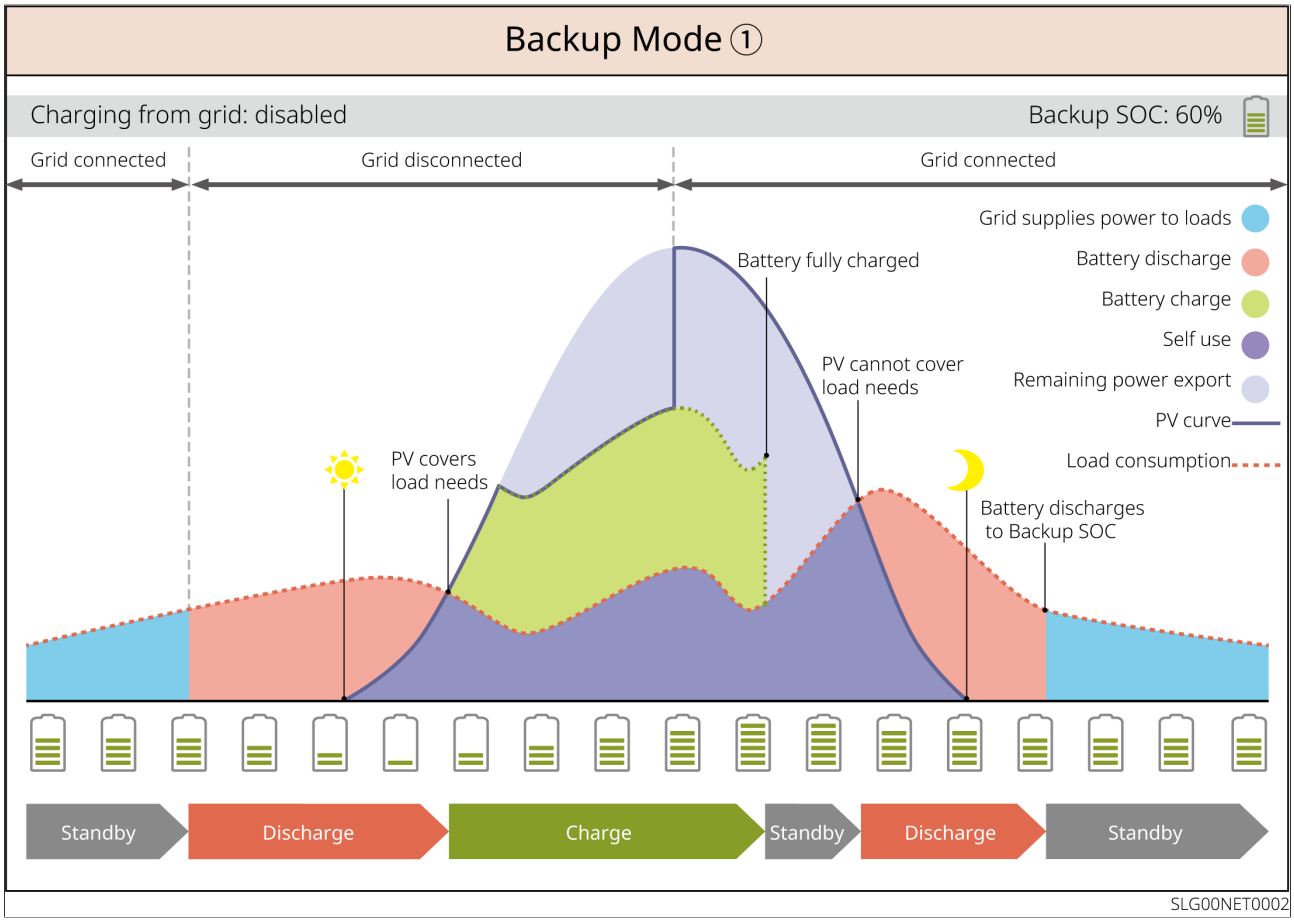


Figure9 Backup Mode 1

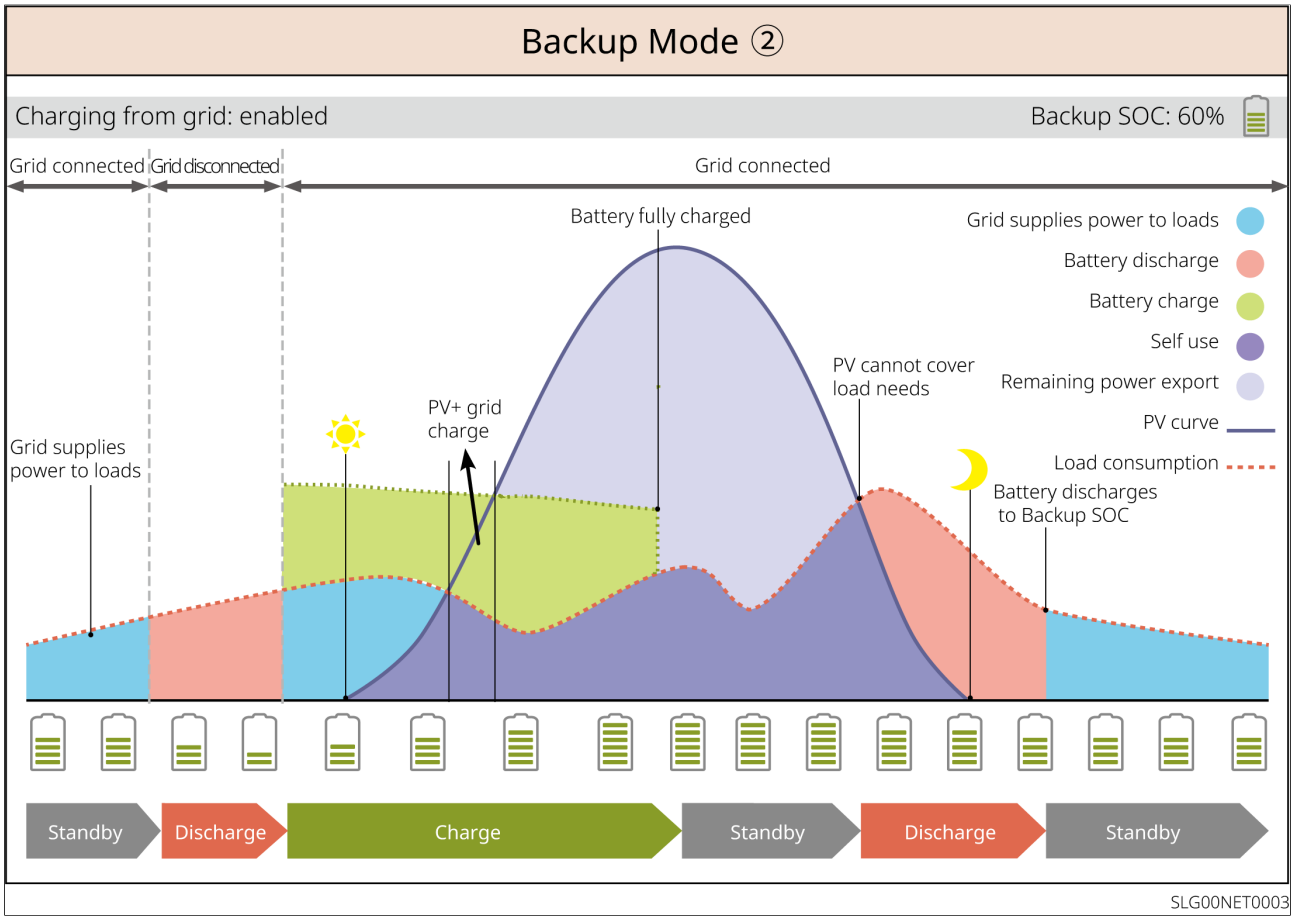


Figure10 Backup Mode 2

TOU Mode

Where permitted by local laws and regulations, set different time periods for buying and selling electricity based on grid peak/off-peak price differences.

For example, during off-peak electricity price periods, set the battery to charging mode and buy electricity from the grid to charge it; during peak price periods, set the battery to discharging mode to supply power to loads from the battery.

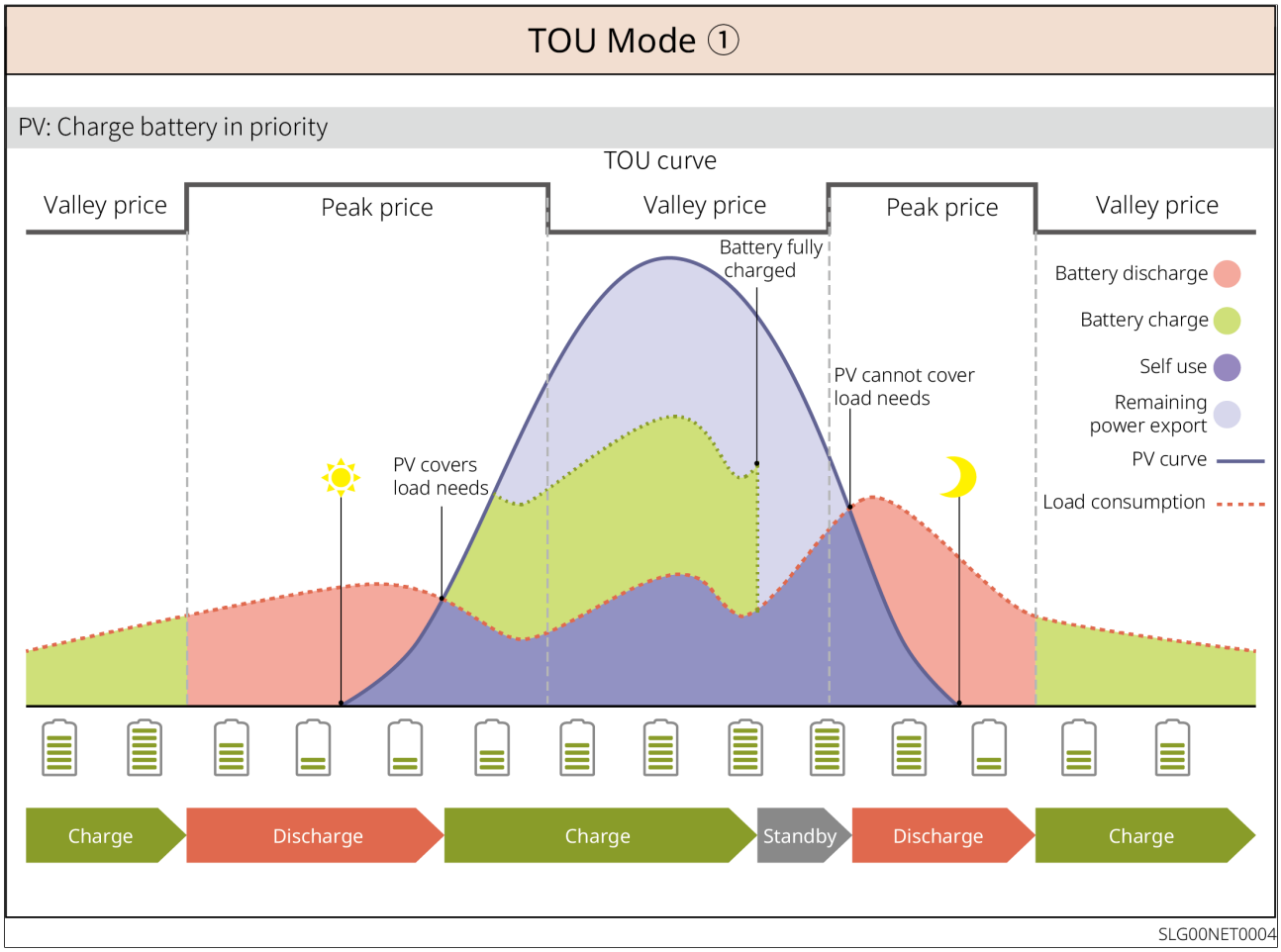


Figure11 TOU Mode 1

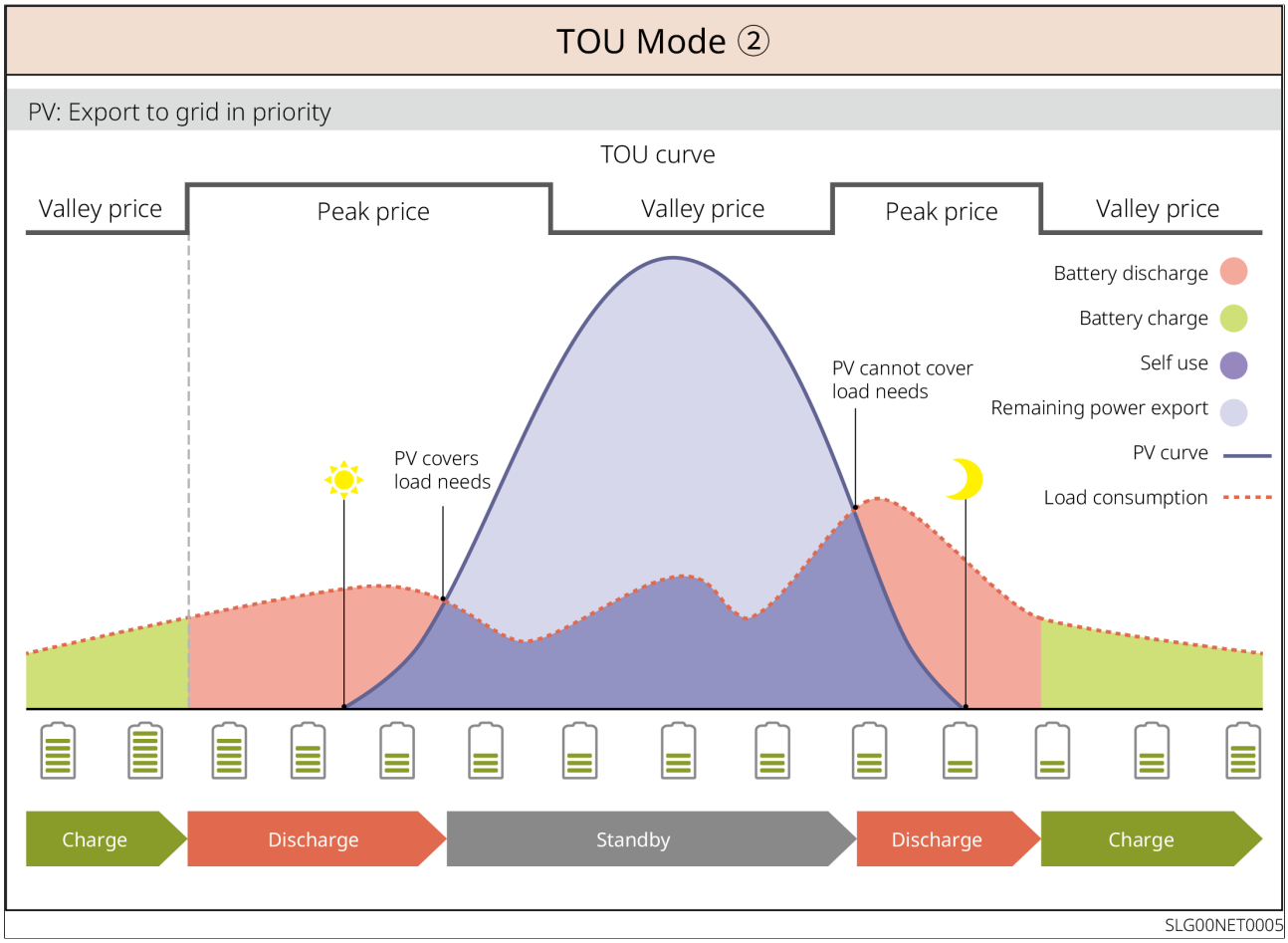


Figure12 TOU Mode 2

Smart Charging (Delayed Charging) Mode

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

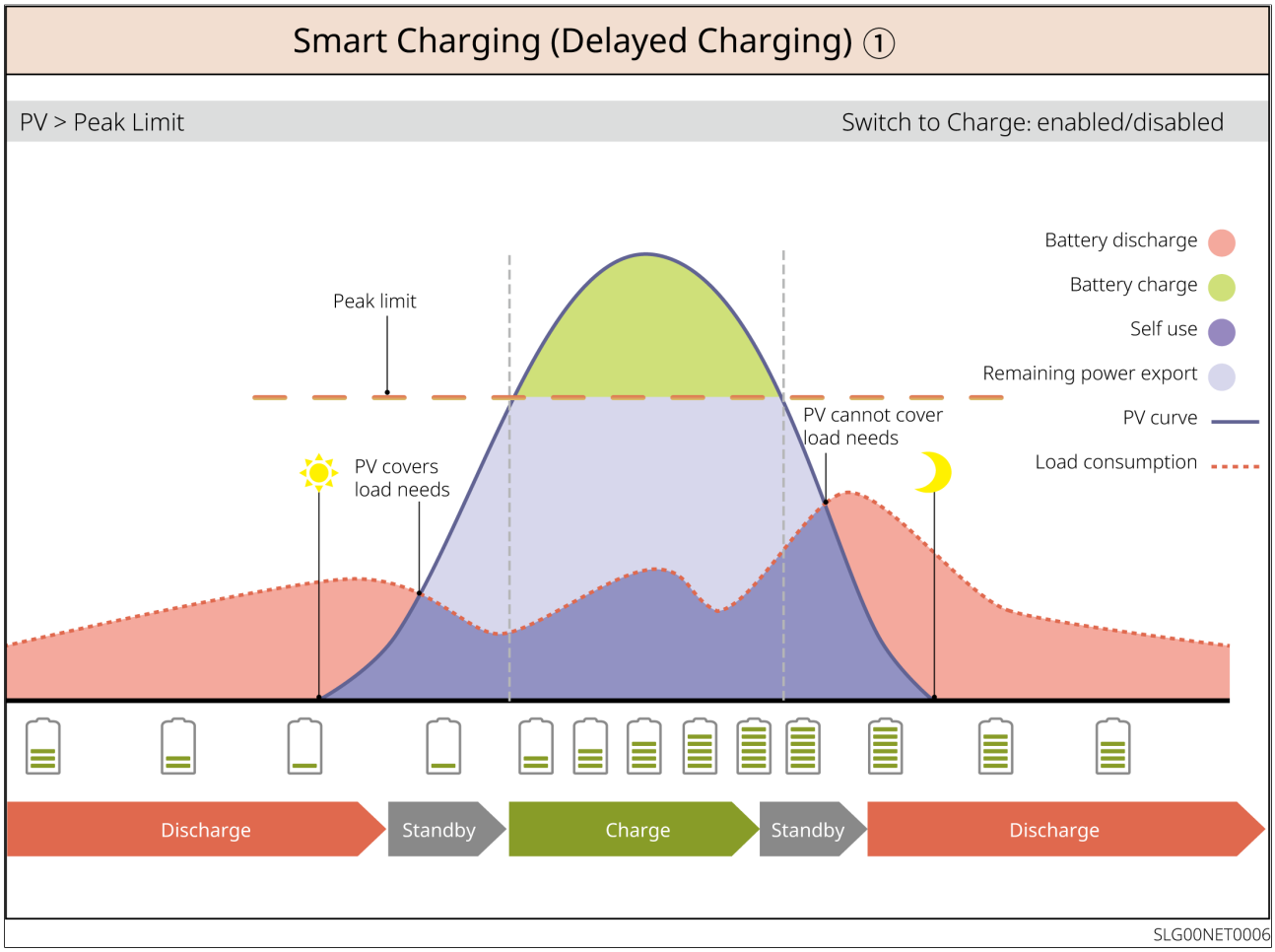


Figure13 Delayed Charging Mode 1

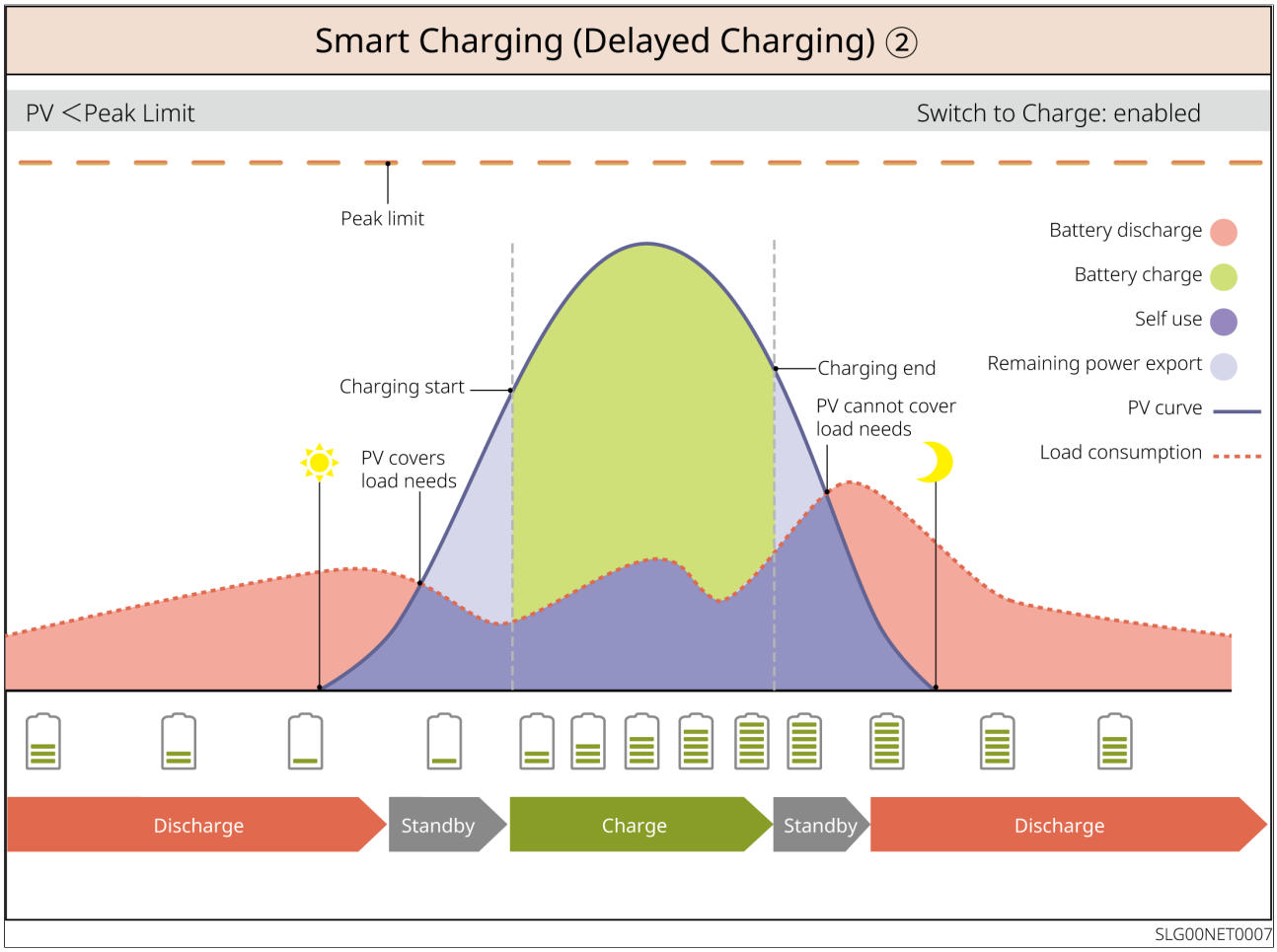


Figure14 Delayed Charging Mode 2

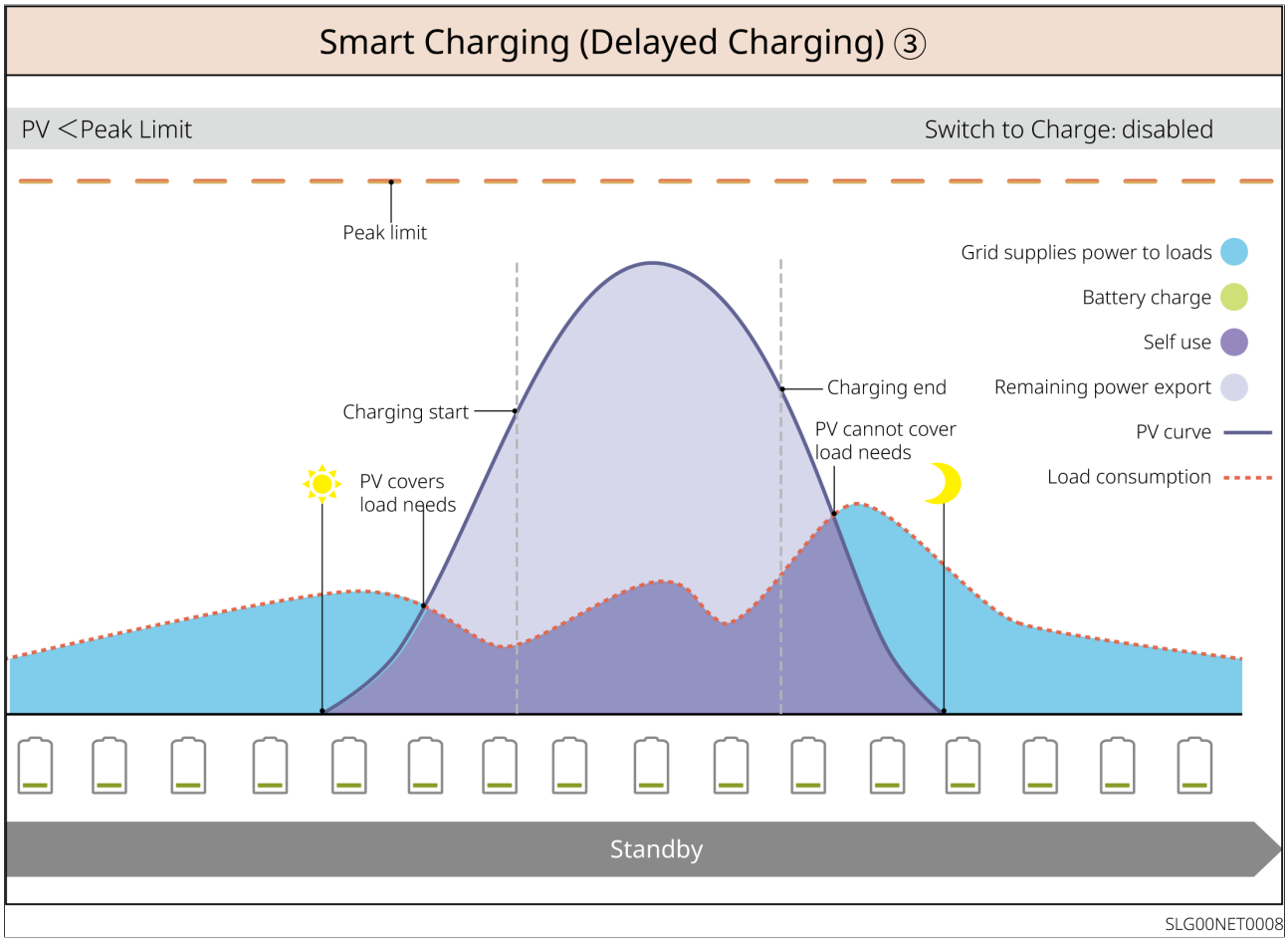


Figure15 Delayed Charging Mode 3

Peakshaving Mode

- Mainly applicable to industrial and commercial scenarios.
- When the total load power exceeds the electricity quota in a short period, battery discharge can be used to reduce the portion of electricity usage exceeding the quota.
- When all battery SOC levels are below the reserved SOC for peakshaving, the system buys electricity from the grid based on the time period, load consumption, and peak purchase limit.

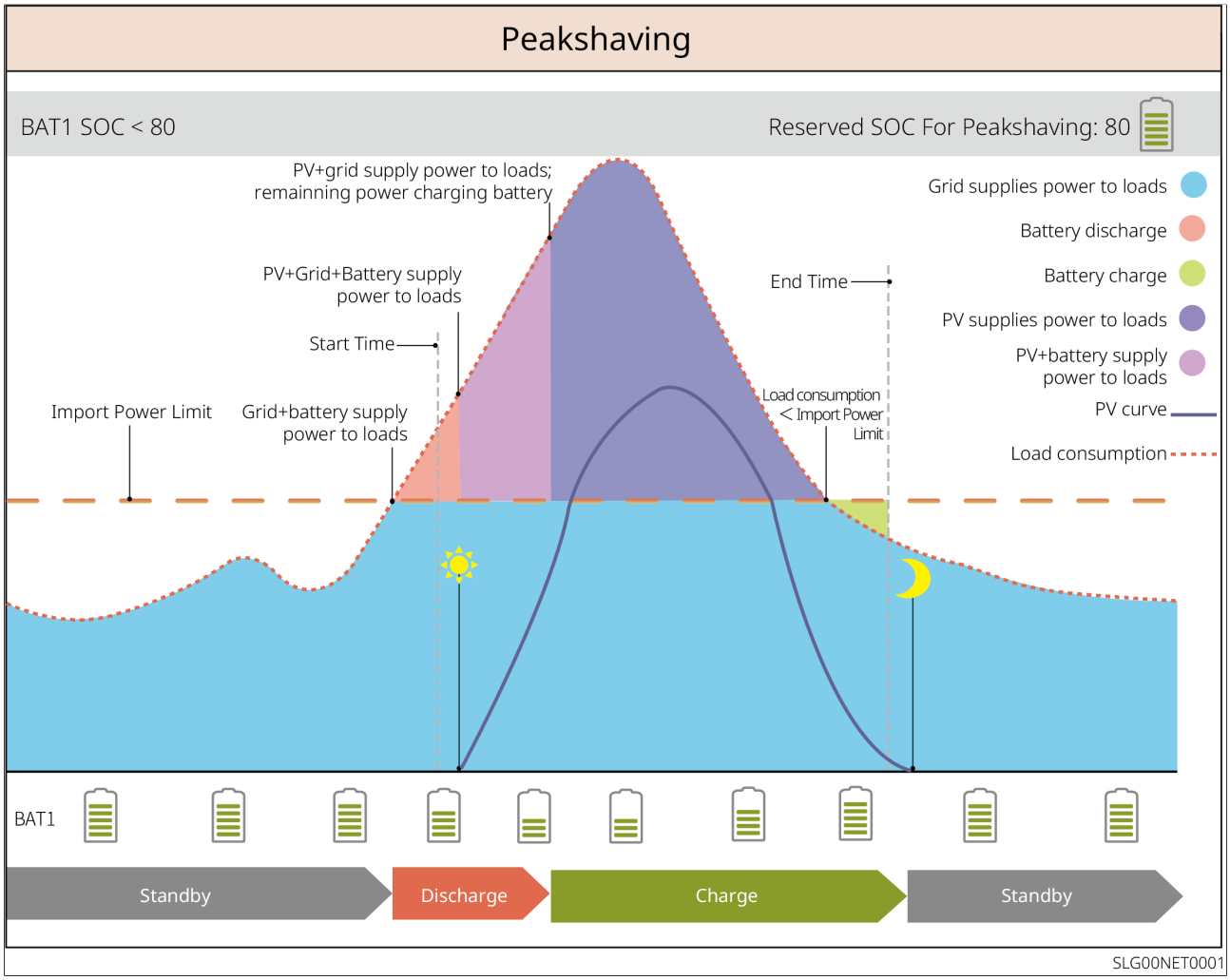


Figure16 Peakshaving Mode

Off-grid Mode

NOTICE
Do not run pure off-grid mode when the inverter is not connected to the battery system.

When the grid fails, the inverter switches to off-grid working mode.

- During the day, PV generation supplies power to loads first, and excess power charges the battery.
- At night, the battery discharges to supply power to loads, ensuring that BACK-UP Loads remain powered.

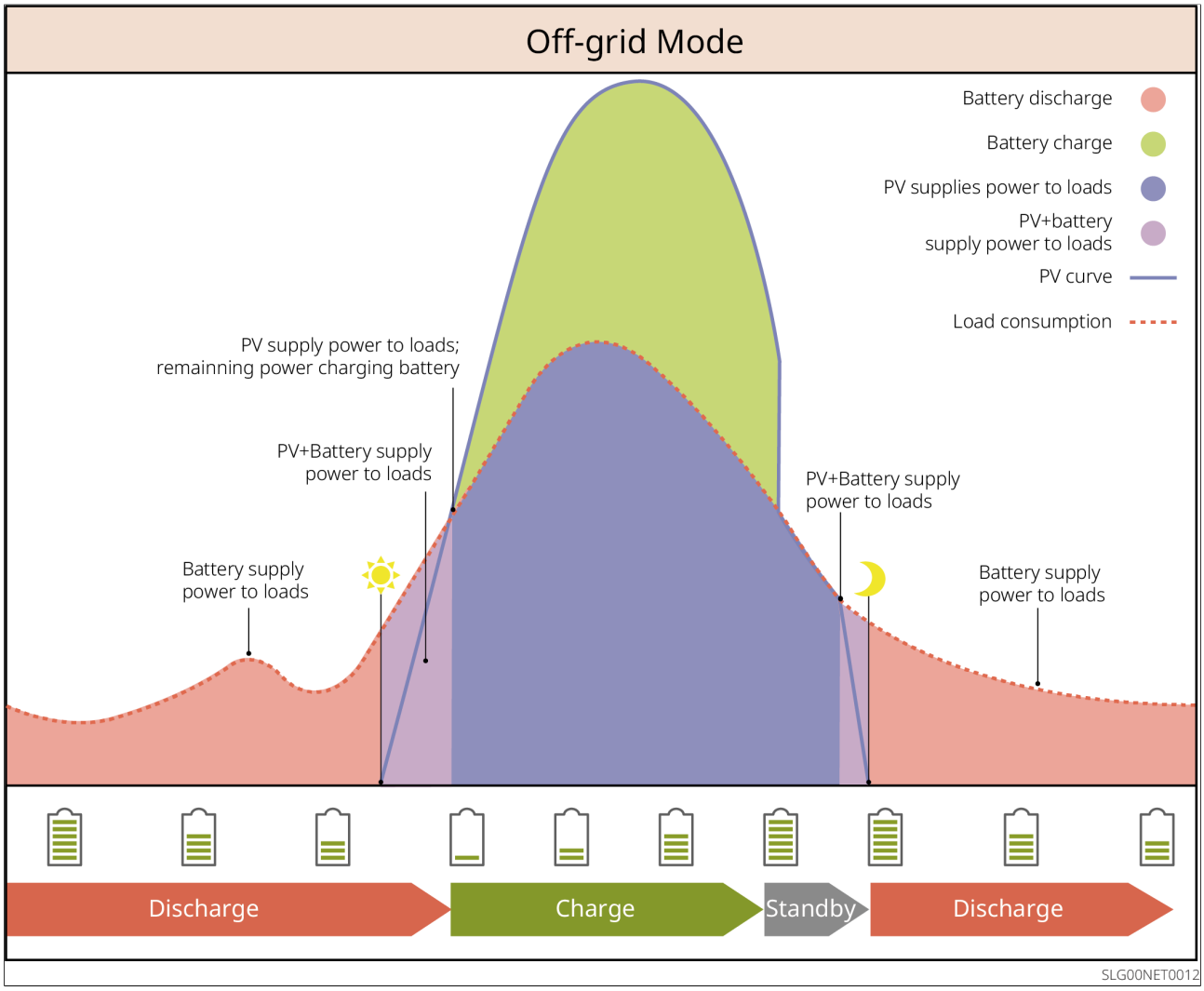


Figure17 Off-grid Mode

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 connection 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 SEMS+ App User Manual.

Model	Label	Description
GW5K-ETA-G20 GW6K-ETA-G20 GW8K-ETA-G20	AFCI：F-I-AFPE-1-2/1-2	F (Full coverage): Full-coverage inverter PV input ports I (Integrated): Integrated into the inverter AFPE（arc fault protection equipment）：Combines the two AFCI Detection functions: AFD and AFI 1: One pair of PV input terminals (PV+, PV−) connects to one PV string 2/1：One AFCI Detection channel has two MPPT inputs; one AFCI Detection channel has one MPPT input; 2：Two AFCI Detection channels

Model	Label	Description
GW9.999K-ETA-G20 GW10K-ETA-G20 GW12K-ETA-G20 GW15K-ETA-G20 GW20K-ETA-G20	AFCI：F-I-AFPE-1-2/2-2	F (Full coverage): Full-coverage inverter PV input ports I (Integrated): Integrated into the inverter AFPE（arc fault protection equipment）：Combines the two AFCI Detection functions: AFD and AFI 1：One pair of PV input terminals (PV+, PV−) connects to one PV string 2/2：Each AFCI Detection channel has two MPPT inputs; 2：Two AFCI Detection channels
GW25K-ETA-G20 GW29.999K-ETA-G20 GW30K-ETA-G20	AFCI：F-I-AFPE-1-2/4-2	F (Full coverage): Full-coverage inverter PV input ports I (Integrated): Integrated into the inverter AFPE（arc fault protection equipment）：Combines the two AFCI Detection functions: AFD and AFI 1：One pair of PV input terminals (PV+, PV−) connects to one PV string 2/4：One AFCI Detection channel has two MPPT inputs; one AFCI Detection channel has four MPPT inputs; 2：Two AFCI Detection channels

Three-phase unbalanced output

Both the inverter grid connection terminal and theBACK-UPterminal support three-phase unbalanced output, allowing loads with different power ratings to be connected to each phase. The maximum output power per phase for each model is shown in the table below:

No.	Model	Maximum output power per phase
1	GW5K-ETA-G20 GW5K-BTA-G20	2.5kW
2	GW6K-ETA-G20 GW6K-BTA-G20	3kW
3	GW8K-ETA-G20 GW8K-BTA-G20	4kW
4	GW9.999K-ETA-G20 GW9.999K-BTA-G20	5kW
5	GW10K-ETA-G20 GW10K-BTA-G20	5kW
6	GW12K-ETA-G20 GW12K-BTA-G20	6kW
7	GW15K-ETA-G20 GW15K-BTA-G20	7.3kW
8	GW20K-ETA-G20 GW20K-BTA-G20	7.3kW
9	GW25K-ETA-G20 GW25K-BTA-G20	11kW
10	GW29.999K-ETA-G20 GW29.999K-BTA-G20	11kW
11	GW30K-ETA-G20 GW30K-BTA-G20	11kW

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 Check and Storage

3.1 Equipment Inspection

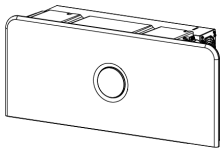
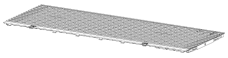
Before accepting the product, carefully check the following:

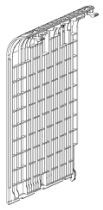
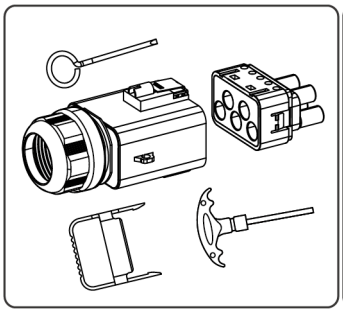
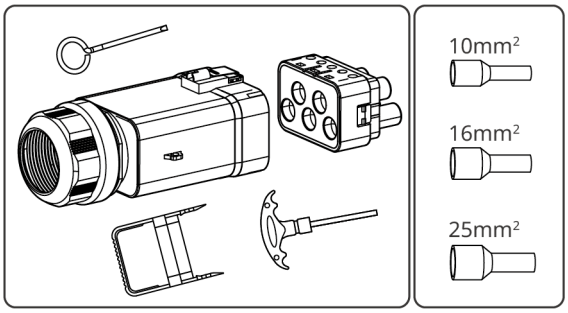
1. Check the outer packaging for damage, such as deformation, holes, cracks, or any other signs that the equipment inside may have been damaged. If damage is found, do not open the package and contact your distributor or after-sales service center.
2. Check that the equipment model is correct. If it 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.

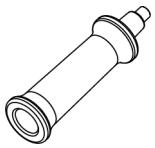
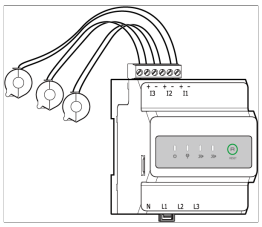
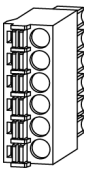
3.2 Delivered Items

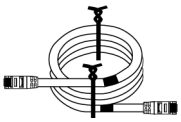
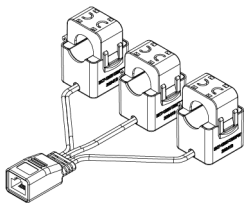
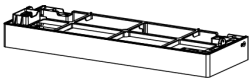
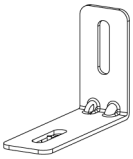
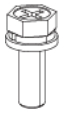
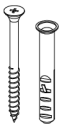
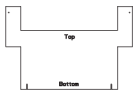
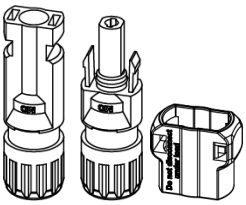
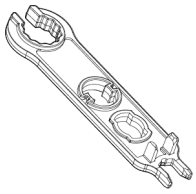
⚠WARNING
Check that the types and quantities of delivered items are correct and that they are undamaged. If any item is damaged, contact your distributor. After removing the delivered items from the packaging, do not place them on rough, uneven, or sharp surfaces to avoid damaging the paint.

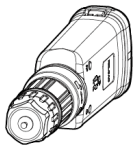
3.2.1 Inverter Deliverables

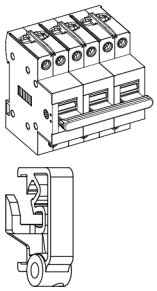
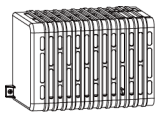
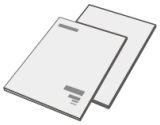
Part	Description	Part	Description
	Inverter x 1		Decorative cover top x 1

Part	Description	Part	Description
	Decorative cover left x 1		Decorative cover right x 1
 or 			AC terminal kit x 2 • AC wiring terminal x 2 • PIN terminal x N ◦ 5-20kW: ▪ 4mm² x 5 ▪ 6mm² x 5 ▪ 10mm² x 5 ▪ 16mm² x 5 ◦ 25-30kW: ▪ 10mm² x 5 ▪ 16mm² x 5 ▪ 25mm² x 5

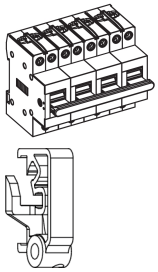
Part	Description	Part	Description
	Handle x 2		GMK330 Smart Meter x N • GW5K-ETA-G20 , GW6K-ETA-G20 , GW8K-ETA-G20, GW6K-EHA-G20, GW9.999K-ETA-G20, GW10K-ETA-G20, GW12K-ETA-G20, GW15K-ETA-G20, GW20K-ETA-G20, GW25K-ETA-G20, GW29.999K-ETA-G20, GW30K-ETA-G20 x 0 • GW5K-BTA-G20, GW6K-BTA-G20, GW8K-BTA-G20, GW9.999K-BTA-G20, GW10K-BTA-G20, GW12K-BTA-G20, GW15K-BTA-G20, GW20K-BTA-G20, GW25-BTA-G20, GW29.999K-BTA-G20, GW30K-BTA-G20 x 1
	OT grounding terminal x 1		6-pin communication terminal x 2

Part	Description	Part	Description
	2-pin communication terminal x 2		PIN terminal x 16
	CT connection cable x 1		CT x 1
	Battery base x 1		Adjustable foot x 4
	Anti-tip bracket x 4		M5*16 screw x 9
	M5*60 expansion screw x 4		Drilling marking paper x 2
			PV terminal unlocking tool x N N: China region x 0; other regions x 1.

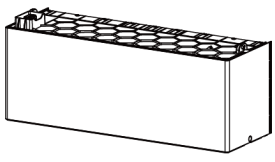
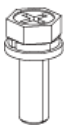
Part	Description	Part	Description
	PV terminal and PV terminal anti-tamper cover • GW5K-ETA-G20 , GW6K-ETA-G20 , GW8K-ETA-G20, GW6K-EHA-G20：3 • GW9.999K-ETA-G20, GW10K-ETA-G20, GW12K-ETA-G20, GW15K-ETA-G20, GW20K-ETA-G20, GW25K-ETA-G20, GW29.999K-ETA-G20, GW30K-ETA-G20：4 • GW5K-BTA-G20, GW6K-BTA-G20, GW8K-BTA-G20, GW9.999K-BTA-G20, GW10K-BTA-G20, GW12K-BTA-G20, GW15K-BTA-G20, GW20K-BTA-G20, GW25-BTA-G20, GW29.999K-BTA-G20, GW30K-BTA-G20：0		Smart Dongle x 1

Part	Description	Part	Description
	• (Australia only) Manual transfer switch x1 • Manual transfer switch lock x N Note: Only used in single-unit scenarios.		Cable cover x N N: Standard in Australia; optional in Europe.
	Product documentation x 1	-	-

(Europe only) Manual transfer switch

Component	Description
	• Manual transfer switch x1 • Manual transfer switch latch x1 Note: For standalone use only. If needed, contact your dealer to purchase.

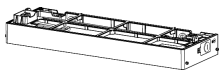
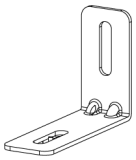
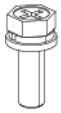
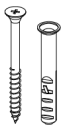
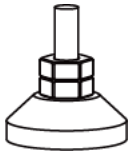
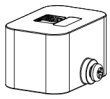
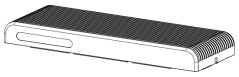
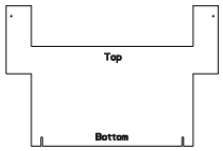
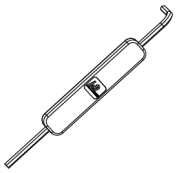
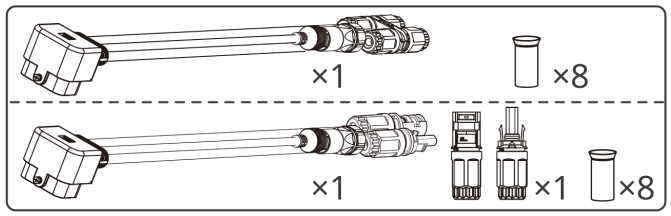
3.2.2 Batteries Deliverables (Lynx D G2)

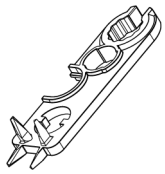
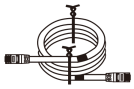
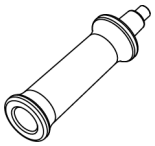
Part	Description	Part	Description
	Battery x 1		M5*16 screw x 2
	Silicone cap x 2	-	-

3.2.2.1 Battery Expansion Kit Deliverable (Optional)

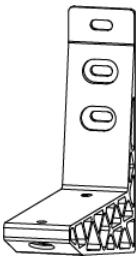
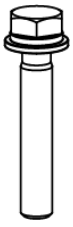
NOTICE

The system supports 5-108kWh. A single column can stack up to 6 batteries. If there is more energy demand, or other scenarios requiring capacity expansion such as reducing the stacking height of a single column due to installation conditions, please contact GoodWe or a dealer to purchase a battery expansion kit.

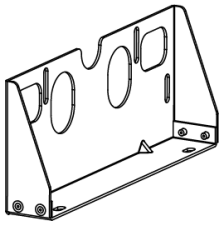
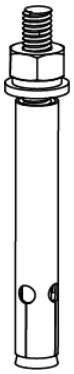
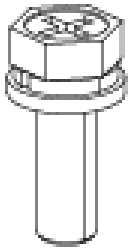
Part	Description	Part	Description
	Base x 1		locking bracket x 4
	M5 screws x 7		M6 expansion screws x 4
	Adjustable feet x 4		OT grounding terminal x 1
	Terminal resistor x 1		Battery decorative cover x 1
	Drilling marking paper x 2		Hex wrench x 1
			Battery expansion wiring harness x 1

Part	Description	Part	Description
	Unlocking tool x N		3m battery expansion connection positive wire harness x 1
	3m battery expansion connection negative wire harness x 1		Battery expansion network cable x 1
	Silicone cap x 2		Handle x 2
	Product documentation x 1	-	-

3.2.2.2 Battery Rack Deliverable (Optional)

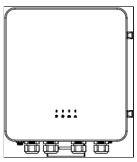
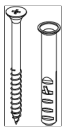
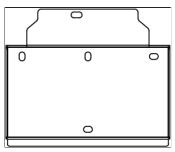
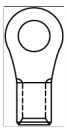
Component	Description	Component	Description
	Mounting bracket x 2		M10 expansion bolt x 6
	M10 screw x 4	-	-

3.2.2.3 Floor-Mounted Standoff Bracket (Optional)

Part	Description	Part	Description
	Floor-Mounted Standoff Bracket x 2		M6 expansion bolts x 4
	M5 mounting screws x 4	-	-

3.2.3 STS deliverable

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

component	Description	component	Description
	Static Transfer Switch Cabinet ×1		Expansion bolts ×6
	Back Mounting Plate ×1		Neutral terminal ×4

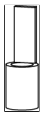
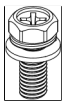
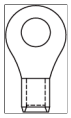
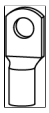
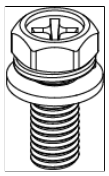
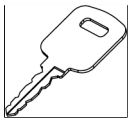
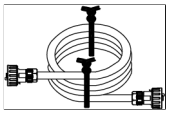
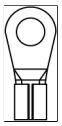
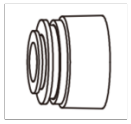
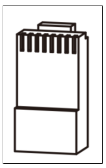
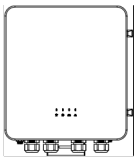
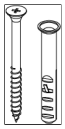
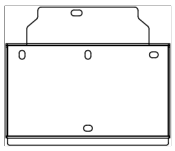
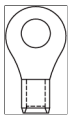
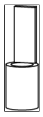
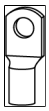
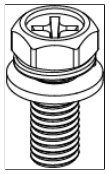
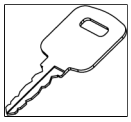
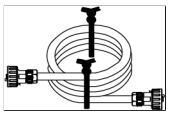
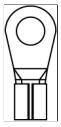
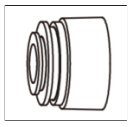
component	Description	component	Description
	63A AC terminal × 16		Neutral line locking screws ×4
	63A ground terminal ×4		Ground terminal screws × 4
	M8 enclosure grounding OT terminal × 1		Enclosure grounding screw ×1
	Communication waterproof ring ×1		Cabinet door keys × 2
	ESA three-phase integrated machine communication conversion cable × 1		Inverter communication cable × 1
	100A Grounding Terminal ×4		Gland sealing ring ×4
	Communication RJ45 connector ×2		Manual ×1

Table43 GW30K-STS-G10-Australia Region

component	Description	component	Description
	Static Transfer Switch Cabinet ×1		Expansion bolts ×6
	Back Mounting Plate ×1		63A ground terminal ×4
	63A AC terminal × 16		Ground terminal screws × 4
	M8 enclosure grounding OT terminal × 1		Enclosure grounding screw ×1
	Communication waterproof ring ×1		Cabinet door keys × 2
	ESA three-phase integrated machine communication conversion cable × 1		Inverter communication cable × 1
	100A Grounding Terminal ×4		Gland sealing ring ×4

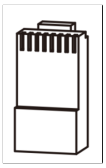
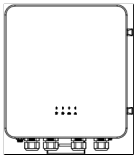
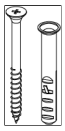
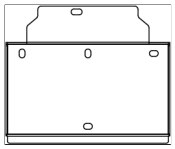
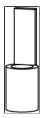
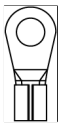
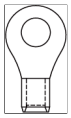
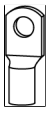
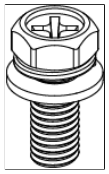
component	Description	component	Description
	Communication RJ45 connector ×2		Manual ×1

Table44 GW30K-STS-G10-Other Regions

component	Description	component	Description
	Static Transfer Switch Cabinet ×1		Expansion bolts ×6
	Back Mounting Plate ×1		100A AC terminals × 12
	63A AC terminals ×4		100A Grounding Terminal ×4
	63A ground terminal ×4		Ground terminal screws × 4
	M8 enclosure grounding OT terminal × 1		Enclosure grounding screw ×1

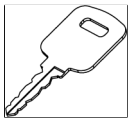
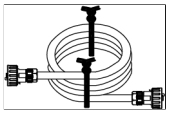
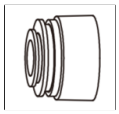
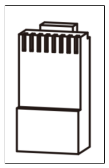
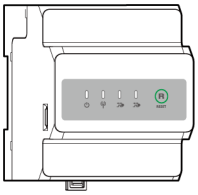
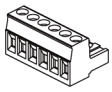
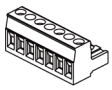
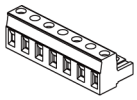
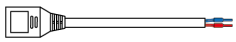
component	Description	component	Description
	Communication waterproof ring ×1		Cabinet door keys × 2
	ESA three-phase integrated machine communication conversion cable × 1		Inverter communication cable × 1
	Gland sealing ring ×4		Communication RJ45 connector ×2
	Manual ×1	-	-

Table45 GW60K-STS-G10-Other Regions

3.2.4 Smart Meter Delivery Set GM330&GMK330

3.2.4.1 Attachment List

Component	Instructions	Component	Instructions
	Smart Meterx1 GMK330:CT×3; GMK360: CT×6; GM330: CT x 0。		2PIN connector x1 Applicable to GM330.

Component	Instructions	Component	Instructions
	6PIN communication terminal x1 Applicable to GM330.		7PINcommunication terminal x1 Applicable to GM330.
	Electricity meter Applicable to GMK330/GMK360.		RS485communication terminal x 1
	2PINterminal andRJ45terminal adapter cable x 1		screwdriver x1
	PIN terminal GMK330/GMK360: x 5 ; GM330: x 6。		Product Documentation x 1

3.3 Storage

- If the inverter has been stored for more than two years or has not been in operation for more than 6 months after installation, it is recommended that it be inspected and tested by professionals before being put into use.
- To ensure good electrical performance of the internal electronic components of the inverter, it is recommended to power it on once every 6 months during storage; if it has not been powered on for more than 6 months, it is recommended that it be inspected and tested by professionals before being put into use.
- To ensure battery performance and service life, avoid long-term idle storage. Long-term storage may cause deep discharge of the battery, resulting in irreversible chemical loss, leading to capacity attenuation or even complete failure, so use it promptly. If the battery needs long-term storage, perform maintenance according to the following requirements:

NOTICE

[1] The storage time is calculated from the SN date on the battery outer packaging. After the storage period is exceeded, charge/discharge maintenance is required. (Battery maintenance time = SN date + charge/discharge maintenance cycle). For how to check the SN date, see: 10.3.Battery SN Code Meaning(Page 352).
[2] After passing charge/discharge maintenance, if the outer box is affixed with a Maintaining Label, please update the maintenance information on the Maintaining Label. If there is no Maintaining Label, please record the maintenance time and battery SOC yourself and keep the data properly for preservation of maintenance records.

Battery Model	Initial SOC Range for Battery Storage	Recommended Storage Temperature	Charge/Discharge Maintenance Cycle[1]	Battery Maintenance Method[2]
GW5.1-BAT-D-G20	30~40%	0~35℃	-20~35℃, 12 months 35~45℃, 6 months	For maintenance methods, please consult your dealer 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℃, 12 months 35~45℃, 6 months 45~55℃, 1 month	
GW9.0-BAT-D-G20				

Packaging requirements:
Ensure that the outer packaging box is not removed and the desiccant inside the box is not lost.
Environmental requirements:

1. Ensure the equipment is stored in a cool place, away from direct sunlight.
2. Ensure the storage environment is clean, with appropriate temperature and humidity ranges, and no condensation. If condensation occurs on the equipment ports, do not install the equipment.
   - Storage humidity range for GW5.1-BAT-D-G20, GW8.3-BAT-D-G20, GW5.1-BAT-D-G21, GW8.3-BAT-D-G21: 5%–95%.
   - Storage humidity range for GW6.0-BAT-D-G20 , GW9.0-BAT-D-G20: 4%–100%.
3. Ensure the equipment is stored away from flammable, explosive, corrosive, and other similar items.
4. Stacking requirements:
   - Ensure the stacking height and direction of the equipment comply with the label instructions on the packaging box.
   - Ensure there is no risk of tipping after stacking.

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

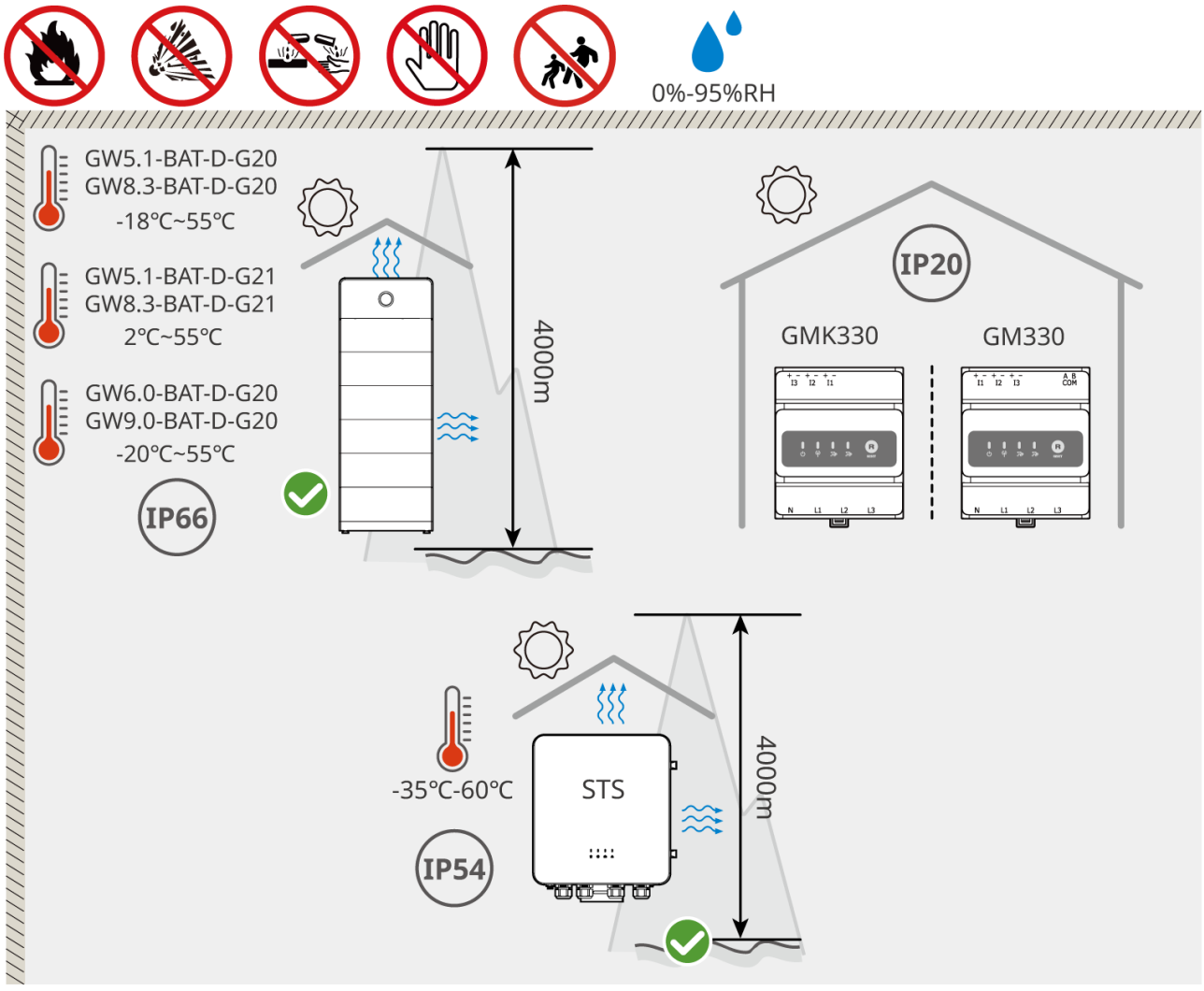
- Inverter Operating Temperature Range: -35°C to 60°C.
- GW5.1-BAT-D-G20, GW8.3-BAT-D-G20: Charging temperature range: -18°C to55°C; discharging temperature range:-20℃-55°C. If installed in an environment below-18℃, the battery may be unable to recharge and recover energy after being depleted, resulting in Battery Undervoltage protection.
- GW5.1-BAT-D-G21, GW8.3-BAT-D-G21: Charging temperature range: 2°C to55°C; discharging temperature range:-20℃-55°C. If installed in an environment below2℃, the battery may be unable to recharge and recover energy after being depleted, resulting in Battery Undervoltage protection.
- GW6.0-BAT-D-G20, GW9.0-BAT-D-G20: Charging temperature range: -20°C to55°C; discharging temperature range:-20℃-55°C. If installed in an environment below -20℃, the battery may be unable to recharge and recover energy after being depleted, 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:
    - 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.
    - Other equipment: Ensure the distance between the equipment and the radio interference device is greater than 30 m.

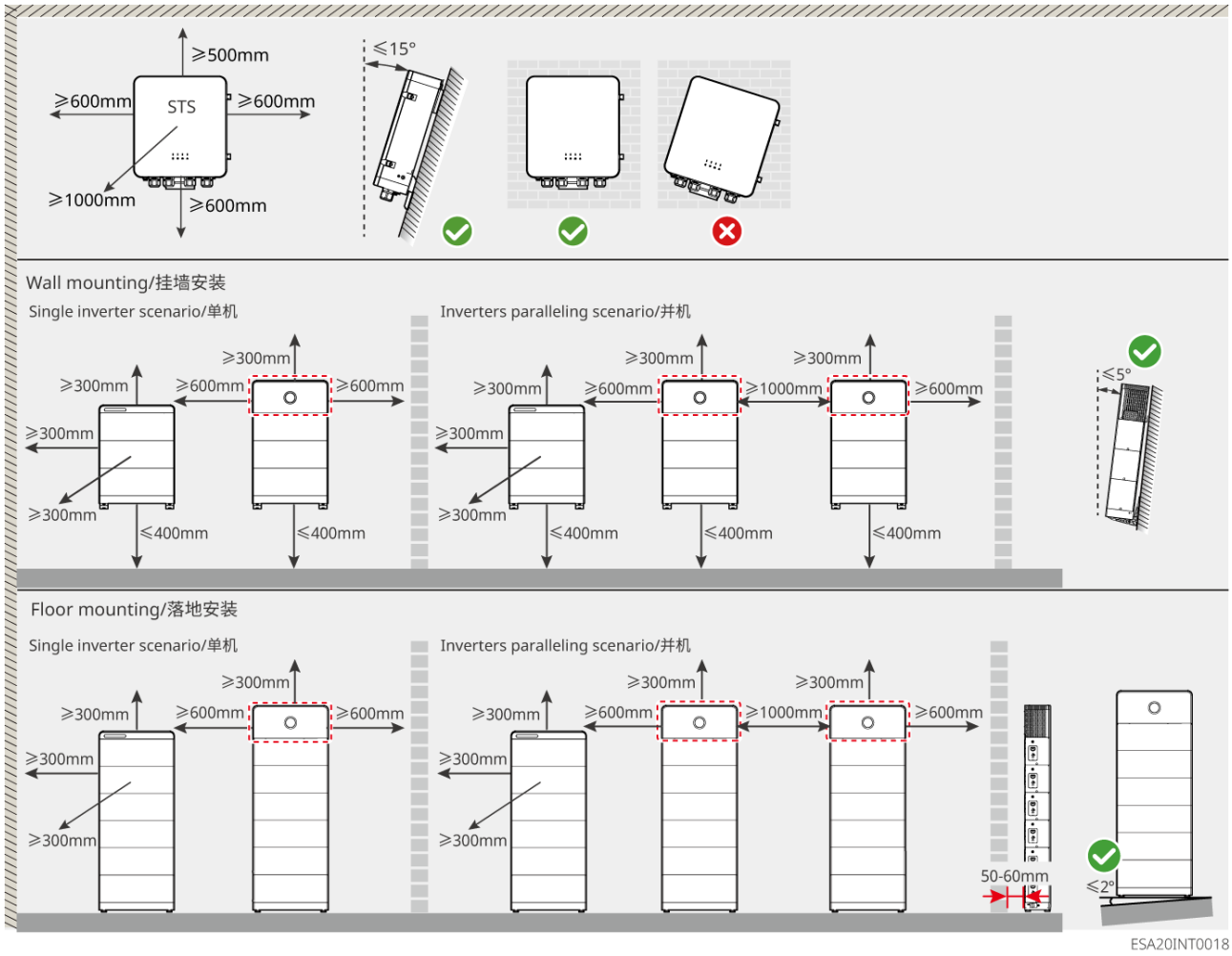


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4.1.2 Installation Space Requirements

1. **Installation Space**

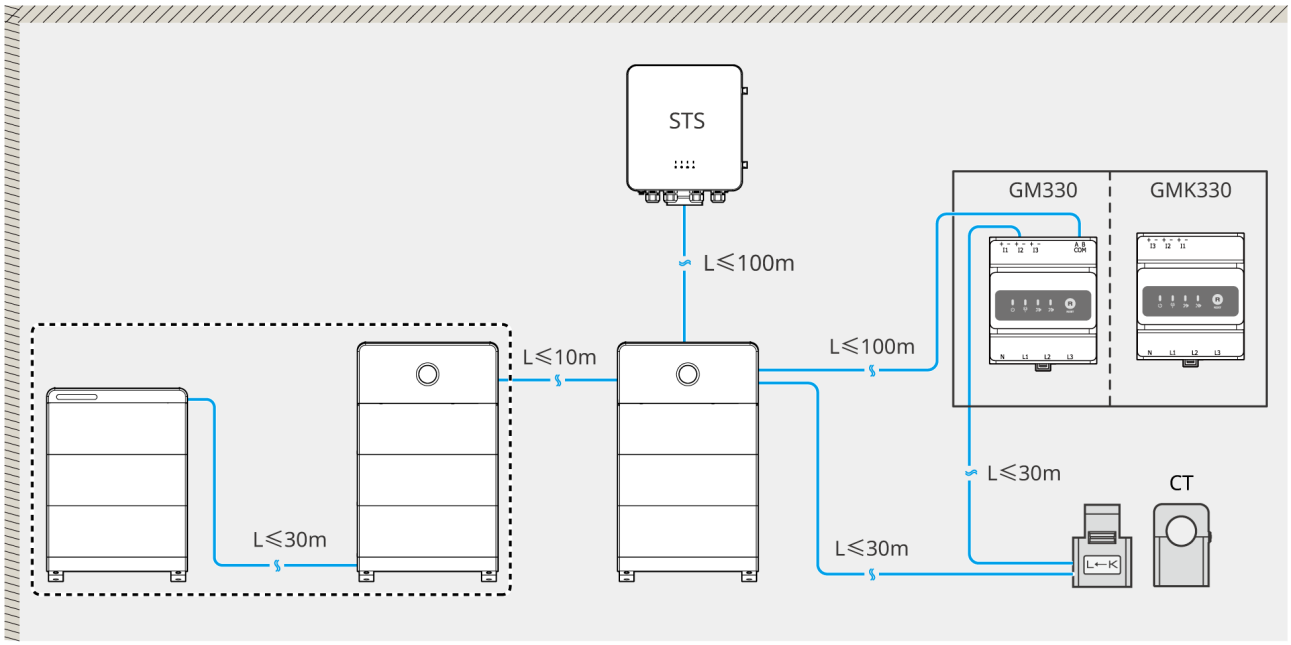
- Ventilation, Heat Dissipation, and Operating Space
  - The installation space must meet the equipment's ventilation and heat dissipation requirements, ensuring sufficient heat dissipation clearance around the equipment.
  - The installation space must meet operating space requirements to facilitate routine inspections, wiring, and maintenance operations.
- The equipment installation height must be convenient for operation and maintenance.



2. **Device Communication Cable Length Requirements**

- When CAT 7E communication cables are used between inverters, the cable distance shall not exceed 10 meters; when CAT 5E or CAT 6E communication cables are used, the cable distance shall not exceed 5 meters. Do not make the communication cable longer than 10 m, otherwise communication anomalies may occur.

- For CT installation, shielded network cables of CAT 5E or higher must be used, and the cable distance shall not exceed 30 meters.
- The RS485 twisted-pair shielded cable for communication between the inverter and the electricity meter shall not exceed 100 meters in cable distance.



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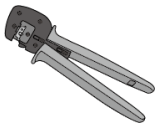
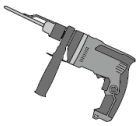
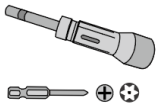
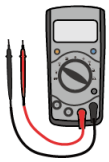
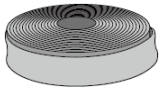
4.1.3 Tool Requirements

NOTICE

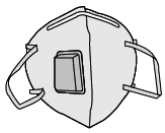
During installation, it is recommended to use the following installation tools. If necessary, other auxiliary tools may be used on-site.

Installation Tools

Tool Type	Description	Tool Type	Description
	diagonal plier		RJ45 connector crimping tool
	wire stripper		Level bar

Tool Type	Description	Tool Type	Description
	open-end wrench		PV terminal crimping tool PV-CZM-61100
	hammer drill (drill bit Φ12mm)		torque wrench M4, M5, M6, M10
	rubber hammer		socket wrench
	marker pen		multimeter Range ≤ 1000V
	heat shrink tubing		heat gun
	cable tie		vacuum cleaner

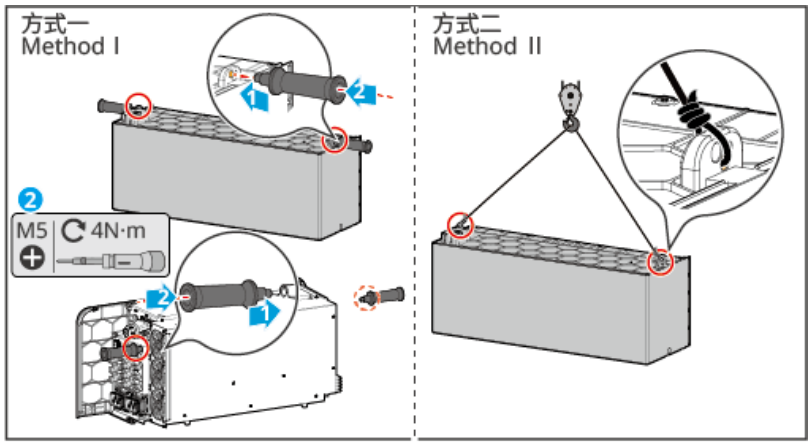
Personal Protective Equipment

Tool Type	Description	Tool Type	Description
	Insulated gloves, protective gloves		Dust mask
	goggle		Safety shoes

4.2 Equipment Handling

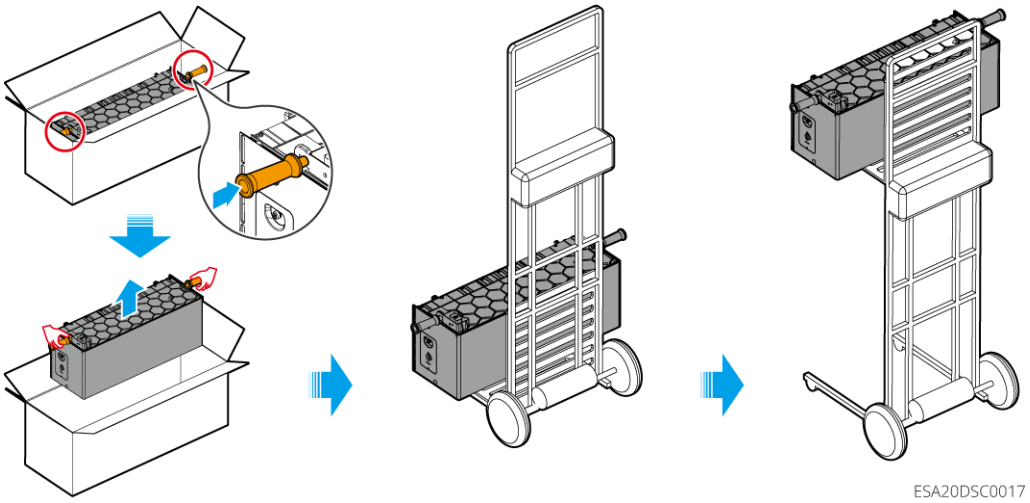
⚠CAUTION

- 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:
        i. GW5.1-BAT-D-G20，GW5.1-BAT-D-G21，GW6.0-BAT-D-G20 ⩾185KG
        ii. GW8.3-BAT-D-G20，GW8.3-BAT-D-G21，GW9.0-BAT-D-G20 ⩾240KG



ESA20INT0013

Method 3



4.3 Install the Device

⚠CAUTION

- When drilling, ensure the drill position avoids water pipes, cables, etc. inside the wall to prevent danger.
- When drilling, wear safety goggles and a dust mask to avoid inhaling dust into the respiratory tract or getting it into your eyes.
- The inverter is installed above the battery; do not install the battery above the inverter.
- When installing the battery system, ensure it is installed level and securely. When placing the battery base, battery, and inverter, confirm that the upper and lower holes are aligned; the anti-tip bracket should be vertically close to the ground, wall, or battery system surface.
- When drilling with a hammer drill, use cardboard or other coverings to shield the battery system to prevent foreign objects from entering the device and causing damage.
- When mounting on a wall, be sure to evaluate the wall's load-bearing capacity to ensure the safety of your life and property.

NOTICE

- The battery must be installed on the base. The base can be installed on the floor or mounted on the mounting bracket.
- For floor installation, up to 4 batteries can be stacked away from the wall, and up to 6 batteries can be stacked against the wall.
- The maximum number of batteries that can be stacked when using a mounting bracket is described below:
  - Same energy stacking:
    - GW5.1-BAT-D-G20, GW5.1-BAT-D-G21: up to 3 batteries.
    - GW8.3-BAT-D-G20, GW8.3-BAT-D-G21: up to 2 batteries.
    - GW6.0-BAT-D-G20: up to 3 batteries.
    - GW9.0-BAT-D-G20: up to 2 batteries.
  - Mixed stacking of different energy levels:
    - When GW5.1-BAT-D-G20, GW5.1-BAT-D-G21, and GW6.0-BAT-D-G20 are mixed and stacked, each system group supports up to 3 batteries.
    - GW8.3-BAT-D-G20, GW8.3-BAT-D-G21, GW9.0-BAT-D-G20, and models stacked in mixed configurations with them, each system group supports up to 2 batteries.
- When mounted against the wall, secure the base, mounting bracket, and the top battery to the wall with anti-tip brackets.
- When marking the drilling positions for mounting bracket installation, have one person hold the base steady while another person uses a marker to mark the drilling positions.
- When installing the battery and inverter, remove the protective caps from the blind-mate connectors before stacking.

Wall-Mounted Installation

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

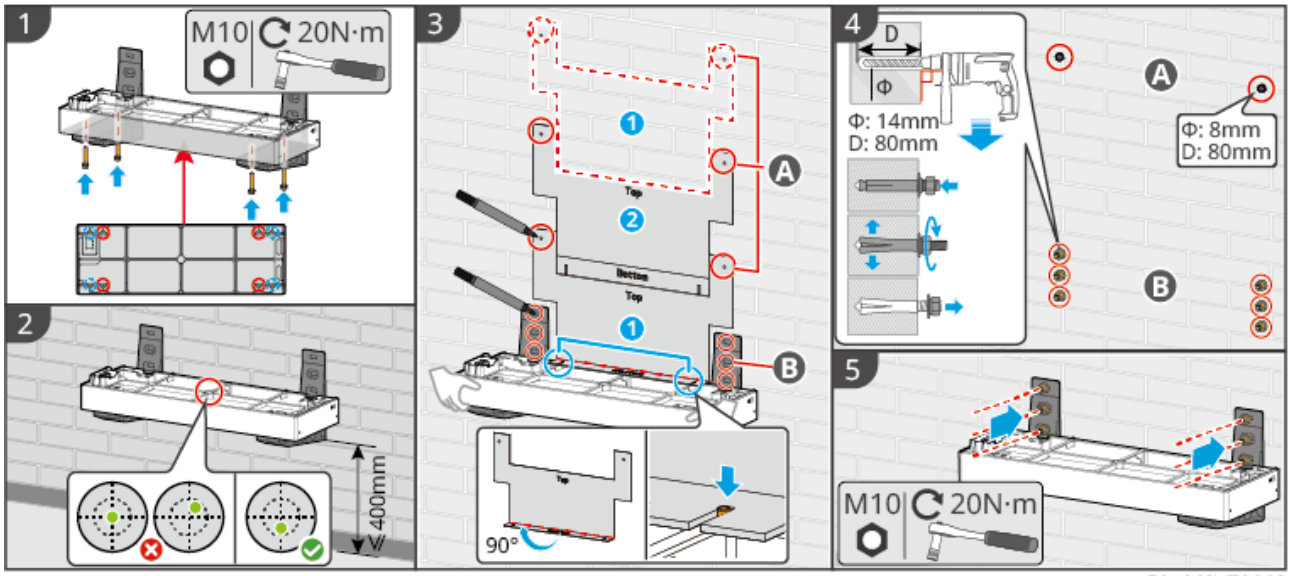
Step 2: Press the bracket firmly against the wall. Make sure the bracket is placed securely and check the bubble level at the center of the base.

Step 3: After adjusting the position and level of the bracket, use a marker to mark the drilling positions. When marking is complete, remove the bracket. (A: PACK fixing holes; B: bracket fixing holes.)

Step 4: Drill holes and install the expansion anchors.

1. Drill the holes with a hammer drill.
2. Clean the holes.
3. Use a rubber mallet to drive the expansion anchors into the holes.
4. Use a hex wrench to tighten the nuts clockwise to expand the anchors.
5. Turn the nuts counterclockwise and remove them.
6. Use a torque screwdriver to secure the anti-tip bracket to the wall.

Step 5: Use a hex wrench to secure the bracket to the wall.



ESA20INT0003

Floor-Standing Installation

Installation Against the Wall

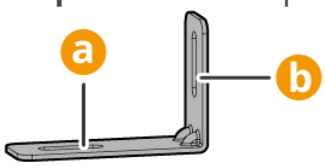
Step 1: Install the adjustable feet on the bottom of the base, and fix the anti-tip bracket to the base.

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

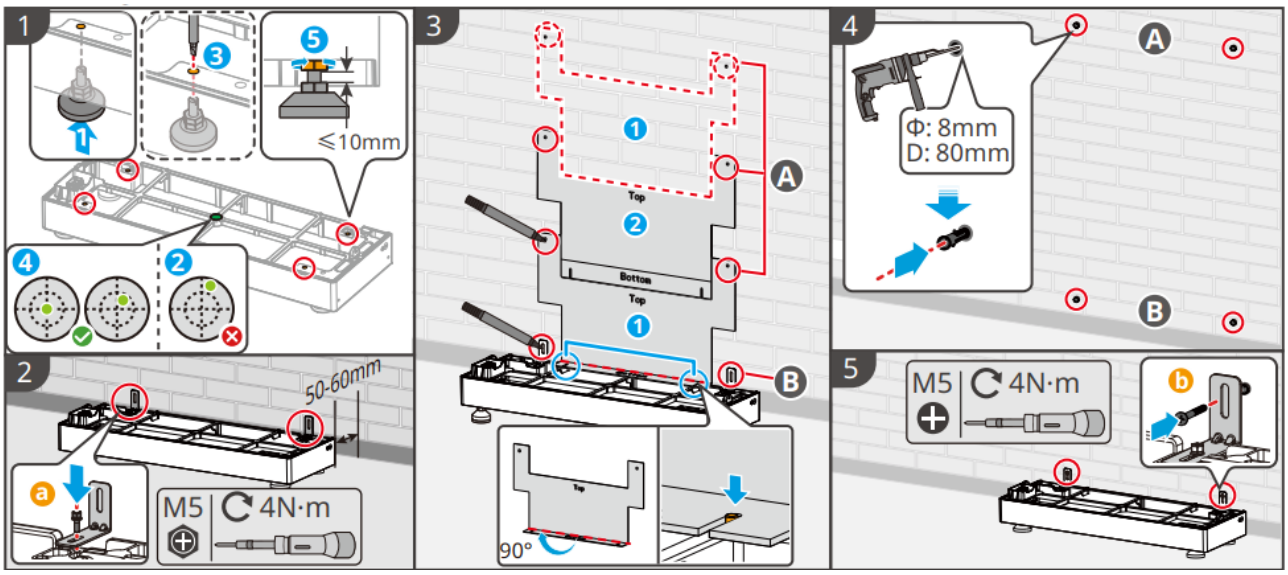
Step 3: After adjusting the position and level of the base, use the drilling template to mark the drilling positions. When marking is complete, remove the base. (A: PACK fixing holes; B: bracket fixing holes.)

Step 4: Drill the holes with a hammer drill and clean the holes.

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



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



Installation Away from the Wall

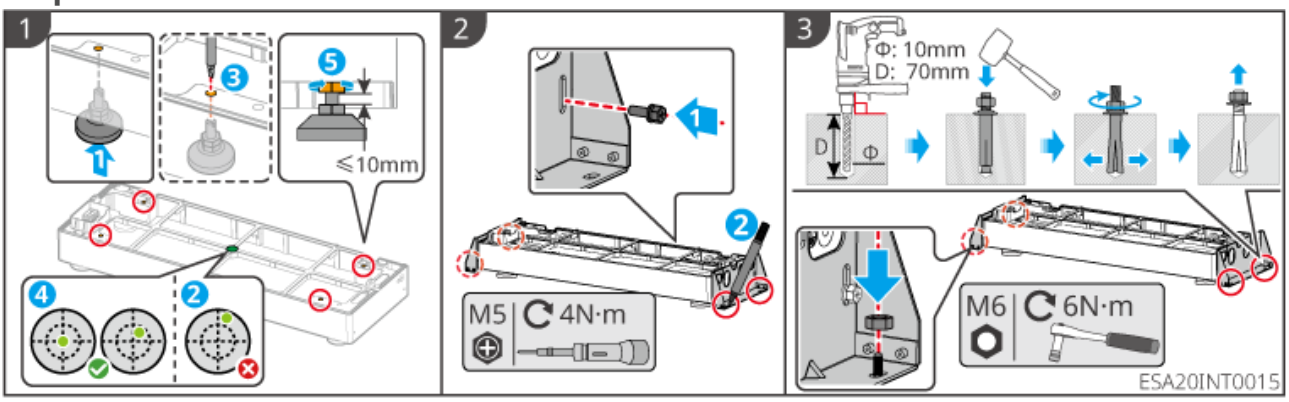
Step 1: Install the adjustable feet on the bottom of the base. Check the bubble level at the center of the base; if the bubble is not centered, use the adjustable feet to level it.

Step 2: After adjusting the position and level of the base, fix the away-from-wall bracket to the base. Select a suitable position and mark the drilling positions. When marking is complete, remove the base.

Step 3: Drill holes and install the expansion anchors.

1. Drill the holes with a hammer drill.
2. Clean the holes.
3. Use a rubber mallet to drive the expansion anchors into the holes.
4. Use a hex wrench to tighten the nuts clockwise to expand the anchors.
5. Turn the nuts counterclockwise and remove them.
6. Use a torque screwdriver to secure the away-from-wall bracket to the floor.

Step 4: Use a hex wrench to secure the base to the floor.

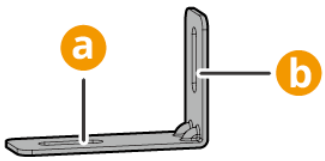


Install the Batteries and Inverter

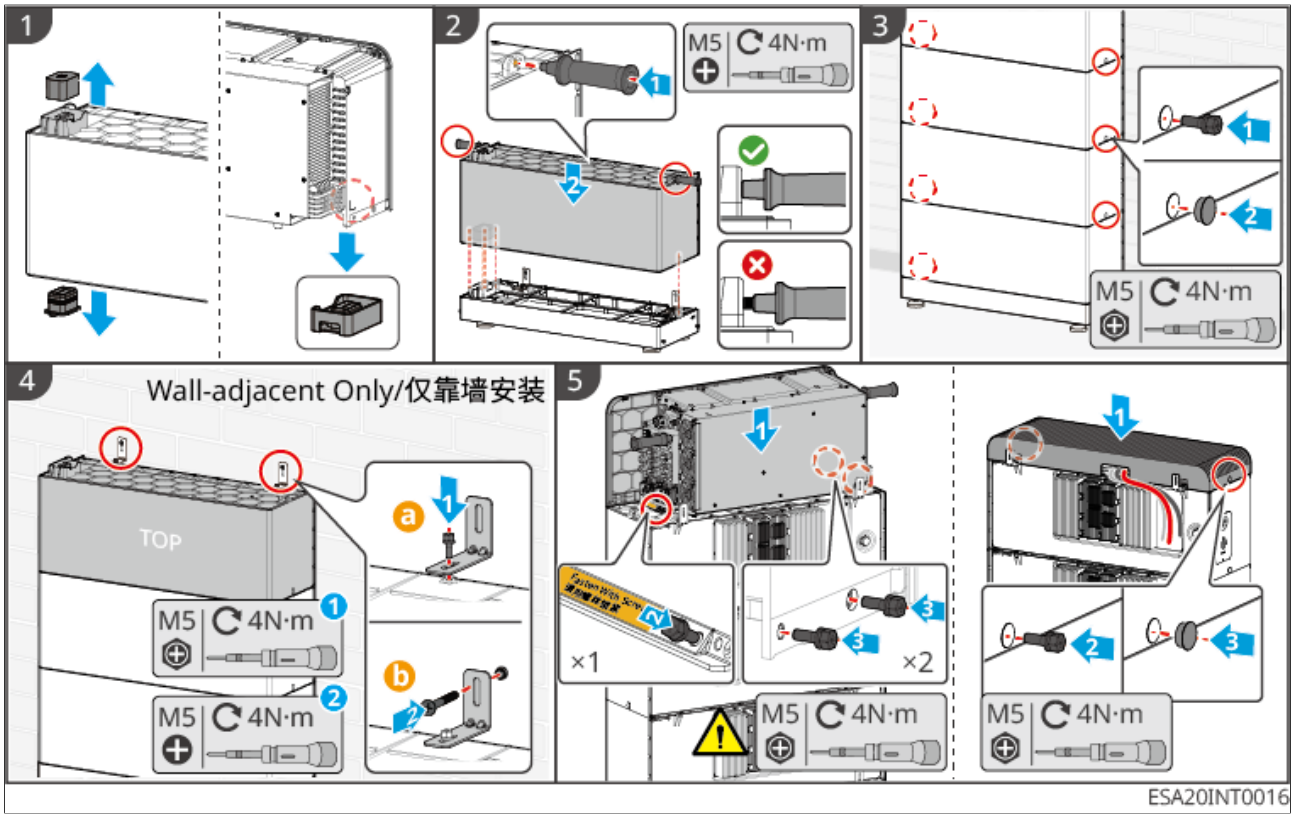
NOTICE
When installing against a wall, the topmost battery must be secured to the wall with an anti-tip bracket.

Step 1: Remove the protective covers on the blind-mate connectors at the bottom of the inverter or battery.
Step 2: Install the handle (optional) and stack the battery onto the base.
If more than 3 batteries are to be installed, use a lifting tool.
Step 3: Tighten the screws between the battery and the base, or between batteries.
To install multiple batteries, repeat **Step1** and **Step2** until all batteries are installed.
The number of stacked batteries must comply with the "2.2.1.System Overall Configuration Description(Page 51)".
Step 4: (Optional) Secure the top battery to the wall using the anti-tip bracket.
Step 5: Install the inverter or the battery trim cover.

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



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



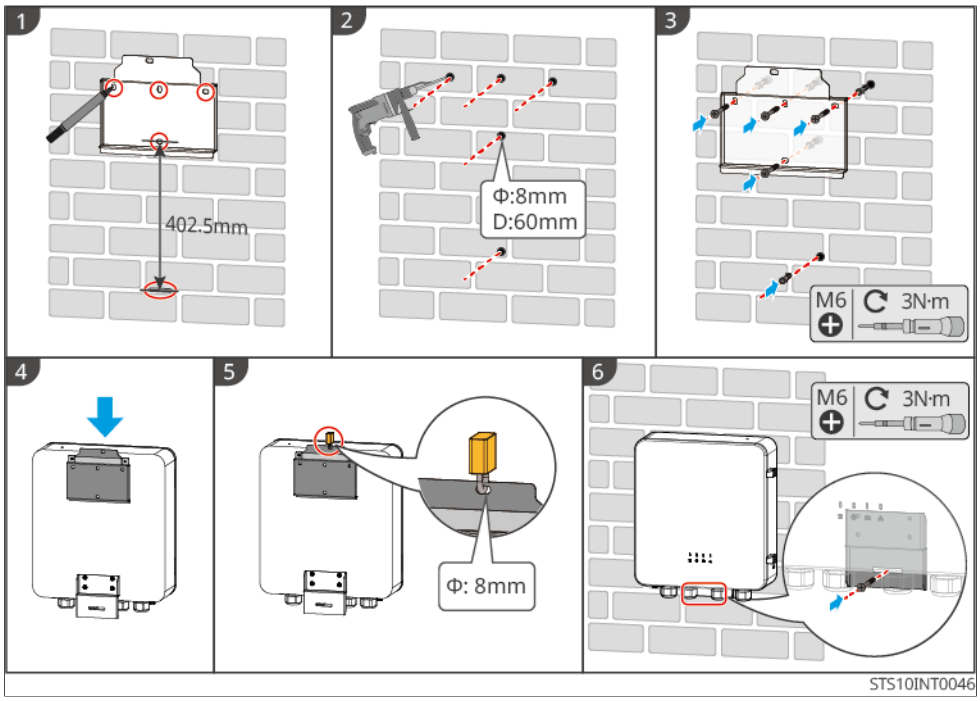
4.4 Install STS

⚠Caution

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

1. Place the backplate horizontally on the wall surface, and use a marker pen to mark the drilling positions.
2. Use an impact drill to drill holes.
3. Secure the back plate to the wall with expansion bolts.

4. Mount the STS on the backplate.
5. Install anti-the ft lock.
6. Secure the mounting bracket to the wall using M6 screws.

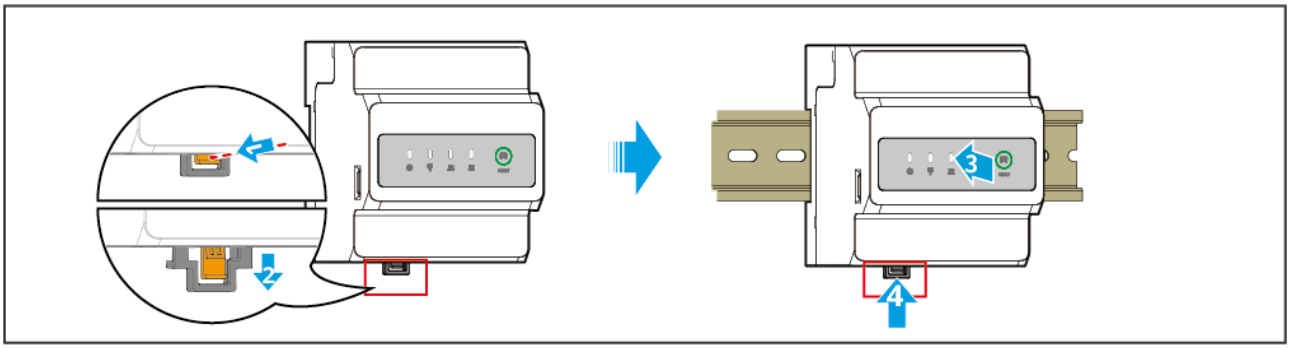


4.5 Installing the Smart Meter

⚠WARNING

In areas with lightning DANGER, if the meter cable length exceeds 10m and the cable is not routed with grounding Steel conduit, it is recommended to install external lightning protection devices.

GM330&GMK330



GMK10INT0003

Step 1: Pull out the buckle at the bottom of the electricity meter.
Step 2: Place the meter on the positioning track and reinstall the buckle onto the meter.

5 system wiring

⚠Danger

- The installation, routing, and connection of cables must comply with local laws, regulations, and code requirements.
- All operations, cables, and component specifications used during the electrical connection process must comply with local laws and regulations.
- Before making electrical connections, disconnect the device's DC Switch and AC output switch to ensure the device is disconnected from power. Never perform operations while energized, otherwise risks such as electric shock may occur.
- Cables of the same type should be bundled together and routed separately from cables of different types. Intertwining or crossing between the m is prohibited.
- If the cable is subjected to excessive tension, it may lead to poor connection. When wiring, please leave a certain length of slack before connecting to the inverter terminal block.
- When crimping the terminal, ensure that the cable conductor is fully in contact with the terminal. Do not crimp the cable insulation together with the terminal, as this may cause the equipment to fail to operate, or generate heat due to unreliable connections after operation, potentially damaging the inverter terminal block.
- This inverter has not been tested and verified in accordance with the AS/NZS 4777.2:2020 standard for multi-phase inverter combinations, the refore such combination schemes should not be adopted.
- For unused cable entry holes and ports (including communication ports), please use the dedicated terminals or plugs provided in the box accessories to reliably seal the m. Otherwise, the following risks may occur:
  - Electric shock hazard: Open electrical ports may cause direct contact with live parts, leading to electric shock accidents.
  - Protection failure: Open ports allow ingress of dust, moisture, or for eign objects, which may cause short circuits, fire, or equipment malfunction.

Note

- When performing electrical connections, please wear personal protective equipment such as safety shoes, protective gloves, and insulating gloves as required.
- Only qualified personnel are allowed to perform electrical connection operations.
- The cable colors in the graphics of this document are for reference only, and specific cable specifications must comply with local regulatory requirements.
- Static Transfer Switch Cabinet (STS) is an optional component applicable only to system standalone scenarios. If required, refer to the wiring method below for connection.

5.1 System Wiring and Electrical Block Diagram

Note

- According to the regulatory requirements of different regions, the wiring methods of N and PE wires for the GRID and BACK-UP ports of the inverter vary, and the specific wiring shall follow local regulations.
- The inverter has a built-in meter and can be directly connected to the CT for use. The CT cable shipped with the unit is 10 meters. If a longer distance is required, a CAT5e or higher shielded cable can be used to extend the connection up to 30 meters.
- CT connection length to inverter exceeding 30m will reduce accuracy. For high accuracy requirements, an external smart meter can be connected.
- The built-in relay of the inverter's GRID AC port is in the open state when the inverter is in off-grid mode, and in the closed state when the inverter is in grid-connected mode.
- When the inverter is powered on, the BACK-UP AC port becomes energized. If maintenance on the BACK-UP load is required, please power off the inverter; otherwise, it may cause electric shock.
- In an all-home backup scenario, if the total power of connected loads exceeds 1.1 times the inverter's Rated Power, after a grid outage, the inverter will stop outputting due to Over load Protection. At this point, please shut down some non-essential loads to ensure that the total power of loads is less than 1.1 times the inverter's Rated Power.

Neutral and PE wires are connected together in the distribution box

Note

- To maintain neutral integrity, the neutral wires of the grid-tied side and off-grid side must be connected together; otherwise, the off-grid function cannot operate normally.
- The following diagram shows a schematic of the power grid system for regions such as Australia and New Zealand:

Type 1:
Whole house backup power

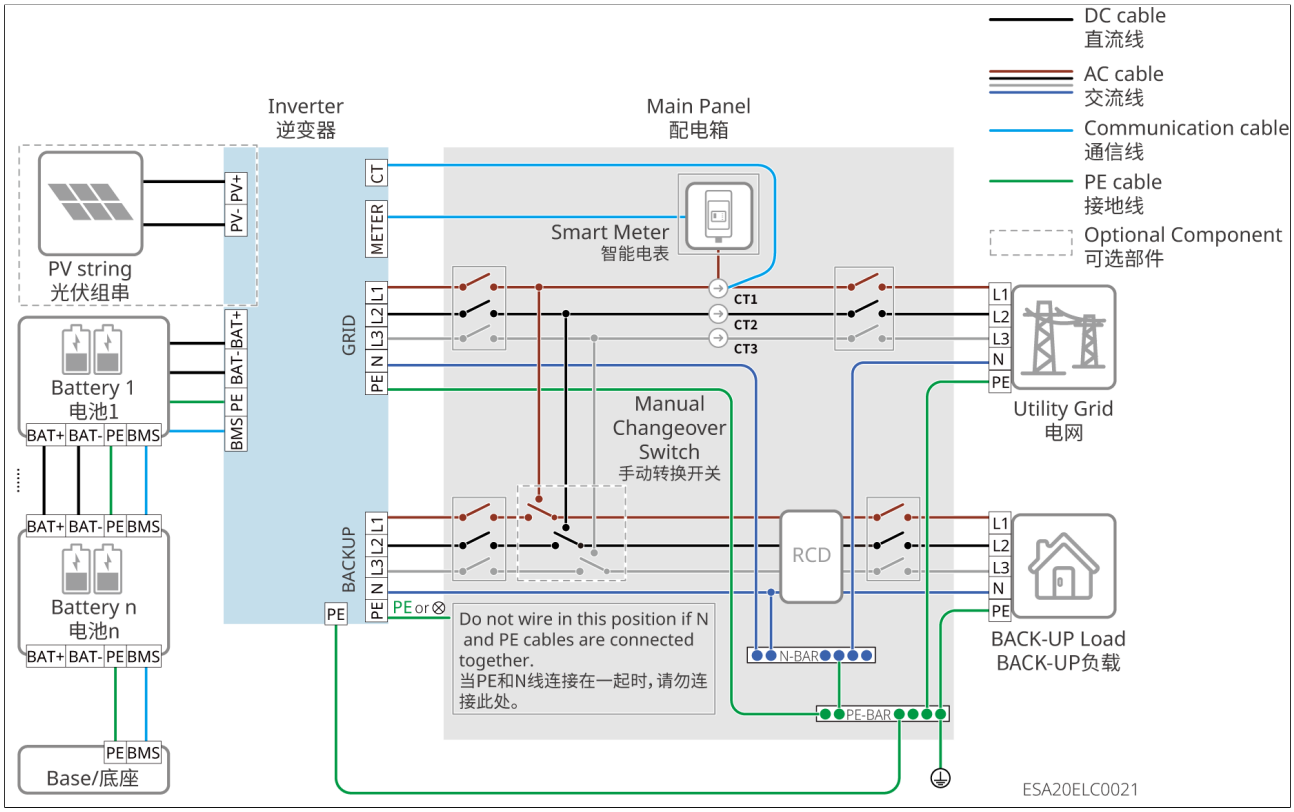


Figure18 Whole house backup power

Partial backup power

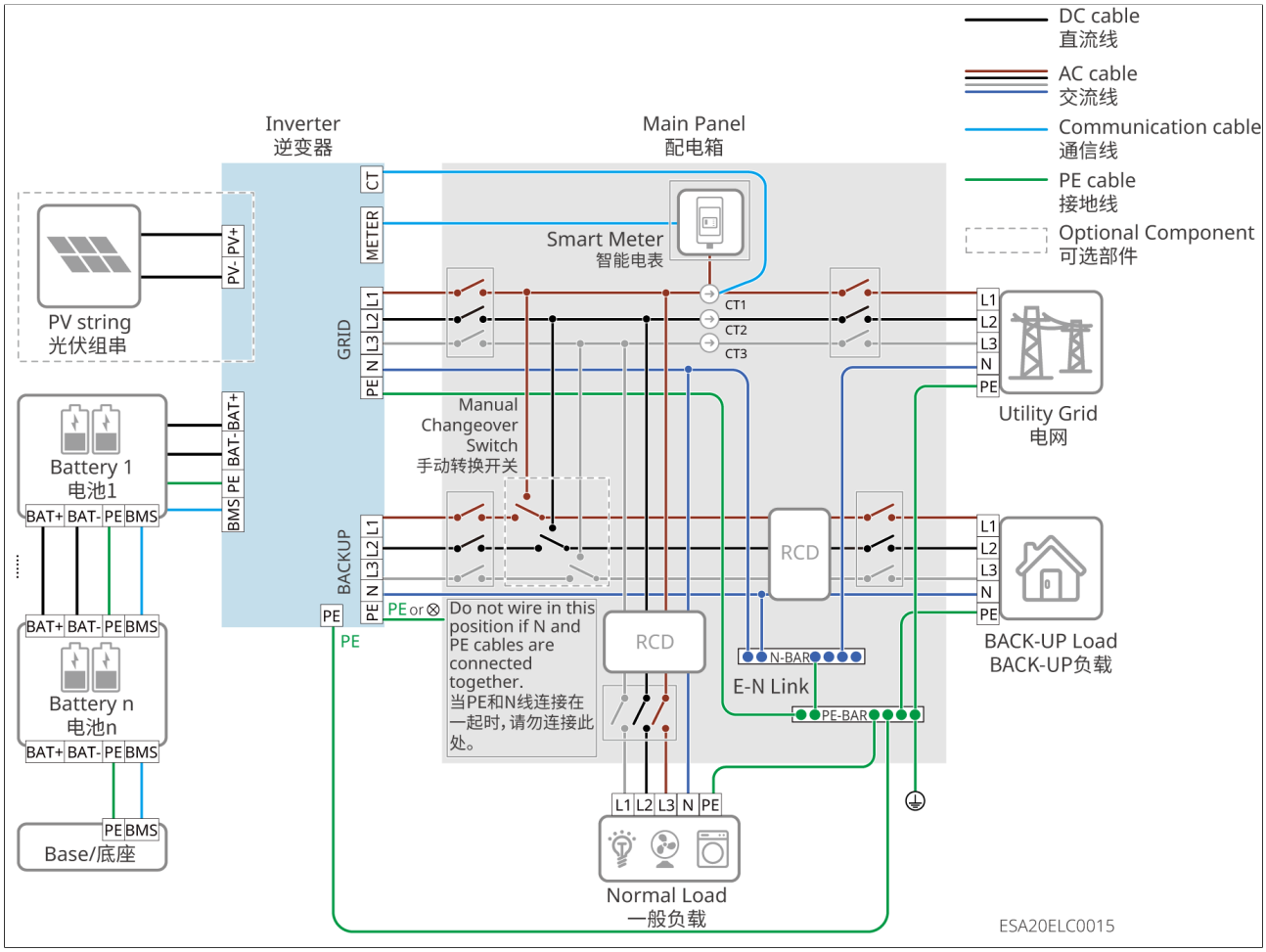


Figure19 Partial backup power

Type 2

Whole house backup power

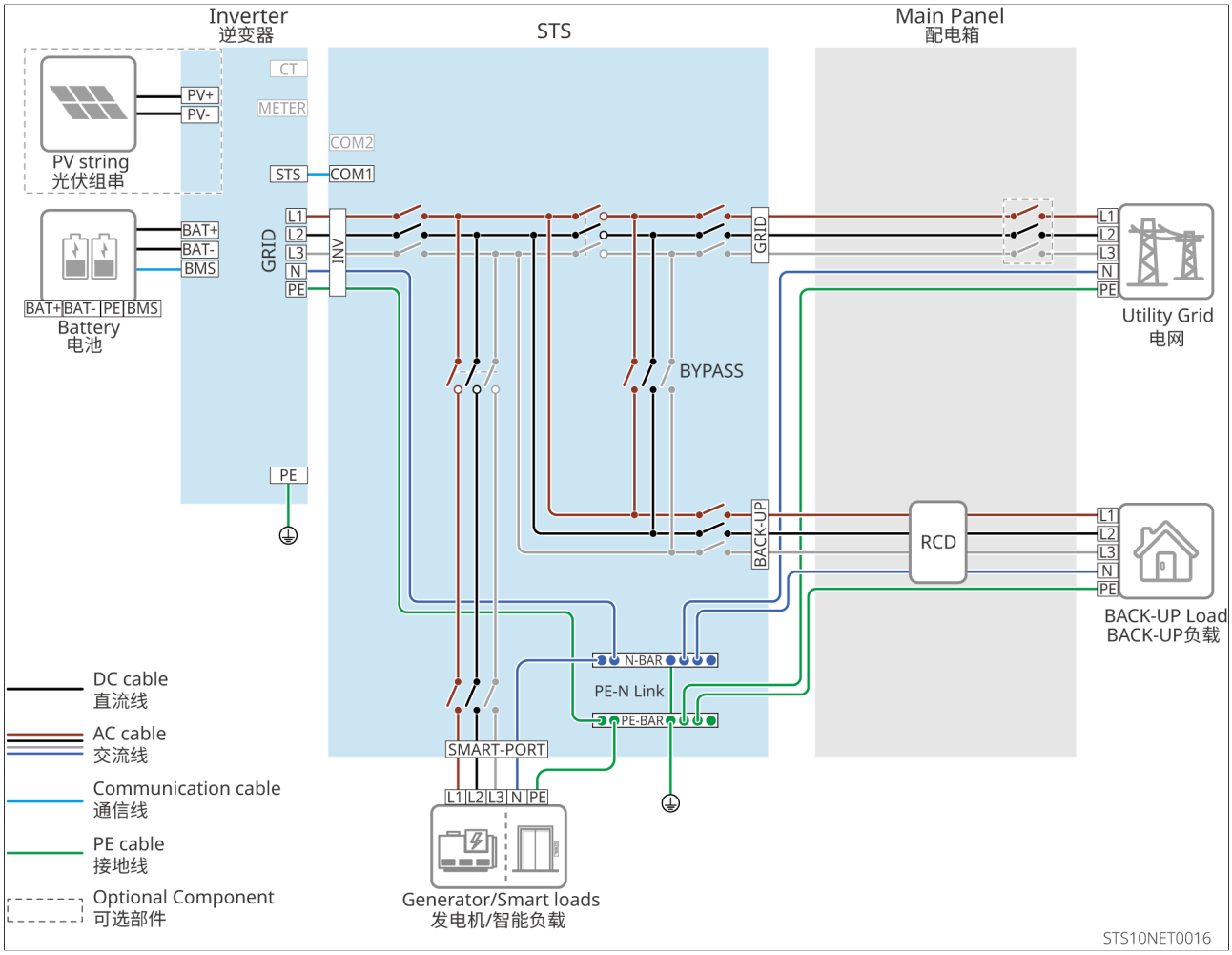


Figure20 with STS whole-house backup power

Partial backup power

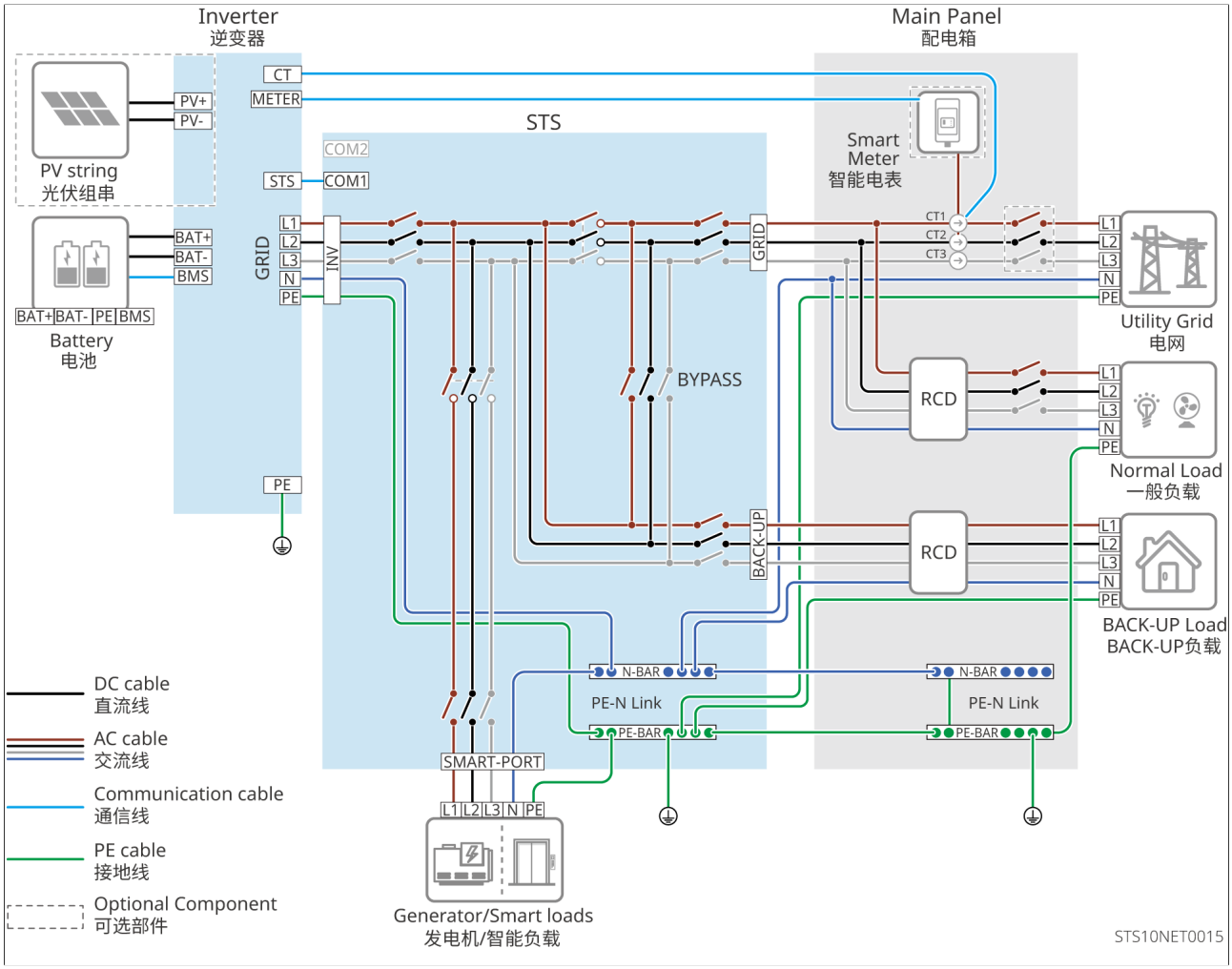


Figure21 with partial backup power for STS

NandPEwires are connected separately in the distribution box

Note

- Please ensure that the Protection ground wire of BACK-UP is correctly and securely connected; otherwise, abnormal operation of the BACK-UP function may occur during a grid fault.
- In a parallel system, do not install Residual Current Protection Devices (RCDs) on the grid-connected branches of each inverter. RCDs should be uniformly installed at the grid summary point.
- Regions other than Australia, New Zealand, etc. are applicable to the following wiring method:

Type I:

Whole house backup power

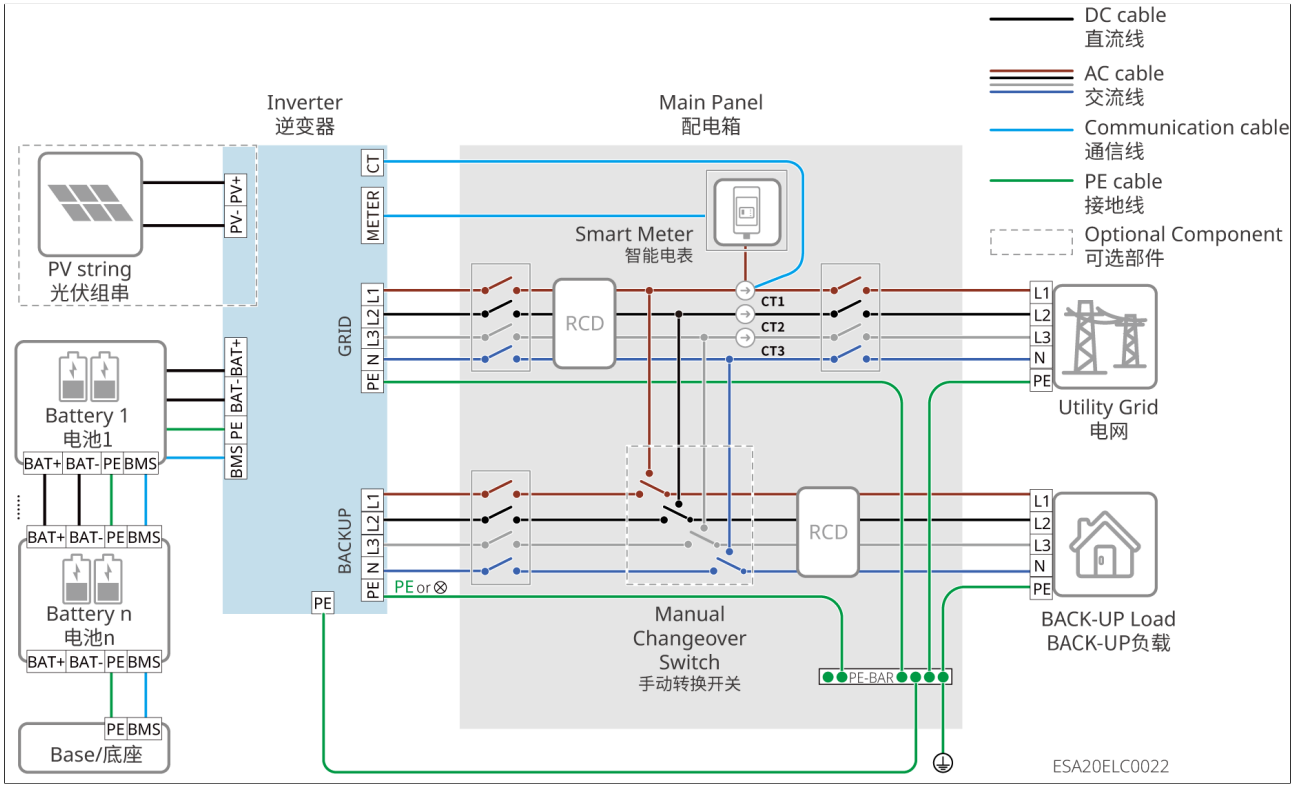


Figure22 Whole house backup power

Partial backup power

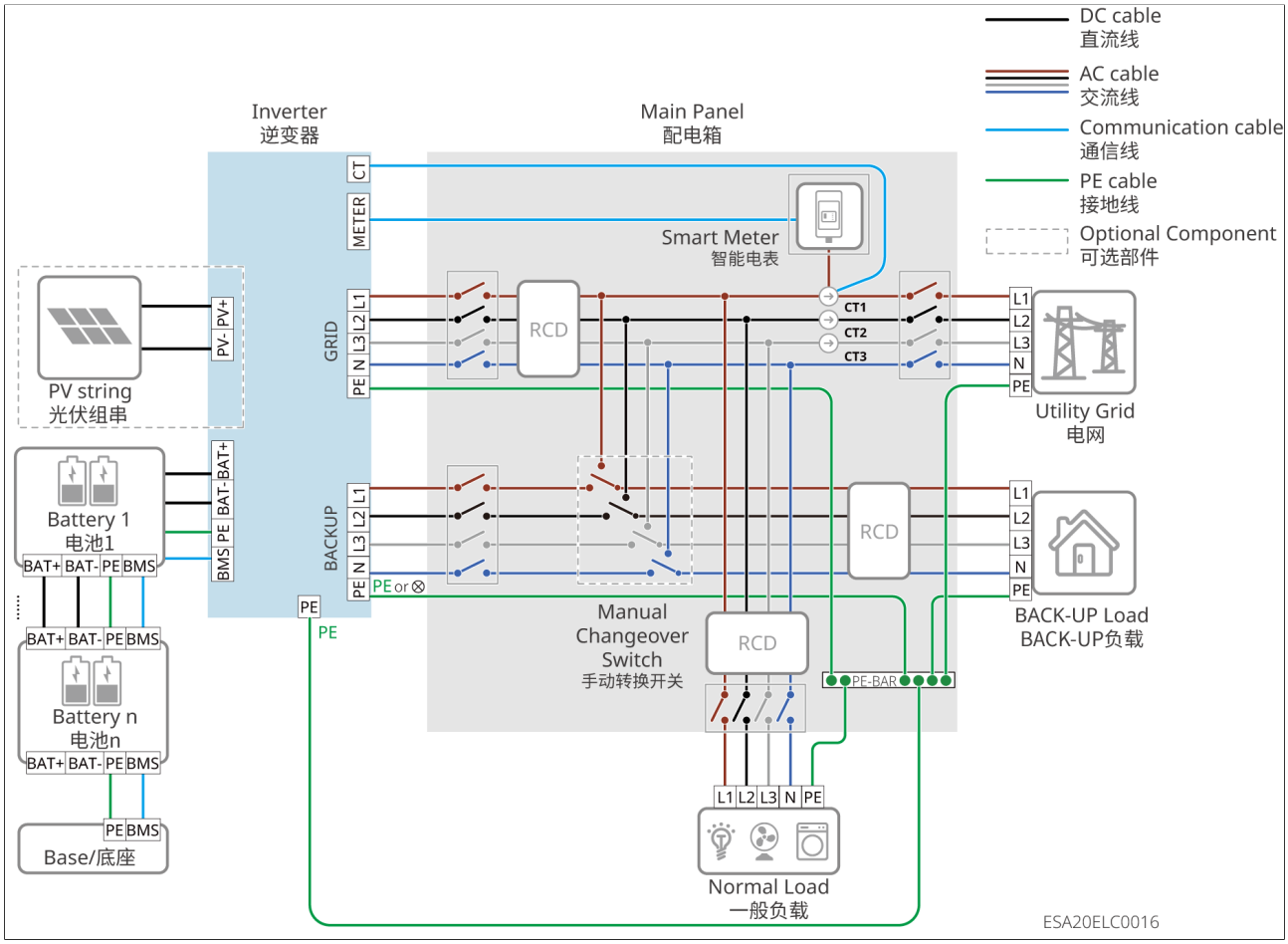


Figure23 Partial backup power

Type 2:

Note
If the inverter does not need to connect the N and PE wires when switching to off-grid mode, this function can be set via the "Backup Power N and PE Relay Switch" in the "Advanced Settings" interface of the App. The following wiring method is applicable to regions other than Australia, New Zealand, etc.:

Whole house backup power

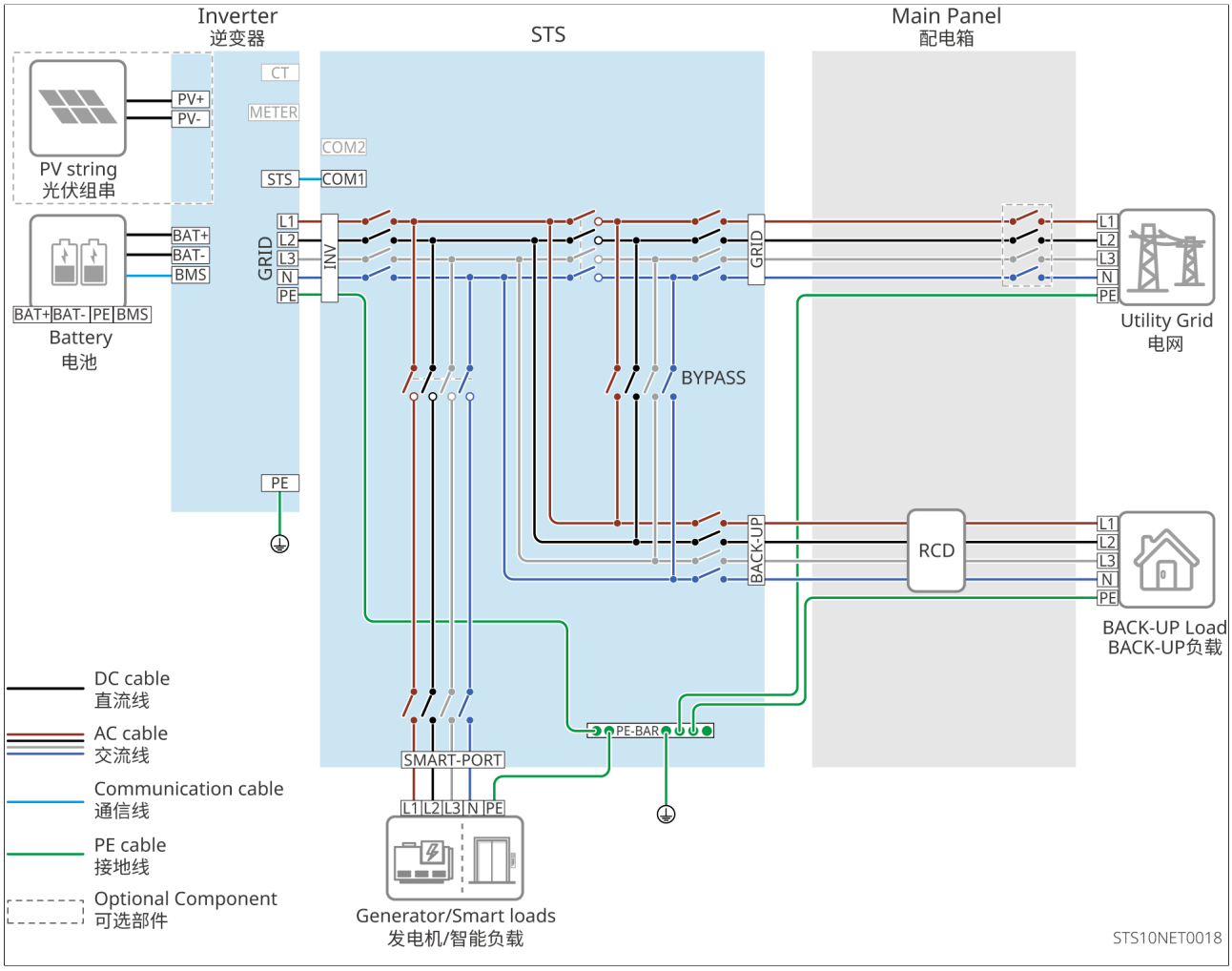


Figure24 with STS whole-house backup power

Partial backup power

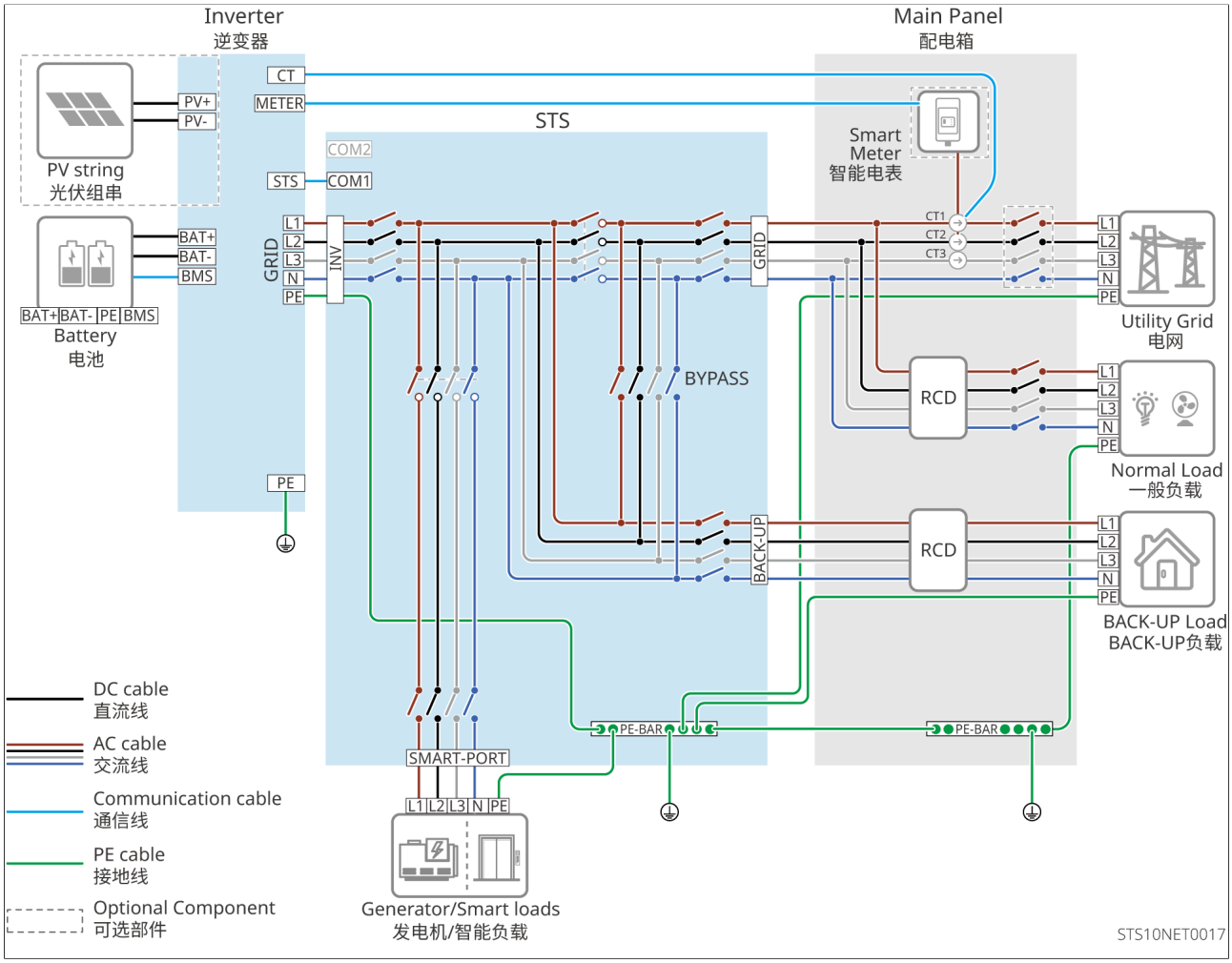
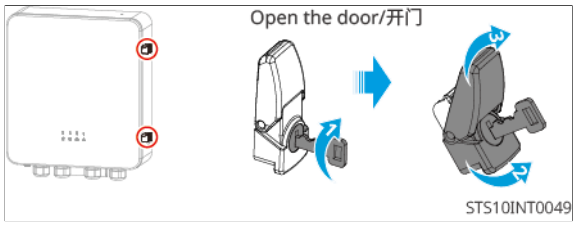


Figure25 with partial backup power for STS

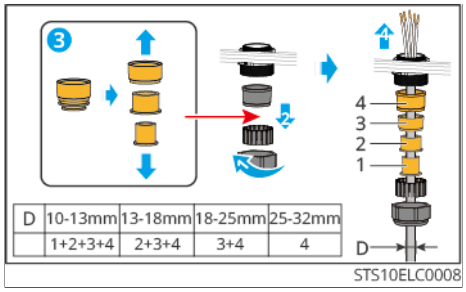
5.2 STS Pre-Wiring Preparation

- **Cabinet door**

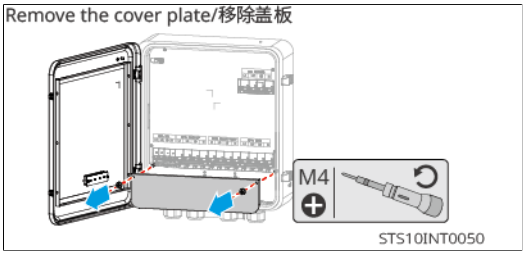


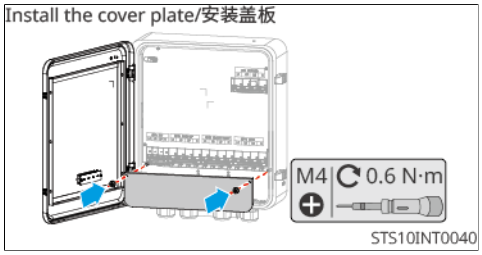


- **Gland operation**

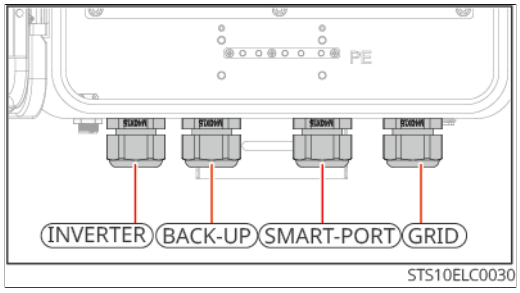


- **Cover plate operation**





- **Wiring schematic**



5.3 Detailed System Wiring Diagram

When the loads in a PV system cannot consume all the power generated by the system, the excess power is fed into the grid. In this case, a smart meter or CT can be used to monitor Energy Generation and control the amount of power fed into the

grid.

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

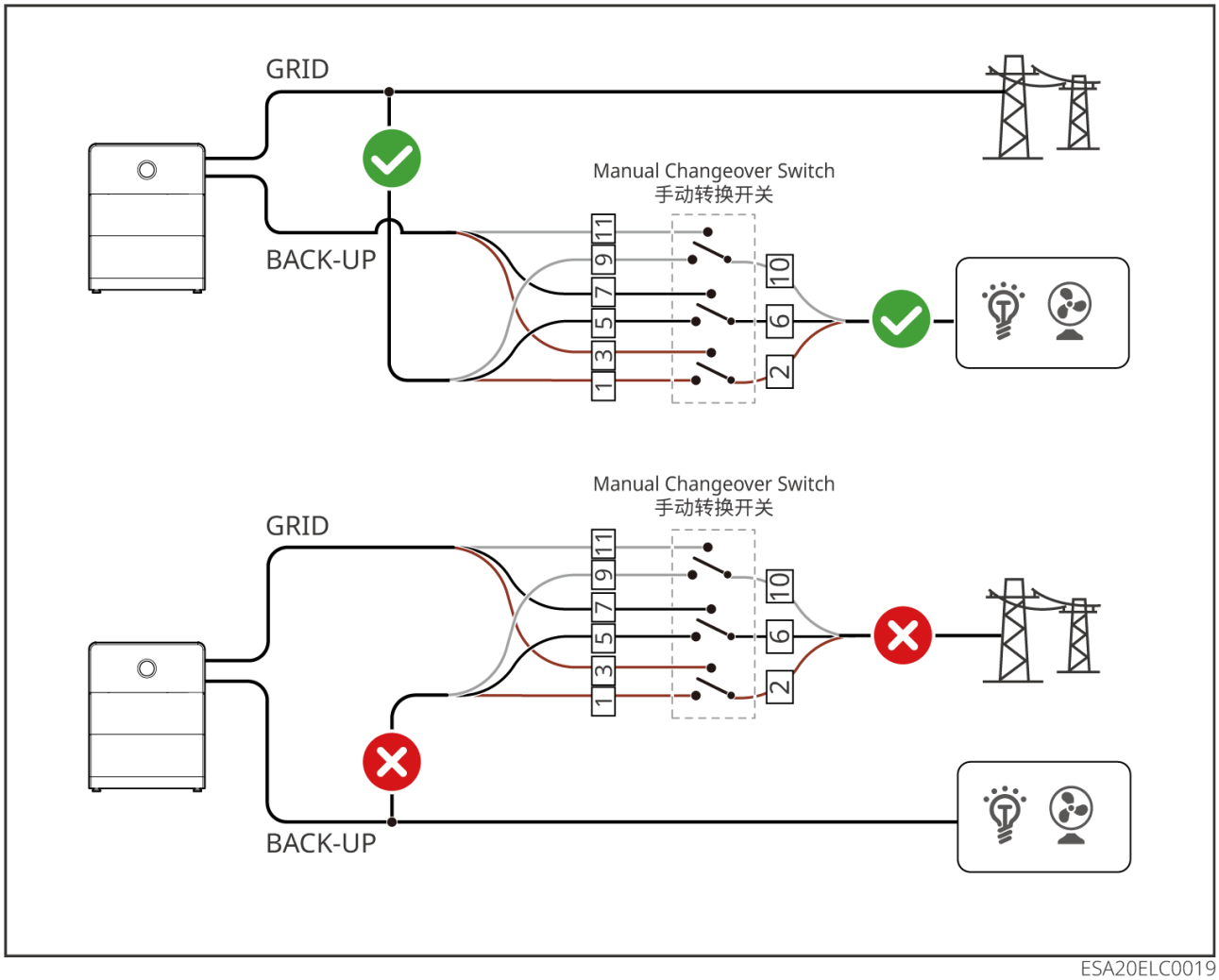
⚠WARNING

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 3-pole manual transfer switch is included with the product. If you need to use it, wire it according to the 3-pole manual transfer switch wiring diagram below.

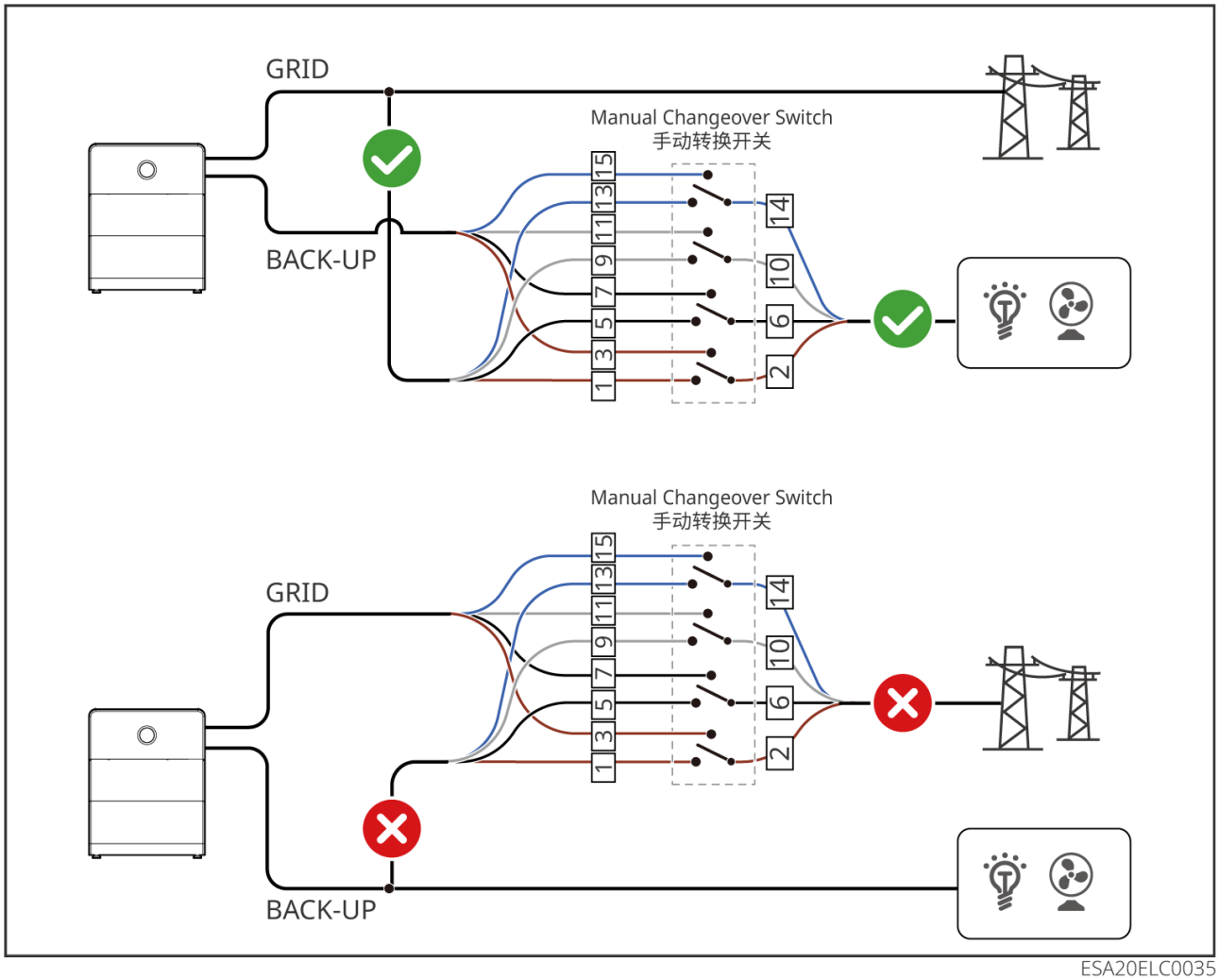


ESA20ELC0019

Europe

NOTICE

In Europe, if you need to use a manual transfer switch, purchase a 4-pole manual transfer switch from your distributor or source one yourself. Once you have the switch, wire it according to the 4-pole manual transfer switch wiring diagram below.



ESA20ELC0035

NOTICE

- 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.
- In whole-home backup scenarios, 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 the Power Limit function.
- The manual transfer switch and STS are only applicable to single-inverter 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

NOTICE

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 inverter Parallel Networking, observe the following:
  - The inverter's built-in meter supports Parallel Networking. If more than two inverters are connected in parallel, or if the wire gauge or measurement range of the supplied CT does not meet the requirements for the total current in the parallel system, use a GM330 smart meter.
  - In a parallel system, set the DIP switches on the first and last inverters to ON and those 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 any DRED devices, RCR devices, Remote Shutdown devices, SG Ready heat pumps, etc. to the master inverter.
  - Remote Shutdown function: Connect the communication cable to the master inverter. Rapid Shutdown function: Connect the communication cables to each inverter individually. Contact the after-sales service center if you need to use both Rapid Shutdown and Remote Shutdown functions.
  - In a parallel system, a WiFi/LAN Kit-20 must be installed on each inverter.
  - 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 open the circuit breaker on any port of an inverter, also open the circuit breakers on all other ports of that inverter; otherwise, the system may operate abnormally.
  - Parallel operation of energy storage inverters is not supported in a Microgrid Scenario.

NOTICE

- In microgrid and AC-coupled scenarios, if the grid-tied inverter is a single-phase model, follow these configuration requirements:
  - The rated power of the single-phase grid-tied inverter must not exceed 1.1 times the single-phase Rated Power of the energy storage inverter.
  - When using a three-phase meter to monitor a single-phase grid-tied inverter, connect only the L1 and N wires for meter power supply. Connect only CT1 for CT sampling, and clamp CT1 around the L wire of the grid-tied inverter.
  - Enable the "Three-Phase Unbalanced Output" switch in the app.
- 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	GMK330
Built-in meter	GM330
GMK330	GMK330
GM330	GM330
GMK330	GM330

Dual-Meter Configuration Options	
GM330	GMK330

5.3.1 General scenario

Detailed Wiring Diagram of Single Inverter System

- Manual transfer switch is optional. Please decide whether to install it based on the actual application scenario.

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

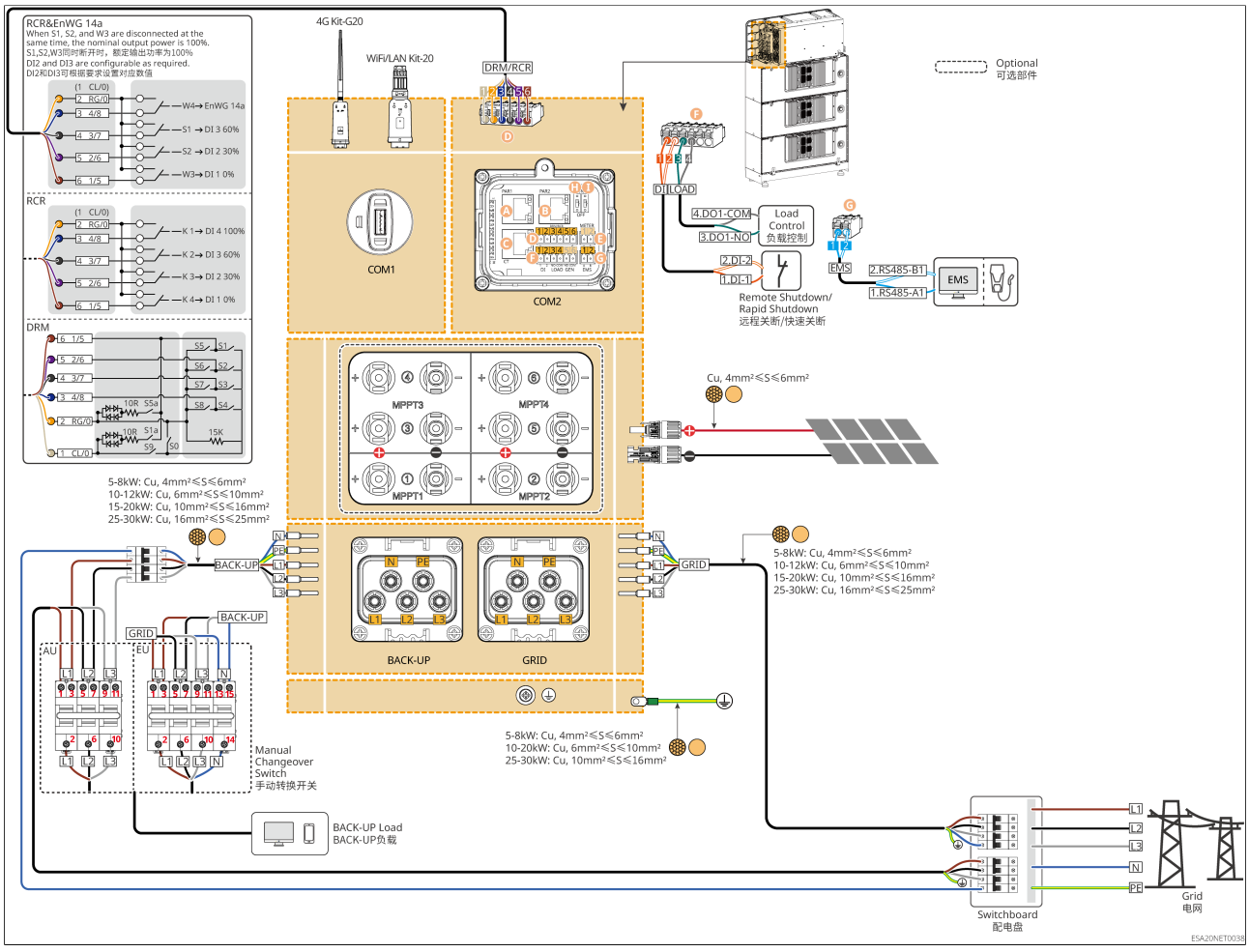


Figure26 General Scenario 1: Whole-House Backup Power Built-in CT Networking Diagram

Networking with built-in meter

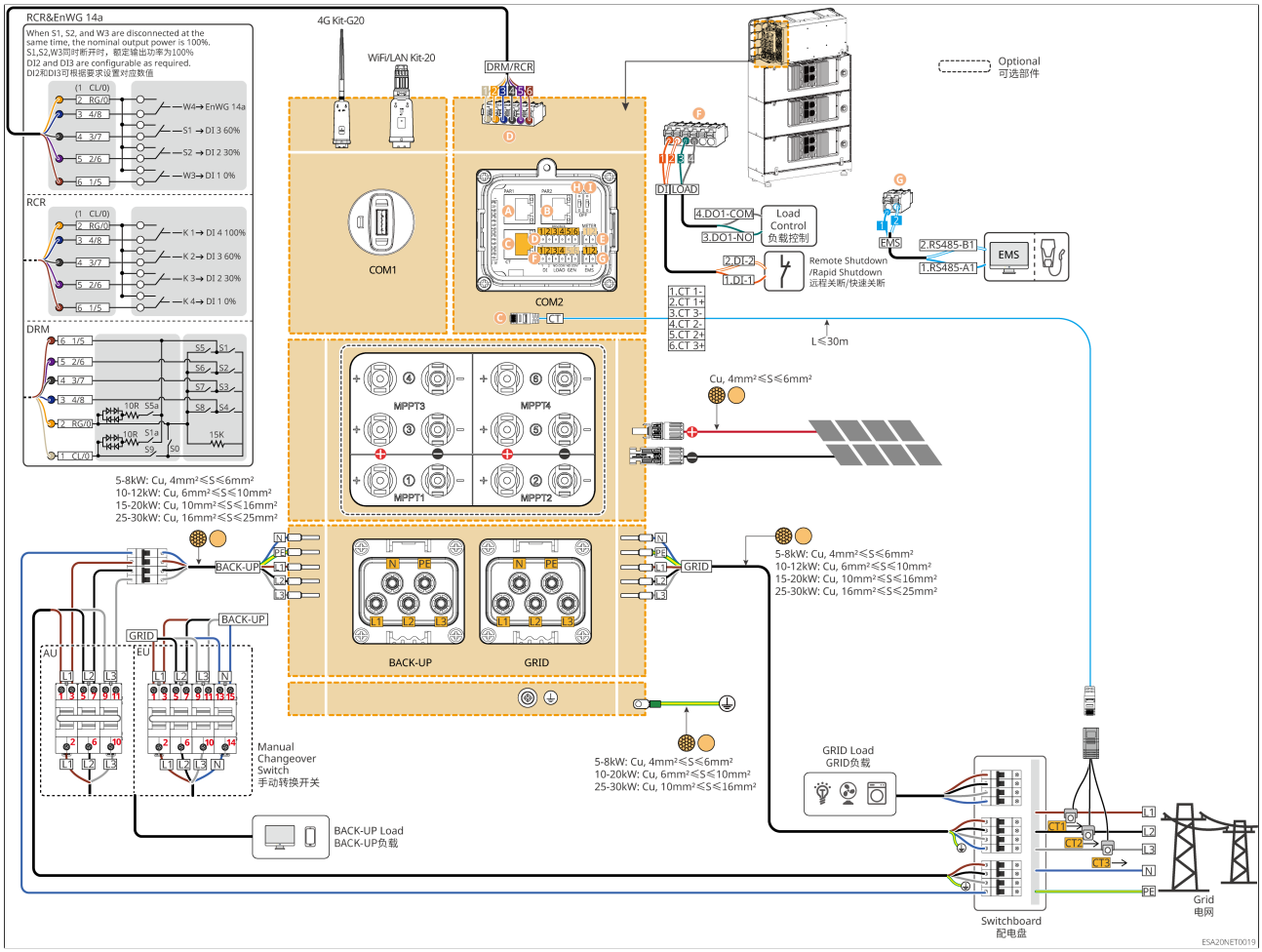


Figure27 General Scenario 2: Networking Diagram with Built-in Meter

Networking with GM330 electric meter

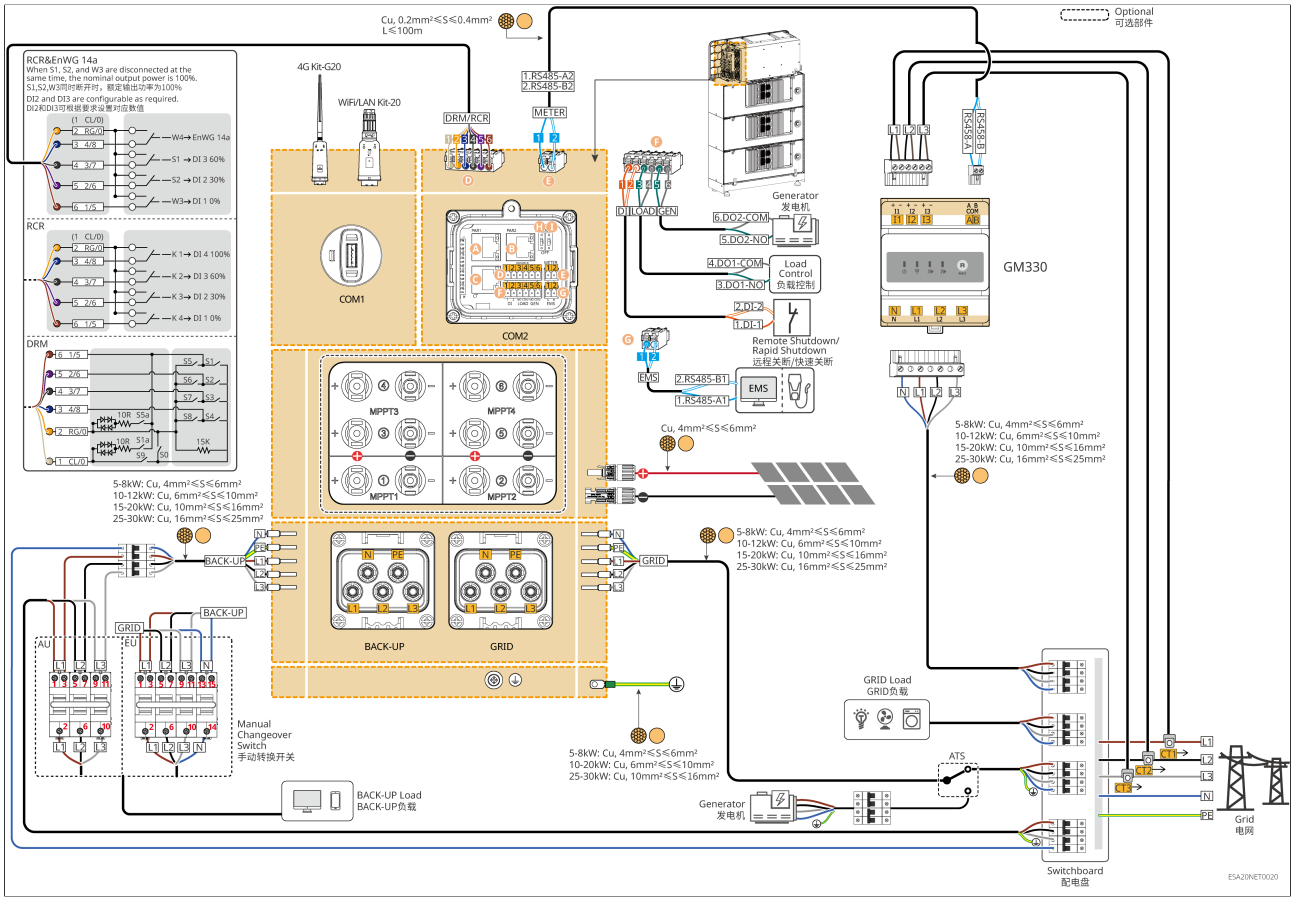


Figure28 General Scenario 3: Network Diagram with GM330 Meter

Configure GMK330 meter networking

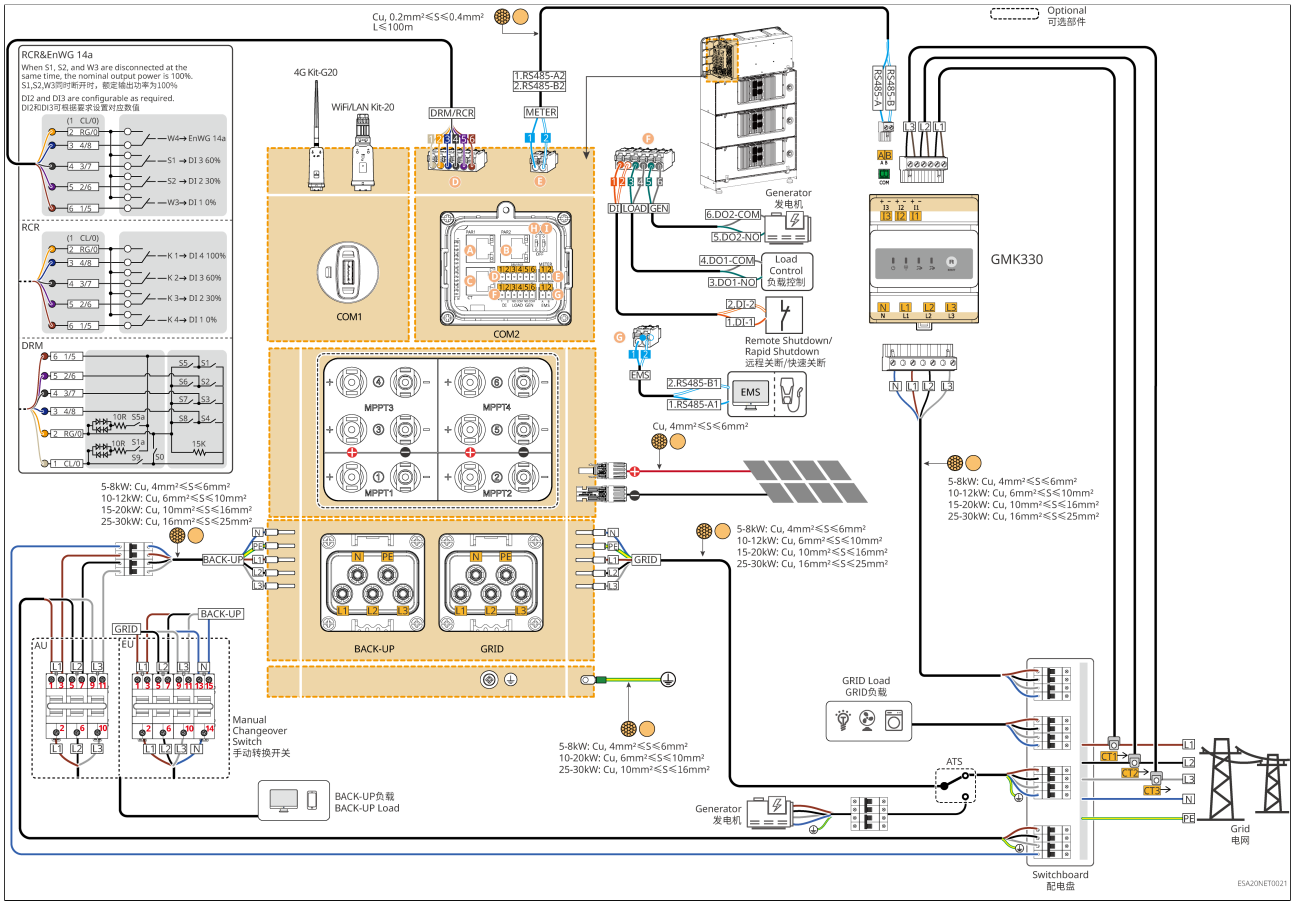


Figure29 General Scenario 4: Networking Diagram with GMK330 Meter

Inverter with Static Transfer Switch (STS) Network Diagram

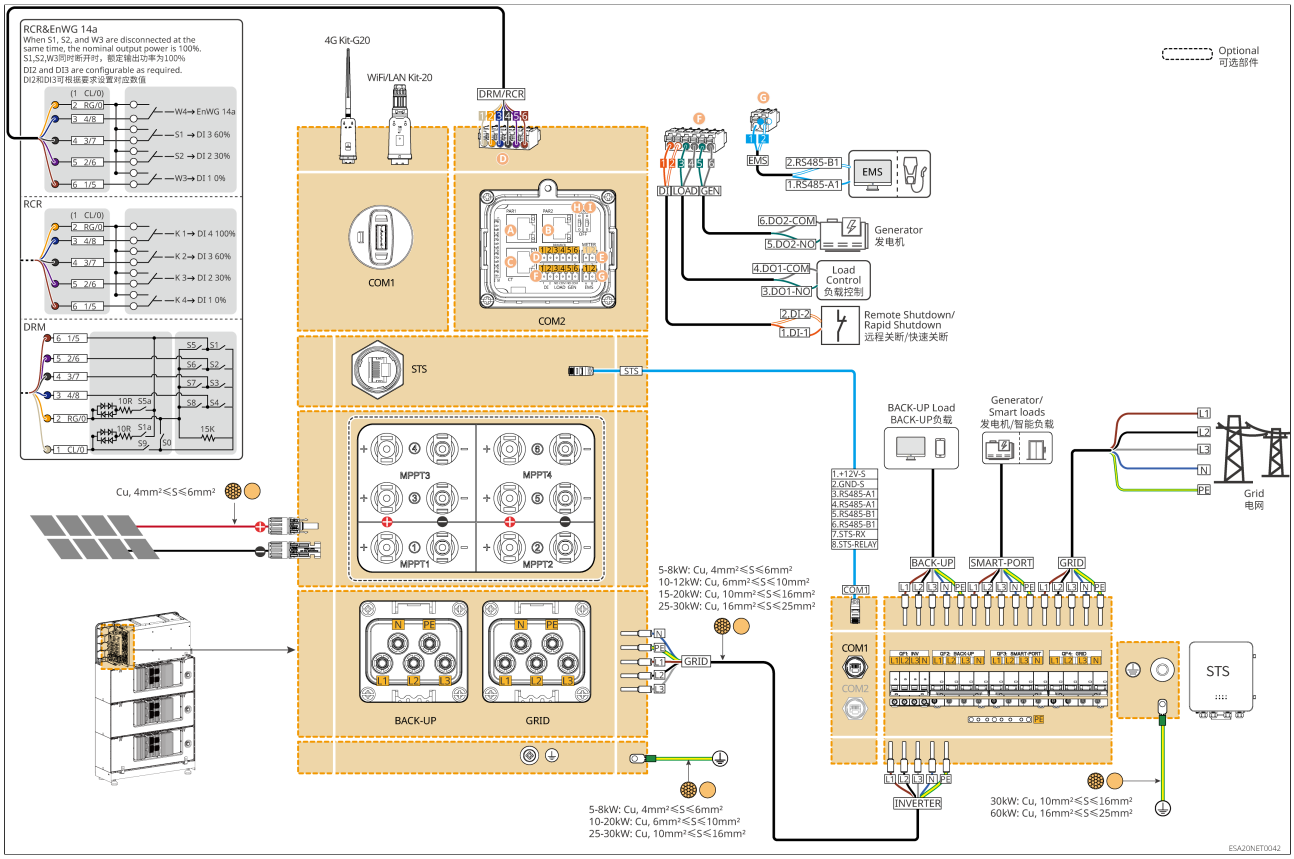


Figure30 General Scenario 5: Inverter with STS Whole House Backup Power Network Diagram

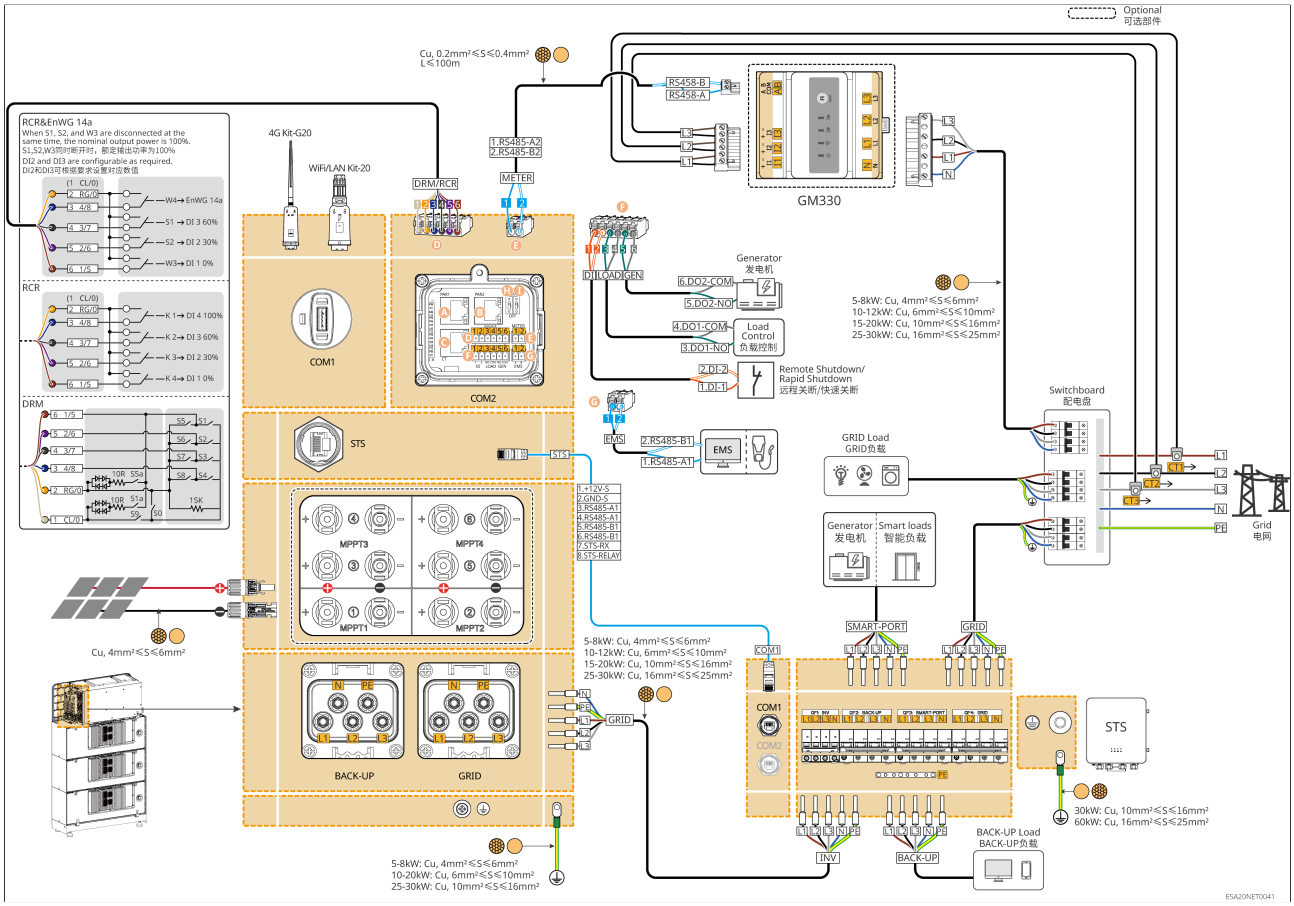


Figure31 General Scenario 6: Networking Diagram of Inverter with STS Partial Backup Power Supply

Inverter Parallel System Wiring Detail Diagram

The following diagram focuses on the wiring for parallel operation. For wiring requirements of other ports, please refer to the single-unit system.

Parallel inverter with built-in meter networking

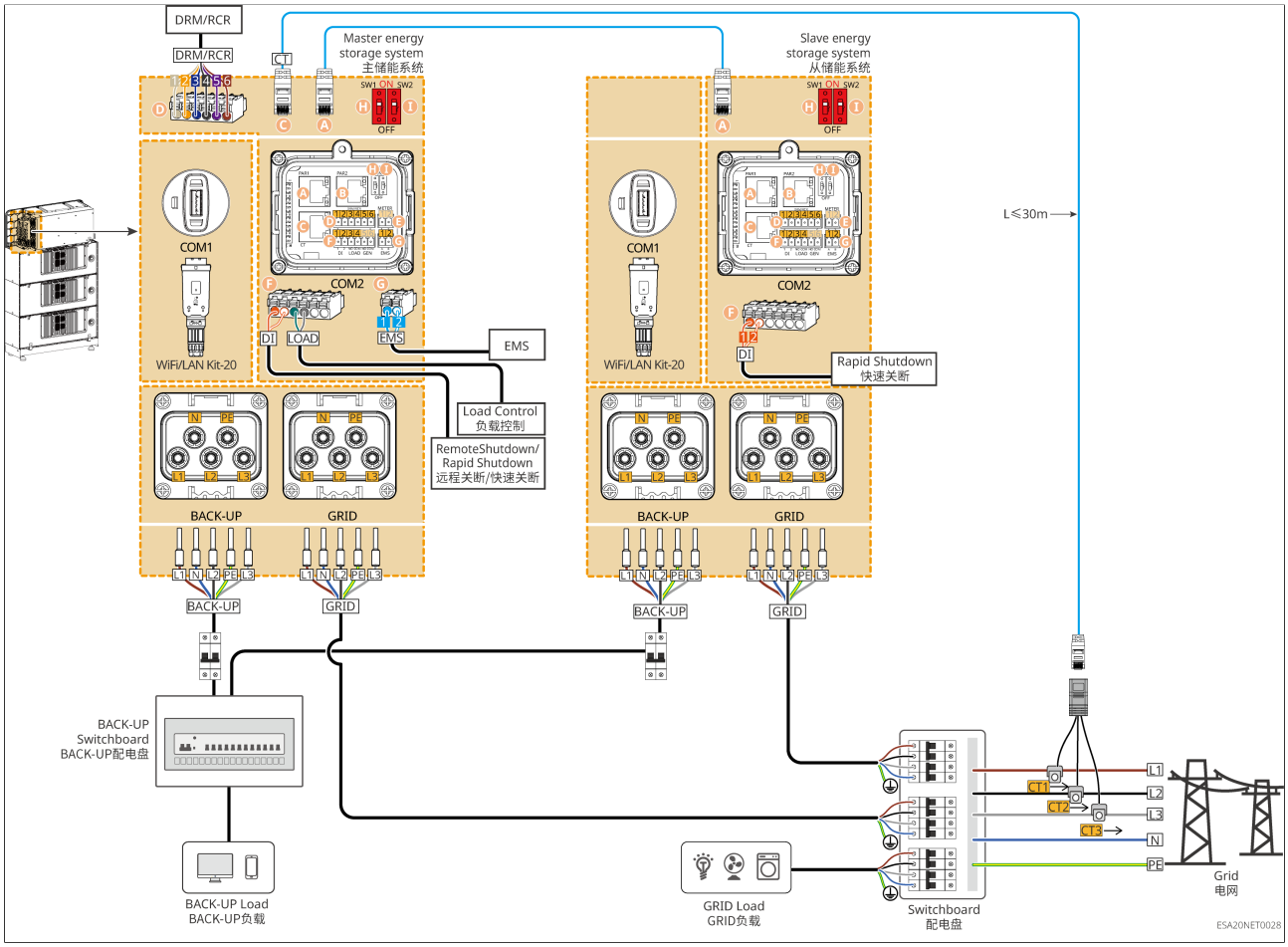


Figure32 General Scenario 7: Inverter Parallel Operation with Built-in Meter Wiring Diagram

Parallel inverters with GMK330 networking

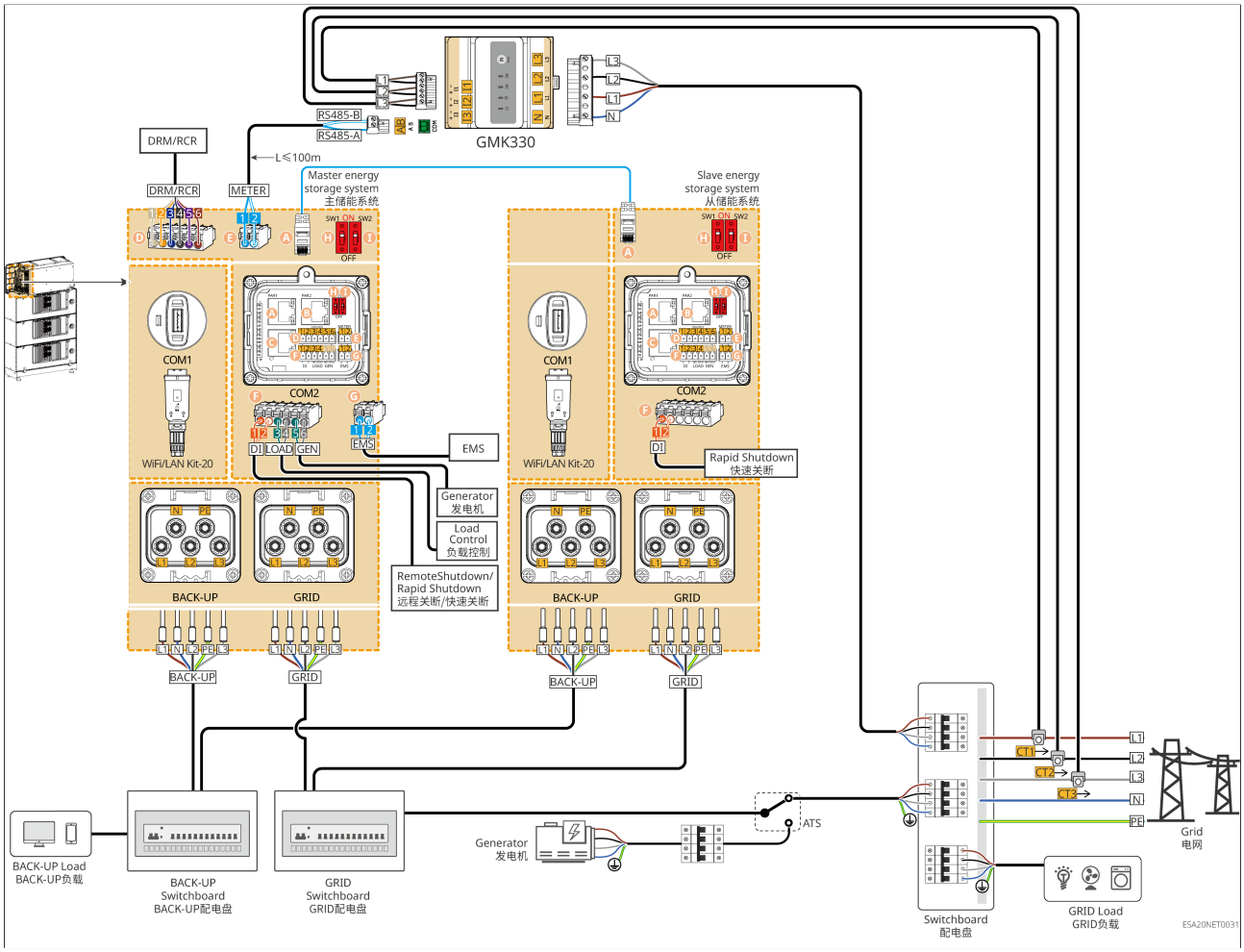


Figure33 General Scenario 8: Inverter Parallel Operation with GMK330 Networking Diagram

Inverter parallel connection with GM330 networking

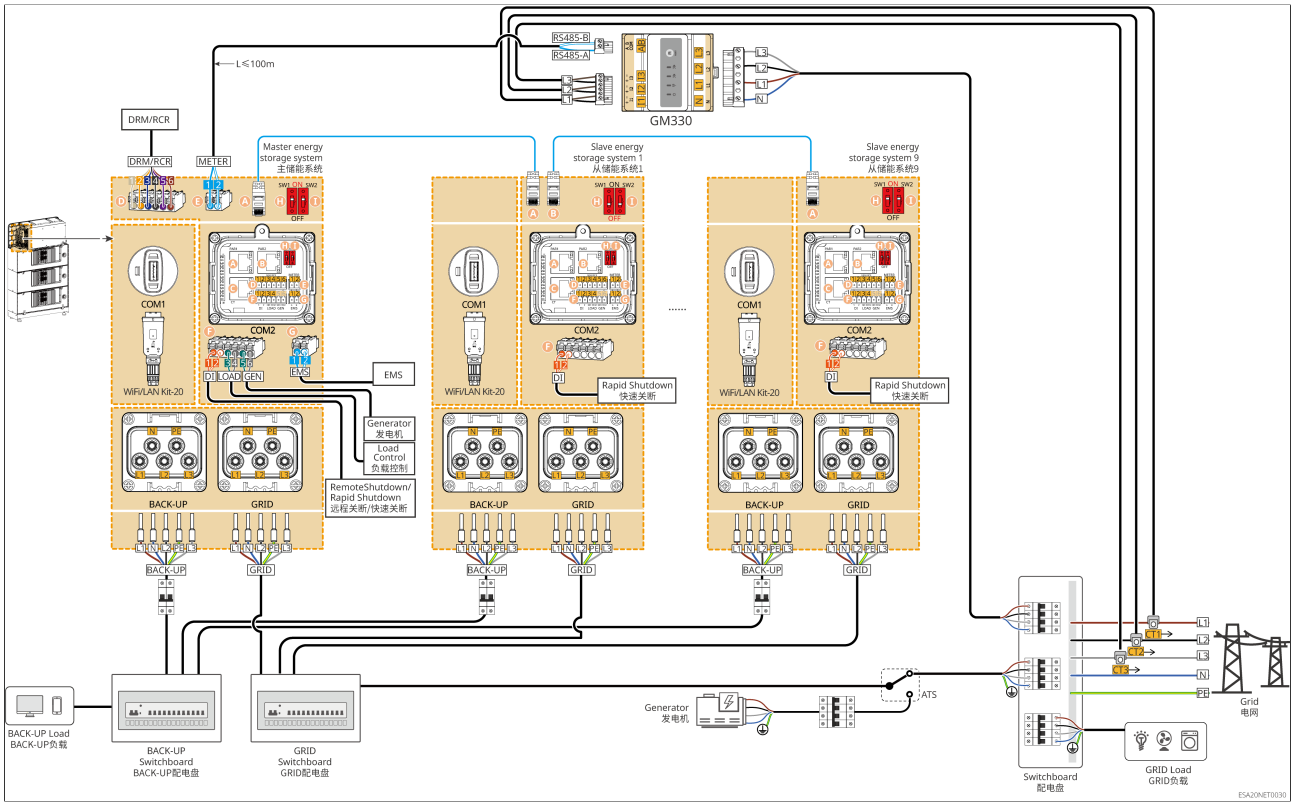


Figure34 General Scenario 9: Inverter Parallel Configuration with GM330 Network Diagram

5.3.2 Microgrid Scenario

Inverter Standalone System Wiring Detail Diagram

- Microgrid Scenario does not support connection to generators or parallel operation of multiple units.
- The manual transfer switch is optional. Please choose whether to install it based on the actual usage scenario.
- In Microgrid Scenario, if the grid-connected inverter requires output power limiting, please connect a meter or CT device separately.

Built-in meter + GM330 meter networking

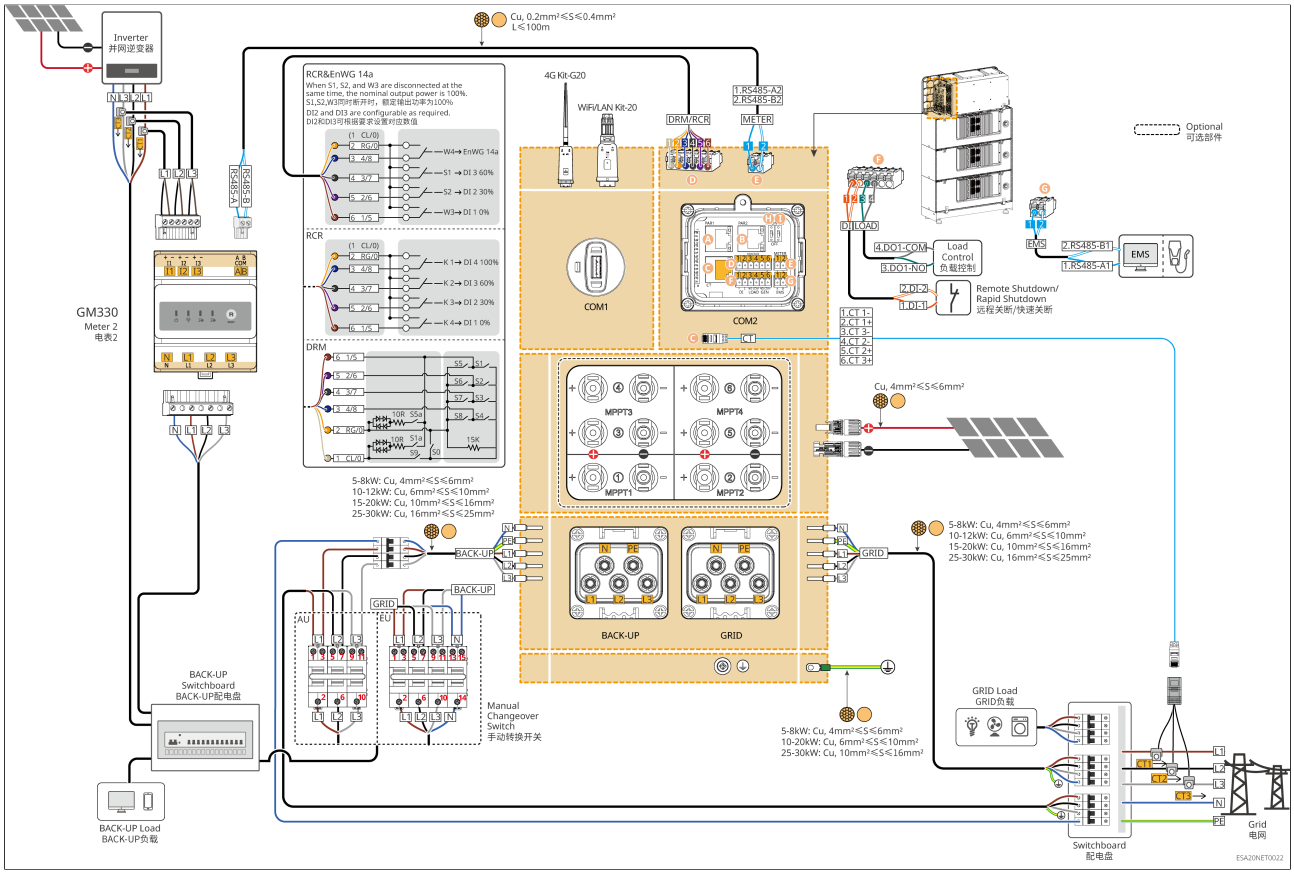


Figure35 Microgrid Scenario 1: Networking diagram of built-in meter + GM330 meter

GMK330 + GMK330 meter networking

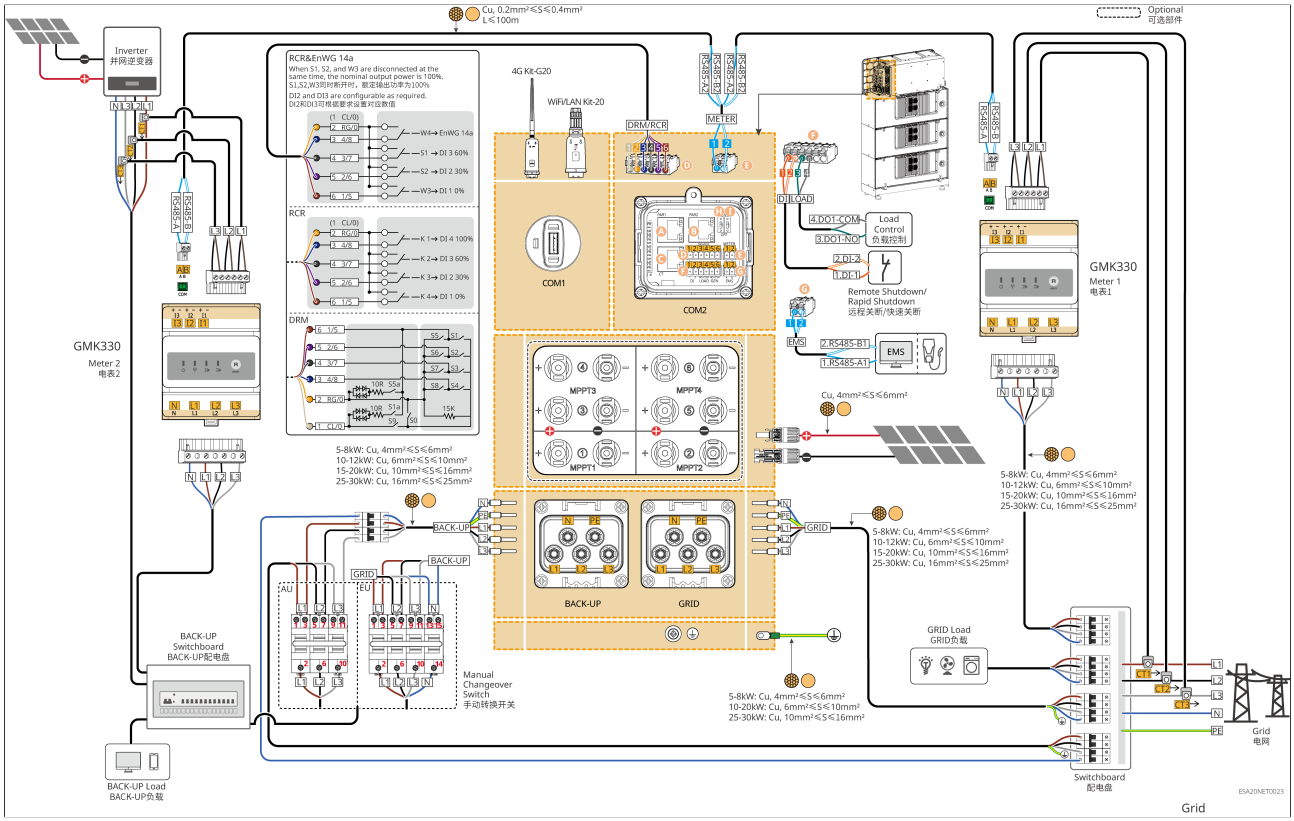


Figure36 Microgrid Scenario 2: Networking diagram of GMK330 + GMK330 meters

Microgrid Scenario, inverter combined with static transfer switch (STS) networking

In the Microgrid Scenario with STS partial backup power networking diagram, the GM330 meter is used as an example for illustration. For wiring methods of other meter models, please refer to the wiring instructions for general scenarios.

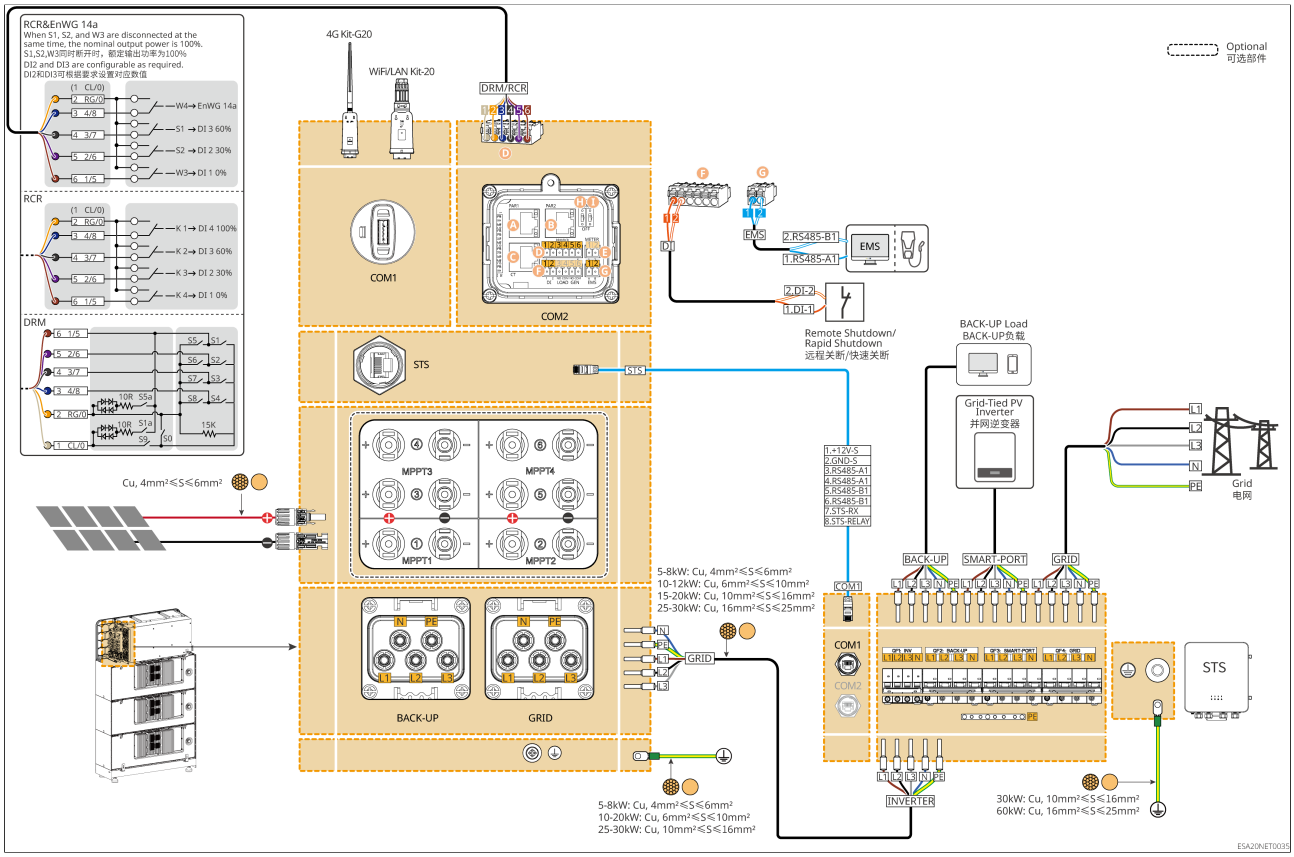


Figure37 Microgrid Scenario 4: Networking diagram of inverter + STS full-house backup power

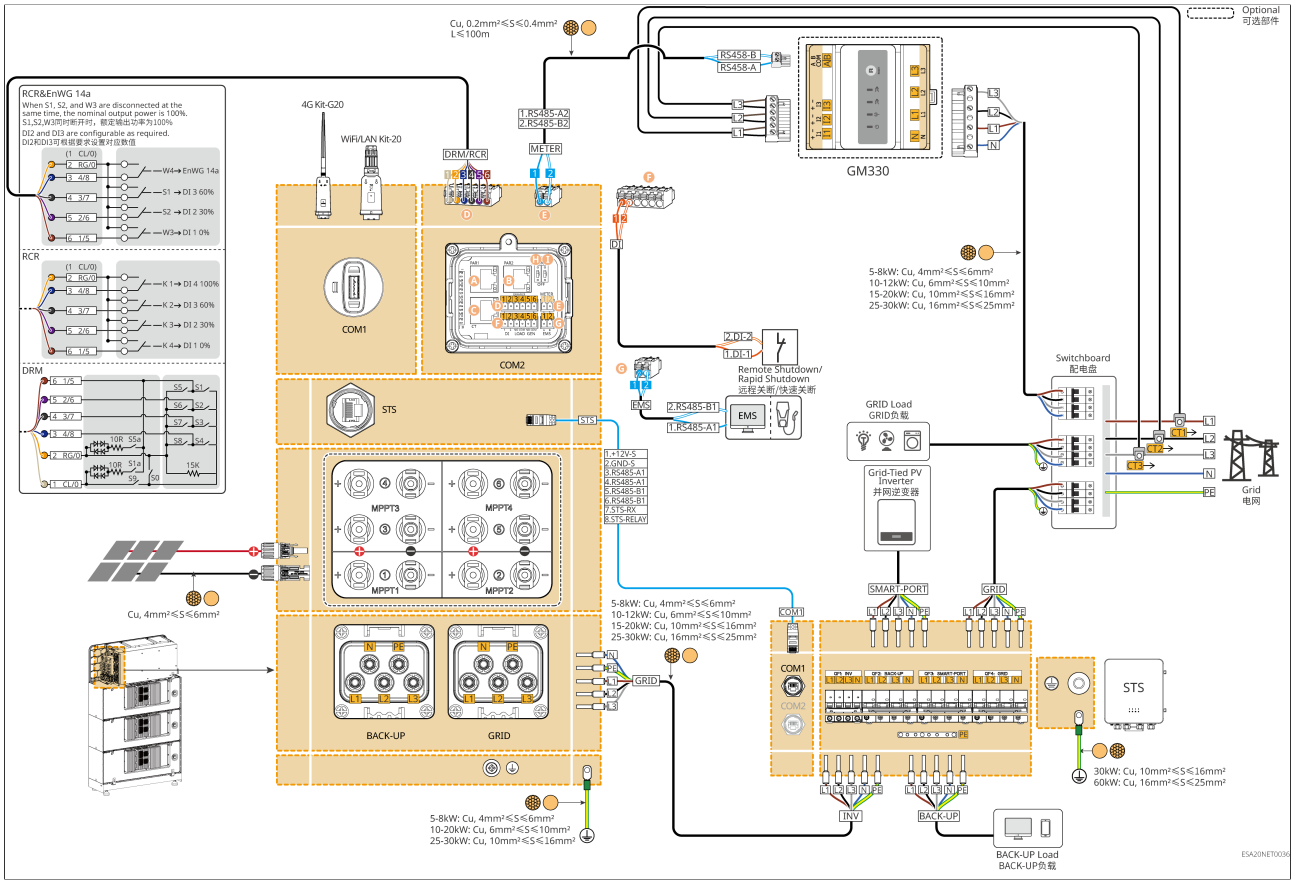


Figure38 Microgrid Scenario 5: Networking diagram of inverter + STS partial backup power

5.3.3 coupling scenario

Inverter Single-Unit System Wiring Diagram

- Manual transfer switch is optional. Please decide whether to install it based on the actual application scenario.
- In coupling scenarios, if the grid-connected inverter requires output power limitation, separately connect devices such as an electric meter or CT.

Built-in meter + GMK330 meter networking

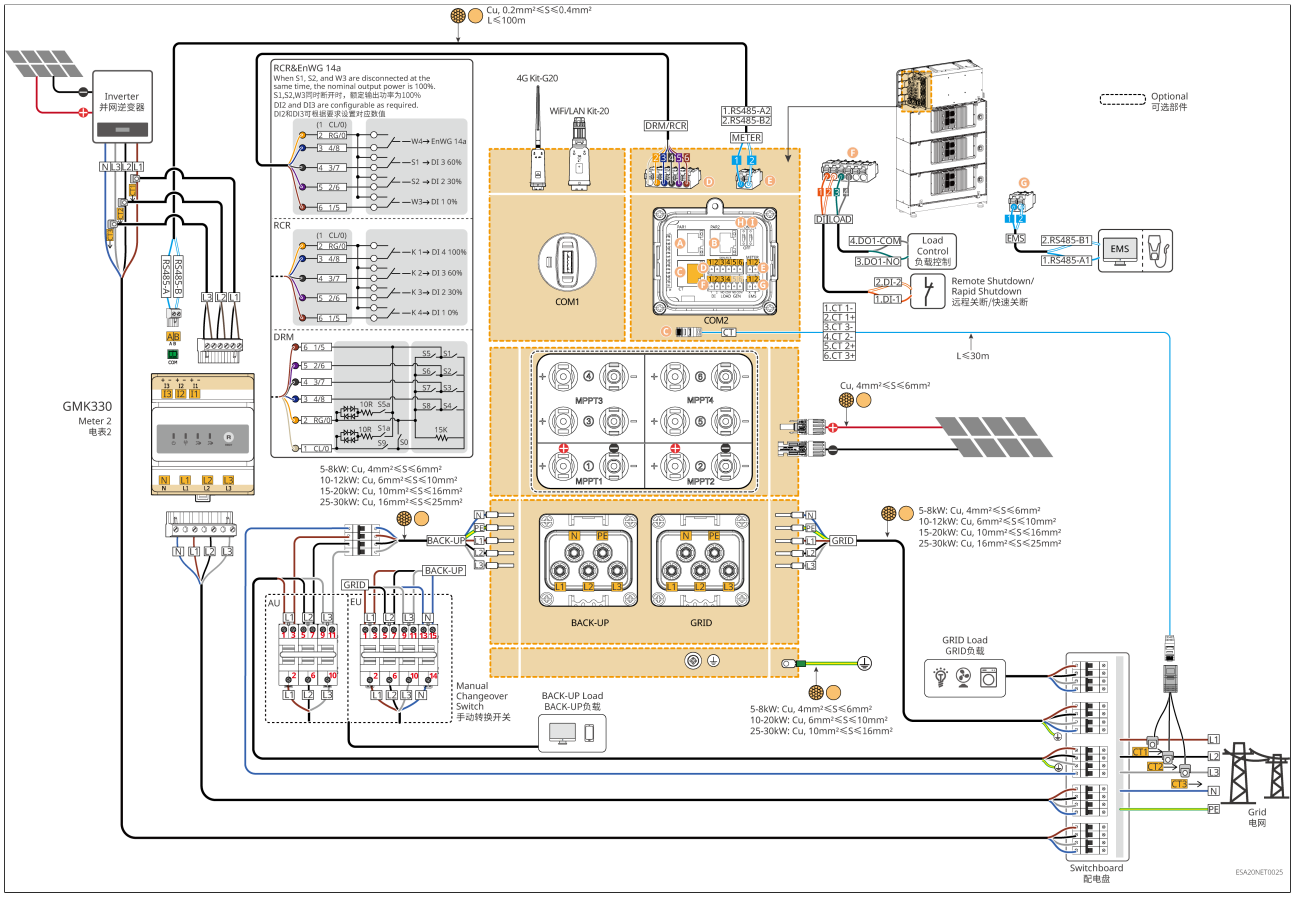


Figure39 Coupling Scenario 1: Network Diagram of Built-in Meter + GMK330 Meter

GM330+GM330 Meter Networking

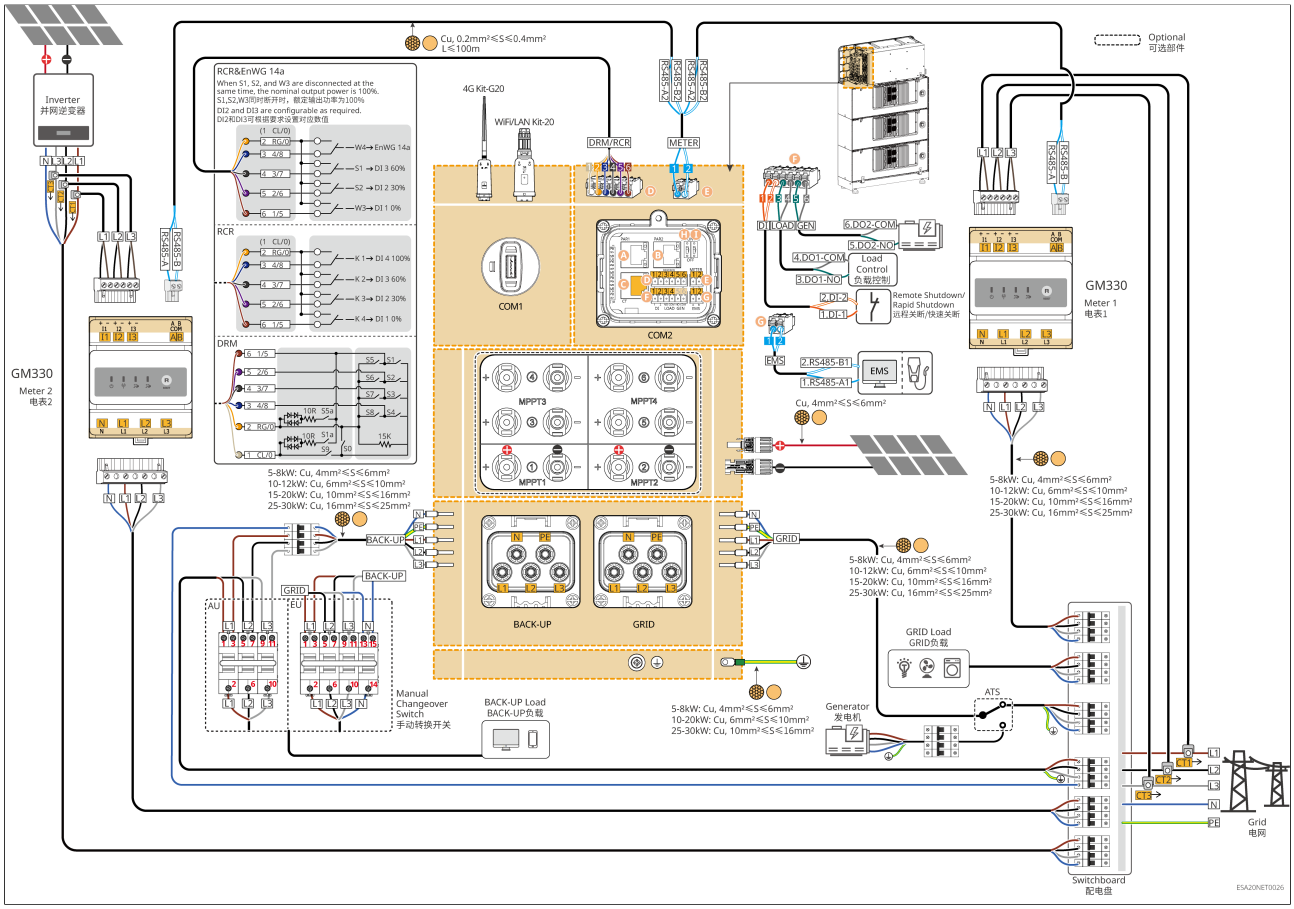


Figure40 Coupling Scenario 2: GM330+GM330 Meter Networking Diagram

Coupling scenario, inverter with static transfer switch (STS) network diagram

In the coupling scenario with STS partial backup power networking diagram, the meter is illustrated using GM330+GM330 as an example. For wiring methods of other meter models, refer to the general scenario wiring instructions.

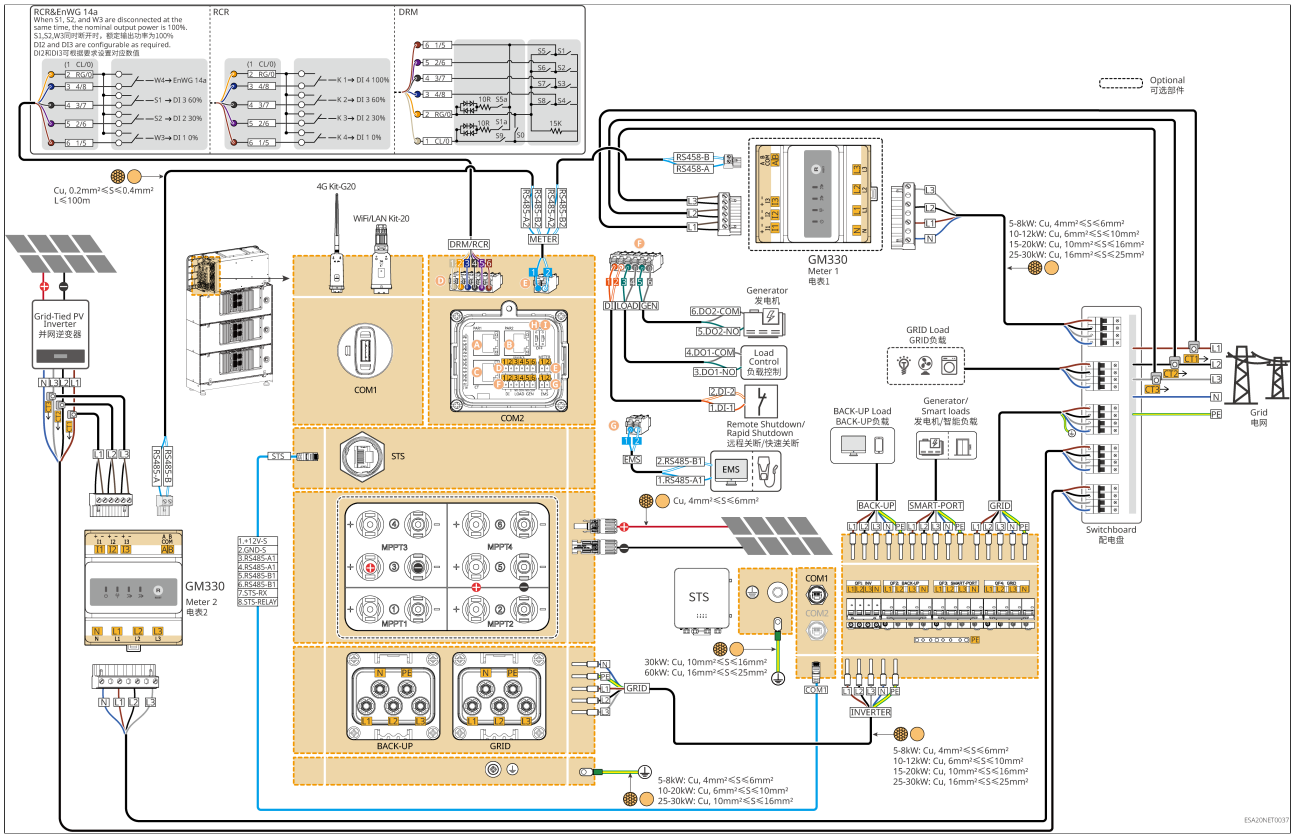


Figure41 Coupling Scenario 3: Inverter with STS Partial Backup Power Grid Connection Diagram

Inverter Parallel System Wiring Detailed Diagram

Coupled scenario, take the GM330 as an example for parallel meter wiring. For wiring of other meter models, refer to the parallel meter wiring instructions in the general scenario.

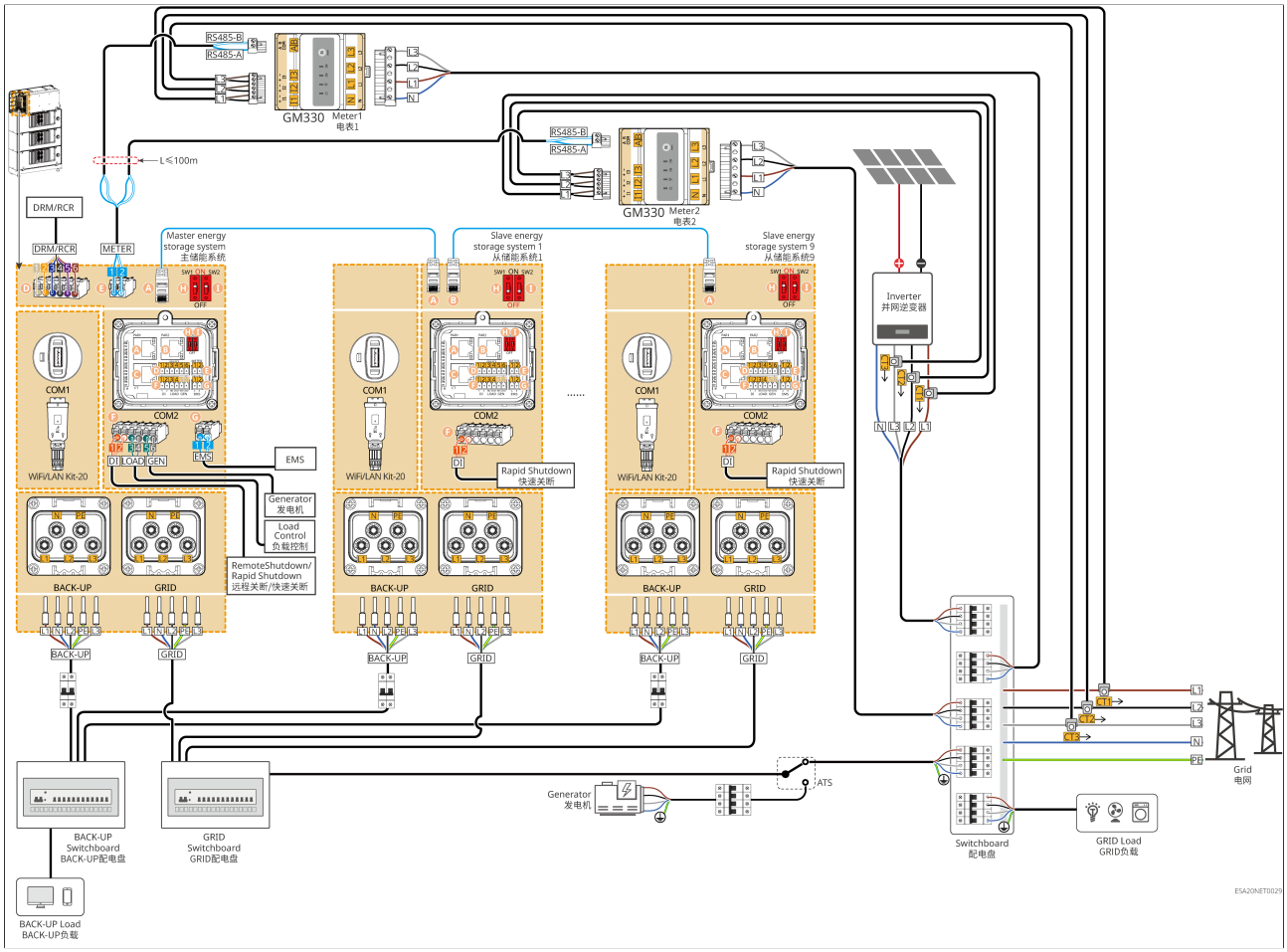


Figure42 Coupling Scenario 4: Diagram of Parallel Networking with GM330

5.3.4 Ezmanager3000 Configuration

NOTICE
Do not connect a generator when using the inverter with EzManager3000.

Wiring for a Single-Inverter System

The diagram below uses the GMK330 as an example. To use a different meter model, refer to the "Meter Wiring" section for specific wiring instructions.

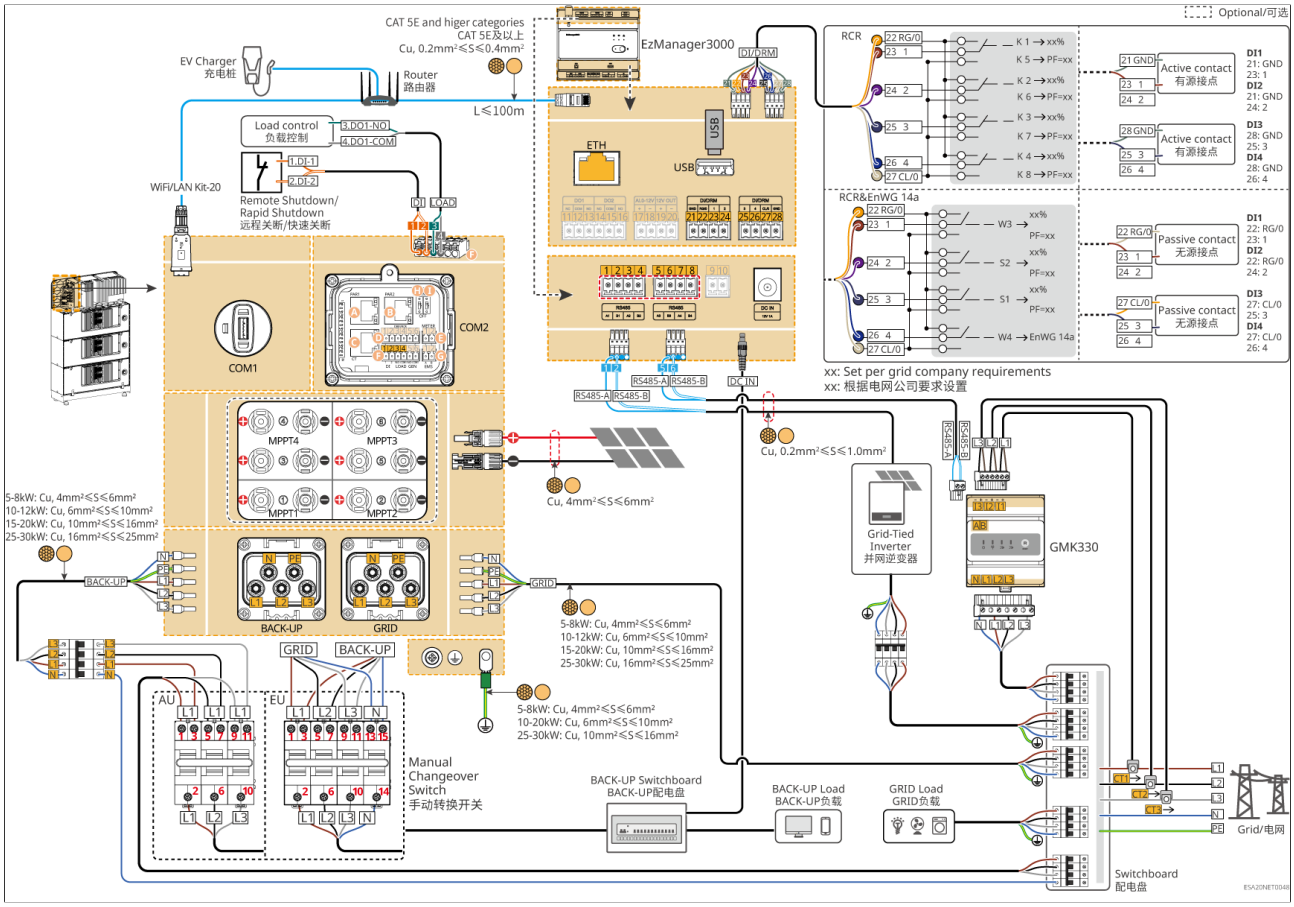


Figure43 Wiring for a Single-Inverter System with EzManager3000

Wiring for a Parallel-Inverter System

The diagram below uses the GM330 as an example. To use a different meter model, refer to the "Meter Wiring" section for specific wiring instructions.

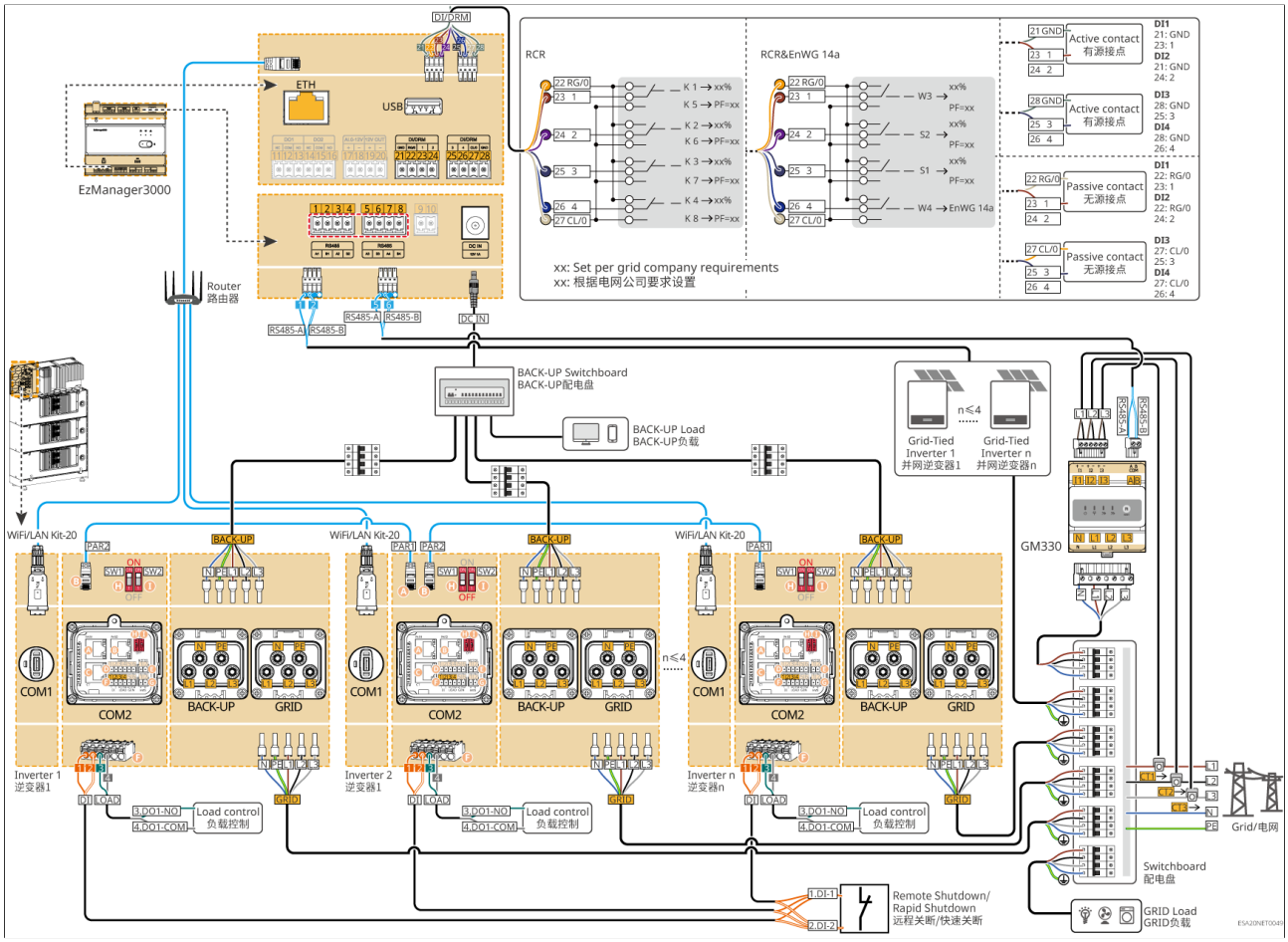


Figure44 Wiring for a Parallel-Inverter System with EzManager3000

5.4 Detailed System Wiring Diagram (Two-Phase, Three-Wire)

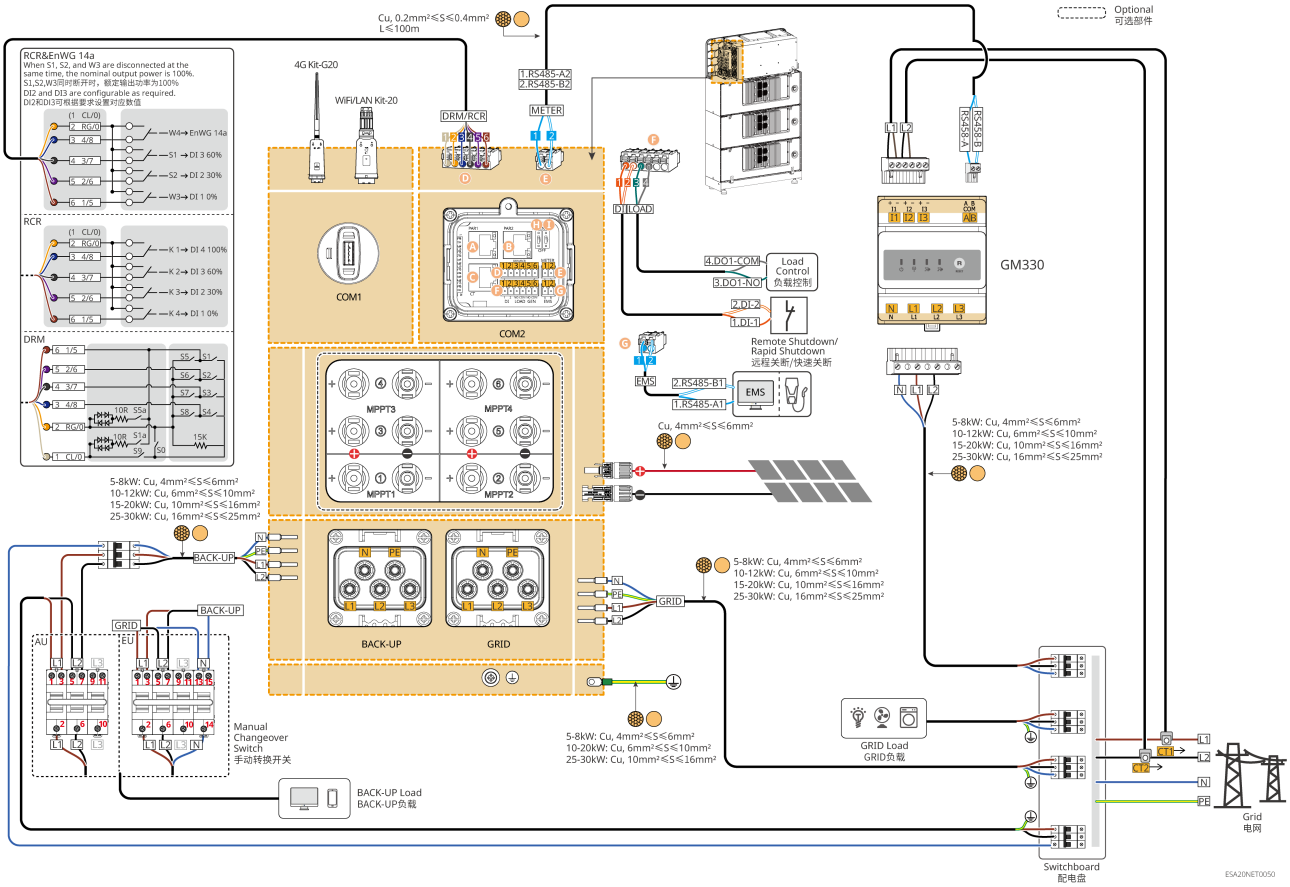
The system supports connection to a two-phase, three-wire grid only in a single-inverter configuration.

NOTICE

When connecting to a two-phase, three-wire grid, observe the following requirements:

- The inverter GRID and BACK-UP ports support connection to L1 and L2 only. Do not connect L3; otherwise, the inverter will report a "Grid Type Fault" alarm.
- Do not connect a generator.
- Please use a three-phase, four-wire energy meter or CT, and configure it as follows:
  - External meter: Connect only L1, L2, and N for meter power supply; do not connect L3. Connect only CT1 and CT2 for the CT sampling wires.
  - Built-in meter: Use the supplied CT. The CT signal wires may only be connected to the CT1 and CT2 ports.

The diagram below uses the GM330 as an example. To use a different meter model, refer to the "Meter Wiring" section for specific wiring instructions.



5.5 Preparing Materials

⚠WARNING

- Do not 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 cannot be connected to one AC circuit breaker simultaneously.
- To ensure that the inverter can safely disconnect from the grid in case of abnormalities, please connect an AC circuit breaker on the AC side of the inverter. Select a suitable AC circuit breaker according to local regulations.
- When the inverter is powered on, the BACK-UP AC port is live. If maintenance is required on the BACK-UP Loads, please power off the inverter; otherwise, it may cause electric shock.
- For cables used in the same system, it is recommended that the following cable conductor material, cross-sectional area, length, etc., be consistent.
  - Inverter's BACK-UP AC cable
  - Inverter's GRID AC cable
- The inverter supports connecting to a generator via an ATS switch to achieve switching between grid and generator power supply. The ATS switch is by default connected to the grid.

5.5.1 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 • Rated Current requirements are as follows: ◦ GW5K-ETA-G20: 20A	Provided by the customer	

No.	Circuit Breaker	Recommended Specifications	Procurement Method	Remarks
		◦ GW6K-ETA-G20: 20A ◦ GW8K-ETA-G20: 20A ◦ GW9.999K-ETA-G20: 32A ◦ GW10K-ETA-G20: 32A ◦ GW12K-ETA-G20: 40A ◦ GW15K-ETA-G20: 50A ◦ GW20K-ETA-G20: 50A ◦ GW25K-ETA-G20: 63A ◦ GW29.999K-ETA-G20: 80A ◦ GW30K-ETA-G20: 80A ◦ GW5K-BTA-G20: 20A ◦ GW6K-BTA-G20: 20A ◦ GW8K-BTA-G20: 20A ◦ GW9.999K-BTA-G20: 32A ◦ GW10K-BTA-G20: 32A ◦ GW12K-BTA-G20: 40A ◦ GW15K-BTA-G20: 50A ◦ GW20K-BTA-G20: 50A ◦ GW25K-BTA-G20: 63A ◦ GW29.999K-BTA-G20: 80A ◦ GW30K-BTA-G20: 80A Recommended configuration for whole-home backup scenarios: • Nominal Voltage≥230Vac • Rated Current requirements are as		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
		follows: ◦ GW5K-ETA-G20: 63A ◦ GW6K-ETA-G20: 63A ◦ GW8K-ETA-G20: 63A ◦ GW9.999K-ETA-G20: 80A ◦ GW10K-ETA-G20: 80A ◦ GW12K-ETA-G20: 80A ◦ GW15K-ETA-G20: 100A ◦ GW20K-ETA-G20: 100A ◦ GW25K-ETA-G20: 125A ◦ GW29.999K-ETA-G20: 125A ◦ GW30K-ETA-G20: 125A ◦ GW5K-BTA-G20: 63A ◦ GW6K-BTA-G20: 63A ◦ GW8K-BTA-G20: 63A ◦ GW9.999K-BTA-G20: 80A ◦ GW10K-BTA-G20: 80A ◦ GW12K-BTA-G20: 80A ◦ GW15K-BTA-G20: 100A ◦ GW20K-BTA-G20: 100A ◦ GW25K-BTA-G20: 125A ◦ GW29.999K-BTA-G20: 125A ◦ GW30K-BTA-G20: 125A Note: If the inverter's BACK-UP port is not used, select a suitable GRID circuit breaker based on the maximum grid-connected current.		

No.	Circuit Breaker	Recommended Specifications	Procurement Method	Remarks
2	ATS switch	For the same model, the specifications of the ATS switch and the GRID circuit breaker are identical.	Provided by the customer	
3	Residual Current Device (RCD)	RCD installation and RCD specification selection: It is recommended to install an external Type A RCD on the inverter's AC output side, with a residual operating current of ≥300 mA (for inverter capacity <30 kVA, select a residual operating current of 300 mA; for inverter capacity ≥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 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

No.	Circuit Breaker	Recommended Specifications	Procurement Method	Remarks
				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 requirements are as follows: • GW5K-ETA-G20, GW6K-ETA-G20, GW8K-ETA-G20, GW9.999K-ETA-G20, GW10K-ETA-G20, GW12K-ETA-G20, GW15K-ETA-G20, GW20K-ETA-G20, GW5K-BTA-G20, GW6K-BTA-G20, GW8K-BTA-G20, GW9.999K-BTA-G20, GW10K-BTA-G20, GW12K-BTA-G20, GW15K-BTA-G20, GW20K-BTA-G20: 63A • GW25K-ETA-G20, GW29.999K-ETA-G20, GW30K-ETA-G20, GW25K-BTA-G20, GW29.999K-BTA-G20, GW30K-BTA-G20: 80A	• Provided by the customer • Shipped with the inverter (Australia only)	• For use in single-inverter scenarios only • During actual equipment selection, you can also choose a suitable manual transfer switch based on local regulations.

5.5.2 Preparing Cables

No.	Cable	Recommended Specification	Supply Method
1	PE cable	**Inverter Protective Grounding:** • Single-core outdoor copper cable • Conductor cross-sectional area: ◦ GW5K-ETA-G20, GW6K-ETA-G20, GW8K-ETA-G20, GW5K-BTA-G20, GW6K-BTA-G20, GW8K-BTA-G20: 4-6mm^2 ◦ GW9.999K-ETA-G20, GW10K-ETA-G20, GW12K-ETA-G20, GW15K-ETA-G20, GW20K-ETA-G20, GW9.999K-BTA-G20, GW10K-BTA-G20, GW12K-BTA-G20, GW15K-BTA-G20, GW20K-BTA-G20: 6-10 mm^2 ◦ GW25K-ETA-G20, GW29.999K-ETA-G20, GW30K-ETA-G20, GW25K-BTA-G20, GW29.999K-BTA-G20, GW30K-BTA-G20: 10-16 mm^2	Customer-supplied
		STS Protective Grounding: • Conductor cross-sectional area: ◦ GW30K-STS-G10: 10-16mm^2 ◦ GW60K-STS-G10: 16-25mm^2 • Cable outer diameter: ◦ GW30K-STS-G10: 18-25mm ◦ GW60K-STS-G10: 24-32mm	

No.	Cable	Recommended Specification	Supply Method
2	PV DC Cable	• Industry-standard outdoor PV cable • Conductor cross-sectional area: 4mm²-6mm² • Cable outer diameter: 5.9mm-8.8mm	Customer-supplied

No.	Cable	Recommended Specification	Supply Method
3	AC Cable	• Inverter AC input/output cable (BACK UP/GRID): • Conductor cross-sectional area: ◦ GW5K-ETA-G20, GW6K-ETA-G20, GW8K-ETA-G20, GW5K-BTA-G20, GW6K-BTA-G20, GW8K-BTA-G20: 4-6mm^2 ◦ GW9.999K-ETA-G20, GW10K-ETA-G20, GW12K-ETA-G20, GW9.999K-BTA-G20, GW10K-BTA-G20, GW12K-BTA-G20: 6-10mm^2 ◦ GW15K-ETA-G20, GW20K-ETA-G20, GW15K-BTA-G20, GW20K-BTA-G20: 10-16mm^2 ◦ GW25K-ETA-G20, GW29.999K-ETA-G20, GW30K-ETA-G20, GW25K-BTA-G20, GW29.999K-BTA-G20, GW30K-BTA-G20: 16-25mm^2 • Multi-core outdoor copper cable outer diameter: ◦ GW5K-ETA-G20, GW6K-ETA-G20, GW8K-ETA-G20, GW9.999K-ETA-G20, GW10K-ETA-G20, GW12K-ETA-G20, GW5K-BTA-G20, GW6K-BTA-G20, GW8K-BTA-G20, GW9.999K-BTA-G20, GW10K-BTA-G20, GW12K-BTA-G20, GW15K-ETA-G20, GW20K-ETA-G20, GW15K-BTA-G20, GW20K-BTA-G20: 10-26mm ◦ GW25K-ETA-G20, GW29.999K-ETA-G20, GW30K-ETA-G20, GW25K-BTA-G20, GW29.999K-BTA-G20, GW30K-BTA-G20: 18-30mm	Customer-supplied

No.	Cable	Recommended Specification	Supply Method
4	STS Power Cable	• Multi-core 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	Customer-supplied
5	Smart Meter Power Cable	• Outdoor copper cable • Conductor cross-sectional area: 1mm²	Customer-supplied
6	Meter RS485 Communication cable	• Shielded twisted pair • Conductor cross-sectional area: 0.2mm²-0.4mm²	Customer-supplied
7	EMS or EV Charger RS485 Communication cable		
8	Remote Shutdown	• Shielded cable meeting local standards • Conductor cross-sectional area: 0.2mm²-0.4mm² • Cable outer diameter: 5mm-8mm	Customer-supplied
9	Load Control and Generator Control DO Communication cable		
10	RCR/DRED/14a Signal Cable		

No.	Cable	Recommended Specification	Supply Method
11	CT Communication cable	Standard straight-through Ethernet cable: • RJ45 shielded connector • CAT 5E or higher-grade straight-through shielded Ethernet cable • Connector specification must match the cable specification	Customer-supplied
12	Inverter Parallel Communication Cable	Standard straight-through Ethernet cable: • RJ45 shielded connector • CAT 5E or higher-grade straight-through shielded Ethernet cable ◦ Recommended length for CAT 5E or CAT 6E not exceeding 5 meters ◦ Recommended length for CAT 7E not exceeding 10 meters • Connector specification must match the cable specification	Customer-supplied
13	STS Communication cable	Standard straight-through Ethernet cable: • RJ45 shielded connector • CAT 5E or higher-grade straight-through shielded Ethernet cable • Connector specification must match the cable specification	Connect to inverter STS communication port: Shipped with the unit

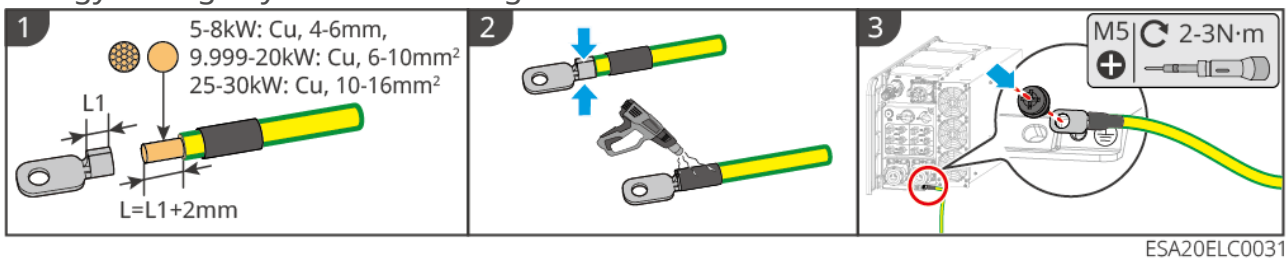
No.	Cable	Recommended Specification	Supply Method
Note: The cable specifications recommended in the table are for reference only. During actual cable selection, factors such as installation ambient temperature, laying method, number of parallel runs, voltage deviation, and thermal stability must be comprehensively considered, and the ampacity should be corrected using corresponding correction factors. The selected cable must meet the following requirement: Cable ampacity ≥ Rated current of the overcurrent protection device ≥ Maximum rated current.			

5.6 Connect the Protection earth wire

⚠Warning

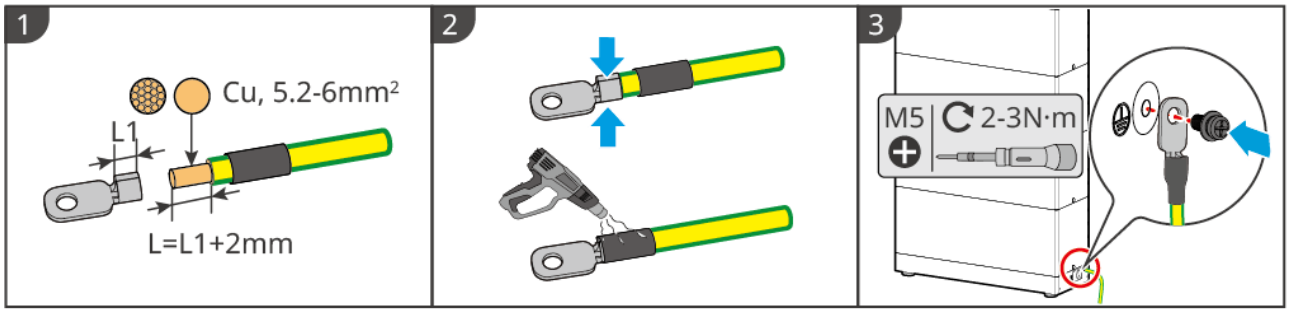
- The Protection Earthing of the chassis enclosure cannot replace the Protection Earth Wire of the AC output port. When wiring, ensure that both Protection Earth Wires are reliably connected.
- To improve the corrosion resistance of the terminal, it is recommended to apply silicone or paint on the outside of the grounding terminal for protection after the installation of the Protection earth wire connection 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, and the system is uniformly grounded through the inverter, so no separate grounding operation for the battery is required during installation. If the re is a need for split expansion, please ground the expanded Battery BANK separately.

Energy Storage System Grounding:



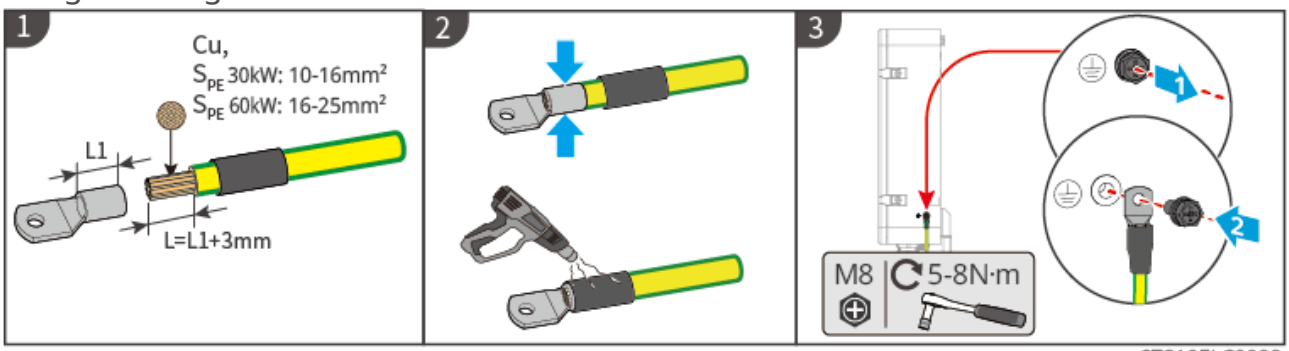
ESA20ELC0031

Expanded Battery BANK Grounding:



BAT20ELC0003

STS grounding



STS10ELC0029

5.7 Connecting the PV Cable

⚠DANGER

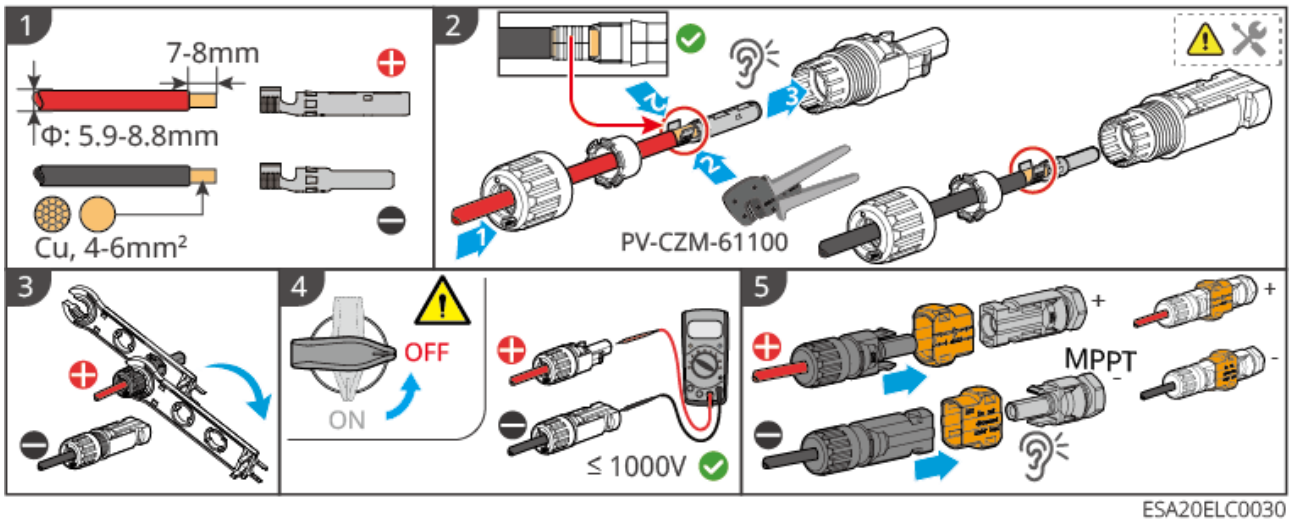
- Do not connect the same PV string to multiple inverters, as this may cause inverter damage.
- Before connecting the PV string to the inverter, confirm the following information. Failure to do so may cause permanent damage to the inverter, and in severe cases, may lead to fire, resulting in personal injury and property loss.
  1. Ensure the maximum short-circuit current and Max. Input Voltage for each MPPT are within the inverter's allowable range.
  2. Ensure the positive pole of the PV string is connected to the inverter's PV+ terminal, and the negative pole is connected to the inverter's PV- terminal.

⚠WARNING

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

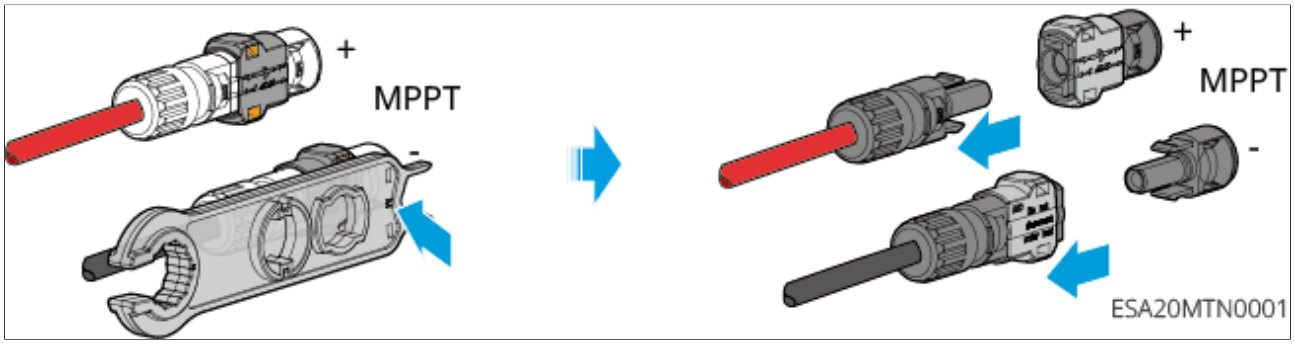
NOTICE

- The two PV strings within each MPPT should use the same model, the same number of panels, and the same tilt and azimuth angles to ensure maximum efficiency.
- Connecting PV cables applies only to the ETA model; the BTA model does not have PV connection ports.



ESA20ELC0030

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



5.8 Expansion line connection for Battery

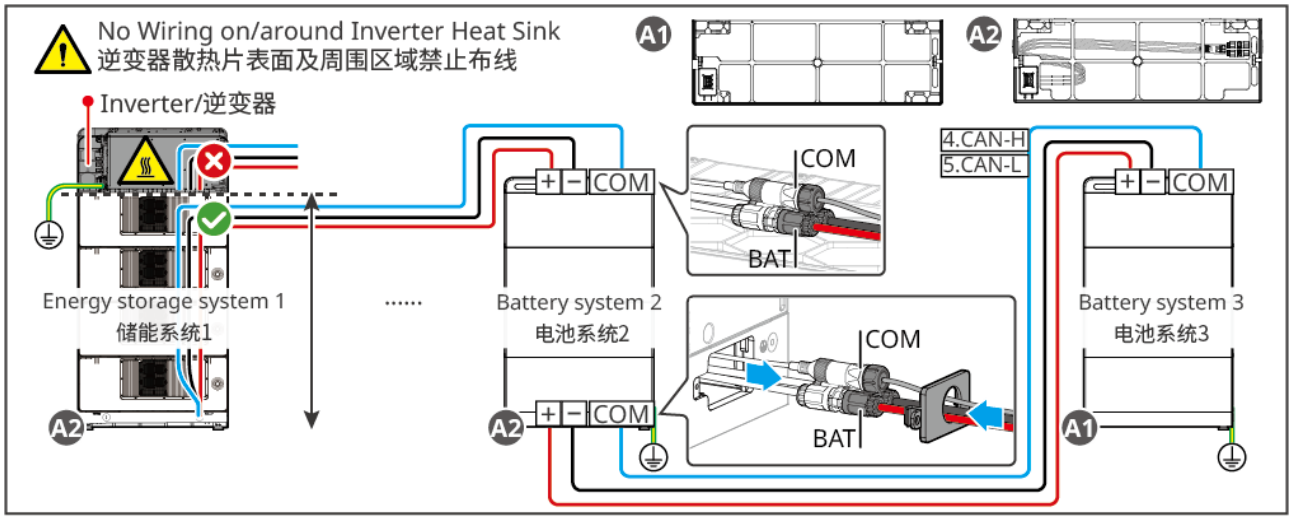
DANGER

- Do not connect any load between Inverter and Battery.
- When Connecting the Battery Cable, use insulated tools to prevent accidental electric shock or Battery Short Circuit.
- Please ensure that Batteryopen-circuit voltage is within the allowable range of Inverter.
- Between Battery and Battery, please configure DC Switch according to local laws and regulations.
- Inverterheat sink surface and surrounding areas are prohibited from wiring to prevent overheating damage to the wire harness.

energy storage system Expansion Overview

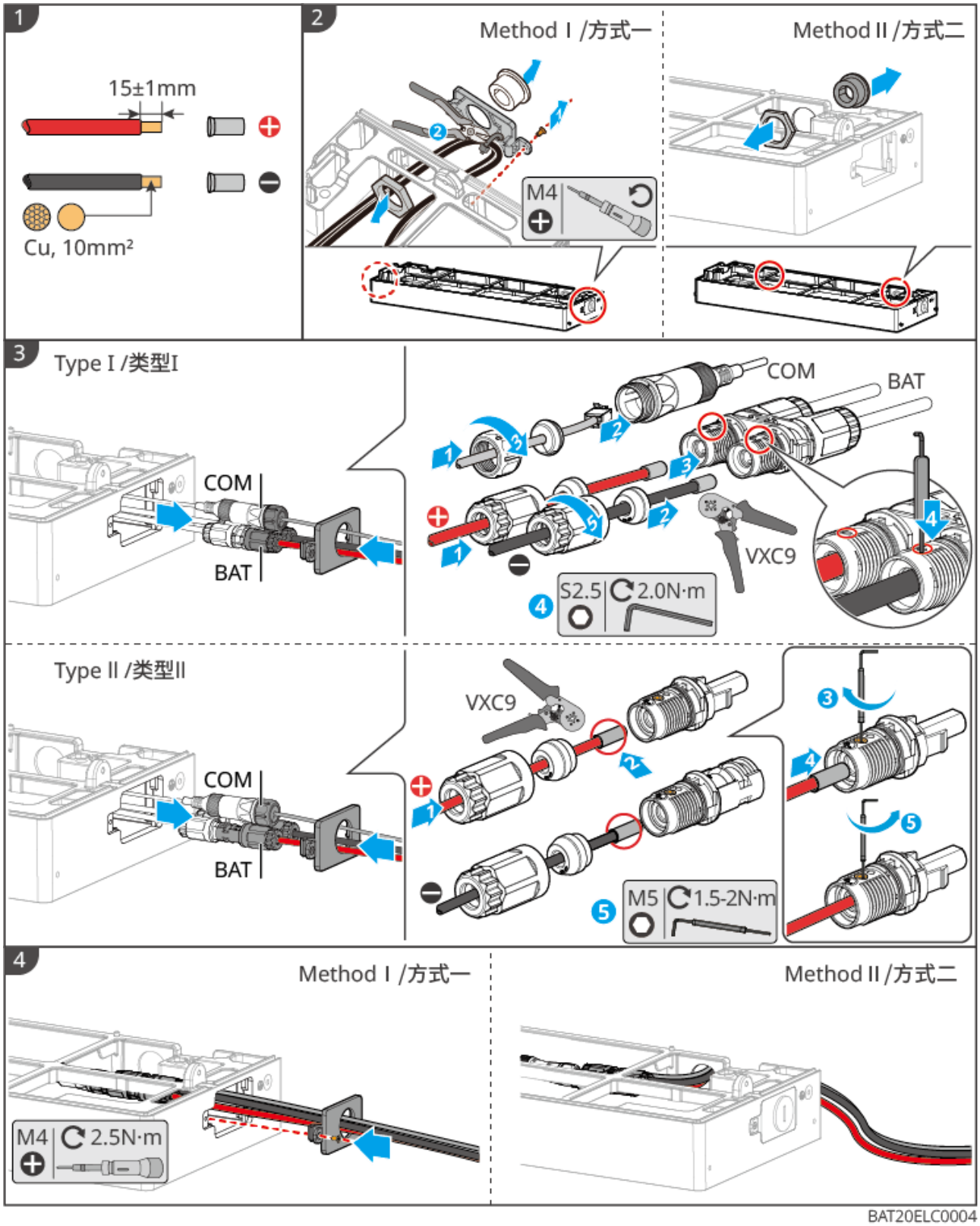
A1: Base shipped with Inverter

A2: Installation Base with parallel port

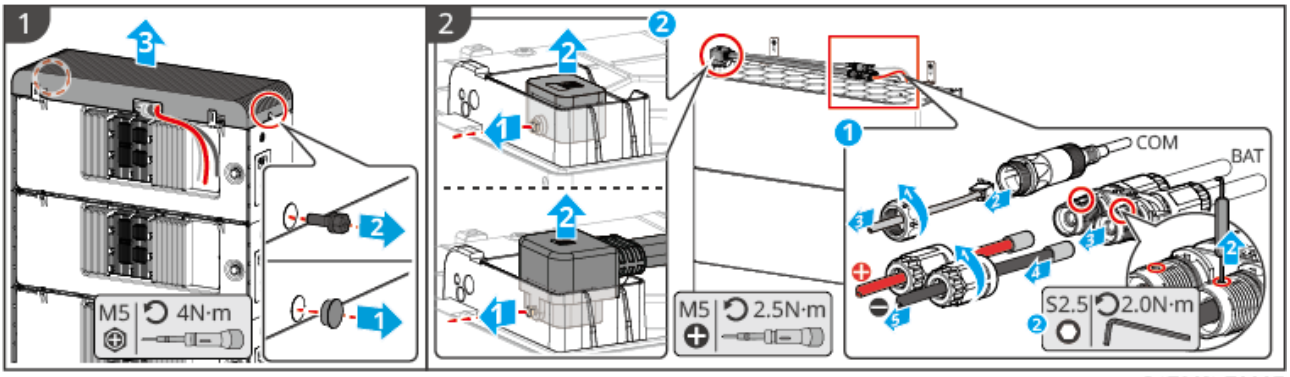


ESA20ELC0025

Battery system Expansion Harness Manufacturing Method



Battery Expansion Harness Disassembly Method



BAT20INT0007

5.9 Connect AC cable

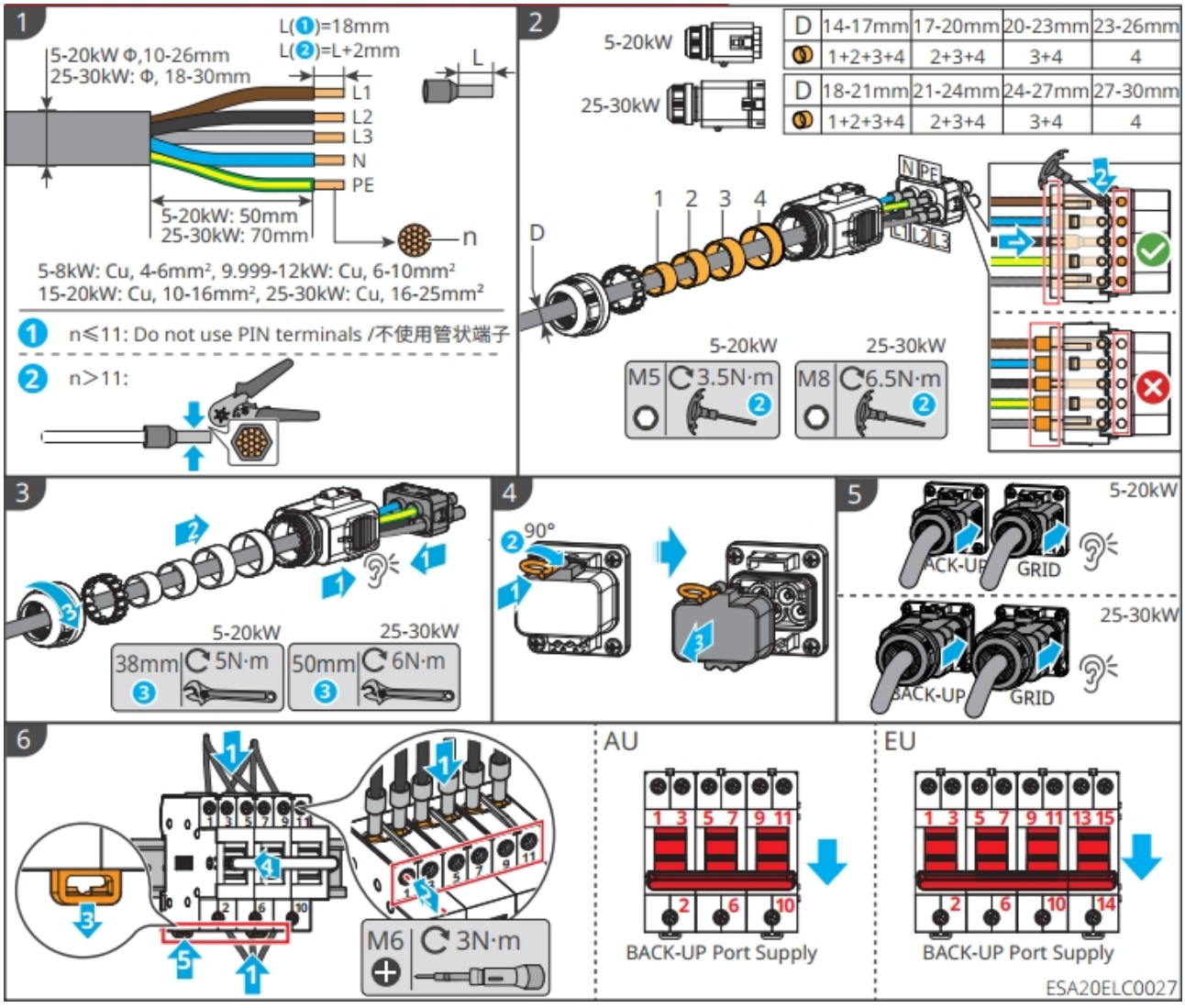
⚠Warning

- 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.
- During wiring, the AC wires must exactly match the "BACKUP" and "GRID" grounding ports on the AC terminals. Incorrect cable connections may result in equipment damage.
- Ensure the conductor core is fully inserted into the terminal connection hole with out any exposure.
- Please ensure that the insulation plate at the AC terminal is tightly clamped and free from loosening.
- Ensure cable connections are secure; otherwise, the terminals may over heat during equipment operation, causing damage to the equipment.

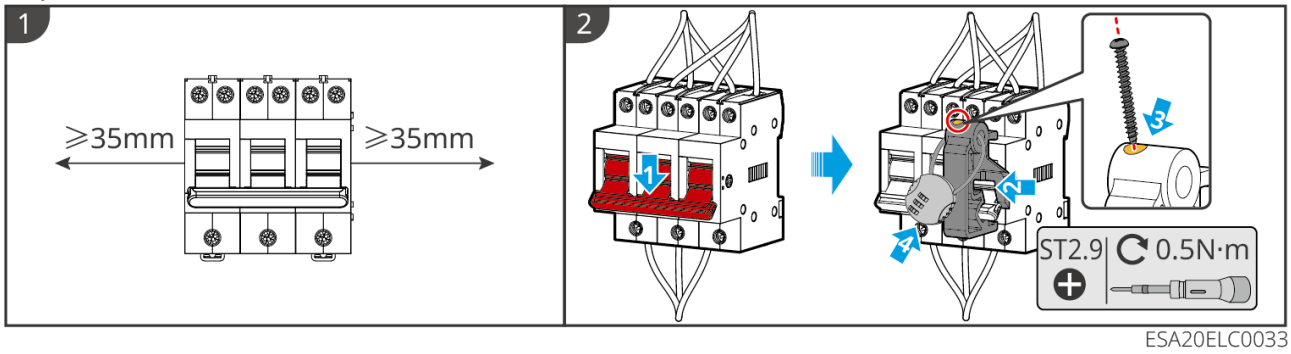
Note

- When crimping AC cables, it is recommended to use a crimping tool with a crimping shape of hexagonal (hexagon) or larger.
- After the system is installed and the wiring is confirmed to be correct, under normal operation, the BACK-UP port of the energy storage inverter should supply power to the critical household loads.
- After completing the AC wiring, switch the manual transfer switch to the "BACK-UP" position to engage. The fixed lock hasp supplied with the cabinet can be installed or not based on the actual situation. If installation is required, to facilitate the installation and removal of the lock accessory, a space of at least 35mm should be reserved on both left and right sides of the switch.
- STS is an optional accessory. If required, please refer to the wiring method below for connection.

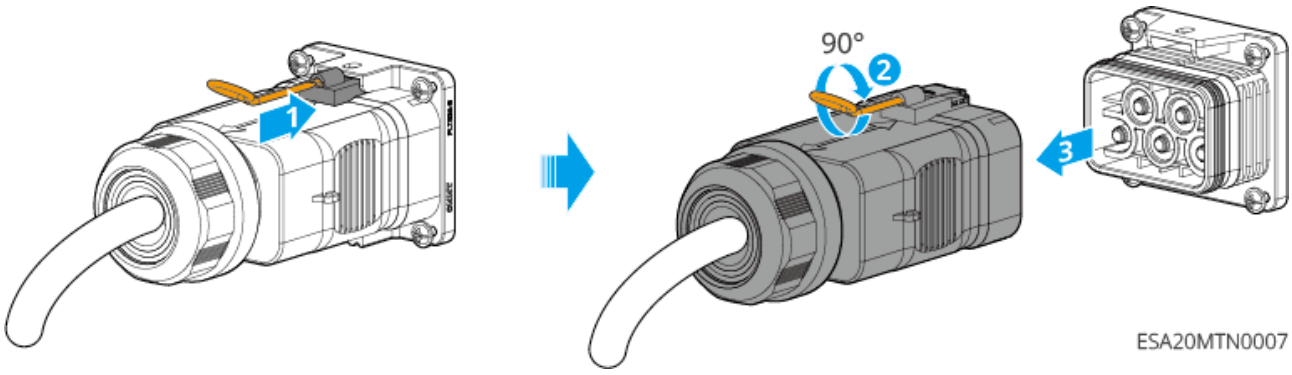
5.9.1 Connect the inverter AC line.



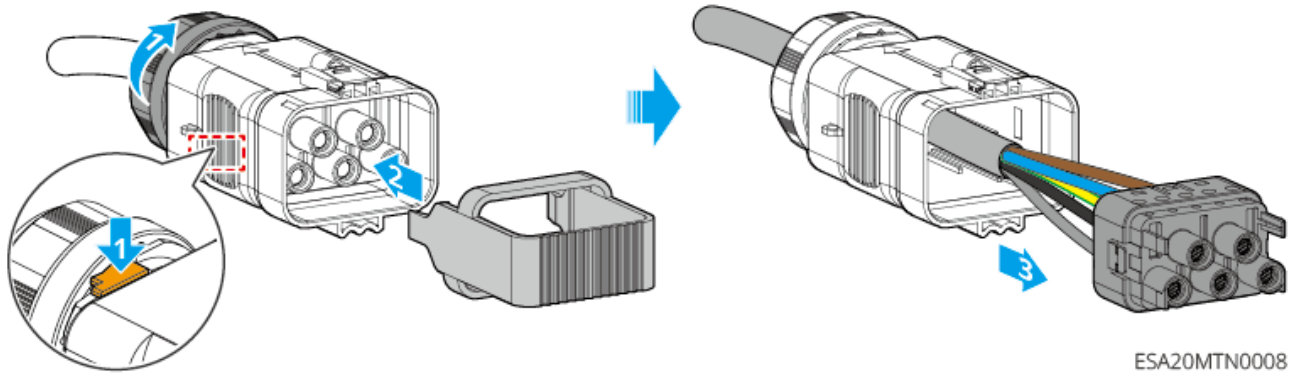
(Optional) Install manual transfer switch lock



If you need to disassemble the AC terminals, please refer to the following steps:



ESA20MTN0007



ESA20MTN0008

5.9.2 Connect the STS power line

⚠Warning

- To ensure that the STS can be safely disconnected from the grid in the event of an abnormal situation, please connect an AC Switch between the STS and the grid. Select an appropriate AC Switch according to local regulations.
- Please ensure that the STS is correctly connected to devices such as the inverter, grid, backup load, or generator. Incorrect connections may cause equipment damage.
- When wiring, the AC wires should fully match the "L1", "L2", "L3", "N", and "PE" ports of the AC terminals. Incorrect cable connection may cause a power outage.
- Ensure the conductor core is fully inserted into the terminal connection hole with out any exposure.
- Please ensure that the insulation plate at the AC terminal is tightly clamped and free from loosening.
- Ensure cable connections are secure; otherwise, the terminals may over heat during equipment operation, causing damage to the equipment.

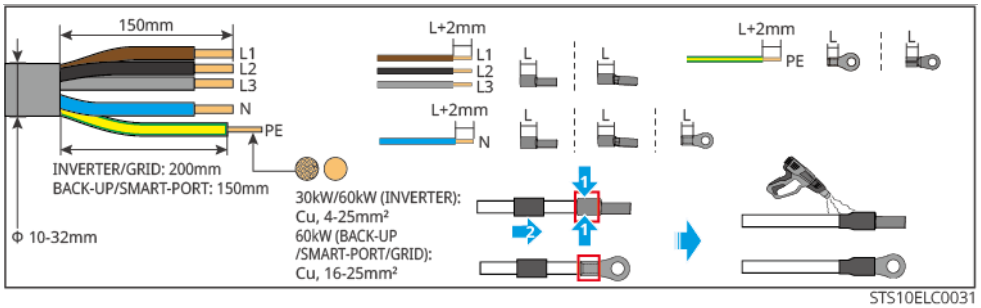


Figure45 cable fabrication

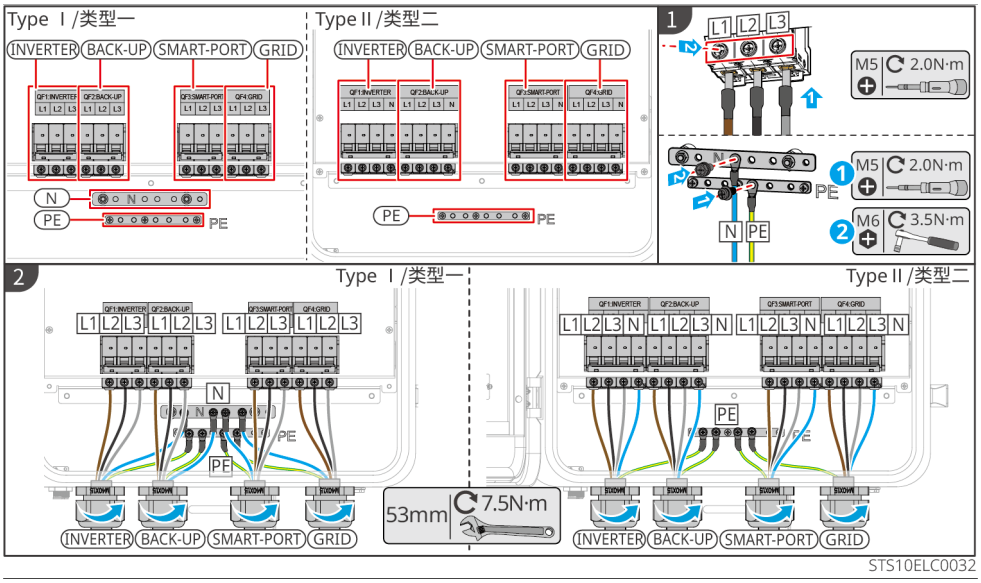


Figure46 30kW model cable connection

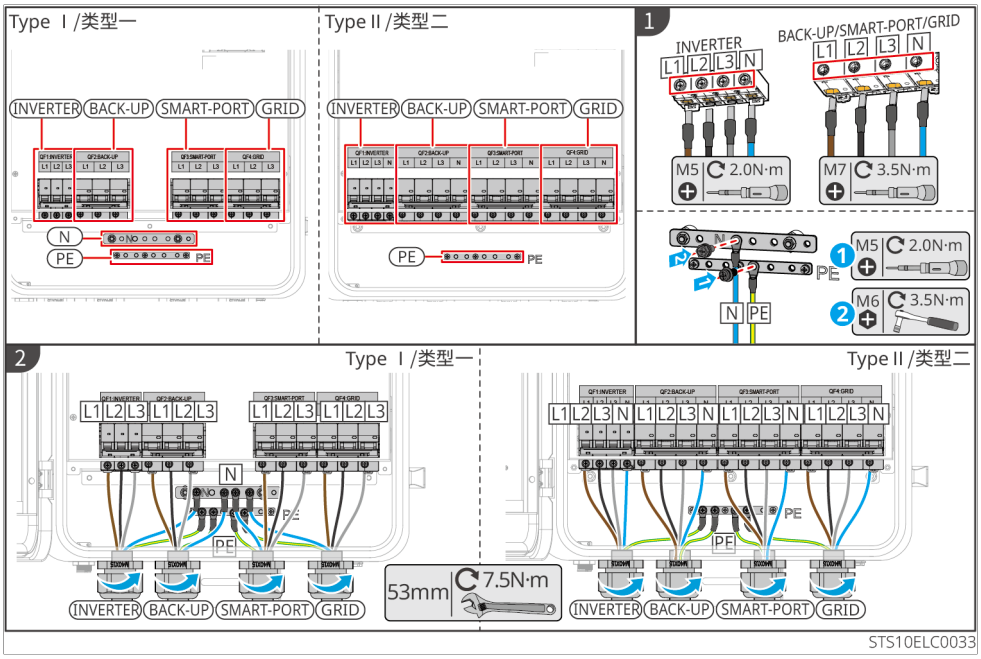


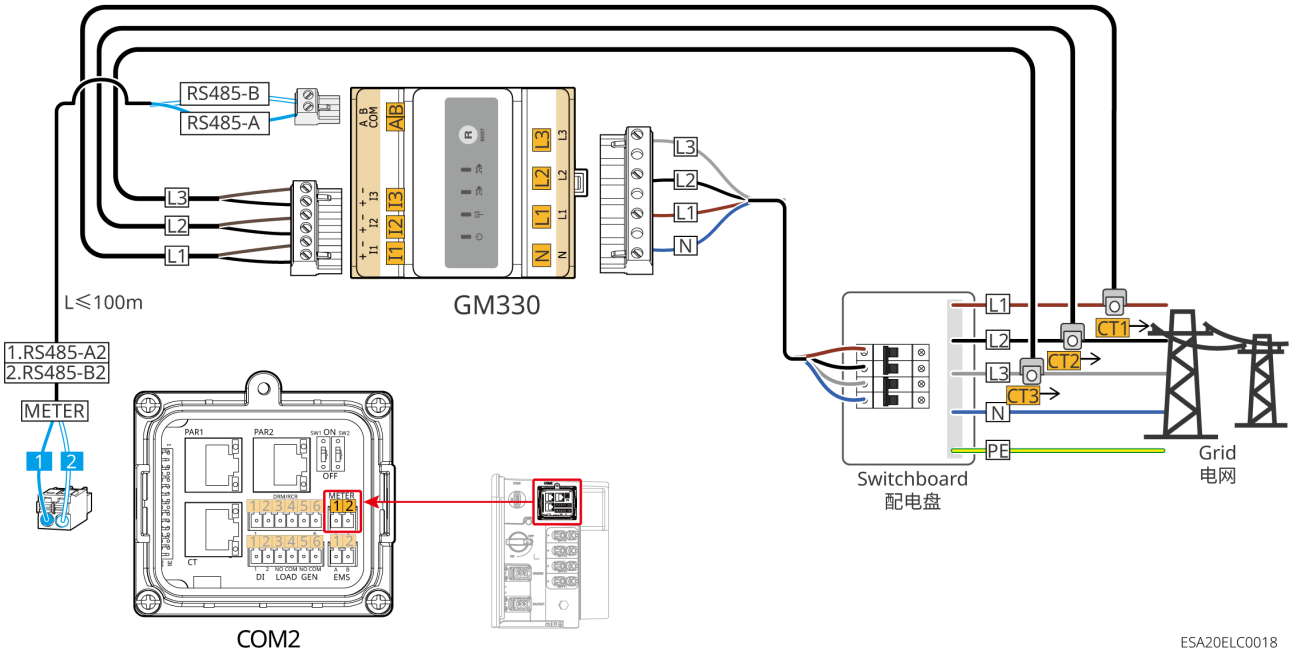
Figure47 Cable connection for 60kW model

5.10 Connecting the Meter Cable

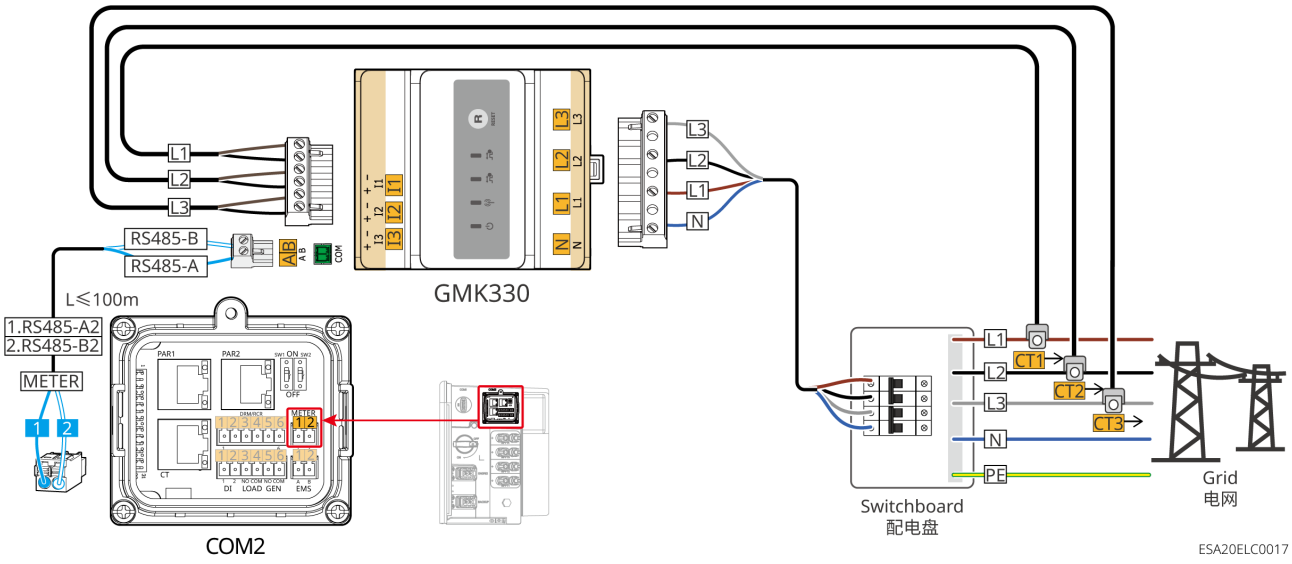
NOTICE

- If there is a need for multiple inverters to be connected in parallel for networking, please consult the manufacturer to purchase a meter separately.
- Please ensure that the CT connection direction and phase sequence are correct; otherwise, it may lead to incorrect monitoring data.
- Ensure that all cables are connected correctly, tightly, and without looseness. Improper wiring may cause poor contact or damage to the meter.
- In areas with lightning risks, if the meter cable length exceeds 10m and the cables are not laid with grounded metal conduits, it is recommended to install external lightning protection devices.

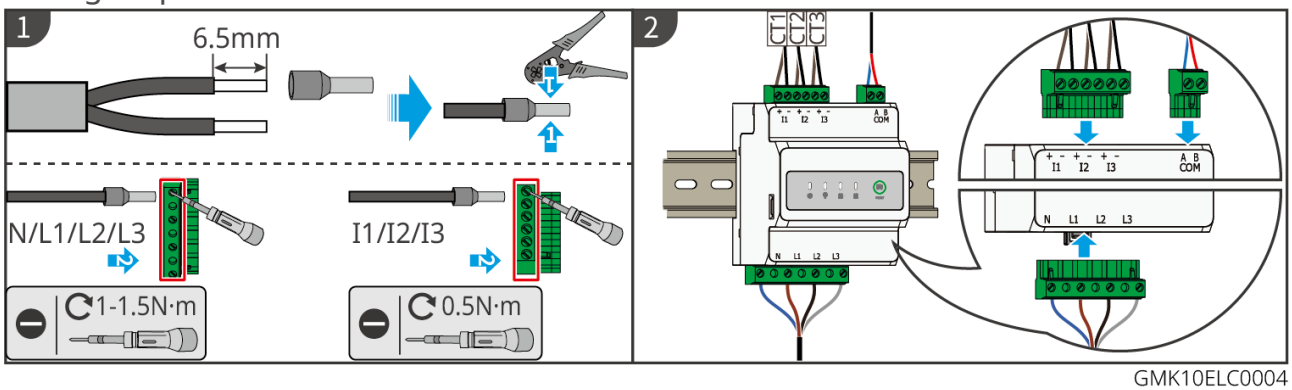
GM330 Meter Wiring



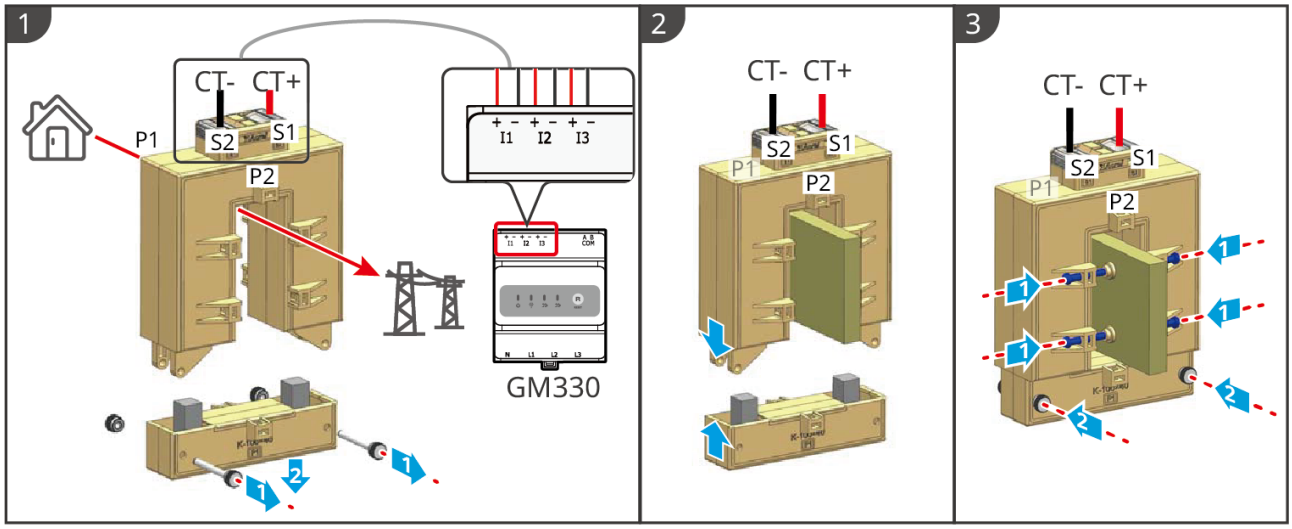
GMK330 Meter Wiring



Wiring Steps

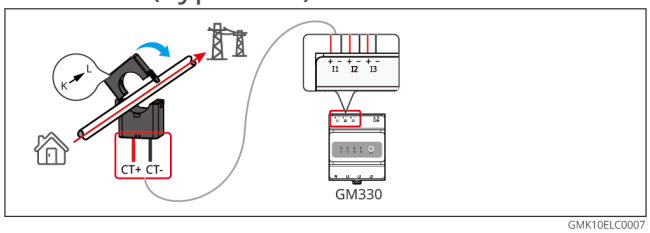


Install CT (Type One)



GMK10ELC0006

Install CT (Type Two)



GMK10ELC0007

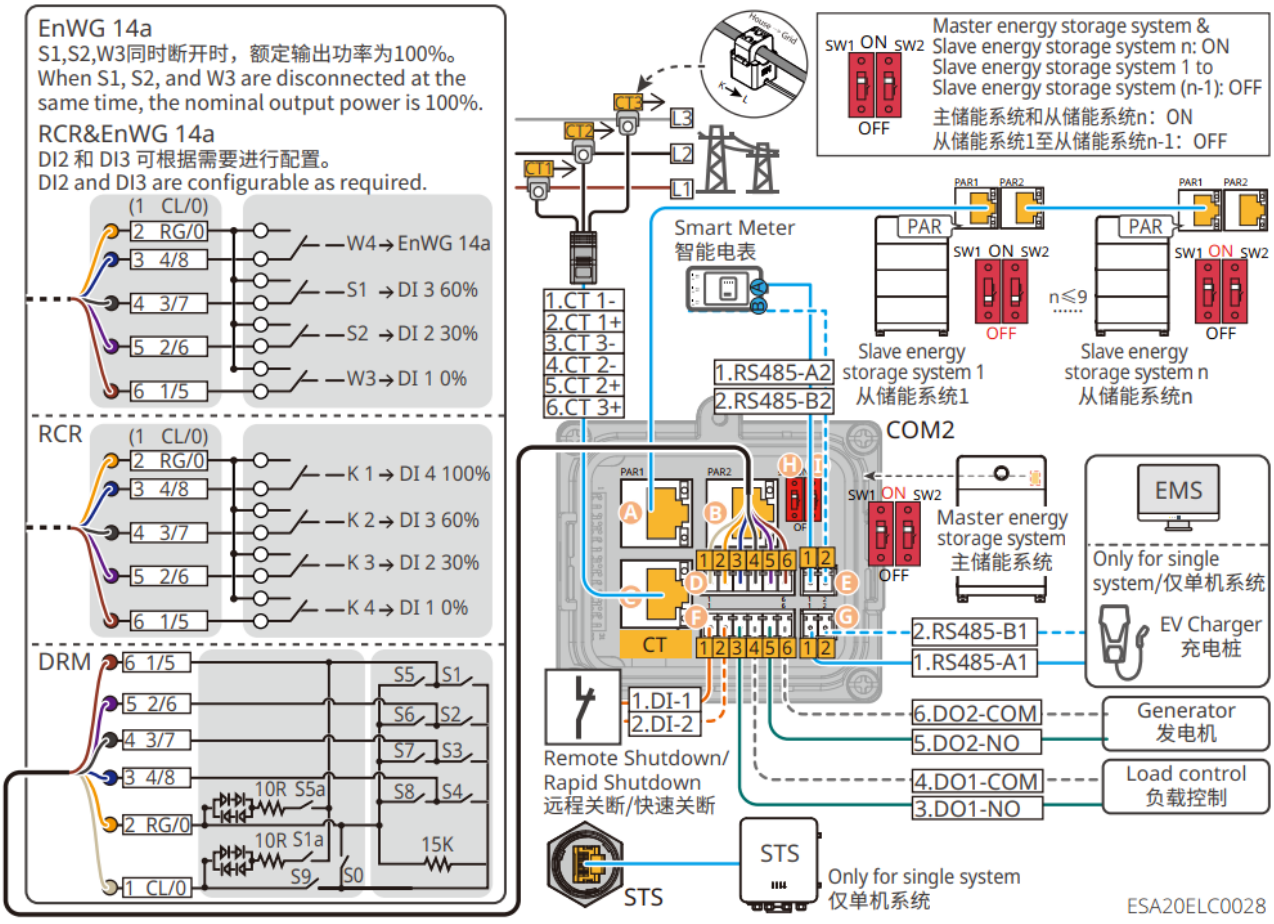
5.11 Connect communication cable

5.11.1 Connect inverter communication line

Note

- To ensure the electric meter and CT function properly, please ensure the following: CT must be correctly connected to the phase wire, CT1 is connected to L1, CT2 is connected to L2, CT3 is connected to L3.
- When using the inverter built-in meter, please use the CT shipped with the inverter.
- To use DRED, RCR, or the remote shutdown function, please enable it in the GoodWe SEMS+ App after completing the wiring.
- If the inverter is not connected to a DRED device or remote shutdown device, do not enable this function in the SEMS+ App, otherwise the inverter cannot operate on-grid.
- In a parallel system, to implement DRED and RCR functions, simply connect the DRED and RCR communication cables to the master inverter.
- To ensure the waterproof rating of the inverter, do not remove the waterproof plugs of unused communication ports on the inverter.
- Inverter DO Signal Communication Port, can connect dry contact signal specifications: Max≤24Vdc, 1A.
- Inverter communication function is optional; select based on actual use scenario.
- The inverter supports connection via Bluetooth, WiFi, and LAN communication methods to mobile devices or web interfaces for setting device parameters, viewing operation and error information, and promptly under standing system status.
- The inverter STS port should be connected to STS COM1. Connecting to CT is strictly prohibited, as it may cause equipment damage.
- In a single-machine system, it supports the installation of WiFi/LAN Kit-20 or 4G Kit-CN smart communication stick.
- In a parallel system, both the master and slave inverters need to be equipped with the WiFi/LAN Kit-20 intelligent communication stick for networking.
- In a parallel system, the DIP switches of the first and last inverters must be set to the ON position, while the other inverters should be set to the OFF position.

Communication Function Description

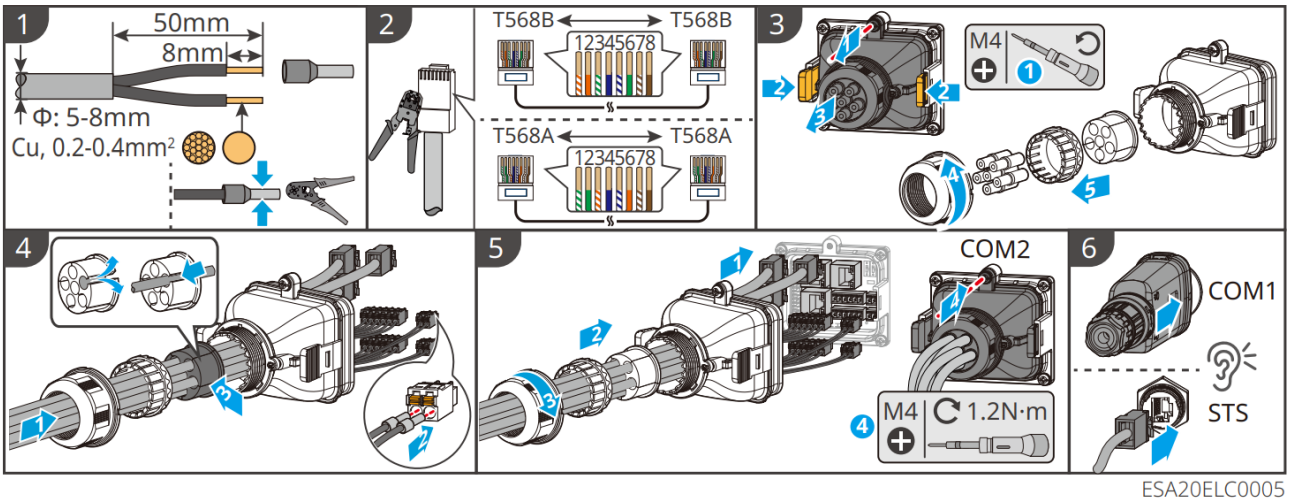


Port (Silkscreen)		function	description
A	PAR1	Parallel communication port 1	Parallel communication port.
B	PAR2	Parallel communication port 2	
C	CT	CT	When only using the inverter's built-in meter, connect the CT communication cable.

Port (Silkscreen)		function	description
D	DRM/RCR	RCR, DRED or EnWG 14a Function Connection Port	• RCR（Ripple Control Receiver）：Provides an RCR signal control port to meet the grid dispatching requirements in European regions. • DRED（Demand Response Enabling Device): provides DRED signal control port, meeting certification requirements for Australia and other regions DERD. • EnWG（Energy Industry Act）14a: All controllable loads must accept emergency grid dimming. Grid operators can temporarily reduce the maximum grid import power of controllable loads to 4.2kW.
E	METER	Meter connection port	Use RS485 communication to connect an external smart meter.
F	DI	Remote Shutdown/Rapid Shutdown	• External Remote Shutdown device, default off. • In a rapid shutdown system, the rapid shutdown transmitter works in conjunction with the receiver to achieve system rapid shutdown. The receiver maintains the module output by receiving signals from the transmitter. The transmitter can be external or built into the inverter. In an emergency, the external trigger device can be enabled to stop the transmitter, the reby shutting down the modules.

Port (Silkscreen)		function	description
	LOAD	load control	• Supports connection to dry contact signals, enabling load control and other functions. DO contact rating is 24 V DC@1A, NO/COM normally open contact. • Supports SG Ready heat pump integration, controlling the heat pump through dry node contact signals.
	GEN	Diesel Generator Control Port	Supports access to Diesel Generator Control signals to control the start/stop of the generator. In a Microgrid Scenario, connecting to a generator is not supported.
G	EMS	EMS/EV Charger Communication Port	• Connect to third-party EMS equipment for energy control • Only supports connecting to GoodWe charging piles in single-machine scenarios.
H	SW1	Parallel operation DIP switch	In a multi-machine parallel scenario, the parallel DIP switches of the first and last inverters need to be set to the ON position, and the other inverters to the OFF position.
I	SW2		

How to Connect the Communication Cable



ESA20ELC0005

5.11.2 Connect the STS communication cable

Note

- When connecting the communication cable to the inverter, please use the communication cable shipped with the product.
- The length of the communication cable shipped with the box is 10m. If this length is insufficient, please prepare a standard network cable of CAT 5E or higher specification and use the RJ45 connectors shipped with the box to crimp the cable.
- The length of self-made communication cables should not exceed 100m, otherwise it may cause communication anomalies.
- When making a self-made communication cable, please cut off the communication cable shipped with the unit and take its waterproof grommet to install on the self-made cable.
- After the communication line connection is completed, please ensure waterproof Protection.
- COM2 port function reserved. Do not remove waterproof cover.

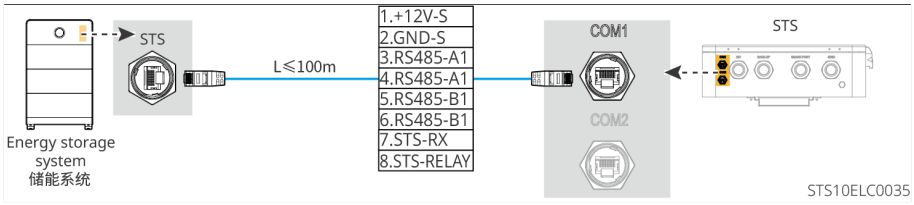


Figure48 Wiring Over view

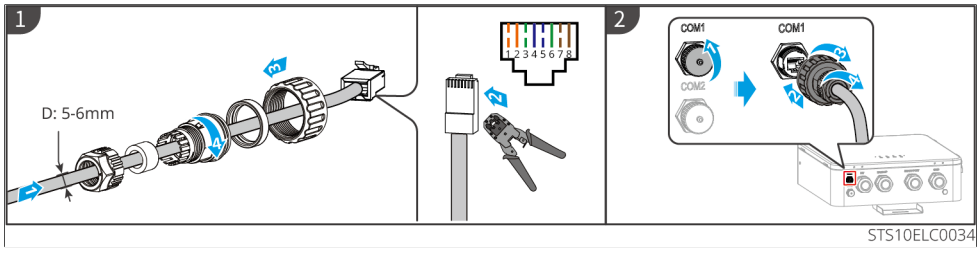
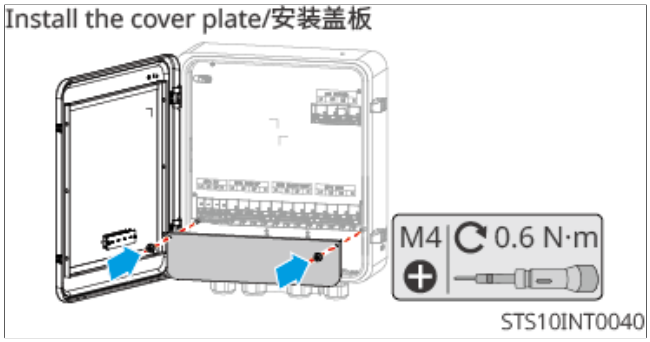


Figure49 Wiring steps

5.12 Installing the STS Cover Plate


Install the cover plate/安装盖板
M4
0.6 N·m
STS10INT0040

6 System Commissioning

6.1 Check Before Power ON

No.	Inspection items
1	The equipment is firmly installed, easy to operate and maintain, with sufficient space for ventilation and heat dissipation, and the environment is clean and tidy.
2	PE cable, DC cables, AC cables, and Communication cable are correctly and securely connected.
3	The cable ties meet the wiring requirements, are reasonably distributed, and show no signs of damage.
4	Unused through-holes and port must be reliably connected using the provided terminal accessories and properly sealed.
5	Ensure that all used wire feed-through holes are properly sealed.
6	The voltage and Frequency of the Inverter on-grid access point comply with the on-grid requirements.

6.2 Power ON

⚠WARNING

- Battery black start: When there is no PV power 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 enter off-grid mode and the battery supplies power to the load.
- After the battery system is started, ensure that the inverter and the battery system communicate normally within 15 minutes. If the inverter and the battery system cannot communicate properly, the battery system switch will automatically disconnect and the battery system will be powered off.
- When the inverter is operating normally, set the manual transfer switch to the BACK-UP position to engage, and the inverter's BACK-UP port supplies power to the load.
- PV strings and "5" are only applicable to the ETA series.

NOTICE

- On the first power-up of the system, it is recommended to perform a battery black start. Close the battery power switch and briefly press the multifunction button on one of the batteries. Observe whether the inverter SOC indicator lights up. If the indicator lights up, the battery is connected properly, and you can proceed to close the DC switch of the subsequent inverter.
- To ensure successful networking of the parallel system, it is recommended to complete the power-on and detection operations in the following order:
  - Before the parallel system networking is successful, do not close the grid-side switch, to avoid the machine starting Grid wiring detection before configuration is complete, which may cause detection timeout.
  - For pure grid-tied parallel operation (i.e., the backup outputs of all machines are not connected to any load), before the parallel system networking is successful, it is recommended to power the inverters only through a single PV string or a single battery string, to avoid the master inverter starting off-grid and entering wiring detection before other machines are configured, which may cause detection timeout.

power on

- **Standalone scenario**

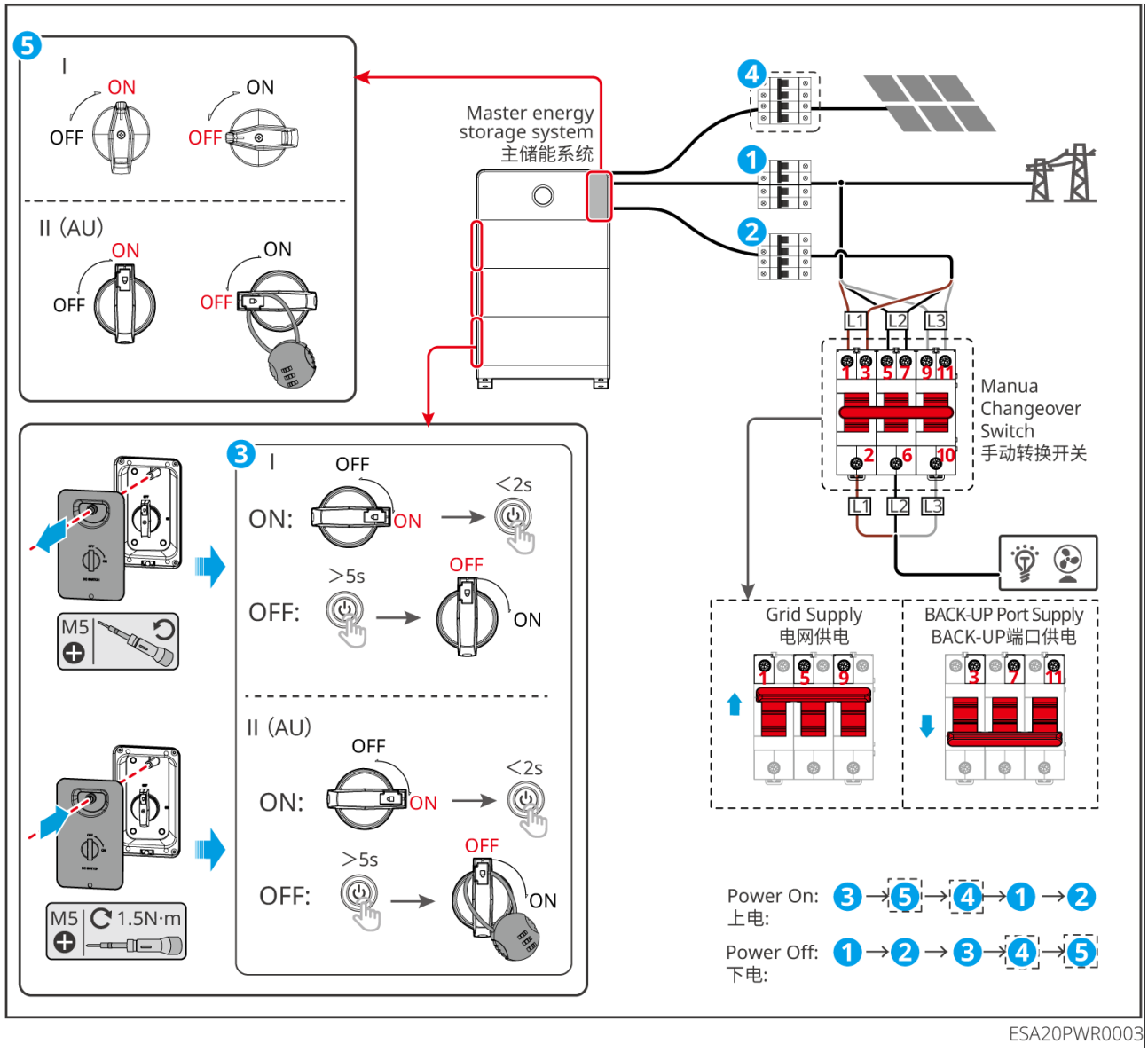


Figure50 Power on for standalone scenario

1. Close the battery power switch and briefly press the battery's multi-function button. When there are multiple batteries in the system, close the power switches of all batteries. Briefly press the multi-function button of any battery to start all batteries.
2. Close the DC switch of the inverter.
3. Close the circuit breaker between the PV modules and the inverter.
4. Close the GRID circuit breaker.

5. Set the manual transfer switch to the BACK-UP position to engage, so that the BACK-UP port supplies power to the load. Close the BACK-UP circuit breaker.

Power on with static transfer switch cabinet

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

⚠DANGER

- Please be sure to operate according to the BYPASS switch closing sequence, otherwise there may be a risk of electric shock.
- When the BYPASS switch is closed, QF1 must be disconnected; otherwise there may be a risk of electric shock.
- After the switch switching is completed, please close the cabinet door.
- Do not discard the retaining clip.

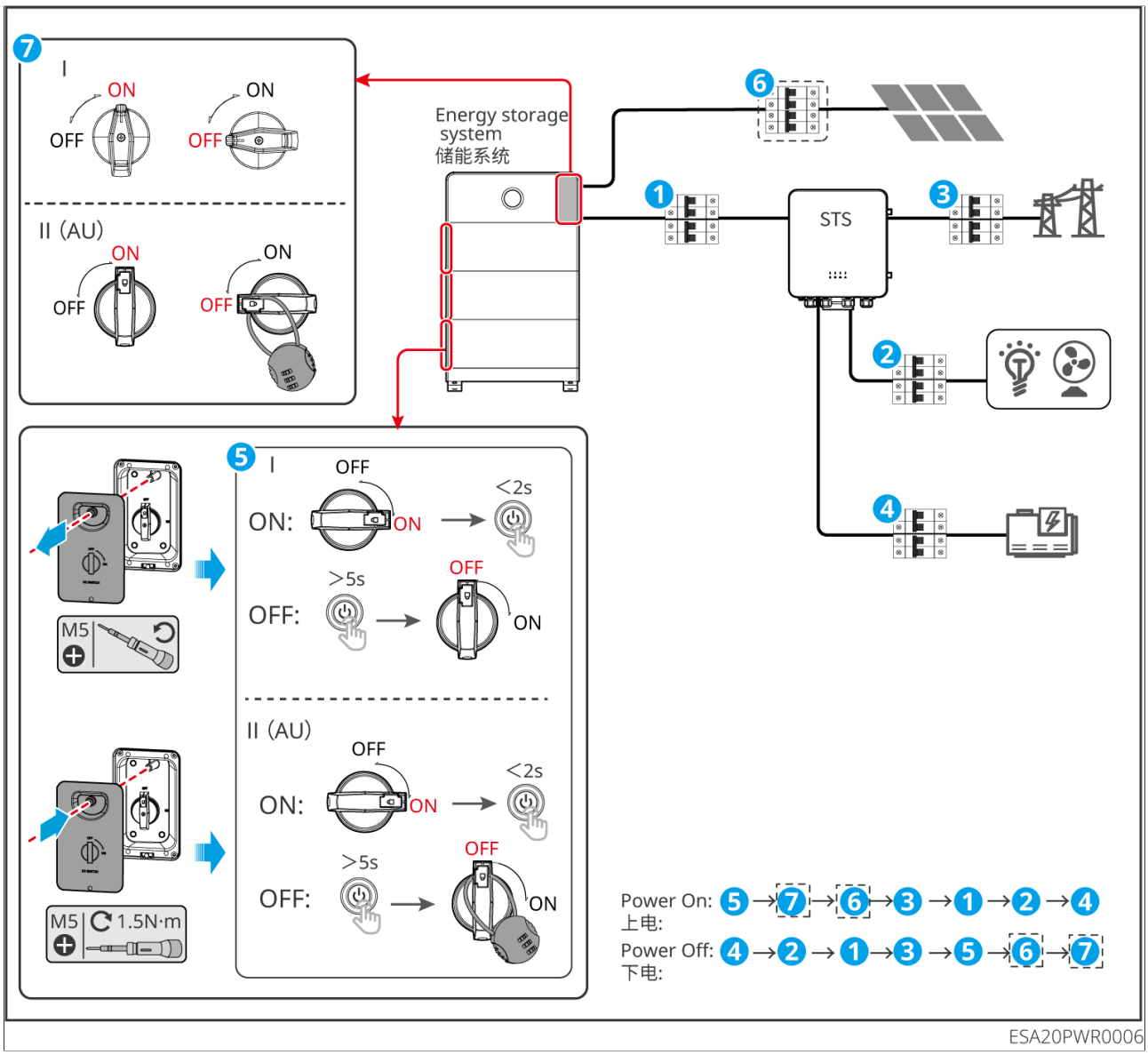


Figure51 Power on with static transfer switch cabinet

1. Close the battery power switch and briefly press the battery's multi-function button. When there are multiple batteries in the system, close the power switches of all batteries. Briefly press the multi-function button of any battery to start all batteries.
2. Close the DC switch of the inverter.
3. Close the circuit breaker between the PV modules and the inverter.
4. Close the STS GRID circuit breaker.
5. Close the STS INV circuit breaker.
6. Close the STS BACK-UP circuit breaker.

7. Close the STS SMART-PORT circuit breaker.

STS BYPASS switch closed

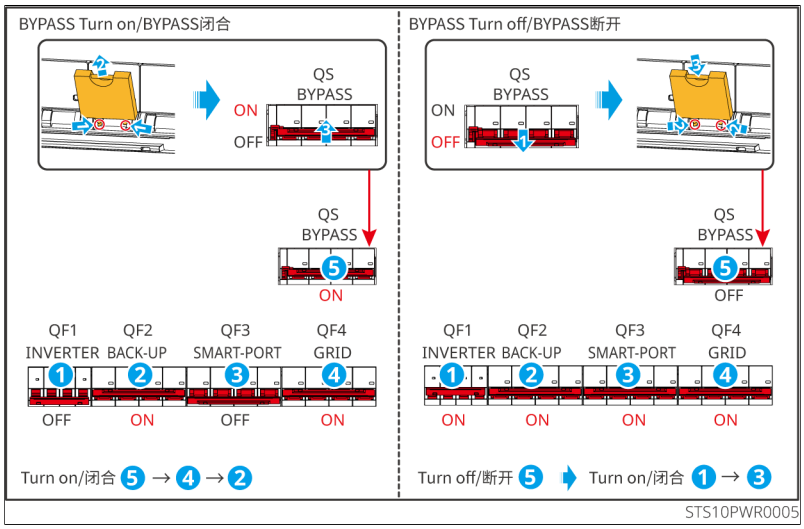
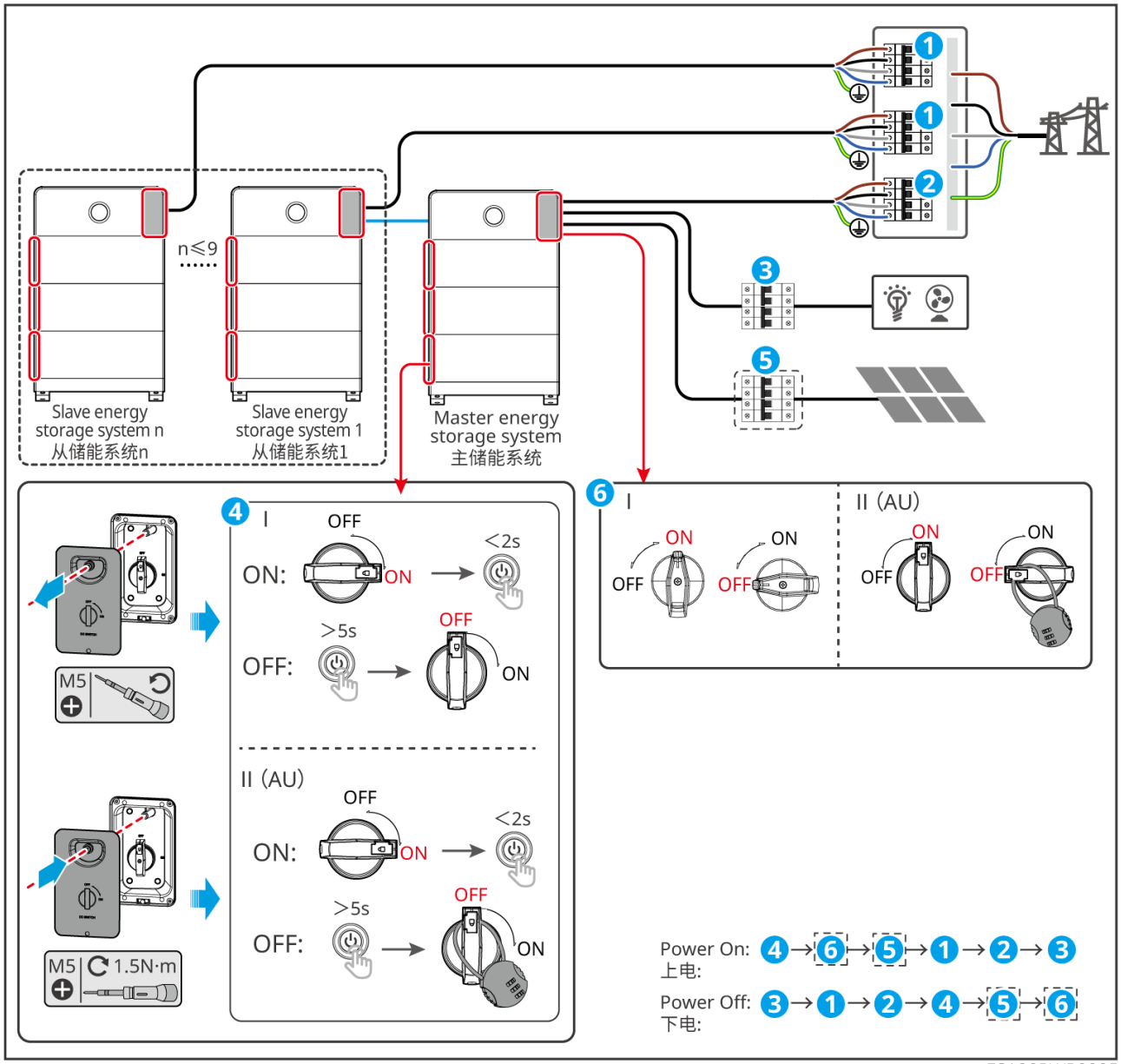


Figure52 BYPASS switch closed

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

- **parallel system**



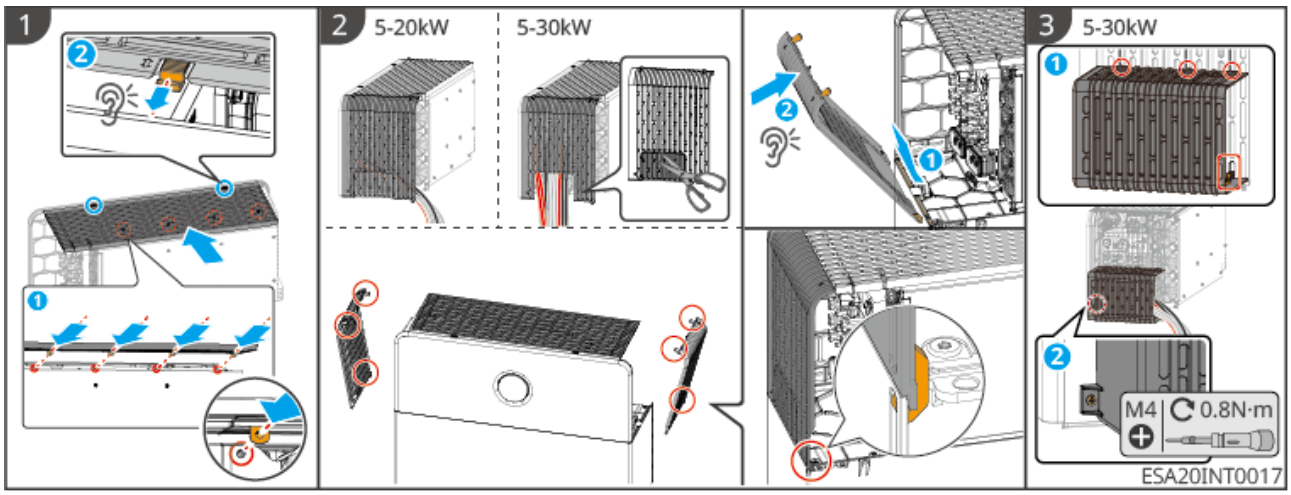
ESA20PWR0005

1. Close the battery power switch and briefly press the battery's multi-function button. When there are multiple batteries in the system, close the power switches of all batteries. Briefly press the multi-function button of any battery to start all batteries.
2. Close the DC switch of the inverter.
3. (Optional) Close the circuit breaker between the PV modules and the inverter.
4. Close the slave inverter GRID circuit breaker.
5. Close the master inverter GRID circuit breaker.
6. Close the BACK-UP circuit breaker.

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. (Optional) Close the circuit breaker between the PV modules and the inverter.
4. Close the GRID circuit breaker.
5. Close the BACK-UP circuit breaker.
6. Briefly press the multi-function button of any battery to start the battery. After the battery is powered on, wait 15 seconds, then press and hold the multi-function button of any battery for 2 seconds; the battery will forcibly discharge to activate the inverter.

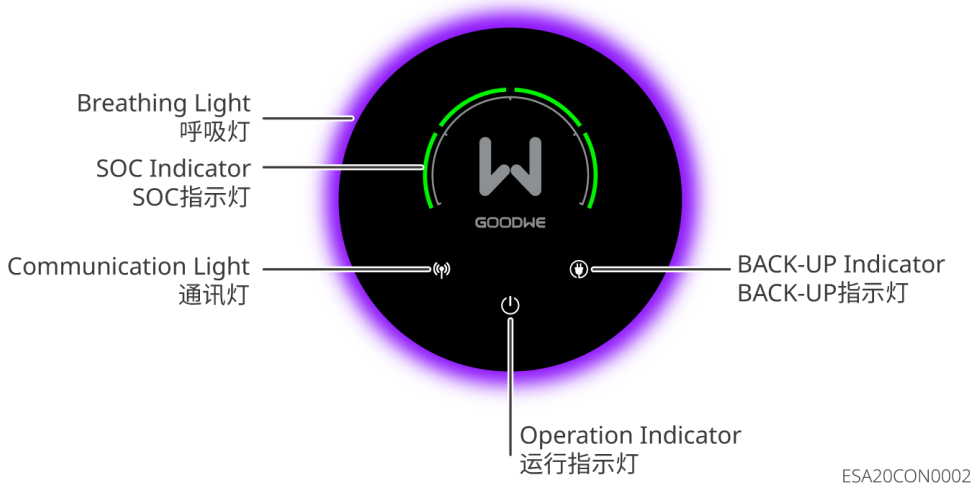
6.3 Installing the Protective Cover



Step 1: Install the inverter top cover. Align the cover with the installation slot on the top of the inverter and slide it forward.
Step 2: Install the side cover. Place the side cover into the slot on the side of the battery and push it forward.
Step 3: (Optional) If using side cable routing, install the cable cover.

6.4 Indicators

6.4.1 Inverter Indicators

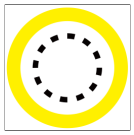
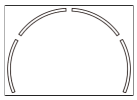
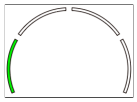
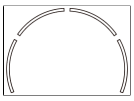
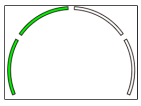
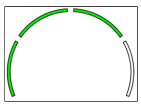
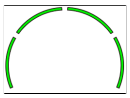


Breathing Light:

- When the system is in an upgrade state: The Breathing Light is a green marquee light; the head of the marquee is brightest and the tail is dimmest. The length of the marquee and the upgrade percentage are influenced by the SEMS+ App settings and the device's operational status.
- Except during inverter upgrades, system faults, and inverter power-off states, the Breathing Light status is affected by the App settings in the SEMS+ App. For setup instructions, please refer to the SEMS+ App User Manual.

Indicator	Indicator Status	Breathing Light Status	Description
⏻		• 3min/Always On: Blue-purple chasing light stays on • Always Off: Off	Inverter is powered on and in standby mode
			Inverter is starting up and in self-test mode
		• 3min: Blue-purple breathing for 3min then off • Always On via App: Blue-purple breathing stays on • Always Off via App: Off	Inverter operating normally in grid-tied generation or off-grid mode

Indicator	Indicator Status	Breathing Light Status	Description
		Red flashing	System fault
		Off	Inverter is powered off
		/	Inverter monitoring module resetting
			No connection established between inverter and communication terminal
			Communication fault between communication terminal and cloud server
			Inverter monitoring normal
			Inverter monitoring module not started
			Grid abnormal, inverter BACK-UP port power supply normal
			Grid normal, inverter BACK-UP port power supply normal
			No power supply to BACK-UP port
			System upgrade
			System fault

Indicator	Indicator Status	Breathing Light Status	Description
			System overload
			Battery has no charge
			Steady on: Charge Flashing: Discharge Battery SOC: 0% < SOC≤25%
			Steady on: Charge Flashing: Discharge Battery SOC: 25% < SOC≤50%
			Steady on: Charge Flashing: Discharge Battery SOC: 50% < SOC≤75%
			Steady on: Charge Flashing: Discharge Battery SOC: 75% < SOC≤100%

6.4.2 Battery Indicators

Button Indicators

No.	Green Light	Red Light	Battery System Status	Description
1	Steady On	--	System Operating Normally	Run
2	Blinking 1 time/S		System Ready	Standby
	Blinking 3 times/S	--	PCS Communication Lost	--
3	Blinking 1 time/2S	--	System Alarm	Includes Level 2 faults from the fault list, where the under-voltage fault is steady on when it is Level 2, 3, or 4.
4	--	Steady On	System Fault	Level 3 and above faults from the fault list (steady on when under-voltage fault is Level 5).

6.4.3 STS indicator light

indicator light	status	Description
		Grid port voltage normal
		No voltage at grid port
		Backup port voltage normal
		Backup port has no voltage.
		SMART-PORT port voltage normal
		No voltage at SMART-PORT.
		Equipment failure
		Equipment fault-free

6.4.4 Smart Meter Indicator Lights GM330&GMK330

6.4.4.1 Indicator Light Description

Type	Status	Description
Power Light	Steady On	The meter is powered on, with no RS485 communication.
	Blinking	The meter is powered on, with normal RS485 communication.
	Off	The meter is powered off.
Comm Light	Off	Reserved.
	Blinking	Press and hold the Reset button for ≥5s, and the Power Light and Buy/Sell Power Light blink: The meter is resetting.
Buy/Sell Power Light	Steady On	buy power from the grid.
	Blinking	Selling power to the grid.
	Off	Not buying or selling power.
Buy/Sell Power Light (GMK360 only)	Steady On	buy power from the grid.
	Blinking	Selling power to the grid.
	Off	Not buying or selling power.

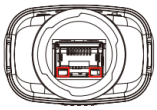
6.4.5 Smart Dongle Indicator

- **WiFi/LAN Kit-20**

NOTICE

- After double-clicking the Reload button to turn on Bluetooth, the communication indicator light will switch to a single-blink state. Please connect to the App within 5 minutes, otherwise Bluetooth will automatically turn off.
- The communication indicator light's single-blink state only appears after double-clicking the Reload button to turn on Bluetooth.

Indicator	Status	Description
Power Light		Constantly lit: The Smart Communication Stick is powered on.
		Off: The Smart Communication Stick is not powered on.
Communication Light		Constantly lit: Communication is normal in WiFi mode or LAN mode.
		Single flash: The Smart Communication Stick's Bluetooth signal is enabled, waiting to connect to the App.
		Two flashes: The Smart Communication Stick is not connected to the router.
		Four flashes: The Smart Communication Stick communicates normally with the router, but is not connected to the server.
		Six flashes: The Smart Communication Stick is identifying connected devices.
		Off: The Smart Communication Stick is undergoing a software reset or is not powered on.

Indicator	Color	Status	Description
LAN port communication light 	Green	Steady on	100Mbps wired network connection is normal.
		Off	• Network cable is not connected. • 100Mbps wired network connection is abnormal. • 10Mbps wired network connection is normal.
	Yellow	Steady on	10/100Mbps wired network connection is normal, with no communication data being transmitted or received.
		Blinking	Communication data is being transmitted or received.
		Off	Network cable is not connected.

Button	Description
Reload	Hold for 0.5~3 seconds, the Smart Communication Stick will reset.
	Hold for 6~20 seconds, the Smart Communication Stick will restore factory settings.
	Double-click quickly to enable Bluetooth signal (maintained for 5 minutes only).

- **4G Kit-G20**

Indicator	Status	Description
Power Light		Steady on: The Smart Communication Stick is powered on.
		Off: The Smart Communication Stick is not powered on.
Communication Light		Steady on: The Smart Communication Stick is connected to the server, communication is normal.
		Blinks twice: The Smart Communication Stick is not connected to the base station.
		Blinks four times: The Smart Communication Stick is connected to the base station but not to the server.
		Blinks six times: Communication between the Smart Communication Stick and the inverter is disconnected.
		Off: The Smart Communication Stick is undergoing a software reset or is not powered on.
Button	Description	
Reload	Hold for 0.5~3 seconds, the Smart Communication Stick will restart.	
	Hold for 6~20 seconds, the Smart Communication Stick will restore factory settings.	

7 System Debugging and Power Station Monitoring

7.1 Device commissioning and plant monitoring via the SEMS+ App

The SEMS+ App is software for remote plant monitoring or near-end device commissioning. It supports installers or plant owners in:

- Remotely monitoring plant operation and setting plant and device operating parameters.
- Connecting to devices locally to view their operating status and set device parameters.

Downloading and installing the SEMS+ App
Phone requirements:

- Mobile 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 following QR code 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 following QR code.

SEMS+ App User Manual

7.2 Perform device commissioning and power station 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. Adding, monitoring power station information, etc.
3. Maintain equipment.

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



SEMS+ WEB User Manual

8 Maintenance

8.1 Power OFF the System

⚠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 hazard.
- After the equipment is powered off, it takes some time for internal components to discharge. Wait until the equipment is fully discharged according to the label time requirements.
- To restart the battery, use the air switch power-on method.
- When powering off the inverter for maintenance, ensure STS QF1 INV is disconnected; otherwise there may be risk of electric shock.
- When shutting down the battery system, strictly follow the battery system power-off requirements to prevent damage to the battery system.

⚠WARNING

When the inverter is powered off for maintenance or due to a fault, to ensure normal operation of the load, switch the manual transfer switch to the grid side and close it, so that the grid supplies power to the load.

NOTICE

- 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, fasten it with screws.
- When the circuit breaker is open, all live parts in the positive and negative circuits are disconnected, and the equipment is in a safe power-off state with no exposed hazardous live parts, so there is no risk of electric shock upon human contact.
- If the system is equipped with a static transfer switch cabinet (STS), close the upper cover of the STS after power-off is completed.
- The PV strings and "❺" are only applicable to the ETA series.

power off

- **Single-unit scenario:**

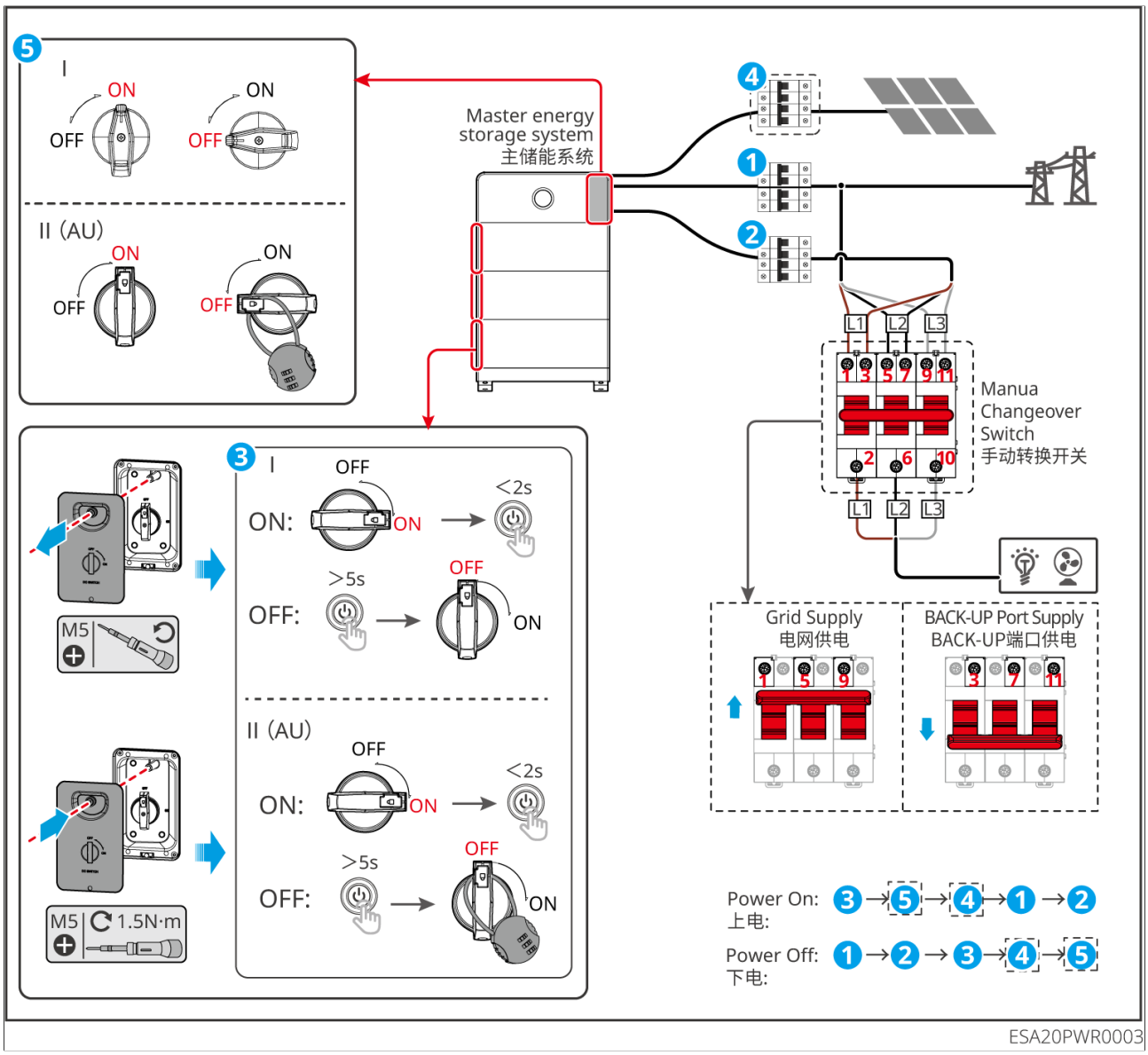


Figure53 Single-unit scenario power off

1. Disconnect the BACK-UP circuit breaker.
2. Disconnect the GRID circuit breaker.
3. Press and hold the multi-function button on any battery 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, turn off the battery system switch.
4. (Optional) Disconnect the circuit breaker between the PV components and the inverter.
5. Disconnect the inverter DC switch. Turn the manual transfer switch to the grid side

to close, and the grid supplies power to the load.

Power off with static transfer switch cabinet

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

⚠DANGER

- Be sure to operate according to 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 retaining ring.

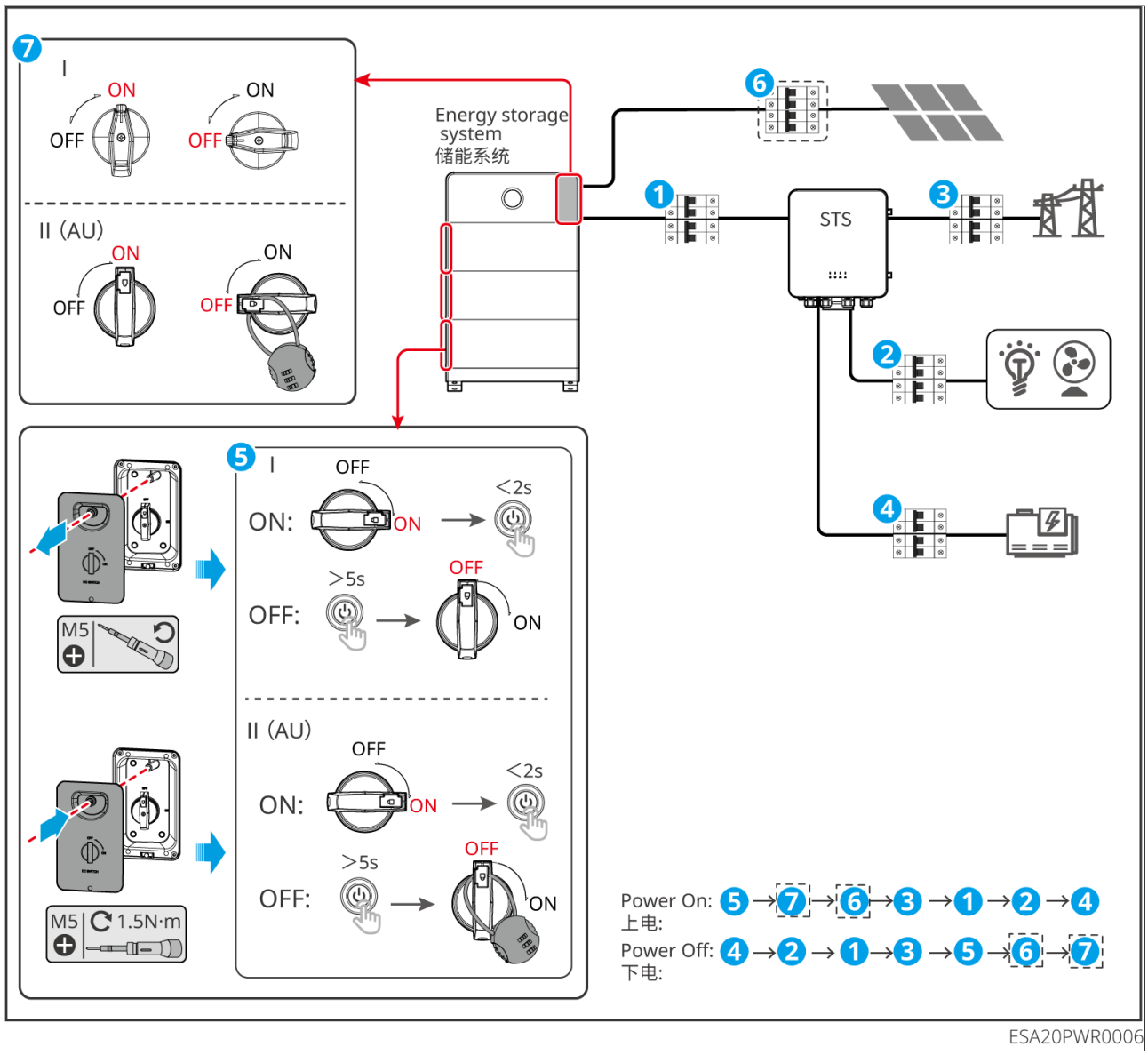


Figure54 Power off with static transfer switch cabinet

1. Disconnect the STS SMART-PORT circuit breaker.
2. Disconnect the STS BACK-UP circuit breaker.
3. Disconnect the STS INV circuit breaker.
4. Disconnect the STS GRID circuit breaker.
5. Press and hold the multi-function button on any battery 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, turn off the battery system switch.
6. (Optional) Disconnect the circuit breaker between the PV components and the

inverter.

7. Disconnect the inverter DC switch.

Disconnect the STS BYPASS switch

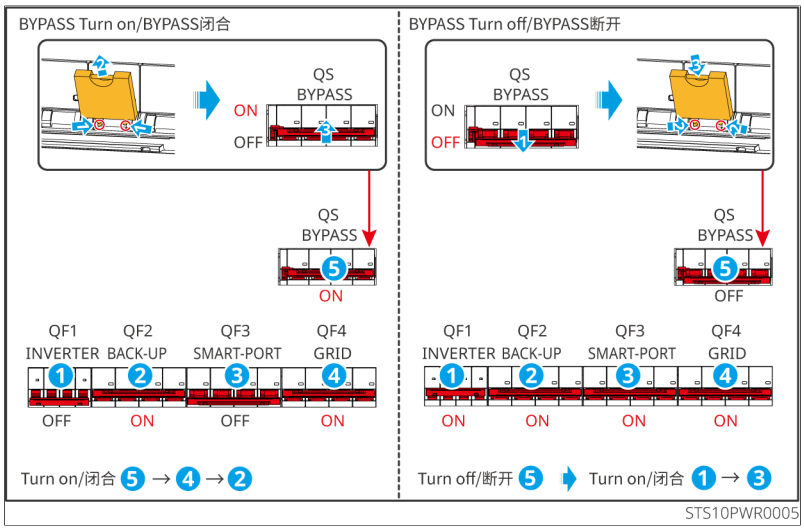
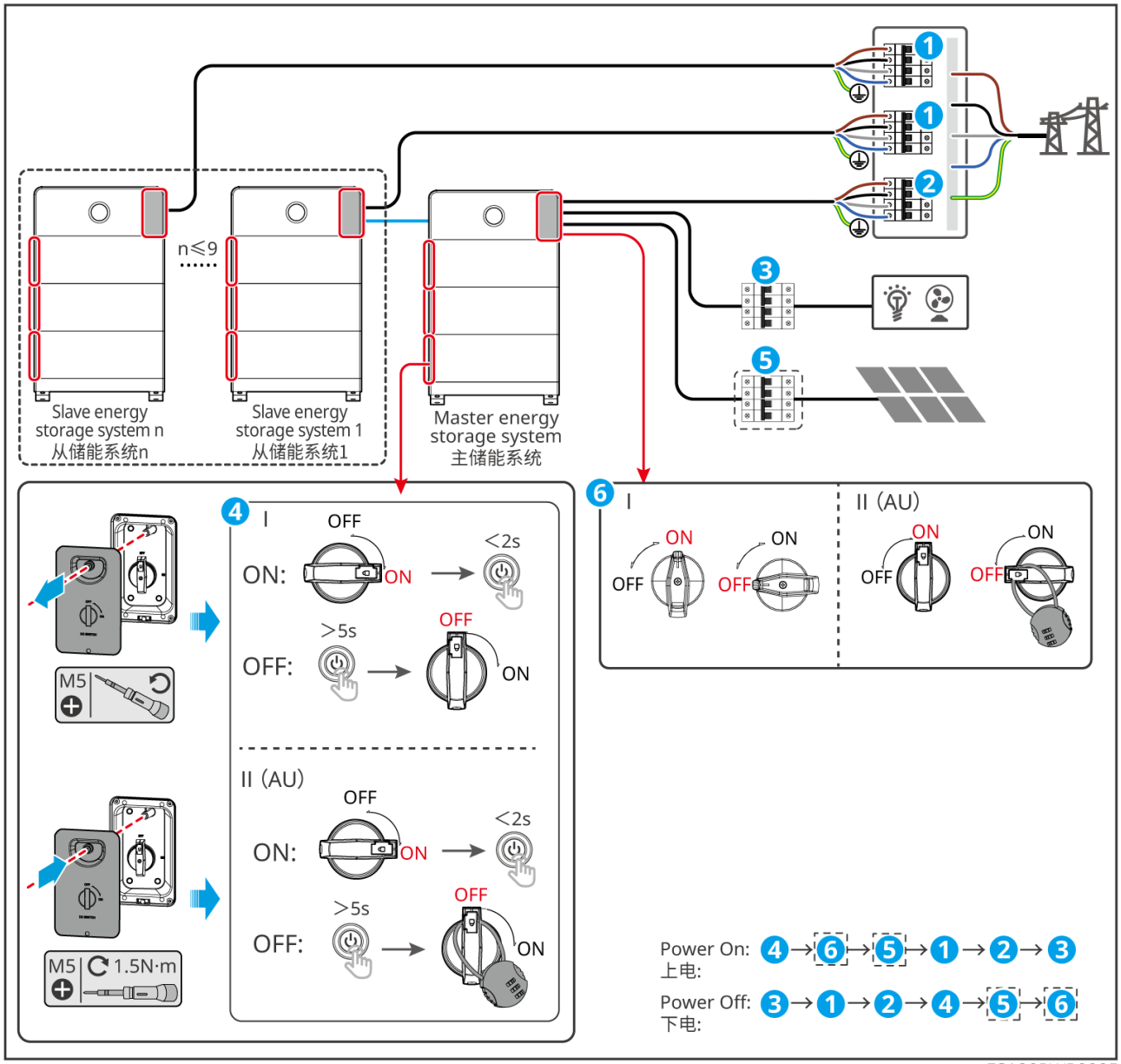


Figure55 **BYPASS switch open**

1. Current status: GRID bypass power supplies BACK-UP; QF3, QF1 open; QF4, QF2, QS1 closed
2. Open QS1 → Use the spring clip to place QS1 in the locked state (to prevent misoperation)
3. Open QF4, 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 sequentially

- **parallel system:**



ESA20PWR0005

1. Disconnect the BACK-UP circuit breaker.
2. Disconnect the slave inverter GRID circuit breaker.
3. Disconnect the master inverter GRID circuit breaker.
4. Press and hold the multi-function button on any battery 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, turn off the battery system switch.
5. (Optional) Disconnect the circuit breaker between the PV components and the inverter.
6. Disconnect the inverter DC switch.

8.2 Removing the Equipment

DANGER

- Ensure the device is powered off.
- When operating the device, please wear personal protective equipment.
- When removing wiring terminals, use standard disassembly tools to avoid damaging the terminals or device.
- Unless otherwise specified, the device disassembly method is the reverse order of the installation method, and this document will not elaborate further.

1. Power down the system.
2. Label the cables connected in the system to indicate their types.
3. Disconnect the cables from the Inverter, Battery, and smart meter in the system, such as DC cables, AC cables, Communication cable, and PE cable.
4. Remove equipment such as the smart communication stick, Inverter, Battery, and smart meter.
5. Store the equipment properly. If it will be put into use again later, ensure the storage conditions meet the requirements.

8.3 Disposing of the Equipment

When the equipment can no longer be used and needs to be disposed of, please handle it according to the electrical waste disposal requirements of the regulations in the country/region where the equipment is located. The equipment must not be disposed of as general household waste.

8.4 Routine Maintenance

WARNING

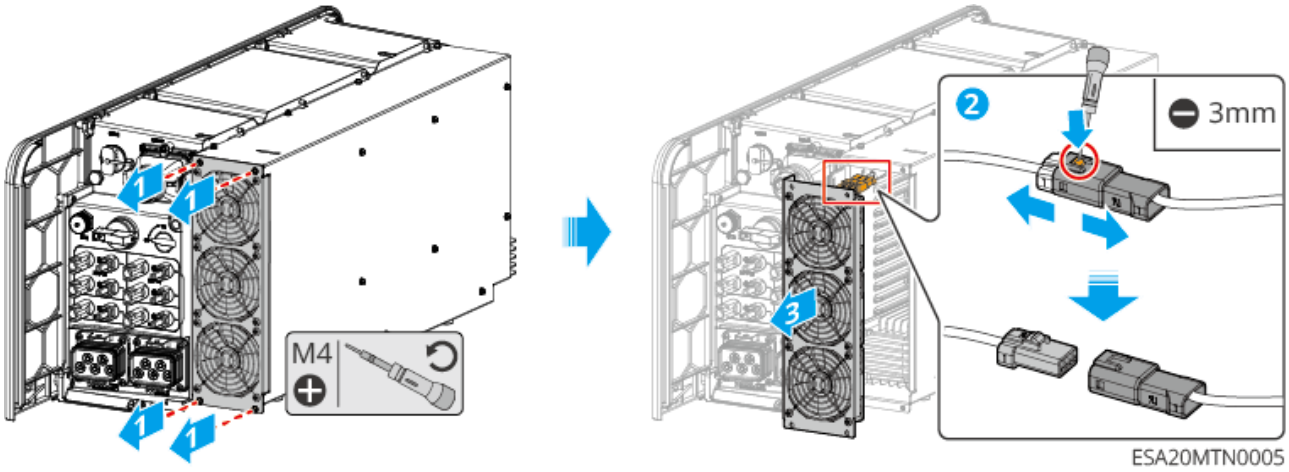
- If any issues that may affect the Battery or hybrid inverter system are discovered, please contact after-sales personnel. Unauthorized disassembly is strictly prohibited.
- If exposed copper wires are found inside the conductive line, do not touch them. High voltage DANGER, please contact after-sales personnel. Unauthorized disassembly is prohibited.
- In case of any other emergencies, please contact the after-sales personnel immediately. Follow their instructions for operation or wait for on-site assistance from the after-sales team.

Maintenance Content	Maintenance method	Maintenance cycle	Maintenance purpose
System cleaning	Check for any foreign objects or dust in the heat sink and air inlet/outlet. Check if the Installation space meets the requirements, and inspect whether there is any debris accumulation around the equipment.	Once every six months	Prevent heat dissipation.
System Installation	Check whether the equipment Installation is secure and whether the fasteners screw are loose. Inspect the equipment for any damage or deformation on the exterior.	Once every six months to once a year	Verify the stability of the Installation equipment.
Electrical connection	Check for loose electrical connections, damaged cable insulation, or exposed copper conductors.	Once every six months to once a year	Verify the reliability of electrical connections.

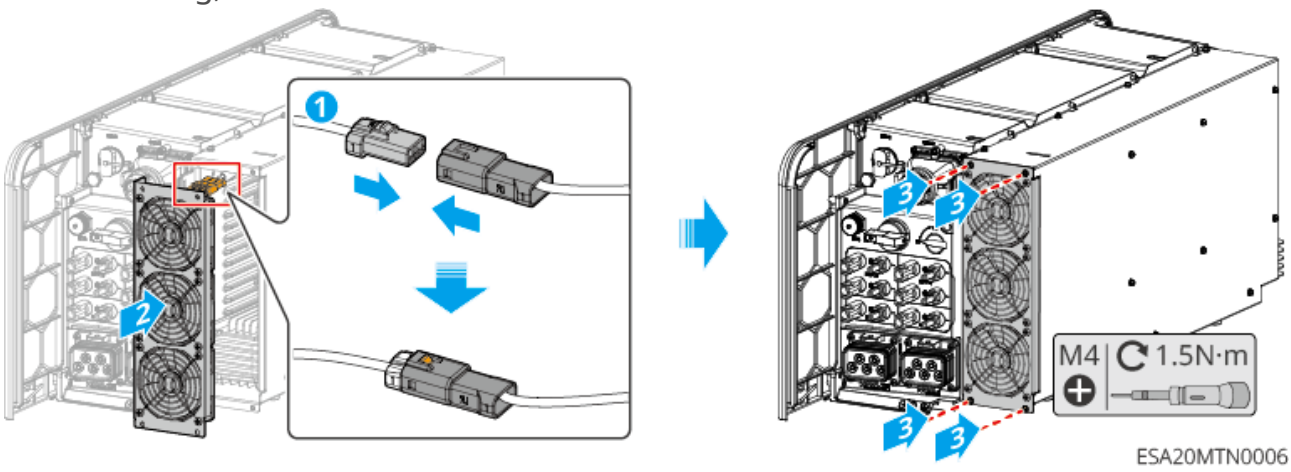
Maintenance Content	Maintenance method	Maintenance cycle	Maintenance purpose
fan	Check if the fan has any abnormal noise; Check the fan blades for cracks; Check if the fan has abnormal blockage or stalling;	1 time/half year	Prevent fan fault.
Sealing	Check whether the cable entry hole Sealing of the equipment meets the requirements. If the gap is too large or unsealed, resealing is required.	Once per year	Verify that the machine's sealing and waterproof performance are intact.
Battery maintenance	If the Battery has not been used or fully charged for a long time, it is recommended to perform Charge on the Battery regularly.	Once/15 days	ProtectionBattery service life.

Fan maintenance can be specifically referred to the following steps:
There is a fan module on the exterior of Inverter. To clean the fan module more effectively, remove it from the machine before cleaning. The specific steps are as follows:

1. Inverterpower off, refer to8.1.Power OFF the System(Page 196).
2. Wait for the residual voltage in the system to be fully discharged and the fan module to completely stop operating.
3. Use screwdriver dismantle module to lock screw, and remove the entire fan module.
4. Clean the fan using a soft brush, cloth, or vacuum cleaner.



After cleaning, reinstall the fan module back into the machine.



8.5 fault

NOTICE
The manual's fault content is updated irregularly, and there may be slight variations between different models. Please refer to the real-time display on your device for specific information.

8.5.1 View fault/alarm details

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

- SEMS+ App

1. Open SEMS+ App and log in with any account.
2. On the home page, click "Alarm" to view the alarm information of all power stations under the account.

- SEMS+ WEB

1. Open SEMS+ WEB and log in using any account.
2. On the power station detail interface, click "Alarm" to view all alarm information of the current power station.

8.5.2 Fault Information and Troubleshooting

Please perform troubleshooting 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 a quick resolution.

1. Product information, such as: serial number, software version, device installation time, fault occurrence time, fault frequency, etc.
2. Device installation environment, such as: weather conditions, whether components are blocked, have shadows, etc. It is recommended to provide photos, videos, and other files to assist in problem analysis.
3. Grid conditions.

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

No.	fault	Resolution
1	Unable to search for the Smart Communication Stick's wireless signal	1. Ensure no other devices are connected to the Smart Communication Stick's wireless signal. 2. Ensure the Smart Communication Stick is powered normally, with the blue signal light flashing or steady on. 3. Ensure the smart device is within the communication range of the Smart Communication Stick. 4. Refresh the App device list again. 5. Restart the inverter.
2	Unable to connect to the Smart Communication Stick's wireless signal	1. Ensure no other devices are connected to the Smart Communication Stick's wireless signal. 2. Restart the inverter or the communication stick, then try connecting to the Smart Communication Stick's wireless signal again. 3. Ensure Bluetooth pairing and encryption were successful.
3	Unable to find the router's 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.
4	After all configuration is complete, the Smart Communication Stick fails to connect to the router	1. Restart the inverter. 2. Check if the network name, encryption method, and password in the WiFi configuration match 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.

No.	fault	Resolution
5	After all configuration is complete, the Smart Communication Stick fails to connect to the server	Restart the router and the inverter.

8.5.2.1 Inverter Faults

8.5.2.1.1 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.

8.5.2.1.2 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.

8.5.2.1.3 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.

8.5.2.1.4 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.

8.5.2.1.5 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

8.5.2.2 battery fault

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
1	BMS1 Rack1 Total Voltage Too High Warning	1. Battery system over voltage 2. Voltage measurement line abnormal	1. Discharge the battery to check if the fault persists; 2. If the fault is not resolved, contact the after-sales service center.
2	BMS1 Rack1 Total Voltage Low Warning	1. Battery system under voltage 2. Voltage measurement line abnormal	1. Charge the battery and let it rest to see if the fault persists. When the inverter has charging conditions, restart the battery to trigger a quick charge. 2. Determine the working status of the inverter, whether it is not charging the battery due to working mode or other issues, try to charge the battery through the inverter, and observe if the fault is resolved. 3. If the fault is not resolved, contact after-sales service center.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
3	BMS1 Rack1 Cell Overvoltage Warning	1. Single cell over voltage 2. Voltage measurement line abnormal	1. Discharge the battery and let it stand to see if the fault persists; 2. If the fault is not resolved, 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 to o low 2. Voltage measurement line abnormal	1. Charge the battery and let it rest to see if the fault persists; 2. Verify the inverter's operation and determine if it is not charging the battery due to working mode or other issues. Attempt to charge the battery via the inverter and observe if the fault clears. 3. If the fault persists, contact after-sales service.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
5	BMS1 Rack1 Charging Overtemperature Warning	1. Ambient Overtemperature 2. Temperature sensor abnormal	1. Stop charging and discharging, let it rest and check if the fault persists; 2. If the fault persists, contact the after-sales service center.
6	BMS1 Rack1 Discharging Temperature Too High Warning	1. Ambient Overtemperature 2. Temperature sensor abnormal	1. Stop charging/discharging, let it rest, and check if the fault persists. 2. If the fault is not resolved, contact after-sales service.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
7	BMS1 Rack1 Charging temperature is too low warning	1. Low ambient temperature 2. Temperature sensor abnormal	1. Check the cell temperature in the background. If the minimum temperature is higher than -20°C, set the battery to discharge to increase the cell temperature. 2. If the temperature is lower than -20°C, turn off the battery and place it in a warm environment, and use it after the cell temperature rises. 3. If none of the above works, contact the after-sales service center.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
8	BMS1 Rack1 Discharging Temperature Too Low Warning/	1. Low ambient temperature 2. Temperature sensor abnormal	1. Check the cell temperature in the background. If the minimum temperature is higher than -20°C, set the battery to discharge to raise the cell temperature. 2. If the temperature is lower than -20°C, shut down the battery and place it in a warm environment. Use it after the cell temperature recovers. 3. If none of the above works, contact the after-sales service center.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
9	BMS1 Rack1 Charge Overcurrent Warning/	1. Charging Current to o high, battery current limiting abnormal: temperature and voltage values sudden change 2. Inverter abnormal response	1. Stop charging and let it rest to see if the fault persists; 2. Check if the inverter is configured with excessive power, causing it to exceed the battery's rated operating current; 3. If overcurrent persists, contact the after-sales service center.
10	BMS1 Rack1 Discharge overcurrent warning/ BMS1 RACK1 Discharge overcurrent warning	1. Excessive discharge current, abnormal current limiting of battery: sudden change in temperature and voltage values. 2. Inverter abnormal response	1. Stop discharging, let it rest and check if the fault persists; 2. Check if the inverter's power setting is too high, causing it to exceed the battery's rated operating current; 3. If overcurrent persists, contact after-sales service center.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
11	BMS1 Rack1 Insulation Resistance Low Warning/	Insulation resistance damage or abnormal contact	Check whether the ground wire is properly connected, restart the battery. If the problem persists after restart, please contact the after-sales service center.
12	BMS1 Rack1 Cell excessive temperature differentials warning/	1. In different stages of excessive temperature difference, the battery will limit its power, i. e., limit the charge/discharge current. The refore, this issue is generally unlikely to occur. 2. Cell capacity degradation leads to excessive internal resistance, resulting in a large temperature rise during over current, and thus the temperature difference	Power off, restart the battery, and wait for 2 hours. If the problem is not resolved, contact the after-sales service center.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
		becomes large. 3. Poor welding of cell tabs leads to rapid heating of the cell under Over current. 4. Temperature sampling issue; 5. Loose power line connection	
13	BMS1 Rack1 Post Overtemperature Warning/	Terminal post over temperature	1. Stop charging and discharging, and let it stand to see if the fault persists; 2. If the fault is not resolved, contact after-sales service center.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
14	BMS1 Rack1 Cell excessive voltage differential warning/	1. Cell aging inconsistency 2. Slave board chip issues can also lead to excessive cell voltage difference. 3. Slave board balancing issues can also cause excessive cell voltage difference. 4. caused by wiring harness issues	1. Stop charging and discharging, and let it sit to see if the fault persists; 2. If the fault is not resolved, contact after-sales service center.
15	BMS1 Rack1 PCS communication loss warning/	Abnormal communication between BMS and PCS	Check whether the communication cable connection between the battery and the inverter is intact.
16	BMS1 Rack1 DCDC warning/ BMS1 RACK1 DCDC warning	Abnormal voltage or current inside the DC-DC converter.	Upgrade the software, restart the battery. If the problem persists after restarting, please contact the after-sales service center.
17	BMS1 Rack1 Heat film MOS adhesion warning/	Heating film MOSFET damaged	Please contact the after-sales service center.
18	BMS1 Rack1 Heat film MOS open warning/	Heating circuit abnormal	Please contact the after-sales service center.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
19	BMS1 Rack1 Total Voltage Too High Fault/	1. Battery system over voltage 2. Voltage measurement line abnormal	1. Discharge the battery to see if the fault persists; 2. If the fault is not resolved, please contact the after-sales service center.
20	BMS1 Rack1 Total Voltage Too Low Fault/	1. Battery system under voltage 2. Voltage measurement line abnormal	1. Charge the battery and let it stand to see if the fault persists; 2. Check the inverter operating status to determine if it is not charging the battery due to working mode issues, etc. Try charging the battery through the inverter and observe if the fault is resolved. 3. If the fault is not resolved, please contact the after-sales service center.
21	BMS1 Rack1 Cell Overvoltage Fault/	1. Single cell over voltage 2. Voltage measurement line abnormal	1. Discharge the battery and let it sit to check if the fault persists; 2. If the fault is not resolved, please contact the after-sales service center.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
22	BMS1 Rack1 Cell voltage is too low fault	1. Single cell voltage to o low 2. Voltage sampling line abnormal	1. Charge the battery and let it sit to see if the fault persists. 2. Determine the inverter's operating status, and check if the battery is not being charged due to issues such as the operating mode. Try charging the battery through the inverter and observe if the fault is resolved.
23	BMS1 Rack1 Charging Overtemperature Fault/	1. Ambient Overtemperature Temperature sensor abnormal	1. Place the battery in a cool place, shut it down and let it sit for 30 minutes. After restarting, check if the fault persists; 2. If the fault persists, please contact the after-sales service center.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
24	BMS1 Rack1 Discharge Overtemperature Fault/	1. Ambient Overtemperature Temperature sensor abnormal	1. Place the battery in a cool area, power it off and let it sit for 30 minutes, then restart and check if the fault persists. 2. If the fault persists, please contact the after-sales service center.
25	BMS1 Rack1 Charging Temperature Too Low Fault /	1. Low ambient temperature 2. Temperature sensor abnormal	1. Check the cell temperature via the backend. If the minimum temperature is above -20°C, set the battery to discharge to increase the cell temperature. 2. If the temperature is below -20°C, turn off the battery and place it in a warm environment. Use it after the cell temperature rises. 3. If the above measures are ineffective, contact the after-sales service center.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
26	BMS1 Rack1 Discharging temperature too low fault	1. Low ambient temperature 2. Temperature sensor abnormal	1. Check the battery 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. Use it after the cell temperature rises. 3. If none of the above works, contact the after-sales service center.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
27	BMS1 Rack1 Charge Overcurrent Fault/	1. Charging Current to o high, battery current limiting abnormal: temperature and voltage values sudden change 2. Inverter abnormal response	1. Shut down and leave idle for 5 minutes, then restart and check if the fault persists; 2. Check whether the inverter power setting is too high, causing the battery rated current to be exceeded; 3. If the overcurrent persists, contact the after-sales service center.
28	BMS1 Rack1 Discharge Overcurrent Fault/	1. Excessive discharge current, abnormal current limiting of battery: sudden change in temperature and voltage values. 2. Inverter abnormal response	1. Power off for 5 minutes, then restart to check if the fault persists; 2. Check if the inverter power setting is too high, causing the battery rated operating current to be exceeded; 3. If overcurrent persists, contact the after-sales service center.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
29	BMS1 Rack1 Insulation Resistance Low Fault/	Insulation resistance damage or abnormal contact	1. Check if the ground wire is properly connected, restart the battery, 2. Upgrade the software. If the problem persists, please contact the after-sales service center.
30	BMS1 RACK1 Cell excessive temperature differentials fault/ BMS1 RACK1 Cell excessive temperature differentials fault	1. In different stages of excessive temperature difference, the battery will limit its power, i. e., limit the charge/discharge current. The refore, this issue is generally unlikely to occur. 2. Cell capacity degradation leads to excessive internal resistance, resulting in a large temperature rise during over current, and thus the temperature difference	Power off, restart the battery, and wait for 2 hours. If the problem is not resolved, contact the after-sales service center.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
		becomes large. 3. Poor welding of cell tabs leads to rapid heating of the cell under Over current. 4. Temperature sampling issue; 5. Loose power line connection	
31	BMS1 RACK1 Post temperature is too high fault/	Terminal post over temperature	1. If the fault persists after 30 minutes of shutdown, restart and check; 2. If the fault persists, contact the after-sales service center.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
32	BMS1 Rack1 Cell excessive voltage differentials fault/	1. Cell aging inconsistency 2. Slave board chip issues can also lead to excessive cell voltage difference. 3. The slave board balancing issue can also cause excessive cell voltage difference. 4. caused by wiring harness issues	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/	MOS short circuit	1. Upgrade the software, let the device sit idle for 5 minutes after shutdown, then restart and check if the fault persists; 2. If it persists, contact the after-sales service center.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
34	BMS1 Rack1 Relay or MOS open circuit fault/	MOS open circuit	1. Upgrade the software, power off and let it sit for 5 minutes, restart and check if the fault persists. 2. If it persists, contact the after-sales service center.
35	BMS1 Rack1 Pre-charging Failure/	The voltage across the pre-charge MOSFET always exceeds the specified threshold.	1. Upgrade the software, power off and leave it for 5 minutes, then restart and check if the fault persists; 2. If it persists, contact the after-sales service center.
36	BMS1 Rack1 Acquisition line fault/ BMS1 RACK1 Acquisition line fault	Battery sampling line poor contact or disconnection	Shut down, check wiring, restack batteries, and if the problem persists after restart, contact the after-sales service center.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
37	BMS1 Rack1 Relay or MOS temperature is too high fault/	Relay or MOSFET over-temperature	1. Upgrade the software, power off and let it sit for 30 minutes, then restart and check if the fault persists; 2. If it persists, contact after-sales service center.
38	BMS1 Rack1 Combiner Box Overtemperature Fault/	Shunt over temperature	1. Upgrade the software, leave it powered off for 30 minutes, then restart and check if the fault persists; 2. If it persists, contact the after-sales service center.
39	BMS1 Rack1 Slave MCU communication fault/	Communication loss between master and slave chips	1. Check the wiring, restart the battery, 2. Update the battery. If the problem persists after restart, please contact the after-sales service center.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
40	BMS1 Rack1 BMU Comm Failure/	BMS master-slave communication harness fault	1. Check the wiring, restart the battery, 2. Upgrade the battery. If the problem persists after restart, please contact the after-sales service center.
41	BMS1 Rack1 Micro-electronics fault/	MCU internal fault	Upgrade the software, restart the battery. If the problem persists after restart, please contact the after-sales service center.
42	BMS1 Rack1 Hardware Overcurrent Fault/	1. Software version is to o low or BMS board is damaged. 2. When a large number of inverters operate in parallel, the battery experiences excessive surge during pre-charge.	1. Upgrade the software and observe if the fault persists. 2. In case of parallel connection, black start the battery first, then start the inverter.
43	BMS1 Rack1 Application software fault/	MCU self-test failed	Upgrade the software, restart the battery. If the problem persists after restart, please contact the after-sales service center.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
44	BMS1 Rack1 Parallel Rack fault/	Communication anomaly between main cluster and slave cluster, or cell inconsistency 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. software upgrade
45	BMS1 Rack1 DCDC fault /	DCDC over load or heatsink temperature to o high, etc.	Upgrade the software, restart the battery. If the problem persists after restart, please contact the after-sales service center.
46	BMS1 Rack1 Inconsistent cell fault	1. Cell identification anomaly 2. Different types of cell stacking	Check the cell type
47	BMS1 Rack1 Output Port Over Temperature Fault/	Loose screw or poor contact at the output port.	1. Battery shutdown, check the wiring and output terminal screws 2. After confirmation, restart the battery, observe if the fault persists, if it persists, contact after-sales service center.

Serial Number	Fault Name	fault cause	Fault Handling Recommendations
48	BMS1 Rack1 SOH too low fault/	Excessive battery usage or severe cell damage	Replace pack
49	BMS1 Rack1 Heating Film Three-Terminal Fault/ BMS1 RACK1 Heating film MOS Three-terminal fault	Heating film MOSFET damaged	Please contact the after-sales service center.

9 technical parameter

9.1 Inverter Parameters

Technical Data	GW5K-ETA-G20	GW6K-ETA-G20	GW8K-ETA-G20
Battery Side			
Battery Type	LFP (LiFePO4)	LFP (LiFePO4)	LFP (LiFePO4)
Nominal Voltage (V)	750	750	750
Voltage Range (V)	700~950	700~950	700~950
Start-up Voltage (V)	720	720	720
Number of Battery Input	1	1	1
Max. Continuous Charging Current (A)	6.7	8.1	10.7
Max. Continuous Discharging Current (A)	7.4	8.9	11.8
Max. Charging Power (kW)	5	6	8
Max. Discharging Power (kW)	5.5	6.6	8.8
PV Side			
Max. Input Power (kW)	10	12	16
Max. Input Voltage (V)*1	1000	1000	1000
MPPT Operating Voltage Range (V)*2	120~950	120~950	120~950
MPPT Voltage Range at Nominal Power (V)	185~850	225~850	300~850
Start-up Voltage (V)	150	150	150
Nominal Input Voltage (V)	750	750	750
Max. MPPT Current (A)	21/21/21	21/21/21	21/21/21

Technical Data	GW5K-ETA-G20	GW6K-ETA-G20	GW8K-ETA-G20
Max. MPPT Short Circuit Current (A)	26/26/26	26/26/26	26/26/26
Max. Backfeed Current to The Array (A)	0	0	0
Number of MPPTs	3	3	3
Number of Strings per MPPT	1/1/1	1/1/1	1/1/1
AC Side (Grid Port)			
Rated Power (kW)	5	6	8
Max. Power (kW)	5	6	8
Rated Apparent Power to Grid (kVA)	5	6	8
Rated Apparent Power from Grid (kVA)	5	6	8
Max. Apparent Power to Grid (kVA)*3	5	6	8
Max. Apparent Power from Grid (kVA)	43.5*4	43.5*4	43.5*4
Nominal Voltage (V)	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE
Voltage Range (V)	180 ~ 260 (According to local standard)	180 ~ 260 (According to local standard)	180 ~ 260 (According to local standard)
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 to Grid (A)	7.6 @380V 7.3 @400V	9.1 @380V 8.7 @400V	12.2 @380V 11.6 @400V
Rated Current from Grid (A)	7.6 @380V 7.3 @400V	9.1 @380V 8.7 @400V	12.2 @380V 11.6 @400V
Max. Current to Grid (A)*6	7.6 @380V 7.3 @400V	9.1 @380V 8.7 @400V	12.2 @380V 11.6 @400V

Technical Data	GW5K-ETA-G20	GW6K-ETA-G20	GW8K-ETA-G20
Max. Current from Grid (A)*6	63.0*4	63.0*4	63.0*4
Max. Output Fault Current (Peak and Duration) (A)	46.7@4μs	46.7@4μs	46.7@4μs
Inrush Current (Peak and Duration) (A)	21.3@5ms	21.3@5ms	21.3@5ms
THDi	<3%	<3%	<3%
Maximum Output Overcurrent Protection (A)	46.7	46.7	46.7
Type of Voltage	a.c.	a.c.	a.c.
AC Side (Back-up Port)			
Rated Apparent Power (kVA)	5	6	8
Max. Apparent Power (kVA)*7	Off-grid: 5.5 (10.0, 10s), on-grid: 43.5	Off-grid: 6.6(12, 10s), on-grid： 43.5	Off-grid: 8.8 (16.0, 10s), on-grid： 43.5
Nominal Voltage (V)	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/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)	7.6 @380V 7.3 @400V	9.1 @380V 8.7 @400V	12.2 @380V 11.6 @400V
Max. Current (A)*7	Off-grid: 11.4, on-grid: 63	Off-grid: 13.7, on-grid:63	Off-grid: 18.2, on-grid: 63
Max. Fault Current (Peak and Duration) (A)	46.7@4μs	46.7@4μs	46.7@4μs
Inrush Current (Peak and Duration) (A)	21.3@5ms	21.3@5ms	21.3@5ms
Maximum Overcurrent Protection (A)	46.7	46.7	46.7
THDv (@Linear Load)	<3%	<3%	<3%

Technical Data	GW5K-ETA-G20	GW6K-ETA-G20	GW8K-ETA-G20
On/Off-grid Switching Time（ms）	<4	<4	<4
Efficiency			
Max. Efficiency	98.00%	98.00%	98.00%
European Efficiency	96.40%	96.90%	97.10%
Max. Battery to AC Efficiency	98.00%	98.00%	98.00%
Protection			
PV String Current Monitoring	Integrated	Integrated	Integrated
PV Insulation Resistance Detection	Integrated	Integrated	Integrated
Residual Current Monitoring	Integrated	Integrated	Integrated
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 Switch	Integrated	Integrated	Integrated
DC Surge Protection	Type II(Type I+II optional)	Type II(Type I+II optional)	Type II(Type I+II optional)
AC Surge Protection	Type II	Type II	Type II
Rapid Shutdown	Optional	Optional	Optional
AFCI	Optional	Optional	Optional
Remote Shutdown	Integrated	Integrated	Integrated
General Data			
Power Factor	0.8 leading ... 0.8 lagging	0.8 leading ... 0.8 lagging	0.8 leading ... 0.8 lagging

Technical Data	GW5K-ETA-G20	GW6K-ETA-G20	GW8K-ETA-G20
Operating Temperature Range (℃)	-35~+60	-35~+60	-35~+60
Operating Environment	Indoor/Outdoor	Indoor/Outdoor	Indoor/Outdoor
Relative Humidity	0~100%	0~100%	0~100%
Max. Operating Altitude (m)	4000 (>2000 derating)	4000 (>2000 derating)	4000 (>2000 derating)
Cooling Method	Smart Fan Cooling	Smart Fan Cooling	Smart Fan Cooling
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)	34	34	34
Dimension (W×H×D mm)	800*340*270	800*340*270	800*340*270
Noise Emission (dB)	≤35	≤35	≤35
Topology	Non-isolated	Non-isolated	Non-isolated
Self-consumption at Night (W)	≤10	≤10	≤10
Ingress Protection Rating	IP66	IP66	IP66
DC Connector	MC4, VACONN Terminal	MC4, VACONN Terminal	MC4, VACONN Terminal
AC Connector	VACONN Terminal	VACONN Terminal	VACONN Terminal
Environmental Category	4K4H	4K4H	4K4H
Pollution Degree	III	III	III
Overvoltage Category	DC II / AC III	DC II / AC III	DC II / AC III
Protective Class	I	I	I

Technical Data	GW5K-ETA-G20	GW6K-ETA-G20	GW8K-ETA-G20
Storage Temperature (℃)	-40~+70	-40~+70	-40~+70
The Decisive Voltage Class (DVC)	Battery: C PV: C AC: C Com: A	Battery: C PV: C AC: C Com: A	Battery: C PV: C AC: C Com: A
Mounting Method	Wall/Floor Mounted	Wall/Floor Mounted	Wall/Floor Mounted
Active Anti-islanding Method*8	SMS(Slip-mode frequency) +AFD	SMS(Slip-mode frequency) +AFD	SMS(Slip-mode frequency) +AFD
Type of Electrical Supply System	three phase	three phase	three phase
Country of Manufacture	China	China	China
Certification			
Grid Standard	Please refer to the official website		
Safety Regulation			
EMC			

Technical Data	GW9.999K-ETA-G20	GW10K-ETA-G20	GW12K-ETA-G20	GW15K-ETA-G20
Battery Side				
Battery Type	LFP (LiFePO4)	LFP (LiFePO4)	LFP (LiFePO4)	LFP (LiFePO4)
Nominal Voltage (V)	750	750	750	750
Voltage Range (V)	700~950	700~950	700~950	700~950
Start-up Voltage (V)	720	720	720	720
Number of Battery Input	1	1	1	1
Max. Continuous Charging Current (A)	13.4	13.4	16.1	20.1

Technical Data	GW9.999K-ETA-G20	GW10K-ETA-G20	GW12K-ETA-G20	GW15K-ETA-G20
Max. Continuous Discharging Current (A)	14.7	14.7	17.7	22.1
Max. Charging Power (kW)	10	10	12	15
Max. Discharging Power (kW)	11	11	13.2	16.5
PV Side				
Max. Input Power (kW)	20	20	24	30
Max. Input Voltage (V)*1	1000	1000	1000	1000
MPPT Operating Voltage Range (V)*2	120~950	120~950	120~950	120~950
MPPT Voltage Range at Nominal Power (V)	250~850	250~850	300~850	360~850
Start-up Voltage (V)	150	150	150	150
Nominal Input Voltage (V)	750	750	750	750
Max. MPPT Current (A)	21/21/21/21	21/21/21/21	21/21/21/21	21/21/21/21
Max. MPPT Short Circuit Current (A)	26/26/26/26	26/26/26/26	26/26/26/26	26/26/26/26
Max. Backfeed Current to The Array (A)	0	0	0	0
Number of MPPTs	4	4	4	4

Technical Data	GW9.999K-ETA-G20	GW10K-ETA-G20	GW12K-ETA-G20	GW15K-ETA-G20
Number of Strings per MPPT	1/1/1/1	1/1/1/1	1/1/1/1	1/1/1/1
AC Side (Grid Port)				
Rated Power (kW)	9.999	10	12	15
Max. Power (kW)	9.999	10	12	15
Rated Apparent Power to Grid (kVA)	9.999	10	12	15
Rated Apparent Power from Grid (kVA)	9.999	10	12	15
Max. Apparent Power to Grid (kVA)*3	9.999	10	12	15
Max. Apparent Power from Grid (kVA)	43.5*4	43.5*4	43.5*4	43.5*4
Nominal Voltage (V)	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE
Voltage Range (V)	180 ~ 260 (According to local standard)	180 ~ 260 (According to local standard)	180 ~ 260 (According to local standard)	180 ~ 260 (According to local standard)
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 to Grid (A)	15.2 @380V 14.5 @400V	15.2 @380V 14.5 @400V	18.2 @380V 17.4 @400V	22.8 @380V 21.8 @400V
Rated Current from Grid (A)	15.2 @380V 14.5 @400V	15.2 @380V 14.5 @400V	18.2 @380V 17.4 @400V	22.8 @380V 21.8 @400V
Max. Current to Grid (A)*6	15.2 @380V 14.5 @400V	15.2 @380V 14.5 @400V	18.2 @380V 17.4 @400V	22.8 @380V 21.8 @400V

Technical Data	GW9.999K-ETA-G20	GW10K-ETA-G20	GW12K-ETA-G20	GW15K-ETA-G20
Max. Current from Grid (A)*6	63.0*4	63.0*4	63.0*4	63.0*4
Max. Output Fault Current (Peak and Duration) (A)	74.6@4μs	74.6@4μs	74.6@4μs	83.3@4μs
Inrush Current (Peak and Duration) (A)	25.4@5ms	25.4@5ms	25.4@5ms	29.1@5ms
THDi	<3%	<3%	<3%	<3%
Maximum Output Overcurrent Protection (A)	74.6	74.6	74.6	83.3
Type of Voltage	a.c.	a.c.	a.c.	a.c.
AC Side (Back-up Port)				
Rated Apparent Power (kVA)	10	10	12	15
Max. Apparent Power (kVA)*7	Off-grid: 11(20.0, 10s), on-grid： 43.5	Off-grid: 11(20.0, 10s), on-grid: 43.5	Off-grid: 13.2(24, 10s), on-grid: 43.5	Off-grid: 16.5(30, 10s), on-grid:43.5
Nominal Voltage (V)	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/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)	15.2 @380V 14.5 @400V	15.2 @380V 14.5 @400V	18.2 @380V 17.4 @400V	22.8 @380V 21.8 @400V
Max. Current (A)*7	Off-grid: 22.8, on-grid:63	Off-grid: 22.8, on-grid: 63	Off-grid: 27.3, on-grid: 63	Off-grid: 33.4, on-grid: 63
Max. Fault Current (Peak and Duration) (A)	74.6@4μs	74.6@4μs	74.6@4μs	83.3@4μs

Technical Data	GW9.999K-ETA-G20	GW10K-ETA-G20	GW12K-ETA-G20	GW15K-ETA-G20
Inrush Current (Peak and Duration) (A)	25.4@5ms	25.4@5ms	25.4@5ms	29.1@5ms
Maximum Overcurrent Protection (A)	74.6	74.6	74.6	83.3
THDv (@Linear Load)	<3%	<3%	<3%	<3%
On/Off-grid Switching Time（ms）	<4	<4	<4	<4
Efficiency				
Max. Efficiency	98.10%	98.10%	98.10%	98.10%
European Efficiency	97.20%	97.20%	97.20%	97.30%
Max. Battery to AC Efficiency	98.00%	98.00%	98.00%	98.00%
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
Anti-islanding Protection	Integrated	Integrated	Integrated	Integrated
AC Overcurrent Protection	Integrated	Integrated	Integrated	Integrated

Technical Data	GW9.999K-ETA-G20	GW10K-ETA-G20	GW12K-ETA-G20	GW15K-ETA-G20
AC Short Circuit Protection	Integrated	Integrated	Integrated	Integrated
AC Overvoltage Protection	Integrated	Integrated	Integrated	Integrated
DC Switch	Integrated	Integrated	Integrated	Integrated
DC Surge Protection	Type II(Type I+II optional)	Type II(Type I+II optional)	Type II(Type I+II optional)	Type II(Type I+II optional)
AC Surge Protection	Type II	Type II	Type II	Type II
Rapid Shutdown	Optional	Optional	Optional	Optional
AFCI	Optional	Optional	Optional	Optional
Remote Shutdown	Integrated	Integrated	Integrated	Integrated
General Data				
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
Operating Temperature Range (℃)	-35~+60	-35~+60	-35~+60	-35~+60
Operating Environment	Indoor/Outdoor	Indoor/Outdoor	Indoor/Outdoor	Indoor/Outdoor
Relative Humidity	0~100%	0~100%	0~100%	0~100%
Max. Operating Altitude (m)	4000 (>2000 derating)	4000 (>2000 derating)	4000 (>2000 derating)	4000 (>2000 derating)
Cooling Method	Smart Fan Cooling	Smart Fan Cooling	Smart Fan Cooling	Smart Fan Cooling
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)

Technical Data	GW9.999K-ETA-G20	GW10K-ETA-G20	GW12K-ETA-G20	GW15K-ETA-G20
Communication Protocols	Modbus-RTU, Modbus-TCP	Modbus-RTU, Modbus-TCP	Modbus-RTU, Modbus-TCP	Modbus-RTU, Modbus-TCP
Weight (kg)	34	34	34	34
Dimension (W×H×D mm)	800*340*270	800*340*270	800*340*270	800*340*270
Noise Emission (dB)	≤40	≤40	≤40	≤40
Topology	Non-isolated	Non-isolated	Non-isolated	Non-isolated
Self-consumption at Night (W)	≤10	≤10	≤10	≤10
Ingress Protection Rating	IP66	IP66	IP66	IP66
DC Connector	MC4, VACONN Terminal	MC4, VACONN Terminal	MC4, VACONN Terminal	MC4, VACONN Terminal
AC Connector	VACONN Terminal	VACONN Terminal	VACONN Terminal	VACONN Terminal
Environmental Category	4K4H	4K4H	4K4H	4K4H
Pollution Degree	III	III	III	III
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
The Decisive Voltage Class (DVC)	Battery: C PV: C AC: C Com: A	Battery: C PV: C AC: C Com: A	Battery: C PV: C AC: C Com: A	Battery: C PV: C AC: C Com: A
Mounting Method	Wall/Floor Mounted	Wall/Floor Mounted	Wall/Floor Mounted	Wall/Floor Mounted

Technical Data	GW9.999K-ETA-G20	GW10K-ETA-G20	GW12K-ETA-G20	GW15K-ETA-G20
Active Anti-islanding Method*8	SMS(Slip-mode frequency) +AFD	SMS(Slip-mode frequency) +AFD	SMS(Slip-mode frequency) +AFD	SMS(Slip-mode frequency) +AFD
Type of Electrical Supply System	three phase	three phase	three phase	three phase
Country of Manufacture	China	China	China	China
Certification				
Grid Standard	Please refer to the official website			
Safety Regulation				
EMC				

Technical Data	GW20K-ETA-G20	GW25K-ETA-G20	GW29.999K-ETA-G20	GW30K-ETA-G20
Battery Side				
Battery Type	LFP (LiFePO4)	LFP (LiFePO4)	LFP (LiFePO4)	LFP (LiFePO4)
Nominal Voltage (V)	750	750	750	750
Voltage Range (V)	700~950	700~950	700~950	700~950
Start-up Voltage (V)	720	720	720	720
Number of Battery Input	1	1	1	1
Max. Continuous Charging Current (A)	26.7	33.3	40.0	40.0
Max. Continuous Discharging Current (A)	29.4	36.7	44.1	44.1
Max. Charging Power (kW)	20	25	30	30

Technical Data	GW20K-ETA-G20	GW25K-ETA-G20	GW29.999K-ETA-G20	GW30K-ETA-G20
Max. Discharging Power (kW)	22	27.5	33	33
PV Side				
Max. Input Power (kW)	40	50	60	60
Max. Input Voltage (V)*1	1000	1000	1000	1000
MPPT Operating Voltage Range (V)*2	120~950	120~950	120~950	120~950
MPPT Voltage Range at Nominal Power (V)	400~850	400~850	450~850	450~850
Start-up Voltage (V)	150	150	150	150
Nominal Input Voltage (V)	750	750	750	750
Max. MPPT Current (A)	21/21/21/21	21/21/42/42	21/21/42/42	21/21/42/42
Max. MPPT Short Circuit Current (A)	26/26/26/26	26/26/52/52	26/26/52/52	26/26/52/52
Max. Backfeed Current to The Array (A)	0	0	0	0
Number of MPPTs	4	4	4	4
Number of Strings per MPPT	1/1/1/1	1/1/2/2	1/1/2/2	1/1/2/2
AC Side (Grid Port)				
Rated Power (kW)	20	25	29.999	30

Technical Data	GW20K-ETA-G20	GW25K-ETA-G20	GW29.999K-ETA-G20	GW30K-ETA-G20
Max. Power (kW)	20	25	29.999	30
Rated Apparent Power to Grid (kVA)	20	25	29.999	30
Rated Apparent Power from Grid (kVA)	20	25	29.999	30
Max. Apparent Power to Grid (kVA)*3	20	25	29.999	30
Max. Apparent Power from Grid (kVA)	43.5*4	55.2*5	55.2*5	55.2*5
Nominal Voltage (V)	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE
Voltage Range (V)	180 ~ 260 (According to local standard)	180 ~ 260 (According to local standard)	180 ~ 260 (According to local standard)	180 ~ 260 (According to local standard)
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 to Grid (A)	30.4 @380V 29.0 @400V	37.9 @380V 36.3 @400V	45.5 @380V 43.5 @400V	45.5 @380V 43.5 @400V
Rated Current from Grid (A)	30.4 @380V 29.0 @400V	37.9 @380V 36.3 @400V	45.5 @380V 43.5 @400V	45.5 @380V 43.5 @400V
Max. Current to Grid (A)*6	30.4 @380V 29.0 @400V	37.9 @380V 36.3 @400V	45.5 @380V 43.5 @400V	45.5 @380V 43.5 @400V
Max. Current from Grid (A)*6	63.0*4	80.0*9	80.0*9	80.0*9
Max. Output Fault Current (Peak and Duration) (A)	83.3@4μs	125@4μs	125@4μs	125@4μs

Technical Data	GW20K-ETA-G20	GW25K-ETA-G20	GW29.999K-ETA-G20	GW30K-ETA-G20
Inrush Current (Peak and Duration) (A)	29.1@5ms	32.3@5ms	32.3@5ms	32.3@5ms
THDi	<3%	<3%	<3%	<3%
Maximum Output Overcurrent Protection (A)	83.3	125	125	125
Type of Voltage	a.c.	a.c.	a.c.	a.c.
AC Side (Back-up Port)				
Rated Apparent Power (kVA)	20	25	30	30
Max. Apparent Power (kVA)*7	Off-grid: 22(30.0, 10s), on-grid:43.5	Off-grid: 27.5(45.0, 10s), on-grid:55.2*10	Off-grid: 27.5(45.0, 10s), on-grid:55.2*10	Off-grid: 27.5(45.0, 10s), on-grid:55.2*10
Nominal Voltage (V)	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/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)	30.4 @380V 29.0 @400V	37.9 @380V 36.3 @400V	45.5 @380V 43.5 @400V	45.5 @380V 43.5 @400V
Max. Current (A)*7	Off-grid: 33.4, on-grid: 63	Off-grid: 50.0, on-grid: 80*11	Off-grid: 50.0, on-grid: 80*11	Off-grid: 50.0, on-grid: 80*11
Max. Fault Current (Peak and Duration) (A)	83.3@4μs	125@4μs	125@4μs	125@4μs
Inrush Current (Peak and Duration) (A)	29.1@5ms	32.3@5ms	32.3@5ms	32.3@5ms

Technical Data	GW20K-ETA-G20	GW25K-ETA-G20	GW29.999K-ETA-G20	GW30K-ETA-G20
Maximum Overcurrent Protection (A)	83.3	125	125	125
THDv (@Linear Load)	<3%	<3%	<3%	<3%
On/Off-grid Switching Time（ms）	<4	<4	<4	<4
Efficiency				
Max. Efficiency	98.10%	98.20%	98.20%	98.20%
European Efficiency	97.30%	97.40%	97.40%	97.40%
Max. Battery to AC Efficiency	98.00%	98.00%	98.00%	98.00%
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
Anti-islanding Protection	Integrated	Integrated	Integrated	Integrated
AC Overcurrent Protection	Integrated	Integrated	Integrated	Integrated
AC Short Circuit Protection	Integrated	Integrated	Integrated	Integrated

Technical Data	GW20K-ETA-G20	GW25K-ETA-G20	GW29.999K-ETA-G20	GW30K-ETA-G20
AC Overvoltage Protection	Integrated	Integrated	Integrated	Integrated
DC Switch	Integrated	Integrated	Integrated	Integrated
DC Surge Protection	Type II(Type I+II optional)	Type II(Type I+II optional)	Type II(Type I+II optional)	Type II(Type I+II optional)
AC Surge Protection	Type II	Type II	Type II	Type II
Rapid Shutdown	Optional	Optional	Optional	Optional
AFCI	Optional	Optional	Optional	Optional
Remote Shutdown	Integrated	Integrated	Integrated	Integrated
General Data				
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
Operating Temperature Range (℃)	-35~+60	-35~+60	-35~+60	-35~+60
Operating Environment	Indoor/Outdoor	Indoor/Outdoor	Indoor/Outdoor	Indoor/Outdoor
Relative Humidity	0~100%	0~100%	0~100%	0~100%
Max. Operating Altitude (m)	4000 (>2000 derating)	4000 (>2000 derating)	4000 (>2000 derating)	4000 (>2000 derating)
Cooling Method	Smart Fan Cooling	Smart Fan Cooling	Smart Fan Cooling	Smart Fan Cooling
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)	34	38	38	38

Technical Data	GW20K-ETA-G20	GW25K-ETA-G20	GW29.999K-ETA-G20	GW30K-ETA-G20
Dimension (W×H×D mm)	800*340*270	800*340*270	800*340*270	800*340*270
Noise Emission (dB)	≤40	≤45	≤45	≤45
Topology	Non-isolated	Non-isolated	Non-isolated	Non-isolated
Self-consumption at Night (W)	≤10	≤10	≤10	≤10
Ingress Protection Rating	IP66	IP66	IP66	IP66
DC Connector	MC4, VACONN Terminal	MC4, VACONN Terminal	MC4, VACONN Terminal	MC4, VACONN Terminal
AC Connector	VACONN Terminal	VACONN Terminal	VACONN Terminal	VACONN Terminal
Environmental Category	4K4H	4K4H	4K4H	4K4H
Pollution Degree	III	III	III	III
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
The Decisive Voltage Class (DVC)	Battery: C PV: C AC: C Com: A	Battery: C PV: C AC: C Com: A	Battery: C PV: C AC: C Com: A	Battery: C PV: C AC: C Com: A
Mounting Method	Wall/Floor Mounted	Wall/Floor Mounted	Wall/Floor Mounted	Wall/Floor Mounted
Active Anti-islanding Method*8	SMS(Slip-mode frequency) +AFD	SMS(Slip-mode frequency) +AFD	SMS(Slip-mode frequency) +AFD	SMS(Slip-mode frequency) +AFD
Type of Electrical Supply System	three phase	three phase	three phase	three phase

Technical Data	GW20K-ETA-G20	GW25K-ETA-G20	GW29.999K-ETA-G20	GW30K-ETA-G20
Country of Manufacture	China	China	China	China
Certification				
Grid Standard	Please refer to the official website			
Safety Regulation				
EMC				

*1: When the input voltage ranges from 950V to 1000V, the inverter will enter the standby mode, and the voltage returns to950V to enter the normal operation state.
*2: Please refer to the user manual for the MPPT Voltage Range at nominal Power.
*3: According to the local grid regulation.
*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：For Australia residential scenarios, Max. Apparent Power from Grid is 43.5kVA
*6：If the backup port is not used, select an appropriate circuit breaker based on the AC maximum output current.
*7:"Off grid"means the energy of backup output only comes from PV and battery. "On grid"means the energy of the backup output includes the energy from grid or generator(on-grid) side.
*8: AFDPF: Active Frequency Drift with Positive Feedback
*9: For Australia residential scenarios, Max. Current from Grid is 63A
*10: For Australia residential scenarios, Max. Apparent Power from Grid of on-grid is 43.5kVA
*11: For Australia residential scenarios, Max. Current from Grid of on-grid is 63A

Technical Data	GW5K-BTA-G20	GW6K-BTA-G20	GW8K-BTA-G20	GW9.999K-BTA-G20
Battery Side				
Battery Type	Li-Ion	Li-Ion	Li-Ion	Li-Ion
Nominal Voltage (V)	750	750	750	750

Technical Data	GW5K-BTA-G20	GW6K-BTA-G20	GW8K-BTA-G20	GW9.999K-BTA-G20
Voltage Range (V)	700-950	700-950	700-950	700-950
Start-up Voltage (V)	720	720	720	720
Number of Battery Inputs	1	1	1	1
Max. Continuous Charging Current (A)	6.7	8.1	10.7	13.4
Max. Continuous Discharging Current (A)	7.4	8.9	11.8	14.7
Max. Charging Power (kW)	5	6	8	10
Max. Discharging Power (kW)	5.5	6.6	8.8	11
AC Side (On-Grid)				
Rated Power (kW)	5	6	8	9.999
Max. Power (kW)	5	6	8	9.999
Rated Apparent Power to Grid (kVA)	5	6	8	9.999
Rated Apparent Power from Grid (kVA)	5	6	8	9.999
Max. Apparent Power to Grid (kVA)	5	6	8	9.999
Max. Apparent Power from Grid (kVA)	43.5	43.5	43.5	43.5
Nominal Voltage (V)	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE

Technical Data	GW5K-BTA-G20	GW6K-BTA-G20	GW8K-BTA-G20	GW9.999K-BTA-G20
Voltage Range (V)	180 ~ 260 (According to local standard)	180 ~ 260 (According to local standard)	180 ~ 260 (According to local standard)	180 ~ 260 (According to local standard)
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 to Grid (A)	7.6 at 380V 7.3 at 400V	9.1 at 380V 8.7 at 400V	12.2 at 380V 11.6 at 400V	15.2 at 380V 14.5 at 400V
Rated Current fromGrid (A)	7.6 at 380V 7.3 at 400V	9.1 at 380V 8.7 at 400V	12.2 at 380V 11.6 at 400V	15.2 at 380V 14.5 at 400V
Max. Current to Grid (A)	7.6 at 380V 7.3 at 400V	9.1 at 380V 8.7 at 400V	12.2 at 380V 11.6 at 400V	15.2 at 380V 14.5 at 400V
Max. Current from Grid (A)	63.0	63.0	63.0	63.0
Max. Output Fault Current (Peak and Duration) (A)	46.7@4μs	46.7@4μs	46.7@4μs	74.6@4μs
Inrush Current (Peak and Duration) (A)	21.3@5ms	21.3@5ms	21.3@5ms	25.4@5ms
THDi	<3%	<3%	<3%	<3%
Maximum Output Overcurrent Protection (A)	46.7	46.7	46.7	74.6
Type of Voltage	a.c.	a.c.	a.c.	a.c.
Back-up Side				
Rated Output Apparent Power (kVA)	5	6	8	10
Max. Output Apparent Power (kVA)	Off-grid: 5.5 (10.0, 10s), on-grid: 43.5	Off-grid: 6.6(12, 10s), on-grid: 43.5	Off-grid: 8.8 (16.0, 10s), on-grid: 43.5	Off-grid: 11(20.0, 10s), on-grid: 43.5

Technical Data	GW5K-BTA-G20	GW6K-BTA-G20	GW8K-BTA-G20	GW9.999K-BTA-G20
Nominal Output Voltage (V)	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE
Nominal Output 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 Output Current (A)	7.6 at 380V 7.3 at 400V	9.1 at 380V 8.7 at 400V	12.2 at 380V 11.6 at 400V	15.2 at 380V 14.5 at 400V
Max. Output Current (A)*3	Off-grid: 11.4, on-grid: 63	Off-grid: 13.7, on-grid:63	Off-grid: 18.2, on-grid: 63	Off-grid: 22.8, on-grid:63
Max. Output Fault Current (Peak and Duration) (A)	46.7@4μs	46.7@4μs	46.7@4μs	74.6@4μs
Inrush Current (Peak and Duration) (A)	21.3@5ms	21.3@5ms	21.3@5ms	25.4@5ms
Maximum Overcurrent Protection (A)	46.7	46.7	46.7	74.6
THDv (@Linear Load)	<3%	<3%	<3%	<3%
On/Off-grid Switching Time（ms）	<4	<4	<4	<4
Efficiency				
Max. Efficiency	98.00%	98.00%	98.00%	98.10%
European Efficiency	96.40%	96.90%	97.10%	97.20%
CEC Efficiency	NA	NA	NA	NA
Max. Battery to AC Efficiency	98.00%	98.00%	98.00%	98.00%
Protection				
Residual Current Monitoring	Integrated	Integrated	Integrated	Integrated

Technical Data	GW5K-BTA-G20	GW6K-BTA-G20	GW8K-BTA-G20	GW9.999K-BTA-G20
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
Remote Shutdown	Integrated	Integrated	Integrated	Integrated
General Data				
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
Operating Temperature Range (℃)	-35~+60	-35~+60	-35~+60	-35~+60
Operating Environment	Indoor/Outdoor	Indoor/Outdoor	Indoor/Outdoor	Indoor/Outdoor
Relative Humidity	0~100%	0~100%	0~100%	0~100%
Max. Operating Altitude (m)	4000 (>2000 derating)	4000 (>2000 derating)	4000 (>2000 derating)	4000 (>2000 derating)
Cooling Method	Smart Fan Cooling	Smart Fan Cooling	Smart Fan Cooling	Smart Fan Cooling
User Interface	LED, WLAN+APP	LED, WLAN+APP	LED, WLAN+APP	LED, WLAN+APP
Communication with BMS	CAN	CAN	CAN	CAN

Technical Data	GW5K-BTA-G20	GW6K-BTA-G20	GW8K-BTA-G20	GW9.999K-BTA-G20
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)	30	30	30	30
Dimension (W×H×D mm)	800*340*270	800*340*270	800*340*270	800*340*270
Noise Emission (dB)	≤35	≤35	≤35	≤35
Topology	Non-isolated	Non-isolated	Non-isolated	Non-isolated
Self-consumption at Night (W)	≤10	≤10	≤10	≤10
Conditional Short-circuit Current (A)	6000	6000	6000	6000
Ingress Protection Rating	IP66	IP66	IP66	IP66
DC Connector	MC4, VACONN Terminal	MC4, VACONN Terminal	MC4, VACONN Terminal	MC4, VACONN Terminal
AC Connector	VACONN Terminal	VACONN Terminal	VACONN Terminal	VACONN Terminal
Environmental Category	4K4H	4K4H	4K4H	4K4H
Pollution Degree	III	III	III	III
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

Technical Data	GW5K-BTA-G20	GW6K-BTA-G20	GW8K-BTA-G20	GW9.999K-BTA-G20
The Decisive Voltage Class (DVC)	Battery: C	Battery: C	Battery: C	Battery: C
	AC: C	AC: C	AC: C	AC: C
	Com: A	Com: A	Com: A	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*4	SMS(Slip-mode frequency) +AFD*4	SMS(Slip-mode frequency) +AFD*4	SMS(Slip-mode frequency) +AFD*4
Type of Electrical Supply System	three phase	three phase	three phase	three phase
Country of Manufacture	China	China	China	China
Certification				
Grid Standard	Please refer to the official website			
Safety Regulation				
EMC				

Technical Data	GW10K-BTA-G20	GW12K-BTA-G20	GW15K-BTA-G20	GW20K-BTA-G20
Battery Side				
Battery Type	Li-Ion	Li-Ion	Li-Ion	Li-Ion
Nominal Voltage (V)	750	750	750	750
Voltage Range (V)	700-950	700-950	700-950	700-950
Start-up Voltage (V)	720	720	720	720
Number of Battery Inputs	1	1	1	1
Max. Continuous Charging Current (A)	13.4	16.1	20.1	26.7
Max. Continuous Discharging Current (A)	14.7	17.7	22.1	29.4

Technical Data	GW10K-BTA-G20	GW12K-BTA-G20	GW15K-BTA-G20	GW20K-BTA-G20
Max. Charging Power (kW)	10	12	15	20
Max. Discharging Power (kW)	11	13.2	16.5	22
AC Side (On-Grid)				
Rated Power (kW)	10	12	15	20
Max. Power (kW)	10	12	15	20
Rated Apparent Power to Grid (kVA)	10	12	15	20
Rated Apparent Power from Grid (kVA)	10	12	15	20
Max. Apparent Power to Grid (kVA)	10	12	15	20
Max. Apparent Power from Grid (kVA)	43.5	43.5	43.5	43.5
Nominal Voltage (V)	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE
Voltage Range (V)	180 ~ 260 (According to local standard)	180 ~ 260 (According to local standard)	180 ~ 260 (According to local standard)	180 ~ 260 (According to local standard)
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 to Grid (A)	15.2 at 380V 14.5 at 400V	18.2 at 380V 17.4 at 400V	22.8 at 380V 21.8 at 400V	30.4 at 380V 29.0 at 400V
Rated Current fromGrid (A)	15.2 at 380V 14.5 at 400V	18.2 at 380V 17.4 at 400V	22.8 at 380V 21.8 at 400V	30.4 at 380V 29.0 at 400V

Technical Data	GW10K-BTA-G20	GW12K-BTA-G20	GW15K-BTA-G20	GW20K-BTA-G20
Max. Current to Grid (A)	15.2 at 380V 14.5 at 400V	18.2 at 380V 17.4 at 400V	22.8 at 380V 21.8 at 400V	30.4 at 380V 29.0 at 400V
Max. Current from Grid (A)	63.0	63.0	63.0	63.0
Max. Output Fault Current (Peak and Duration) (A)	74.6@4μs	74.6@4μs	83.3@4μs	83.3@4μs
Inrush Current (Peak and Duration) (A)	25.4@5ms	25.4@5ms	29.1@5ms	29.1@5ms
THDi	<3%	<3%	<3%	<3%
Maximum Output Overcurrent Protection (A)	74.6	74.6	83.3	83.3
Type of Voltage	a.c.	a.c.	a.c.	a.c.
Back-up Side				
Rated Output Apparent Power (kVA)	10	12	15	20
Max. Output Apparent Power (kVA)*6	Off-grid: 11(20.0, 10s), on-grid: 43.5	Off-grid: 13.2(24, 10s), on-grid: 43.5	Off-grid: 16.5(30, 10s), on-grid: 43.5	Off-grid: 22(30.0, 10s), on-grid: 43.5
Nominal Output Voltage (V)	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE
Nominal Output 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 Output Current (A)	15.2 at 380V 14.5 at 400V	18.2 at 380V 17.4 at 400V	22.8 at 380V 21.8 at 400V	30.4 at 380V 29.0 at 400V
Max. Output Current (A)*3	Off-grid: 22.8, on-grid: 63	Off-grid: 27.3, on-grid: 63	Off-grid: 33.4, on-grid: 63	Off-grid: 33.4, on-grid: 63

Technical Data	GW10K-BTA-G20	GW12K-BTA-G20	GW15K-BTA-G20	GW20K-BTA-G20
Max. Output Fault Current (Peak and Duration) (A)	74.6@4μs	74.6@4μs	83.3@4μs	83.3@4μs
Inrush Current (Peak and Duration) (A)	25.4@5ms	25.4@5ms	29.1@5ms	29.1@5ms
Maximum Overcurrent Protection (A)	74.6	74.6	83.3	83.3
THDv (@Linear Load)	<3%	<3%	<3%	<3%
On/Off-grid Switching Time（ms）	<4	<4	<4	<4
Efficiency				
Max. Efficiency	98.10%	98.10%	98.10%	98.10%
European Efficiency	97.20%	97.20%	97.30%	97.30%
CEC Efficiency	NA	NA	NA	NA
Max. Battery to AC Efficiency	98.00%	98.00%	98.00%	98.00%
MPPT Efficiency	NA	NA	NA	NA
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

Technical Data	GW10K-BTA-G20	GW12K-BTA-G20	GW15K-BTA-G20	GW20K-BTA-G20
AC Overvoltage Protection	Integrated	Integrated	Integrated	Integrated
AC Surge Protection	Type II	Type II	Type II	Type II
Remote Shutdown	Integrated	Integrated	Integrated	Integrated
General Data				
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
Operating Temperature Range (℃)	-35~+60	-35~+60	-35~+60	-35~+60
Operating Environment	Indoor/Outdoor	Indoor/Outdoor	Indoor/Outdoor	Indoor/Outdoor
Relative Humidity	0~100%	0~100%	0~100%	0~100%
Max. Operating Altitude (m)	4000 (>2000 derating)	4000 (>2000 derating)	4000 (>2000 derating)	4000 (>2000 derating)
Cooling Method	Smart Fan Cooling	Smart Fan Cooling	Smart Fan Cooling	Smart Fan Cooling
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)	30	30	30	30
Dimension (W×H×D mm)	800*340*270	800*340*270	800*340*270	800*340*270
Noise Emission (dB)	≤35	≤35	≤40	≤40
Topology	Non-isolated	Non-isolated	Non-isolated	Non-isolated

Technical Data	GW10K-BTA-G20	GW12K-BTA-G20	GW15K-BTA-G20	GW20K-BTA-G20
Self-consumption at Night (W)	≤10	≤10	≤10	≤10
Conditional Short-circuit Current (A)	6000	6000	6000	6000
Ingress Protection Rating	IP66	IP66	IP66	IP66
DC Connector	MC4, VACONN Terminal	MC4, VACONN Terminal	MC4, VACONN Terminal	MC4, VACONN Terminal
AC Connector	VACONN Terminal	VACONN Terminal	VACONN Terminal	VACONN Terminal
Environmental Category	4K4H	4K4H	4K4H	4K4H
Pollution Degree	III	III	III	III
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
The Decisive Voltage Class (DVC)	Battery: C	Battery: C	Battery: C	Battery: C
	AC: C	AC: C	AC: C	AC: C
	Com: A	Com: A	Com: A	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*4	SMS(Slip-mode frequency) +AFD*4	SMS(Slip-mode frequency) +AFD*4	SMS(Slip-mode frequency) +AFD*4
Type of Electrical Supply System	three phase	three phase	three phase	three phase
Country of Manufacture	China	China	China	China
Certification				

Technical Data	GW10K-BTA-G20	GW12K-BTA-G20	GW15K-BTA-G20	GW20K-BTA-G20
Grid Standard	Please refer to the official website			
Safety Regulation				
EMC				

Technical Data	GW25K-BTA-G20	GW29.999K-BTA-G20	GW30K-BTA-G20
Battery Side			
Battery Type	Li-Ion	Li-Ion	Li-Ion
Nominal Voltage (V)	750	750	750
Voltage Range (V)	700-950	700-950	700-950
Start-up Voltage (V)	720	720	720
Number of Battery Inputs	1	1	1
Max. Continuous Charging Current (A)	33.3	40.0	40.0
Max. Continuous Discharging Current (A)	36.7	44.1	44.1
Max. Charging Power (kW)	25	30	30
Max. Discharging Power (kW)	27.5	33	33
AC Side (On-Grid)			
Rated Power (kW)	25	29.999	30
Max. Power (kW)	25	29.999	30
Rated Apparent Power to Grid (kVA)	25	29.999	30
Rated Apparent Power from Grid (kVA)	25	29.999	30
Max. Apparent Power to Grid (kVA)	25	29.999	30
Max. Apparent Power from Grid (kVA)	55.2	55.2	55.2

Technical Data	GW25K-BTA-G20	GW29.999K-BTA-G20	GW30K-BTA-G20
Nominal Voltage (V)	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE
Voltage Range (V)	180 ~ 260 (According to local standard)	180 ~ 260 (According to local standard)	180 ~ 260 (According to local standard)
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 to Grid (A)	37.9 at 380V 36.3 at 400V	45.5 at 380V 43.5 at 400V	45.5 at 380V 43.5 at 400V
Rated Current fromGrid (A)	37.9 at 380V 36.3 at 400V	45.5 at 380V 43.5 at 400V	45.5 at 380V 43.5 at 400V
Max. Current to Grid (A)	37.9 at 380V 36.3 at 400V	45.5 at 380V 43.5 at 400V	45.5 at 380V 43.5 at 400V
Max. Current from Grid (A)	80.0	80.0	80.0
Max. Output Fault Current (Peak and Duration) (A)	125@4μs	125@4μs	125@4μs
Inrush Current (Peak and Duration) (A)	32.3@5ms	32.3@5ms	32.3@5ms
THDi	<3%	<3%	<3%
Maximum Output Overcurrent Protection (A)	125	125	125
Type of Voltage	a.c.	a.c.	a.c.
Back-up Side			
Rated Output Apparent Power (kVA)	25	30	30
Max. Output Apparent Power (kVA)*6	Off-grid: 27.5(45.0, 10s), on-grid: 55.2	Off-grid: 33(45.0, 10s), on-grid: 55.2	Off-grid: 33(45.0, 10s), on-grid: 55.2
Nominal Output Voltage (V)	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE	220/380, 230/400, 3L/N/PE

Technical Data	GW25K-BTA-G20	GW29.999K-BTA-G20	GW30K-BTA-G20
Nominal Output Frequency (Hz)	50/60	50/60	50/60
Frequency Range (Hz)	45~55 / 55~65	45~55 / 55~65	45~55 / 55~65
Rated Output Current (A)	37.9 at 380V 36.3 at 400V	45.5 at 380V 43.5 at 400V	45.5 at 380V 43.5 at 400V
Max. Output Current (A)*3	Off-grid: 50.0, on-grid: 80	Off-grid: 50.0, on-grid: 80	Off-grid: 50.0, on-grid: 80
Max. Output Fault Current (Peak and Duration) (A)	125@4μs	125@4μs	125@4μs
Inrush Current (Peak and Duration) (A)	32.3@5ms	32.3@5ms	32.3@5ms
Maximum Overcurrent Protection (A)	125	125	125
THDv (@Linear Load)	<3%	<3%	<3%
On/Off-grid Switching Time（ms）	<4	<4	<4
Efficiency			
Max. Efficiency	98.20%	98.20%	98.20%
European Efficiency	97.40%	97.40%	97.40%
CEC Efficiency	NA	NA	NA
Max. Battery to AC Efficiency	98.00%	98.00%	98.00%
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

Technical Data	GW25K-BTA-G20	GW29.999K-BTA-G20	GW30K-BTA-G20
AC Overvoltage Protection	Integrated	Integrated	Integrated
AC Surge Protection	Type II	Type II	Type II
Remote Shutdown	Integrated	Integrated	Integrated
General Data			
Power Factor	0.8 leading ... 0.8 lagging	0.8 leading ... 0.8 lagging	0.8 leading ... 0.8 lagging
Operating Temperature Range (℃)	-35~+60	-35~+60	-35~+60
Operating Environment	Indoor/Outdoor	Indoor/Outdoor	Indoor/Outdoor
Relative Humidity	0~100%	0~100%	0~100%
Max. Operating Altitude (m)	4000 (>2000 derating)	4000 (>2000 derating)	4000 (>2000 derating)
Cooling Method	Smart Fan Cooling	Smart Fan Cooling	Smart Fan Cooling
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)	32	32	32
Dimension (W×H×D mm)	800*340*270	800*340*270	800*340*270
Noise Emission (dB)	≤45	≤45	≤45
Topology	Non-isolated	Non-isolated	Non-isolated
Self-consumption at Night (W)	≤10	≤10	≤10
Conditional Short-circuit Current (A)	6000	6000	6000
Ingress Protection Rating	IP66	IP66	IP66

Technical Data	GW25K-BTA-G20	GW29.999K-BTA-G20	GW30K-BTA-G20
DC Connector	MC4, VACONN Terminal	MC4, VACONN Terminal	MC4, VACONN Terminal
AC Connector	VACONN Terminal	VACONN Terminal	VACONN Terminal
Environmental Category	4K4H	4K4H	4K4H
Pollution Degree	IV	IV	IV
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
The Decisive Voltage Class (DVC)	Battery: C	Battery: C	Battery: C
	AC: C	AC: C	AC: C
	Com: A	Com: A	Com: A
Mounting Method	Wall/Floor Mounted	Wall/Floor Mounted	Wall/Floor Mounted
Active Anti-islanding Method	SMS(Slip-mode frequency) +AFD*4	SMS(Slip-mode frequency) +AFD*4	SMS(Slip-mode frequency) +AFD*4
Type of Electrical Supply System	three phase	three phase	three phase
Country of Manufacture	China	China	China
Certification			
Grid Standard	Please refer to the official website		
Safety Regulation			
EMC			

*1: When the input voltage ranges from 950V to 1000V, the inverter will enter the standby mode, and the voltage returns to950V to enter the normal operation state.
*2: Please refer to the user manual for the MPPT Voltage Range at nominal Power.
*3: The Max. Output Current in off-grid operation accounts for a three-phase maximum 150% unbalanced capability.
*4: AFDPF: Active Frequency Drift with Positive Feedback, AQDPF: Active Q Drift with Positive Feedback.

9.2 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			
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			

Technical Data		GW5.1-BAT-D-G20	GW8.3-BAT-D-G20	GW5.1-BAT-D-G21	GW8.3-BAT-D-G21
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			
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
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, $(C_3H_6)_n$	

Technical Data		GW6.0-BAT-D-G20	GW9.0-BAT-D-G20
Ingress Protection		IP66	
Protective Class		Ⅰ	
Dimensions (W×H×D mm)		800*326*270	
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.

9.3 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

9.4 Smart Meter Technical Data

9.4.1 GM330

model	GM330
Measurement Range	
Supported Grid Types	1P2W/3P3W/3P4W
Operating voltage (Vac)*	3P4W：100~472 L-N 3P3W：100~472 L-L
Frequency (Hz)	50/60
CT ratio	nA: 5A
Accuracy Parameters	
voltage/current	Class 0.5
Active Energy	Class 0.5
Reactive Energy	Class 1
Communication Parameters	
Communication Method	RS485

model	GM330
Communication Distance (m)	1000
General Parameters	
Dimensions (W*H*D mm)	72*85*72
Housing	4-module
Weight (g)	240
Mounting Method	DIN Rail
User Interface	4 LEDs, Reset Button
Power Consumption (W)	< 5
Environmental Parameters	
IP Rating	IP20
Operating Temperature Range (°C)	-30-+70
Storage Temperature Range (°C)	-30-+70
Relative Humidity (non-condensing)	0-95%
Max. Operating Altitude (m)	3000

*Supports 1.1 times voltage access.
*The standard CT for the meter has been uniformly updated to the 120A:40mA specification. Meters equipped with the 200A:50mA specification CT will no longer be sold after June 2026.

9.4.2 GMK330

model	GMK330
Measurement Range	

model	GMK330
Supported Grid Types	1P2W/3P3W/3P4W
Operating voltage (Vac)*	3P4W：90~264 L-N 3P3W：90~264 L-L
Frequency (Hz)	50/60
CT ratio	120A: 40mA 200A: 50mA*
Number of CTs	3
Accuracy Parameters	
voltage/current	Class 0.5
Active Energy	Class 0.5
Reactive Energy	Class 1
Communication Parameters	
Communication Method	RS485
Communication Distance (m)	1000
General Parameters	
Dimensions (W*H*D mm)	72*85*72
Housing	4-module
Weight (g)	240
Mounting Method	DIN Rail
User Interface	4 LEDs, Reset Button
Power Consumption (W)	＜5
Environmental Parameters	
IP Rating	IP20

model	GMK330
Operating Temperature Range (℃)	-30-+70
Storage Temperature Range (℃)	-30-+70
Relative Humidity (non-condensing)	0-95%
Max. Operating Altitude (m)	3000

*Supports 1.1 times rated voltage connection.
*The standard CT for the meter has been uniformly changed to the 120A:40mA specification. Meters equipped with CTs of the 200A:50mA specification will no longer be sold after June 2026.

9.5 Smart Dongle Technical Data

9.5.1 WiFi/LAN Kit-20

technical parameter		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 Standard
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 and Play
Operating Temperature Range (℃)		-30~+60
Storage Temperature Range (℃)		-40~+70
Relative Humidity		0-95%

technical parameter	WiFi/LAN Kit-20
Max. Operating Altitude (m)	4000

9.5.2 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
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

Product Model	4G Kit-G20
Max. Operating Altitude (m)	4000
Applicable Standards	
Certification	CE-RED（EN18031）、RCM

9.6 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	

Model	EzManager3000
Dimensions (W×H×D mm)	99*85.6*71
Weight (kg)	0.2
Mounting Method	Wall, DIN-Rail, or Desktop Mounting
Environmental Parameters	
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

10 Appendix

10.1 FAQ

10.1.1 How to conduct auxiliary detection for smart meters/CT?

The meter detection function can detect whether the meter CT is connected correctly and the current operating status of the meter and CT.

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

10.1.2 How to Upgrade the Device Version

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

- **Prompt Upgrade:**

When the user opens the App, an upgrade prompt pops up on the home page. The user can choose whether to upgrade. If they choose to upgrade, they can complete the upgrade by following the on-screen instructions.

- **Regular Upgrade:**

Go to **[Home]** > **[Settings]** > **[Firmware Information]** to enter the firmware information viewing interface.
Click "Check for Updates". If a new version is available, complete the upgrade by following the on-screen instructions.

- **Forced Upgrade:**

The App pushes upgrade information. The user must upgrade according to the prompts; otherwise, the App cannot be used. Complete the upgrade by following the

on-screen instructions.

Inverter Software Version Upgrade

- The inverter supports software upgrade via a USB drive.
- Before using a USB drive to upgrade the device, please contact the after-sales service center to obtain the software upgrade package and upgrade method.

10.2 Explanation of Terms

- **Definition of Overvoltage Categories**
  - **Overvoltage Category I**: Equipment connected to circuits where measures are taken to limit transient overvoltages to a suitably low level.
  - **Overvoltage Category II**: Energy-consuming equipment supplied from a fixed electrical installation. This category includes appliances, portable tools, and other household and similar loads. If special requirements for reliability and suitability of such equipment exist, Overvoltage Category III applies.
  - **Overvoltage Category III**: Equipment in fixed electrical installations where special requirements for reliability and suitability must be met. This includes switching devices in fixed installations and industrial equipment permanently connected to fixed electrical installations.
  - **Overvoltage Category IV**: Equipment used at the origin of the electrical installation. This includes meters and primary overcurrent protection devices, etc.
- **Definition of Damp Location Categories**

Environmental Parameters	Level		
	3K3	4K2	4K4H
Temperature Range	0~+40℃	-33~+40℃	-33~+40℃
Humidity Range	5% to 85%	15% to 100%	4% to 100%

- **Definition of Environmental Categories:**
  - **Outdoor Inverter**: Ambient air temperature range from -25°C to +60°C, suitable for Pollution Degree 3 environments.
  - **Indoor Type II Inverter**: Ambient air temperature range from -25°C to +40°C, suitable for Pollution Degree 3 environments.
  - **Indoor Type I Inverter**: Ambient air temperature range from 0°C to +40°C,

suitable for Pollution Degree 2 environments.

- **Definition of Pollution Degree Categories**
  - **Pollution Degree 1**: No pollution or only dry, non-conductive pollution.
  - **Pollution Degree 2**: Normally only non-conductive pollution occurs. Temporary conductivity caused by condensation must be expected occasionally.
  - **Pollution Degree 3**: Conductive pollution occurs, or dry non-conductive pollution becomes conductive due to condensation.
  - **Pollution Degree 4**: Persistent conductive pollution occurs, for example, due to conductive dust, rain, or snow.

10.3 Battery SN Code Meaning



LXD10DSC0002

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

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

Month	Jan-Sep	Oct	Nov	Dec
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 for representation, e.g., 1~9 represent the 1st to 9th days, A represents the 10th day, and so on. Among them, the letters I and O are not used to avoid confusion. Details are as follows:

Production Day	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

11 Contact Information

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