2026-07-02 V1.2

ET 50-100kW User Manual

Copyright Notice

Copyright©Goodwe Technologies Co., Ltd. 2026. All rights reserved.

Without the authorization of Goodwe Technologies Co., Ltd., no part of this manual may be reproduced, transmitted, or uploaded to any third-party platform such as public networks in any form.

Trademark Authorization

GOODWE and other GOODWE trademarks used in this manual are owned by Goodwe Technologies Co., Ltd. All other trademarks or registered trademarks mentioned in this manual are the property of their respective owners.

Note

Due to product version upgrades or other reasons, the document content will be updated from time to time. Unless otherwise agreed, the document content shall not replace the safety instructions on the product labels. All descriptions in this document are for guidance only.

Preface

Overview

This document mainly introduces product information, installation wiring, configuration and commissioning, fault troubleshooting, and maintenance of the energy storage system composed of inverters, battery systems, and smart meters. Please read this manual carefully before installing and using the product to understand the safety information and become familiar with the functions and features of the product. The document may be updated from time to time. Please obtain the latest version of the materials and more product information from the official website.

Applicable Products

The energy storage system includes the following products:

Product Type	Product Information	Description
Inverter	GW50K-ET-L-G10	Hybrid solar-storage inverter. Rated output power: 3kW-10kW
	GW75K-ET-G10	
	GW80K-ET-G10	
	GW99.99K-ET-G10	
	GW100K-ET-G10	
	GW75K-BT-G10	AC-coupled inverter. Rated output power: 3kW-10kW
	GW80K-BT-G10	
	GW99.99K-BT-G10	
	GW100K-BT-G10	
Static Transfer Switch Cabinet	GW125K-STS-G10	Rated power: 125kW

Product Type	Product Information	Description
Battery System	BAT Series 35.8-56.3kWh High Voltage Battery	Single cluster capacity: 35.8/40.9/46.0/51.2/56.3 kWh. Max parallel cluster capacity: 214.8/245.4/276.0/307.2/337.8 kWh.
	BAT Series 92.1-112.6kWh Commercial Battery System	Single cluster capacity: 92.1/102.4/112.6 kWh. Max parallel cluster capacity: 368.4/409.6/450.4 kWh.
	BAT-C Series 208.9kWh Commercial Battery System	Single cluster capacity: 208.9 kWh, max parallel cluster capacity: 835.6 kWh.
Smart Meter	GM330	Monitoring module in the energy storage system, capable of detecting operating voltage, current, and other information.
Smart Communication Stick	WiFi/LAN Kit-20	In a standalone scenario, system operation information can be uploaded to the monitoring platform via WiFi or LAN signals.
	4G Kit-CN-G20	In a standalone scenario, system operation information can be uploaded to the monitoring platform via 4G signals.
	4G Kit-G20	In a standalone scenario, system operation information can be uploaded to the monitoring platform via 4G signals.

Symbol Definitions

⚠Danger
Indicates a high level of potential risk that, if not avoided, will result in death or serious injury.

⚠Warning
Indicates a moderate level of potential risk that, if not avoided, could result in death or serious injury.
⚠Caution
Indicates a low level of potential risk that, if not avoided, could result in minor or moderate injury.
Notice
Provides emphasis or supplementation to the content, and may offer tips or tricks for optimal product usage, helping you solve a problem or save time.

Table of Contents

1 Safety Precautions 12
1.1 General Safety 12
1.2 Personnel Requirements 12
1.3 System Safety 13
1.3.1 PV String Safety 15
1.3.2 Inverter Safety 16
1.3.3 Battery Safety 17
1.3.4 Meter Safety 20
1.4 Explanation of Safety Symbols and Certification Marks 20
1.5 European Declaration of Conformity 22
1.5.1 Equipment with Wireless Communication Function 22
1.5.2 Equipment without Wireless Communication Function (Except Batteries) 23
1.5.3 Battery 23
2 System Introduction 24
2.1 System Overview 24
2.1.1 Grid-Connected Scenario 26
2.1.2 Grid-Connected and Off-Grid Scenario 31
2.1.3 Microgrid Scenario 38
2.2 Product Introduction 46
2.2.1 Inverter 47

2.2.2 STS 48
2.2.3 Battery 50
2.2.3.1 BAT Series 35.8-56.3kWh High Voltage Battery 51
2.2.3.2 BAT Series 92.1-112.6kWh Commercial and Industrial Battery System 54
2.2.3.3 BAT-C Series 208.9kWh Commercial and Industrial Battery System 64
2.2.3.3.1 Appearance Introduction 64
2.2.3.3.2 Component Introduction 67
2.2.3.3.2.1 Power Supply and Distribution System 67
2.2.3.3.2.2 Environment Control System 70
2.2.3.3.2.3 Fire Protection System 72
2.2.3.3.2.3.1 Introduction to Fire Protection Components 72
2.2.3.3.2.3.2 Introduction to Fire Protection Logic 76
2.2.4 Smart Meter 78
2.2.5 Smart Communication Stick 79
2.3 Supported Grid Types 79
2.4 System Mode 79
2.5 Functional Features 90
3 Equipment Inspection and Storage 93
3.1 Equipment Inspection 93
3.2 Deliverables 93
3.2.1 Inverter Deliverables 93
3.2.2 STS Deliverables 95

3.2.3 Battery Deliverables (BAT Series 35.8-56.3kWh High Voltage Battery) 96
3.2.4 Battery Deliverables (BAT Series 92.1-112.6kWh Commercial Battery System) 99
3.2.5 Battery Deliverables (BAT-C Series 208.9kWh Commercial Battery System) 101
3.2.6 Smart Meter Deliverables 102
3.2.7 Smart Communication Stick 103
3.2.7.1 Communication Module Delivery (WiFi/LAN Kit-20) 103
3.2.7.2 Communication Module Delivery (4G Kit-G20/4G Kit-CN-G20) 103
3.3 Device Storage 104
4 Installation 107
4.1 System Installation and Commissioning Process 107
4.2 Installation Requirements 108
4.2.1 Installation Environment Requirements 108
4.2.2 Installation Space Requirements 110
4.2.3 Foundation Requirements 111
4.2.4 Handling Requirements 113
4.2.5 Tool Requirements 117
4.3 Installing the Inverter 118
4.4 Installing the STS 120
4.5 Installing the Battery 121
4.5.1 Opening the Cabinet Door 121
4.5.2 Installing the BAT Series 35.8-56.3kWh High-Voltage Battery 122

4.5.3 Installing the BAT Series 92.1-112.6kWh Commercial and Industrial Battery System 126
4.5.4 Install BAT-C Series 208.9kWh Commercial & Industrial Battery System 128
4.6 Install Meter 128
5 System Wiring 130
5.1 System Wiring Electrical Block Diagram 131
5.2 System Wiring Detail Diagram 133
5.2.1 Grid-Tied Scenario 133
5.2.2 Grid-Tied and Off-Grid Scenario 137
5.2.3 Microgrid Scenario 142
5.2.4 Battery System Wiring Diagram 147
5.3 Material Preparation 150
5.3.1 Switch Preparation 150
5.3.2 Cable Preparation 151
5.4 Connect Protective Ground Wire 155
5.5 Connect PV Cables 157
5.6 Connect Battery Cables 160
5.6.1 BAT Series 35.8-56.3kWh High-Voltage Battery 163
5.6.1.1 Connect Inverter and Battery Power Cables 163
5.6.1.2 Connect battery-to-battery power cable 165
5.6.1.3 Connect communication cable 165
5.6.2 BAT series 92.1-112.6kWh commercial battery system 166

5.6.2.1 Introduction to battery cable routing holes and system wiring 166
5.6.2.2 Connect inverter to battery power cable and battery-to-battery power cable 166
5.6.2.3 Connect communication cable 168
5.6.2.4 Connect battery HVAC cable 171
5.6.2.5 Install base plate and release emergency stop switch 171
5.6.3 BAT-C series 208.9kWh commercial battery system 172
5.6.3.1 Introduction to cable routing holes 172
5.6.3.2 Connect power cable 173
5.6.3.3 Connect communication cable 175
5.6.3.4 Connect liquid cooling unit power cable 178
5.6.3.5 Operations after wiring 179
5.7 Connect AC cables 180
5.7.1 Connect inverter AC cable 181
5.7.2 Connect STS AC cable (optional) 182
5.8 Connect meter cable 184
5.9 Connect communication cable 186
5.9.1 Connect inverter communication cable 186
5.9.2 Connect STS communication cable 192
6 System trial run 194
6.1 Pre-power-on check 194
6.2 Power on the system 194

6.2.1 Grid-tied scenario 195
6.2.2 Grid-tied and off-grid scenarios & Microgrid scenario 197
6.3 Indicator light introduction 198
6.3.1 Inverter indicator light 198
6.3.2 Battery indicator light 199
6.3.3 Smart meter indicator light 202
6.3.4 Smart communication stick indicator light 203
6.3.5 STS indicator light 205
6.4 Close the cabinet door 205
7 System commissioning 207
7.1 Monitor the power station via SEMS+ 207
7.2 Commission via SEC3000C 207
8 System Maintenance 208
8.1 System Power-off 208
8.1.1 Grid-tied Scenario 208
8.1.2 Grid-tied and Off-grid Scenario&Microgrid Scenario 210
8.2 Device Removal 211
8.3 Device Disposal 212
8.4 Periodic Maintenance 212
8.5 Fault 213
8.5.1 System Communication Fault 214
8.5.2 Inverter Fault 216

8.5.2.1 Fault Handling (Fault Code F01-F40) 216
8.5.2.2 Fault Handling (Fault Code F41-F80) 232
8.5.2.3 Fault Handling (Fault Code F81-F121) 240
8.5.2.4 Troubleshooting (Fault Codes F122-F163) 250
8.5.2.5 Fault Symptom Handling 259
8.5.3 Battery Faults 277
9 Technical Parameters 297
9.1 Inverter Technical Parameters 297
9.2 STS Technical Parameters 297
9.3 Battery Technical Parameters 297
9.3.1 BAT Series 35.8-56.3kWh High Voltage Battery 297
9.3.2 BAT Series 92.1-112.6kWh C&I Battery System 297
9.4 Smart Meter Technical Parameters 297
9.5 Smart Communication Stick Technical Parameters 298
10 Appendix 299
10.1 FAQ 299
10.1.1 How to perform auxiliary detection of meter/CT? 299
10.1.2 How to upgrade device version 299
10.2 Acronyms 300
10.3 Glossary 303
10.4 Battery SN Code Meaning 304
11 Contact Information 306

1 Safety Precautions

Always follow the safety precautions in this document when operating the device.

⚠Warning

The equipment has been designed and tested in strict accordance with safety regulations, but as electrical equipment, relevant safety instructions must be followed before any operation on the equipment. Improper operation may cause serious injury or property damage.

1.1 General Security

Note

- Due to product version upgrades or other reasons, the document content is updated from time to time. Unless otherwise agreed, the document content cannot replace the safety precautions on the product label. All descriptions in the document are only for usage guidance.
- Please read this document carefully before installing the device to understand the product and precautions.
- All operations on the device must be performed by professional, qualified electrical technicians who are familiar with the relevant standards and safety regulations of the project location.
- When operating the device, use insulated tools and wear personal protective equipment to ensure personal safety. When contacting electronic components, wear anti-static gloves, anti-static wrist straps, anti-static clothing, etc., to protect the device from electrostatic damage.
- Unauthorized disassembly or modification may cause equipment damage, and such damage is not covered by the warranty.
- Equipment damage or personal injury caused by failure to install, use, or configure the device in accordance with this document or the corresponding user manual is not the responsibility of the equipment manufacturer. For more product warranty information, please visit the official website: https://www.goodwe.com/warrantyrelated.html.

1.2 Personnel Requirements

Note

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

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

1.3 System Security

⚠Danger

- Before making electrical connections, disconnect all upstream switches of the device to ensure the device is powered off. Live working is strictly prohibited, otherwise dangers such as electric shock may occur.
- To prevent personal injury or equipment damage caused by live working, a circuit breaker must be added on the voltage input side of the device.
- All operations such as transportation, storage, installation, operation, use, and maintenance shall 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 supplied with the device to connect the device cables. If other types of connectors are used, any resulting equipment damage is not within the responsibility of the equipment manufacturer.
- Ensure that all device cable connections are correct, tight, and secure. Improper wiring may cause poor contact or damage to the device.
- Before operating the device, ensure that the system is reliably grounded. Otherwise, there may be a risk of electric shock.
- To protect the device and its components from damage during transportation, ensure that transport personnel are professionally trained. Record the operation steps during transportation and keep the device balanced to avoid dropping.
- The device is heavy. Assign personnel according to the device weight to prevent the device from exceeding the weight range that can be carried by humans and causing injury.
- Ensure the device is placed stably and not tilted. Tipping over may cause equipment damage and personal injury.
- Do not wear metal items during device handling, installation, or commissioning to avoid equipment damage or electric shock injury.
- Do not place metal parts on the device to prevent electric shock from conduction.
- If the device is short-circuited, do not approach or touch the device. Turn off the power immediately.

⚠Warning

- During equipment installation, avoid putting weight on the wiring terminals, otherwise it may cause terminal damage.
- If the cable is subjected to excessive tension, it may result in poor connections. When wiring, leave a certain length of cable before connecting it to the device's wiring port.
- Cables of the same type should be bundled together. Different types of cables should be separated by at least 30mm, and must not be entangled or crossed.
- Using cables in high-temperature environments may cause insulation aging and damage. The distance between cables and heat-generating components or the periphery of heat source areas should be at least 30mm.

1.3.1 PV String Safety

⚠Warning

- Ensure that the component frame and support system are properly grounded.
- After connecting the DC cables, ensure that the connections are tight and secure. 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 and no reverse connection; and that the voltage is within the allowable range.
- Use a multimeter to measure the DC cables, ensure correct polarity and no reverse connection; 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 liability.
- The PV string output does not support grounding. Before connecting the PV string to the inverter, ensure that the minimum insulation resistance to ground of the PV string meets the minimum insulation impedance requirement (R = maximum input voltage (V) / 30mA).
- Do not connect the same PV string to multiple inverters, as this may damage the inverters.
- The photovoltaic modules used with the inverter must comply with IEC 61730 Class A standard.
- When the PV string input voltage is high or the input current is high, the inverter output power may be derated.

1.3.2 Inverter Safety

⚠Warning

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

1.3.3 Battery Safety

⚠Danger

- This battery system is a high-voltage system, and there is high voltage when the equipment is running. Before operating the equipment in the system, ensure that the equipment is powered off to avoid the risk of electric shock. During equipment operation, strictly follow all safety precautions in this manual and the safety signs on the equipment.
- This battery system is a high-voltage system. Except for professionals, other personnel must keep away. Do not touch or operate without permission.
- This energy storage system is heavy equipment. Use appropriate equipment and tools and take protective measures during installation and maintenance. Improper operation may cause personal injury or product damage.
- Do not disassemble, modify, or repair the battery or control box without official authorization from the equipment manufacturer. Otherwise, electric shock or equipment damage may occur. The losses incurred are not within the responsibility scope of the equipment manufacturer.
- The equipment must be installed on concrete or other non-combustible surfaces. Ensure the foundation is level, firm, flat, dry, and has sufficient load-bearing capacity. No depressions or tilts are allowed.

- Do not impact, pull, drag, squeeze, step on the equipment, or use sharp objects to pierce the equipment casing. Do not place the battery in fire, otherwise there is a risk of battery explosion.
- Do not place the battery in high-temperature environments. Ensure there are no heat sources near the battery and it is not directly exposed to sunlight. When the ambient temperature exceeds 60°C, fire may occur.
- If the battery or control box has obvious defects, cracks, damage, or other conditions, do not use.
- Battery damage may cause electrolyte leakage.
- Do not move the battery system while the battery is in operation.
- When installing the battery system, pay attention to the positive and negative terminals. Do not reverse the connections, otherwise it may cause a short circuit, resulting in personal injury or property damage.
- It is strictly forbidden to short-circuit the positive and negative terminals of the battery. Battery short circuit may cause personal injury. The instantaneous high current from a short circuit can release a large amount of energy, which may cause a fire.
- When operating the equipment, ensure the equipment is not damaged and the system has no faults. Otherwise, there may be risks of electric shock and fire.
- During equipment operation, do not open the equipment cabinet door or touch any terminals or components. Otherwise, there is a risk of electric shock.
- The cabinet temperature may exceed 60°C during equipment operation. Do not touch the cabinet until it has cooled down. Do not install within reach of non-professionals.
- During battery system operation, do not plug or unplug terminals and connecting wires, otherwise it may cause safety hazards.
- If an abnormal situation occurs during battery system operation, immediately power off the battery system and contact relevant personnel promptly.
- The battery DC circuit breaker must meet the requirements of the AS/NZS 5139 standard.
- Each battery may only be connected to one energy storage inverter. Do not directly connect the same battery to multiple energy storage inverters. Connecting one battery to multiple inverters may cause abnormal reverse current or circulating current, which may trigger GFCI protection or battery overcurrent protection. In severe cases, this may damage the battery and inverters.

⚠Warning

- Ensure that the battery is charged promptly after discharge, otherwise over-discharge may cause battery damage.
  Do not charge or discharge the battery with current exceeding the rated charge/discharge current.
- 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 be started, contact the after-sales service center as soon as possible. Otherwise, the battery may be permanently damaged.
- If you need to replace or add battery modules, contact the after-sales service center.
- Avoid charging the battery at low temperatures, otherwise the battery system capacity may decrease.
- Do not place irrelevant items into any part of the battery cabinet.

Emergency Response Measures

- Battery Electrolyte Leakage
  If the battery module leaks electrolyte, avoid contact with the leaked liquid or gas. Electrolyte is corrosive and contact may cause skin irritation and chemical burns. If you inadvertently come into contact with the leaked substance, perform the following actions:
  - Inhalation: Evacuate from the contaminated area and seek medical help immediately.
  - Eye contact: Rinse with clean water for at least 15 minutes and seek medical help immediately.
  - Skin contact: Thoroughly wash the affected area with soap and water, and seek medical help immediately.
  - Ingestion: Induce vomiting and seek immediate medical assistance.
- Fire
  - When the battery temperature exceeds 150°C, there is a risk of fire, and toxic and harmful gases may be released after the fire.
  - To avoid fire, ensure that carbon dioxide, Novec1230, or FM-200 fire extinguishers are available near the equipment.
  - When extinguishing a fire, do not use ABC dry powder fire extinguishers. Firefighters must wear protective clothing and self-contained breathing apparatus.

1.3.4 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 the meter.

1.4 Explanation of Safety Symbols and Certification Marks

⚠Danger

- After installation, the labels and warning signs on the enclosure must be clearly visible. Do not cover, alter, or damage them.
- The following enclosure warning label descriptions are for reference only. Please refer to the actual labels on the equipment.

No.	Symbol	Meaning
1		Potential hazard exists when the equipment is running. Please take protective measures when operating the equipment.
2		High voltage hazard. High voltage exists when the equipment is running. Ensure the equipment is powered off before operating it.
3		High temperature on the inverter surface. Do not touch when the equipment is running, otherwise it may cause burns.
4		Please use the equipment properly. Under extreme conditions, the equipment may explode.

No.	Symbol	Meaning
5		Risk of fire.
6		Corrosive electrolyte is contained in the equipment. Avoid contact with leaked electrolyte or volatile gases.
7		Delayed discharge. After power-off, wait 5 minutes until the equipment is fully discharged.
8		Do not install the equipment in an explosive environment.
9		Do not install the equipment in a corrosive environment.
10	 	Keep the equipment away from open flames or ignition sources.
11		Keep the equipment away from children's reach.
12		Children must not touch.
13		Do not lift the equipment.
14		Do not disassemble.
15		Do not disconnect under load, as it may cause electric shock or fire hazards.
16		Read the product manual carefully before operating the equipment.

No.	Symbol	Meaning
		
17		Personal protective equipment must be worn during installation, operation, and maintenance.
18		Do not dispose of the equipment as household waste. Dispose of it in accordance with local laws and regulations, or return it to the manufacturer.
19		Protective earth connection point.
20		Recycling symbol.
21		CE marking.
22		TUV marking.
23		RCM marking.

1.5 European Declaration of Conformity

1.5.1 Devices with wireless communication functions

Devices with wireless communication functions that can be sold on the European market must meet the following directive requirements:

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

1907/2006 (REACH)

1.5.2 Devices without wireless communication function (excluding batteries)

Devices without wireless communication function that can be sold on the European market must comply with the following directive requirements:

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

1.5.3 Battery

Batteries sold on the European market comply with the following directive requirements:

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

For more EU declarations of conformity, please visit the official website.

2 System Introduction

2.1 System Overview

System Overview

The industrial and commercial smart inverter solution integrates inverters, static transfer switch cabinets, batteries, smart meters, smart communication sticks, and other devices. In a photovoltaic system, it converts solar energy into electricity or purchases electricity from the grid to meet industrial and commercial power demands. The energy IoT devices in the system manage the overall power consumption by monitoring the total electricity status, thereby intelligently managing power for loads, storage in batteries, or output to the grid.

⚠Warning

1. Photovoltaic systems are not suitable for connecting devices that require stable power supply, such as life-supporting medical equipment. Please ensure that no personal injury can occur when the system is powered off.
2. In photovoltaic systems, try to avoid using loads with high starting current, such as high-power water pumps, otherwise the instantaneous high current may cause off-grid output failure.
3. If the photovoltaic system is not equipped with a battery, it is not recommended to use the BACK-UP function, otherwise it may cause the risk of system power failure.
4. Battery current may be affected by some factors, such as temperature, humidity, weather conditions, etc., which may cause battery current limiting and affect load capacity.
5. When the inverter experiences a single overcurrent protection, it can automatically restart; if it occurs multiple times, the restart time will be prolonged. To restart the inverter as soon as possible, you can immediately restart the inverter via the SEMS+ App.
6. When the inverter is in off-grid mode, it can supply power to industrial and commercial loads normally, such as:
   - Motor loads:
     - If the power of a single-phase motor is greater than or equal to 6kW or the power of a single three-phase motor is greater than or equal to 15kW, a VFD/VSD must be configured;
     - The sum of the rated power of single-phase motors connected to a certain phase shall not exceed 0.5*Pn/3, and the sum of the rated power of the total motor load on three phases shall not exceed 0.5*Pn; Pn refers to the rated output power of the inverter.
     - If there are other loads, the motor load should be reduced accordingly, and refer to calculations based on specific application conditions.
   - Capacitive loads: total power ≤ 0.33Pn. Pn refers to the rated output power of the inverter.
   - The inverter supports half-wave loads. Half-wave loads: Some old or non-EMC compliant appliances (such as hairdryers using half-wave rectification, small heaters, etc.)

When the inverter is in off-grid mode, it can supply normal power to industrial and commercial loads. The off-grid load capacity of the inverter is shown in the table below:

Parameter Item	Grid Single Phase	Grid Three Phase
Rated power of single motor load (kVA)	6	15
Sum of rated power of motor loads (kVA)	0.5*Pn/3	0.5*Pn
Capacitive load (kVA)	0.33*Pn/3	0.33*Pn
Half-wave load (kVA)	4	-

Notes:

1. Pn: Rated output power of the inverter.
2. If the rated power of a single motor load is greater than or equal to the nominal value in the above table, VFD/VSD needs to be configured.
3. If two or more units are paralleled, the allowable total motor load power = Pn * 50% * number of paralleled units * 80%.

2.1.1 Grid-Tied Scenario

The system remains connected to the grid and operates synchronously, following the principle of "self-consumption, surplus power to the grid". Photovoltaic power is prioritized for local loads. The energy storage system charges and discharges according to electricity price periods or operating modes to achieve economic functions such as peak-valley arbitrage and demand management.

Features

- The system relies on grid operation.
- When the grid is disconnected, the inverter must stop output immediately and cannot supply power to loads.

Applicable Scenarios

Stable grid power supply, saving electricity costs or increasing PV self-consumption rate, acceptable for system shutdown during power outages.

Single-Unit Scenario

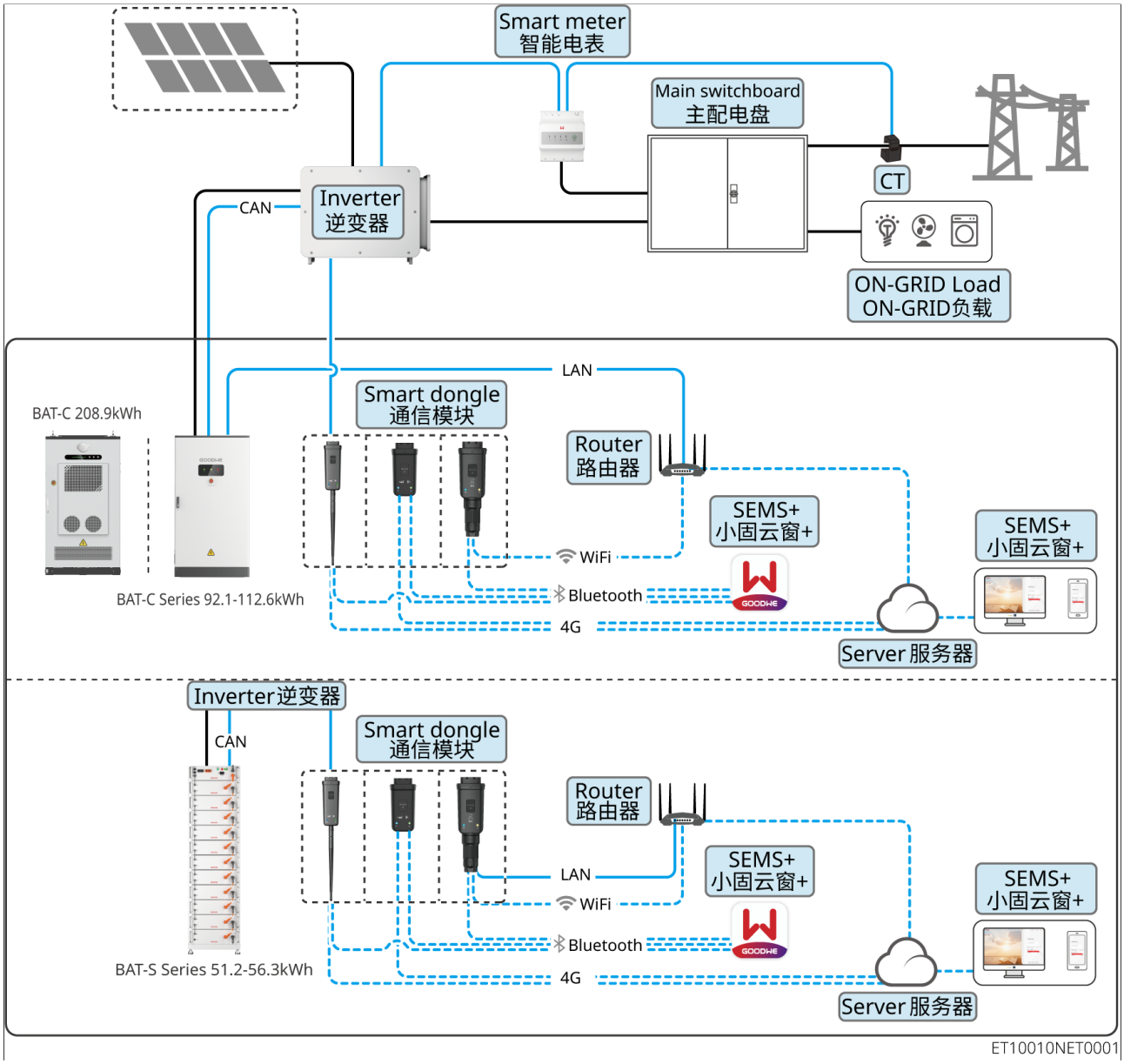


Figure1 Grid-tied scenario (single-unit, withBAT 51.2-56.3kWh, BAT 92.1-112.6kWh or BAT-C 208.9kWh)

Parallel-Unit Scenario

Note

- BAT-C 92.1-112.6kWh, BAT-C 208.9kWh
  - The battery has a built-in Ezlink module. Each inverter is connected to the battery system through an intelligent communication stick, and the battery system transmits the parallel information to the smart energy control box.
- BAT-S 51.2-56.3kWh
  - The battery does not have a built-in Ezlink module. Each inverter transmits the information of a single inverter to the smart energy control box through an intelligent communication stick.

Type 1: BAT 51.2-56.3kWh

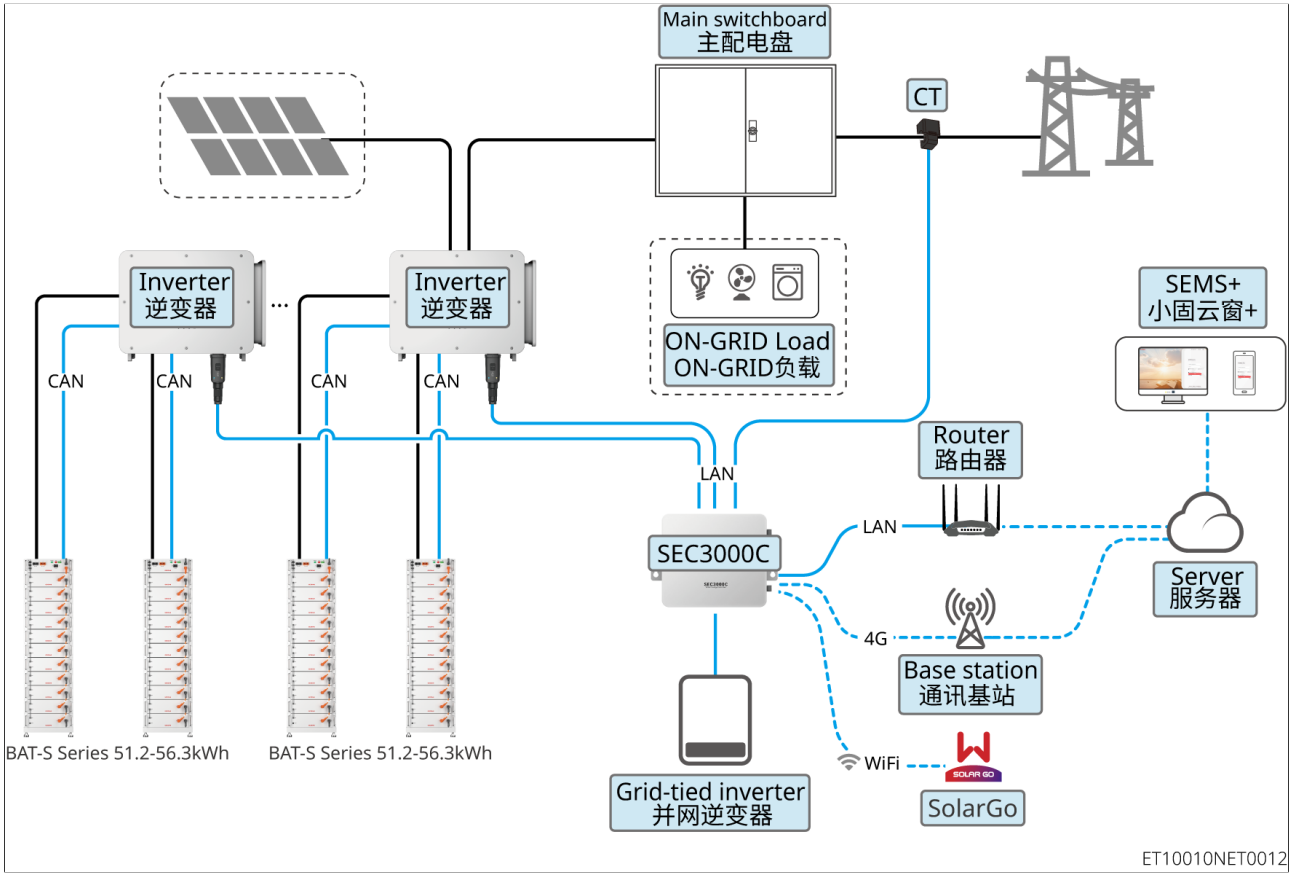


Figure2 Grid-tied scenario (parallel-unit, withBAT 51.2-56.3kWh)

Type 2: BAT 92.1-112.6kWh, BAT-C 208.9kWh

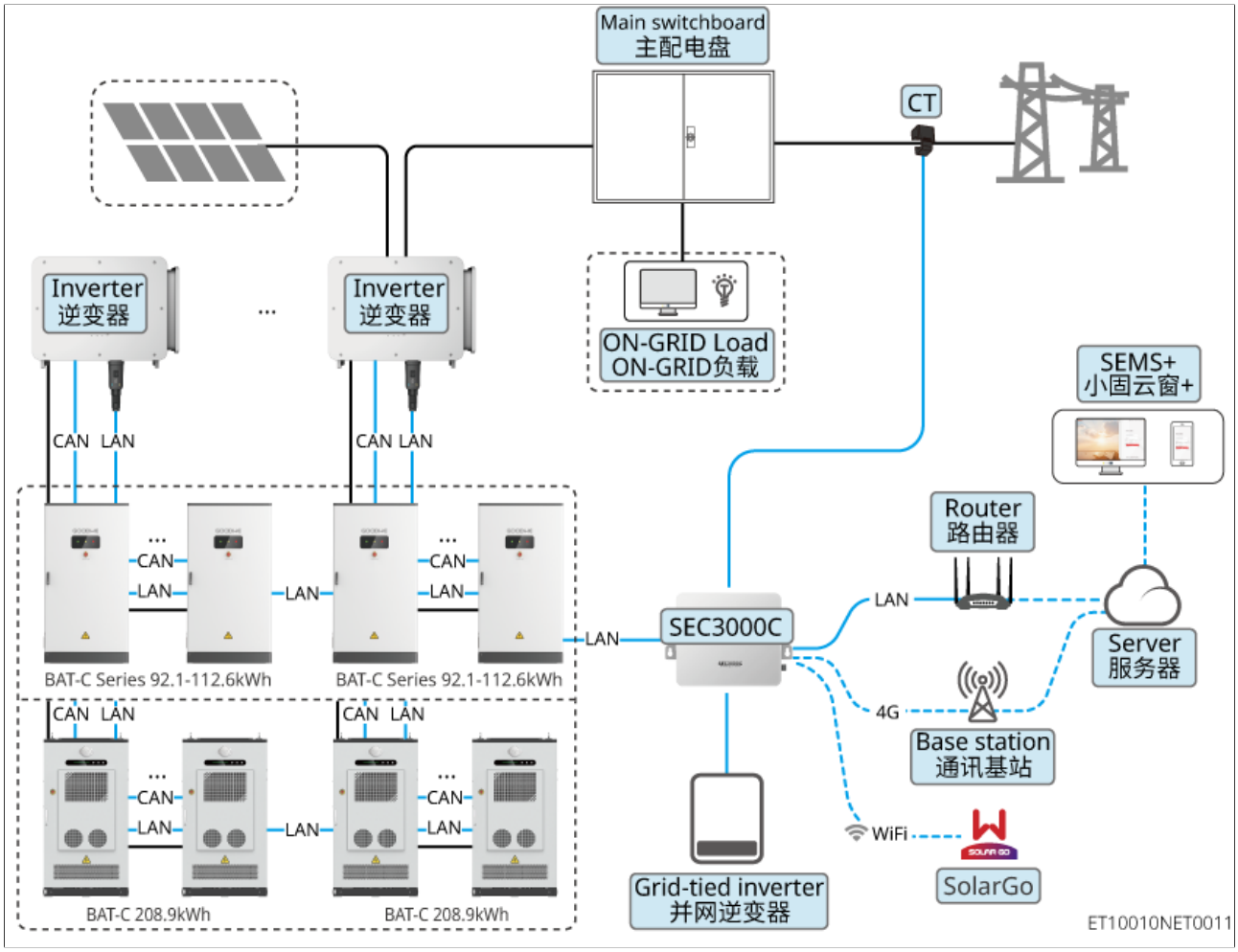


Figure3 Grid-tied scenario (parallel-unit, withBAT 92.1-112.6kWh or BAT-C 208.9kWh)

Equipment Type	Model	Description
Hybrid Inverter	GW50K-ET-L-G10 GW75K-ET-G10 GW80K-ET-G10 GW99.99K-ET-G10 GW100K-ET-G10	

Equipment Type	Model	Description
AC Coupled Inverter	GW75K-BT-G10 GW80K-BT-G10 GW99.99K-BT-G10 GW100K-BT-G10	• The system supports a maximum of 15 inverters in parallel. • The inverter has two battery input terminals. The two battery terminals can be connected in parallel to the same battery system or independently to two battery systems. Each battery input terminal can connect batteries according to the maximum number of batteries per cluster. • Software version requirements: ◦ Inverter ARM software version is 2.184 or higher. ◦ Inverter DSP software version is 2.212 or higher.
Battery System	GW51.2-BAT-I-G10 GW56.3-BAT-I-G10	• The battery system can have up to 6 units in parallel per cluster. • Different models of battery systems cannot be mixed in the same cluster. • To ensure full-power charging and discharging of the inverter and to improve system battery balancing reliability and load capacity, it is recommended to use two balanced battery port connections; it is not recommended to connect only one battery port to the inverter battery port.
	GW92.1-BAT-AC-G10 GW102.4-BAT-AC-G10 GW112.6-BAT-AC-G10	The battery system can have up to 4 units in parallel per cluster. Different models of battery systems cannot be mixed in the same cluster.

Equipment Type	Model	Description
	GW208.9-BAT-LC-G10	The battery system can have up to 4 units in parallel per cluster.
Smart Energy Control Box	SEC3000C	• (Optional) Used in parallel scenarios. • SEC main program version is V7.5.32 or higher
Smart Meter	GM330	• (Optional) Used in grid-tied scenarios for single-unit systems. • Shipped with the inverter.
CT	-	Can be purchased from Goodwe or separately. CT ratio requirement: nA/5A • nA: CT primary side input current, n range 200-5000 • 5A: CT secondary side output current
Smart Communication Dongle	WiFi/LAN Kit-20	Can upload system operation data to the monitoring platform via WiFi or LAN signal.
	4G Kit-CN-G21 4G Kit-G20	• (Optional) Used in single-unit scenarios. • Can upload system operation data to the monitoring platform via 4G signal.

Table17 Grid-tied scenario system component description

2.1.2 Grid-Tied and Off-Grid Scenario

Under normal conditions, the system operates as grid-tied. In the event of a grid

fault or power outage, it automatically disconnects from the grid and switches to off-grid mode to independently supply power to loads.

Core Features

- When grid-tied, functions are the same as the grid-tied scenario.
- The inverter needs to work with the STS to achieve grid-tied/off-grid switching. When the grid fails, the system switches to off-grid operation to supply power to BACK-UP loads. When the grid is out:
  - If no generator is connected in the system, photovoltaic generation or battery discharge is used for loads.
  - If a generator is connected in the system, the start conditions and logic of the generator can be set according to customer requirements for load usage.
- When the grid power is restored, the system automatically switches back to grid-tied operation.
- The inverter can continue to operate in off-grid mode, maximizing the use of solar energy.

Applicable Scenarios

Places with average grid stability or with clear requirements for power supply continuity, balancing economy and backup reliability.

Single Unit Scenario

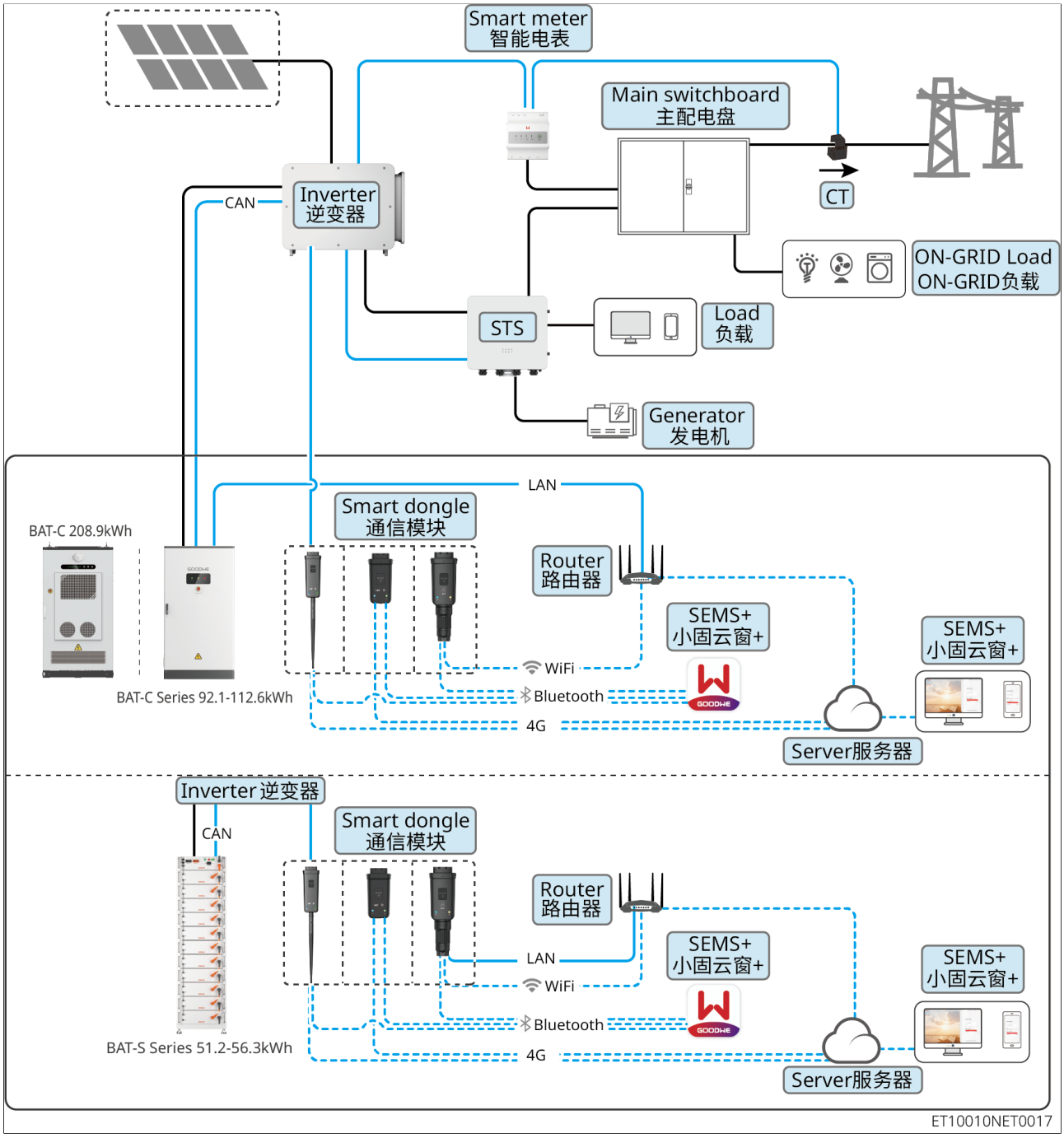


Figure4 Grid-Tied and Off-Grid Scenario (Single Unit)

Parallel Unit Scenario

Note

- BAT-C 92.1-112.6kWh, BAT-C 208.9kWh
  - The battery has a built-in Ezlink module. Each inverter is connected to the battery system via a smart communication stick, and the battery system sends the parallel operation information to the smart energy control box.
- BAT-S 51.2-56.3kWh
  - The battery does not have a built-in Ezlink module. Each inverter transmits single inverter information to the smart energy control box via a smart communication stick.

Type 1: BAT 51.2-56.3kWh

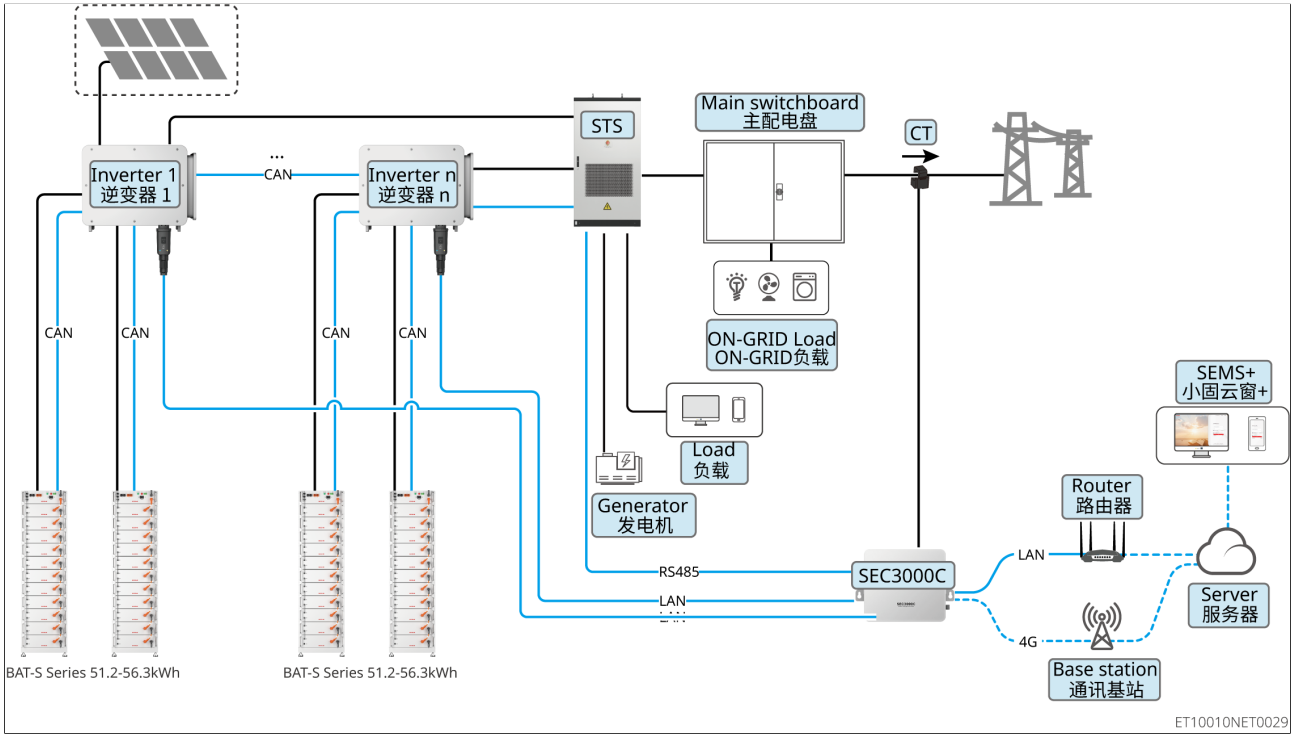


Figure5 Grid-Tied and Off-Grid Scenario (Parallel Units, with BAT 51.2-56.3kWh)

Type 2: BAT 92.1-112.6kWh, BAT-C 208.9kWh

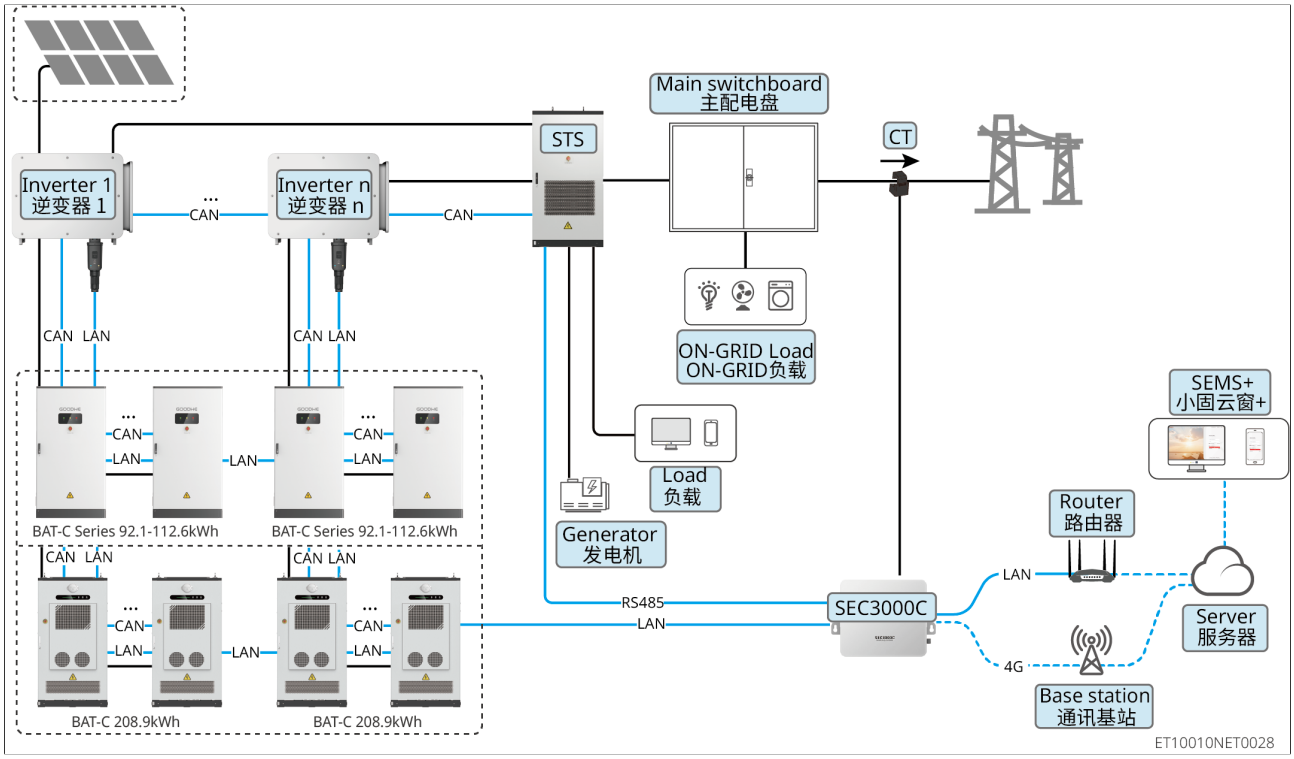


Figure6 Grid-Tied and Off-Grid Scenario (Parallel Units, with BAT 92.1-112.6kWh or BAT-C 208.9kWh)

Device Type	Model	Description
Hybrid Inverter	GW50K-ET-L-G10 GW75K-ET-G10 GW80K-ET-G10 GW99.99K-ET-G10 GW100K-ET-G10	• The system supports a maximum of 6 inverters in parallel • The inverter has 2 pairs of battery input terminals, which can be connected in parallel to the same battery system or independently to two battery systems. Each pair of battery input terminals can connect batteries according to the maximum number of battery clusters supported by the battery. • Software version requirements: ◦ ARM software version 3.193 or above ◦ DSP software version 3.306 or above
AC-coupled Inverter	GW75K-BT-G10 GW80K-BT-G10 GW99.99K-BT-G10 GW100K-BT-G10	

Device Type	Model	Description
Battery System	GW51.2-BAT-I-G10 GW56.3-BAT-I-G10	• The battery system supports a maximum of 6 units in parallel • Different battery system models cannot be mixed in parallel • To ensure full power charging and discharging of the inverter and improve system battery balancing reliability and load capacity, it is recommended to use a balanced connection method with two battery ports; connecting only one battery to the inverter battery port is not recommended
	GW92.1-BAT-AC-G10 GW102.4-BAT-AC-G10 GW112.6-BAT-AC-G10	The battery system supports a maximum of 4 units in parallel Different battery system models cannot be mixed in parallel
	GW208.9-BAT-LC-G10	The battery system supports a maximum of 4 units in parallel

Device Type	Model	Description
STS	GW125K-STS-G10 GW375K-STS-A-G10 GW750K-STS-A-G10	• The BACK-UP port supports connection to critical loads • Description of supported inverter quantity: ◦ 125K: Wall-mounted; rated power of Grid, BACK-UP, and SMART-PORT ports is 125kW@400V; supports connection of 1 hybrid inverter (or AC-coupled inverter) ◦ 375K: Cabinet type; rated power of Grid, BACK-UP, and SMART-PORT ports is 375kW@400V/200kW@220V; supports connection of 3 hybrid inverters (or AC-coupled inverters) ◦ 750K: Cabinet type; rated power of Grid, BACK-UP, and SMART-PORT ports is 750kW@400V/400kW@220V; supports connection of 6 hybrid inverters (or AC-coupled inverters) • Software version 3.304 or above
Smart Energy Control Box	SEC3000C	• (Optional) Required in parallel scenarios • Software version 7.18 or above

Device Type	Model	Description
Smart Meter	GM330	• In single-unit scenarios with partial backup, a smart meter and CT are required; not needed in whole-house backup scenarios ◦ Partial backup: Loads connected to the grid side and the BACK-UP port of the STS ◦ Whole-house backup: All loads connected to the BACK-UP port of the STS • Smart meter: shipped with the inverter
CT	-	• CT: Available from Goodwe or purchased separately • CT ratio requirement: nA/5A ◦ nA: CT primary side input current, n range 200-5000 ◦ 5A: CT secondary side output current
Smart Communication Stick	WiFi/LAN Kit-20	Can upload system operation information to the monitoring platform via WiFi or LAN signals
	4G Kit-CN-G21 4G Kit-G20	• (Optional) Used in single-unit scenarios • Can upload system operation information to the monitoring platform via 4G signals

2.1.3 Microgrid Scenario

This system prioritizes guaranteeing load power supply as its core principle, and is composed of key equipment such as hybrid inverters (or AC-coupled inverters), STS, and smart energy control boxes. The system supports the following functions:

- During grid-connected operation, the smart energy controller dispatches the hybrid inverter (or AC-coupled inverter) to execute preset charging/discharging strategies based on system status (e.g., load demand, battery state of charge, PV output, etc.). The electricity generated is supplied to local loads or fed into the grid.
- When the grid is down, the hybrid inverter (or AC-coupled inverter) works with the STS to achieve grid-connected and off-grid switching, enabling uninterrupted operation of loads, while becoming a grid-forming power source within the microgrid. The PV grid-tied inverter connected to the BACK-UP port continues normal operation, supplying power to BACK-UP loads or charging the battery.
  - When no generator is connected to the system, PV power or battery discharge supplies the loads.
  - When a generator is connected and PV power and battery discharge already meet load demand, the generator does not start.
  - When a generator is connected and PV power and battery discharge cannot meet load demand, the generator starts to supply the loads, and PV and generator power charge the battery.
- After grid recovery, the system can automatically switch back to grid power supply.

Single-Unit Scenario

Type 1

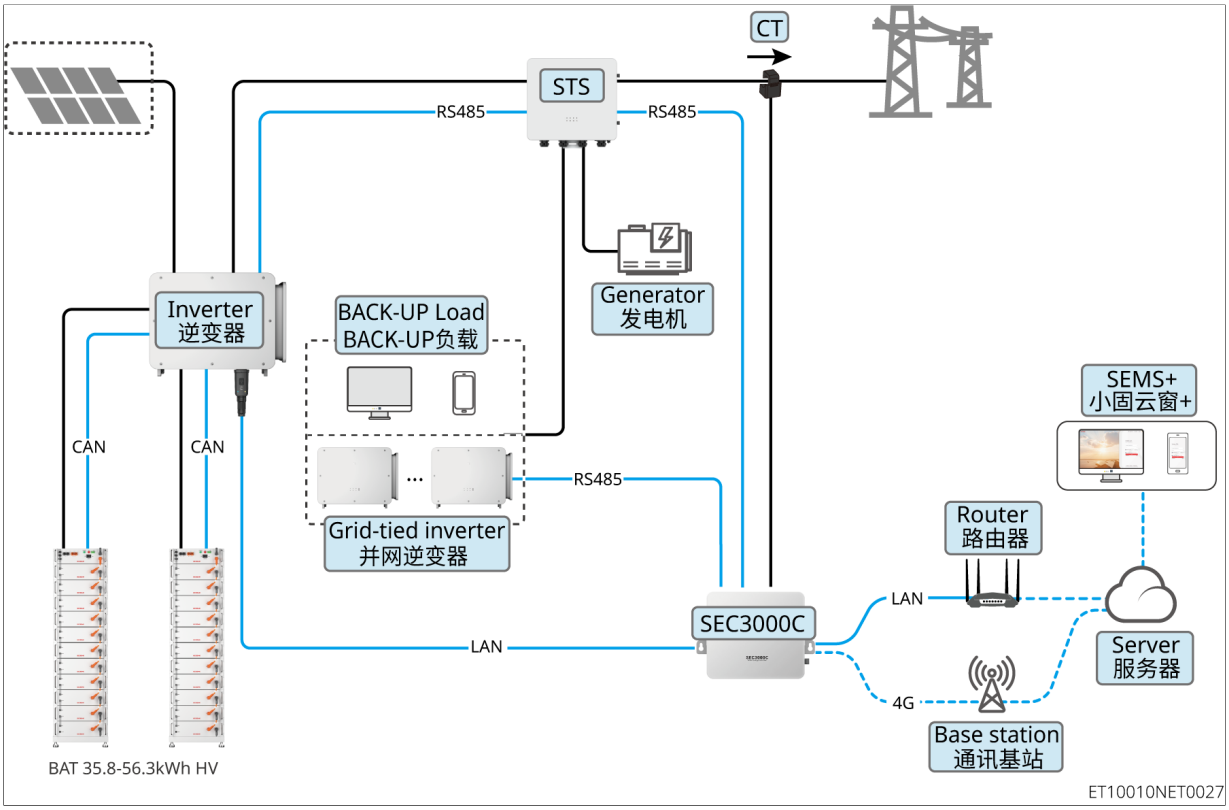


Figure7 Microgrid Scenario (Single Unit, with BAT 51.2-56.3kWh)

Type 2

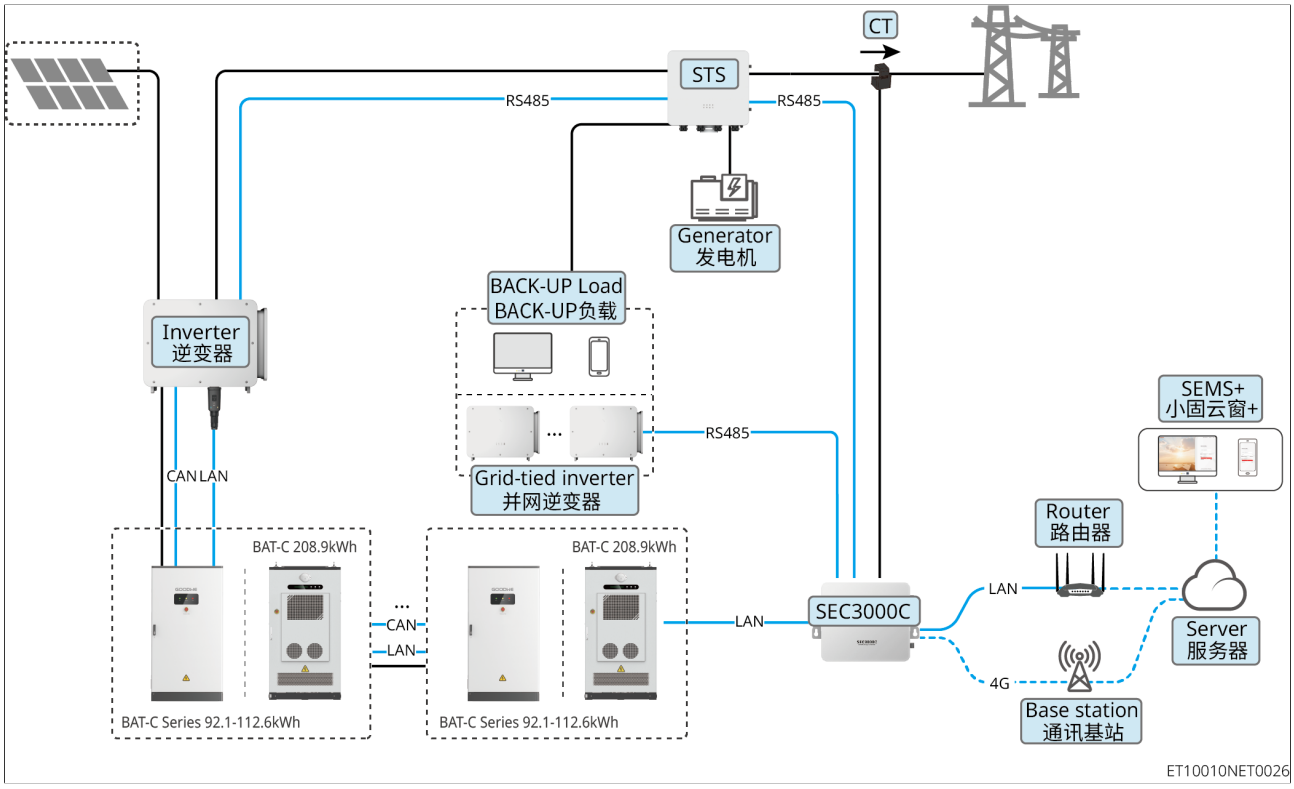


Figure8 Microgrid Scenario (Single Unit, with BAT 92.1-112.6kWh or BAT-C 208.9kWh)

Parallel Unit Scenario

Type 1

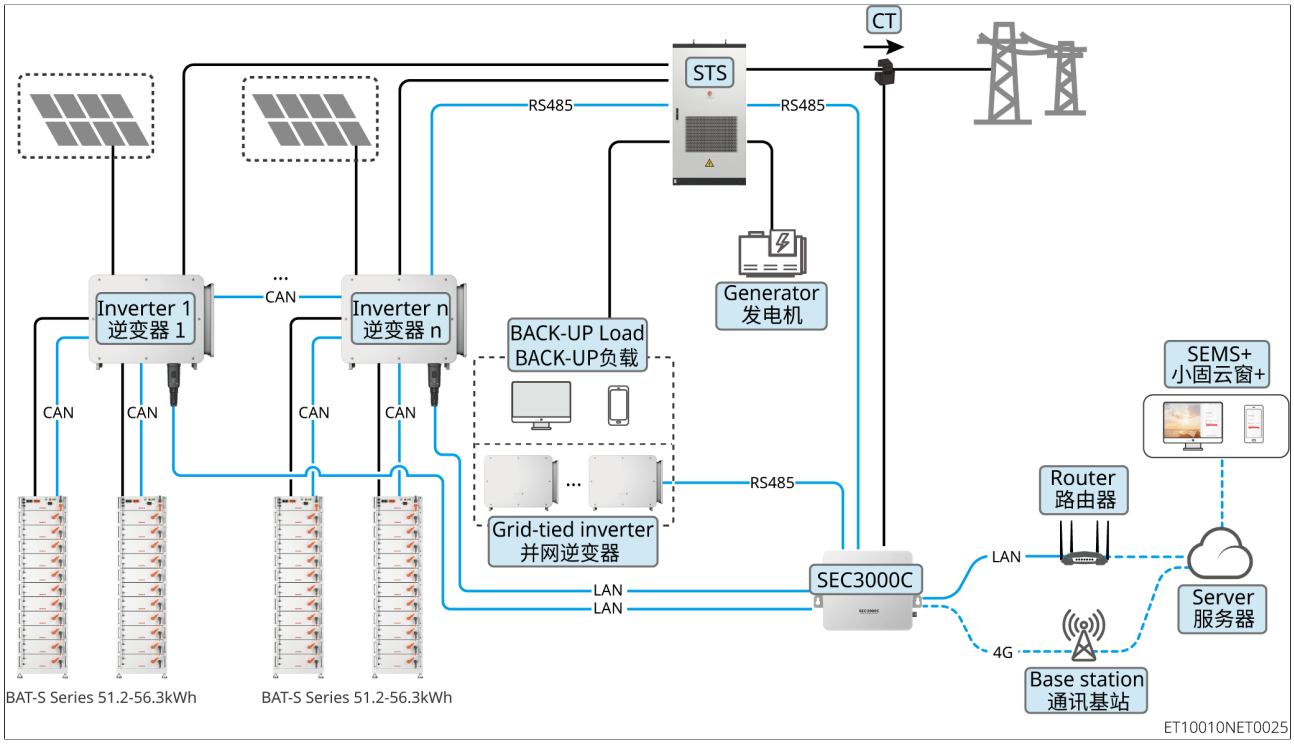


Figure9 Microgrid Scenario (Parallel Units, with BAT 51.2-56.3kWh)

Type 2

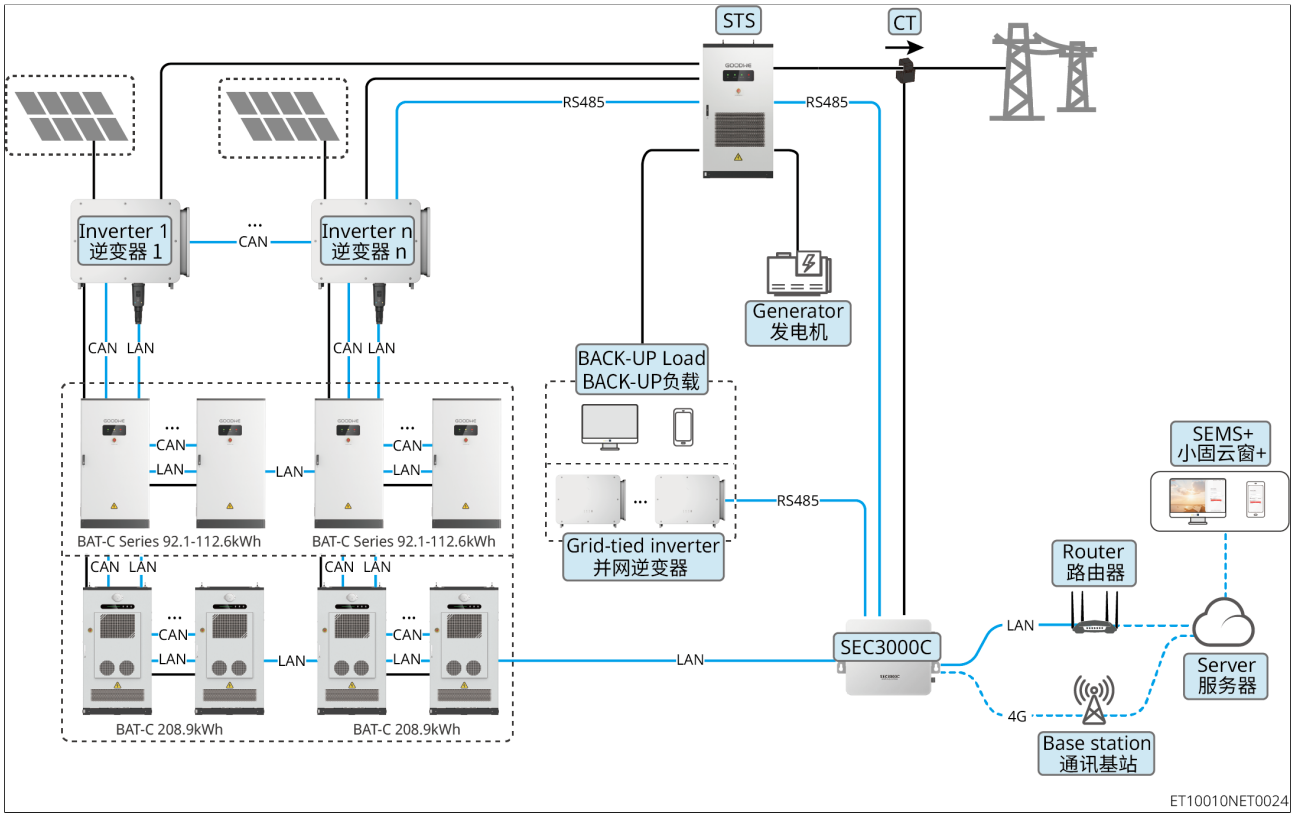


Figure10 Microgrid Scenario (Parallel Units, with BAT 92.1-112.6kWh or BAT-C 208.9kWh)

Device Type	Model	Description
Hybrid Inverter	GW50K-ET-L-G10 GW75K-ET-G10 GW80K-ET-G10 GW99.99K-ET-G10 GW100K-ET-G10	• The system supports up to 6 inverters in parallel • The inverter has 2 pairs of battery input terminals. The two battery terminals can be connected in parallel to the same battery system or independently to two battery systems. Each pair of battery input terminals can connect batteries according to the maximum number of battery clusters. • Software version requirements: ◦ ARM software version is 3.193 or higher ◦ DSP software version is 3.306 or higher
AC Coupled Inverter	GW75K-BT-G10 GW80K-BT-G10 GW99.99K-BT-G10 GW100K-BT-G10	

Device Type	Model	Description
Battery System	GW51.2-BAT-I-G10 GW56.3-BAT-I-G10	• Up to 6 battery clusters can be paralleled • Battery systems of different models cannot be mixed in parallel clusters • To ensure full power charging and discharging of the inverter and improve the reliability of system battery balancing operation and load capacity, it is recommended to use two battery ports for balanced access; it is not recommended to connect only one battery to the inverter battery port
	GW92.1-BAT-AC-G10 GW102.4-BAT-AC-G10 GW112.6-BAT-AC-G10	Up to 4 battery clusters can be paralleled Battery systems of different models cannot be mixed in parallel clusters
	GW208.9-BAT-LC-G10	Up to 4 battery clusters can be paralleled

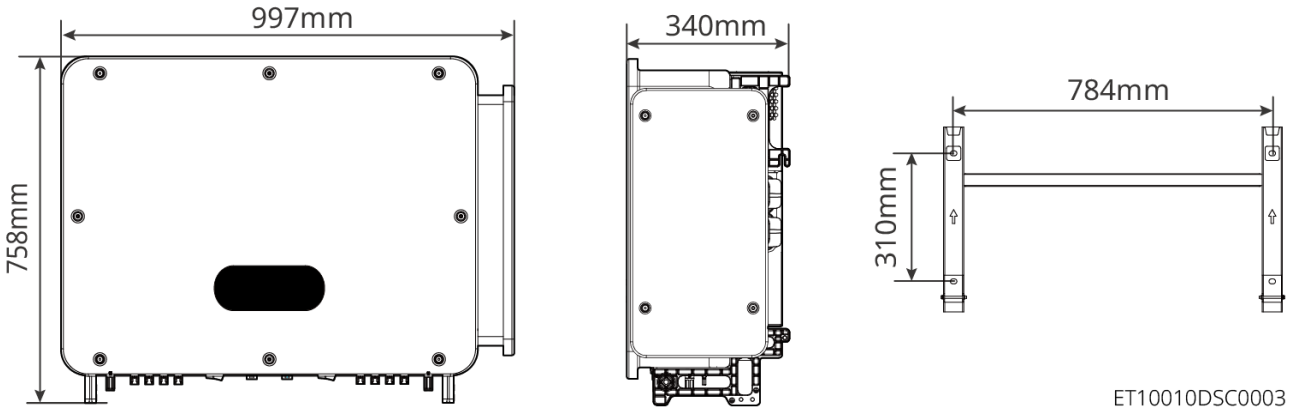
Device Type	Model	Description
STS	GW125K-STS-G10 GW375K-STS-A-G10 GW750K-STS-A-G10	• SMART-PORT supports connection of diesel generator or large load, but not simultaneously • BACK-UP port supports connection of grid-tied inverters, loads, UPS, etc. When a grid-tied inverter is connected, the system becomes a solar-plus-storage microgrid system • Number of inverters supported: ◦ 125K: wall-mounted; rated power of grid side, BACK-UP port, SMART-PORT port is 125kW@400V; supports connection of 1 hybrid inverter (or AC coupled inverter) ◦ 375K: cabinet type; rated power of grid side, BACK-UP port, SMART-PORT port is 375kW@400V/200kW@220V; supports connection of 3 hybrid inverters (or AC coupled inverters) ◦ 750K: cabinet type; rated power of grid side, BACK-UP port, SMART-PORT port is 750kW@400V/400kW@220V; supports connection of 6 hybrid inverters (or AC coupled inverters) • Software version is 3.304 or higher

Device Type	Model	Description
Grid-Tied Inverter	-	• Only grid-tied inverters of the same brand as the hybrid inverter (or AC coupled inverter) are supported to ensure communication protocol consistency • The rated power of the grid-tied inverter must be less than the rated charging power of the battery. If the inverter power is too large, curtailment may occur in some cases • Please consult pre-sales technical support for the matching list of grid-tied inverter models • The number of grid-tied inverters in parallel should be determined according to the parallel capability of the corresponding model
Smart Energy Control Box	SEC3000C	• A smart energy control box must be used in the microgrid system • Software version is 7.18 or higher
CT	-	Can be purchased from GoodWe or by yourself. CT ratio requirement: nA/5A • nA: CT primary input current, n range 200-5000 • 5A: CT secondary output current
Smart Communication Stick	WiFi/LAN Kit-20	Can upload system operation information to the monitoring platform via WiFi or LAN signal

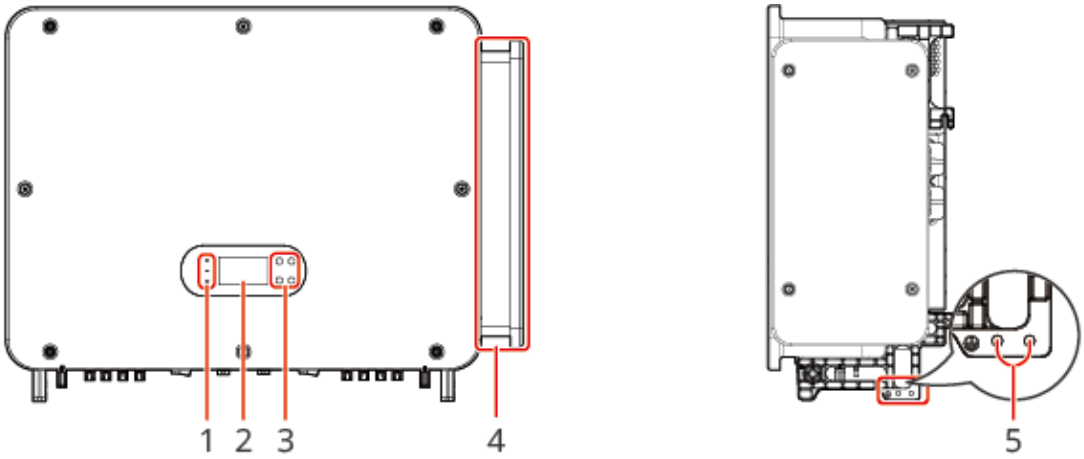
2.2 Product Introduction

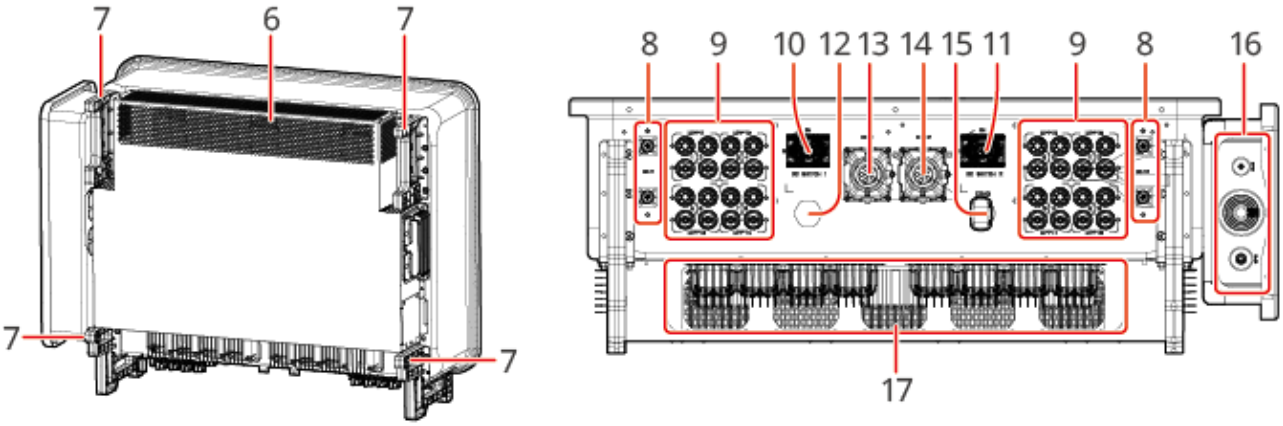
2.2.1 Inverter

In photovoltaic systems, the inverter controls and optimizes energy flow through an integrated energy management system. It enables the electricity generated by the photovoltaic system to be used by loads, stored in batteries, or fed into the grid.



ET10010DSC0003



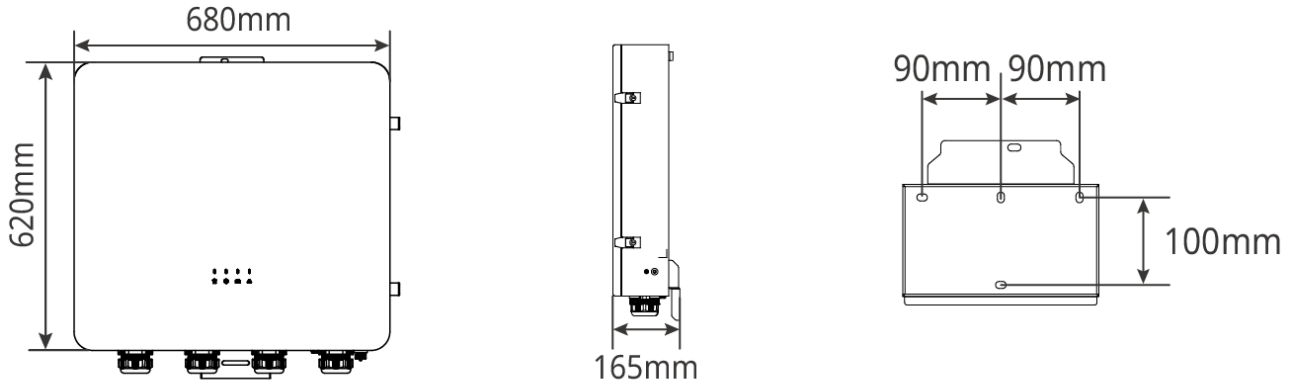


ET10010DSC0001

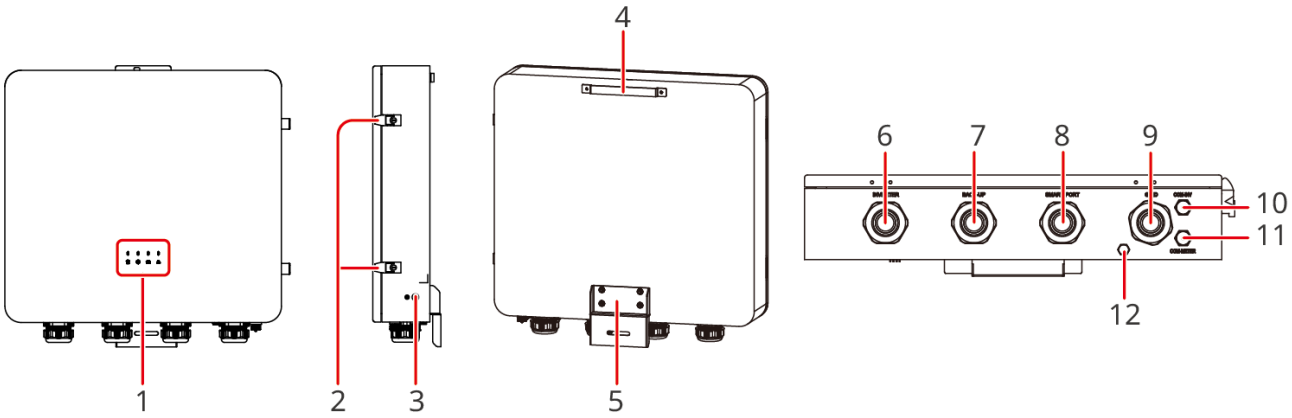
No.	Component/Silk Screen	Description
1	Indicator	Indicates the working status of the inverter.
2	Display (Optional)	Cooperates with buttons to view inverter-related data.
3	Buttons (Optional)	Cooperates with the display to operate the inverter.
4	AC Wiring Module	AC cable connection area.
5	Ground Terminal	Connect the protective earth wire.
6	Air Outlet	Exhaust hot air.
7	Handle	Used to carry the inverter.
8	Battery Input Terminal	Connect the battery DC input cable.
9	PV Input Terminal	Connect the PV module DC input cable. (Only applicable for non-coupled inverter)
10	DC Switch 1	Controls the connection/disconnection of DC input MPPT1-4. (Only applicable for non-coupled inverter)
11	DC Switch 2	Controls the connection/disconnection of DC input MPPT5-8. (Only applicable for non-coupled inverter)
12	Vent Valve	-
13	Communication Port 1	Connect communication cables for load control, RS485, remote shutdown/rapid shutdown, DRM (Australia) /RCR (Europe), etc.
14	Communication Port 2	Connect communication cables for smart meter, BMS, STS, etc.
15	Communication Port 3	Connect the smart communication stick. Please select the type of communication stick based on actual requirements.
16	AC Cable Entry Hole	AC output cable entry/exit hole.
17	External Fan	Heat dissipation.

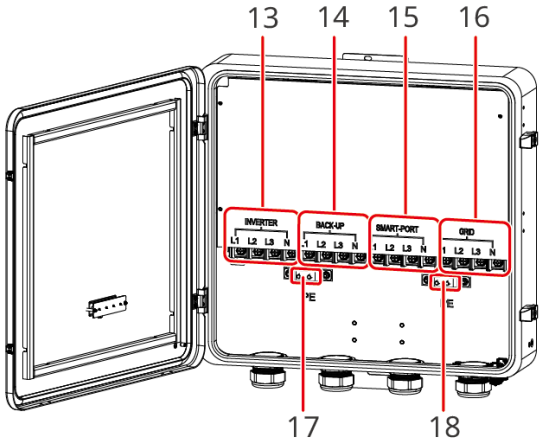
2.2.2 STS

The system supports inverter grid-tied/off-grid switching via STS.



STS10DSC0005





STS10DSC0004

No.	Name	Description
1	Indicator Light	Indicates the working status of STS
2	Lock Catch	Used to open/close the cover of STS

No.	Name	Description
3	Protective Ground Terminal	For connecting PE wire
4	Hanging Bracket	For mounting STS on the backplate
5	Fixing Bracket	For fixing and supporting STS on the wall
6	Inverter Cable Entry	Cable entry
7	BACK-UP Cable Entry	
8	Smart Port Cable Entry	
9	Grid Cable Entry	
10	Inverter Communication Terminal (COM1)	For connecting to the inverter to enable communication between STS and inverter
11	Meter Communication Terminal (COM2)	In a whole-house backup scenario, used to connect to the inverter's Meter communication port to transmit power information to the inverter for power control function.
12	Vent Valve	-
13	Inverter Terminal	For connecting to the inverter
14	BACK-UP Terminal	For connecting BACKUP loads
15	Smart Terminal	For connecting generator or large loads
16	Grid Terminal	For connecting to the grid
17	PE Terminal Strip	For connecting PE wires

2.2.3 Battery

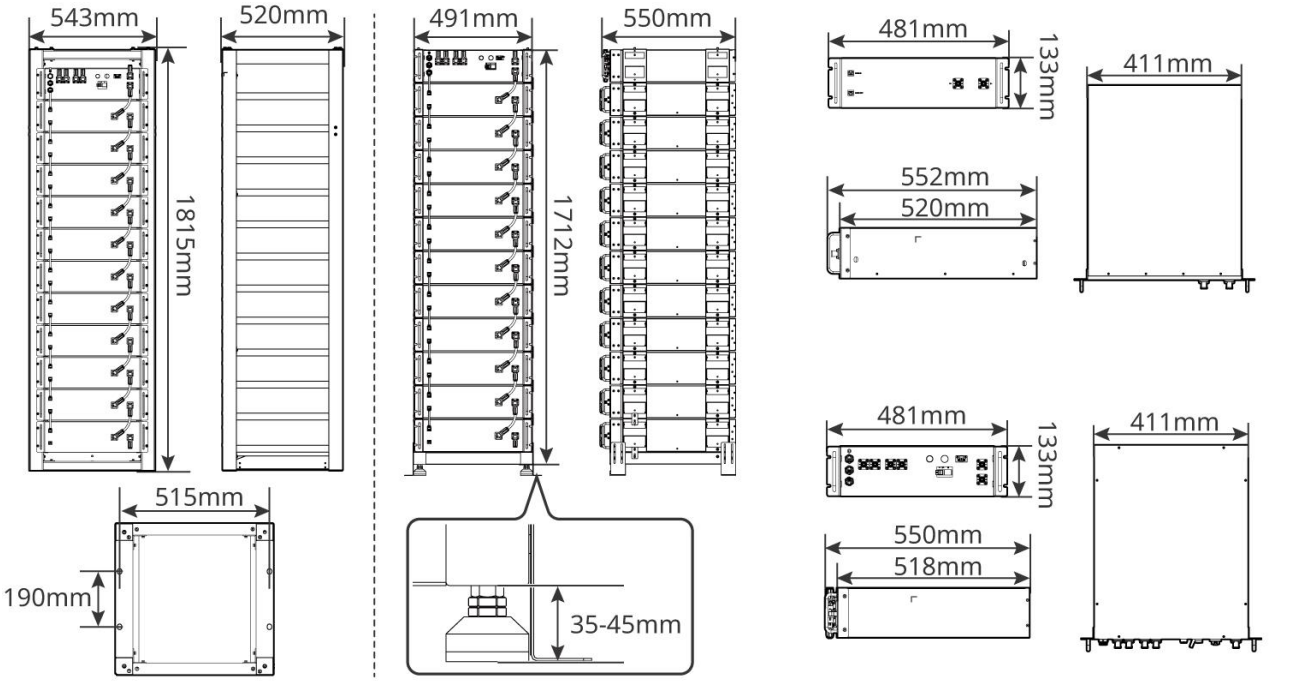
The battery system mainly consists of PCU and PACK.
The battery system can store and release electricity according to the requirements of the photovoltaic energy storage system. The input and output ports of the energy storage system are both high-voltage direct current.

Note
• After installing a single battery cabinet, expansion by adding PACKs is not supported. • Within one year of installing the BAT series battery system, it can be expanded by adding battery cabinets of the same model and part number. For details, please contact after-sales service.

2.2.3.1 BAT Series 35.8-56.3kWh High Voltage Battery

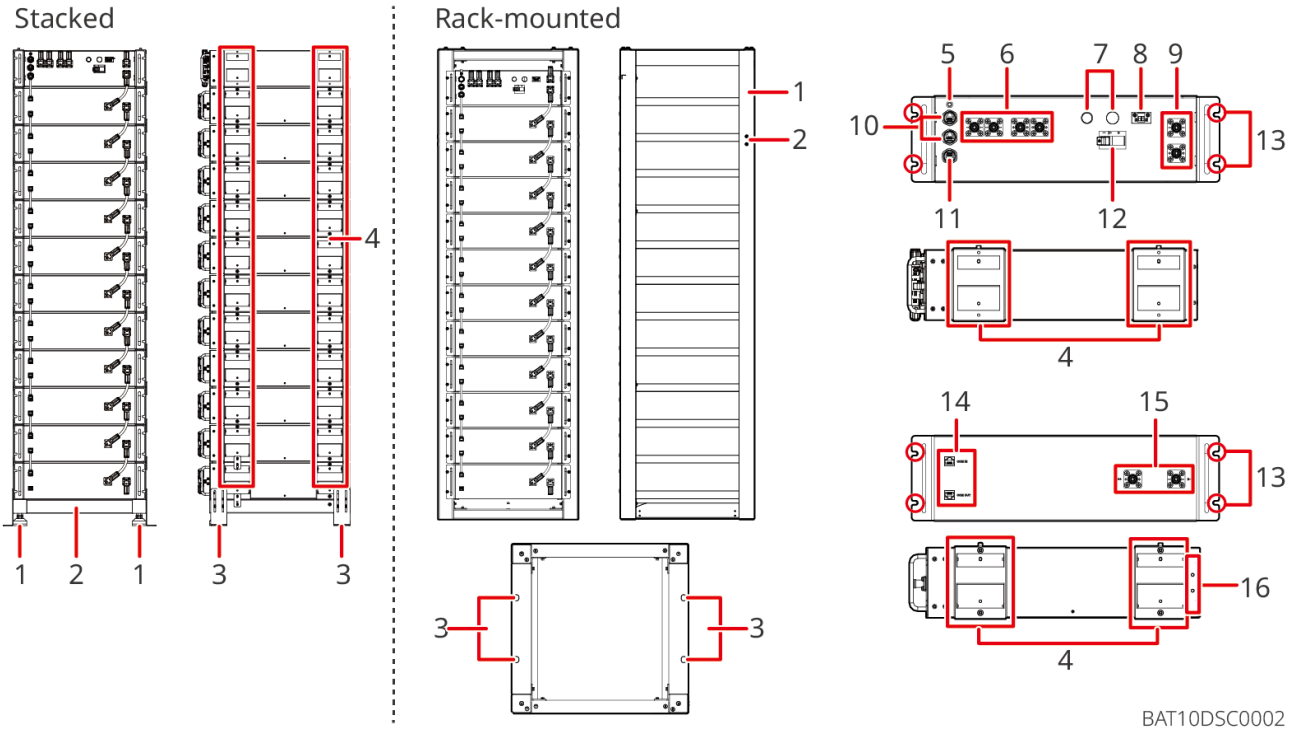
No.	Model	Number of Battery Modules	Usable Capacity (kWh)
1	GW35.8-BAT-I-G10	7	35.8
2	GW40.9-BAT-I-G10	8	40.9
3	GW46.0-BAT-I-G10	9	46.0
4	GW51.2-BAT-I-G10	10	51.2
5	GW56.3-BAT-I-G10	11	56.3

Dimensions



BAT10DSC0007

Component Introduction



BAT10DSC0002

- Type I (Rack Mount)

No.	Name	Description
1	Battery Rack	Used for installing the battery system
2	Wall Bracket Fixing Hole	Used to fix the battery rack to the wall to prevent tipping over
3	Floor Bracket Fixing Hole	Used to fix the battery rack to the floor to prevent tipping over

- Type II (Stack Mount)

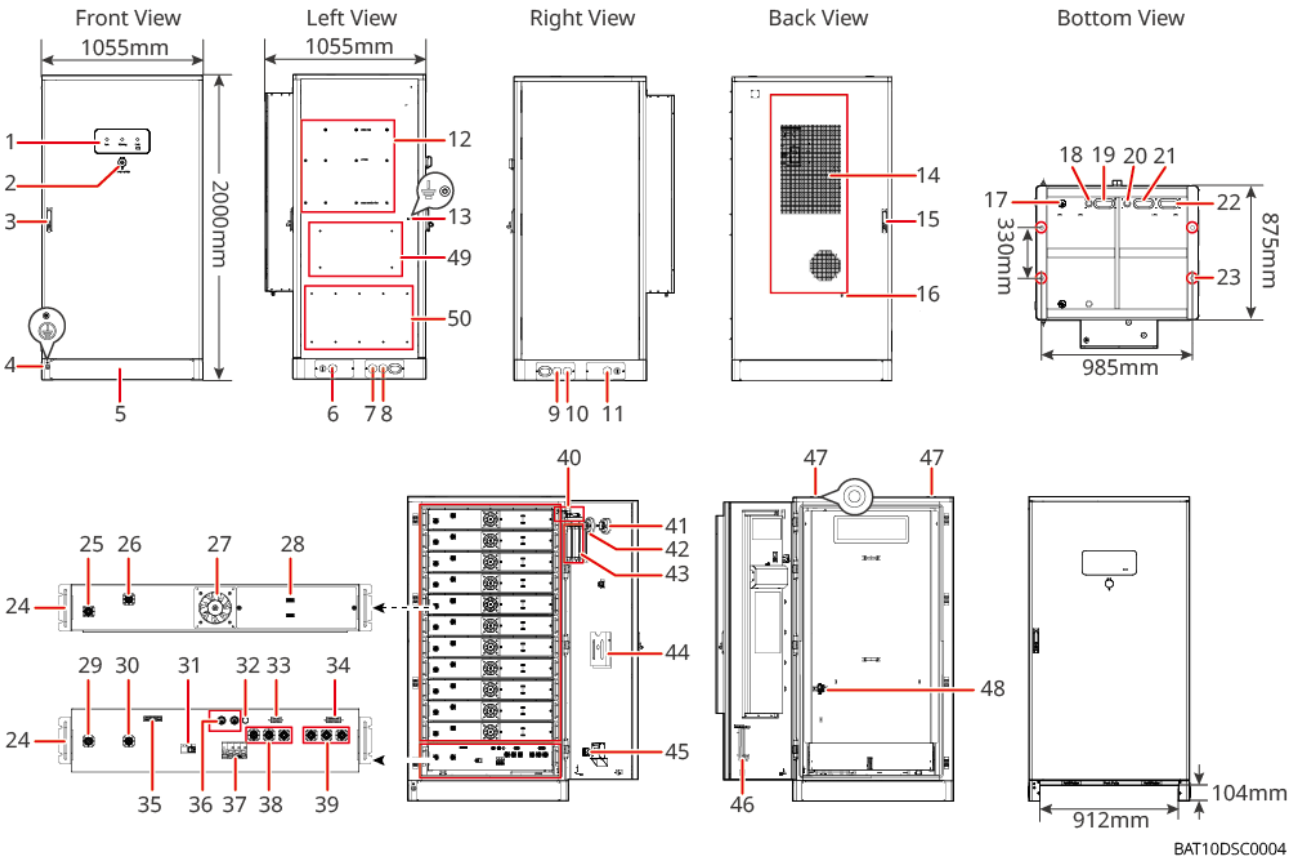
No.	Name	Description
1	Adjustable foot	Adjustable height to keep the base level
2	Base	The battery system is stacked and installed on the base
3	Floor locking bracket	Used to secure the base to the floor to prevent tipping
4	Stacking bracket	Fixed to the battery PACK and HV box for stacking the battery system
5	Protective grounding point	Used for connecting the ground wire
6	HV box power input/output port 1	Connects the power cable between the HV box and the inverter
7	Battery indicator	Used to indicate the battery system status
8	Dry contact	Contact for external fire system activation (normally open; when closed, the battery system automatically powers off)
9	HV box power input/output port 2	Connects the power cable between the HV box and the battery PACK
10	External communication port	Communication with inverter / place termination resistor / battery system parallel cluster communication

No.	Name	Description
11	HV box communication port	Communication with battery PACK
12	Battery system switch	Controls the start/stop of the battery system
13	HV box / battery PACK mounting hole	Used to fix the HV box / battery PACK to the battery rack
14	Battery PACK communication port	Communication between adjacent battery PACKs and with the HV box
15	Battery PACK power input/output port	Connects the power cable between adjacent battery PACKs
16	Wall locking bracket mounting hole	Used to install the wall locking bracket

2.2.3.2 BAT Series 92.1-112.6kWh Commercial and Industrial Battery System

No.	Model	PACK Quantity	Rated Capacity (kWh)
1	GW92.1-BAT-AC-G10	9	92.1
2	GW102.4-BAT-AC-G10	10	102.4
3	GW112.6-BAT-AC-G10	11	112.6

Component Introduction



No.	Name	Description
1	LED indicator	-
2	Emergency stop button	Press the emergency stop button to power down the battery system.
3	Front door lock	-
4	PE port 1	Connect battery grounding cable
5	Bottom baffle	-
6	Left inlet hole 1	Air conditioner power cable & ET100 power cable
7	Left inlet hole 2	Inverter communication cable
8	Left inlet hole 3	Inverter power cable
9	Right inlet hole 1	Battery cluster power cable

No.	Name	Description
10	Right inlet hole 2	Battery cluster communication cable
11	Right inlet hole 3	Air conditioner power cable
12	Backplate mounting hole	Inverter backplate mounting hole position
13	PE port 2	Connect inverter grounding cable
14	Air conditioner	Responsible for temperature control, air conditioner refrigerant model is R134A
15	Rear door lock	-
16	Air conditioner drain pipe installation port	-
17	Explosion-proof valve	Responsible for explosion-proof, exhaust and other functions. When abnormal pressure rises inside the battery system, the explosion-proof one-way valve opens to quickly and directionally release internal gas, thereby preventing the battery system from exploding.
18	Communication cable entry/exit (bottom)	Communication cable entry/exit between battery and inverter
19	Power cable entry/exit (bottom)	Power cable entry/exit between battery and inverter
20	Battery communication cable entry/exit	Battery cluster communication cable entry/exit
21	Battery power cable entry/exit (positive)	Battery cluster power cable entry/exit (positive)
22	Battery power cable entry/exit (negative)	Battery cluster power cable entry/exit (negative)

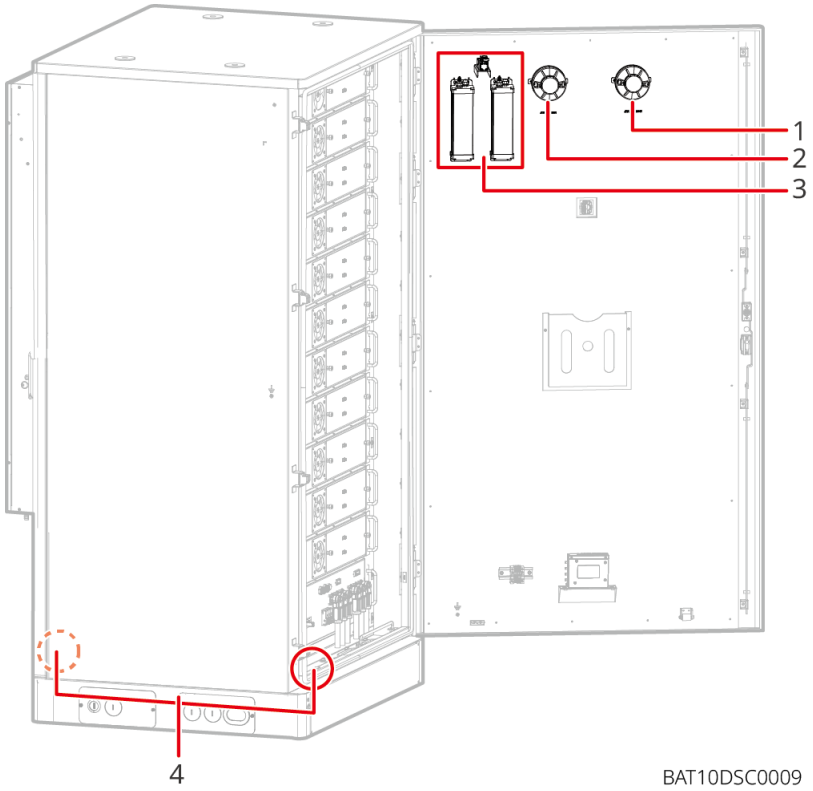
No.	Name	Description
23	Foundation fixing hole	Use this to fasten the battery system to the foundation
24	Handle	-
25	Battery PACK power input/output port positive	-
26	Battery PACK power input/output port negative	-
27	Fan	-
28	Battery PACK communication port	Communication between adjacent battery PACKs, communication with high voltage box, fan power supply
29	High voltage box power input/output port negative 1	Power cable connecting high voltage box and battery PACK
30	High voltage box power input/output port positive 1	
31	Molded case circuit breaker	Controls the high voltage output of the battery system
32	Black start button	Controls the black start of the battery system
33	Internal communication port 1	Communication with battery PACK and battery PACK fan power supply port 1
34	Internal communication port 2	Air conditioner communication, access control identification, emergency stop and fire signal communication port

No.	Name	Description
35	LAN communication port	Inter-battery LAN communication for transmitting cell-level information (Only supported on machines shipped after October 2025)
36	External communication port 1	Communication with inverter / Place termination resistor / Battery system cluster communication
37	Air switch	Controls the low-voltage power supply of the battery system
38	High voltage box power input/output port positive 2	Power cable connecting high voltage box and inverter
39	High voltage box power input/output port negative 2	Power cable connecting high voltage box and inverter
40	Access control switch	Automatically disconnects after door opening to ensure the energy storage system is powered off
41	Heat detector	The heat detector monitors temperature through a dual thermistor network and outputs a voltage proportional to the ambient temperature. One thermistor is exposed to ensure good thermal contact with the surrounding air, while the other is thermally insulated. When an anomaly is detected, it emits a red light to alert the operator. • Suitable for environments with dust or smoke under normal conditions • Wide operating voltage range

No.	Name	Description
42	Smoke detector	The smoke detector uses the principle of scattered light to detect smoke entering the detector housing cavity. • Good response to slow-burning, smoldering fires • Unaffected by wind or atmospheric pressure • Some models are equipped with flashing LED and magnetically controlled test switch • Alarm indicator: red light-emitting diode (LED) emits red light.
43	Aerosol fire extinguishing device	Monitor fire signals inside the cabinet and extinguish fire. When a fire occurs, the aerosol fire extinguishing device ignites the thermal fuse upon receiving an electrical start signal or open flame. The electric igniter thermal fuse burns and activates the aerosol generator in the extinguishing device. The aerosol generator releases heat through a series of reactions to decompose the chemical coolant, allowing the aerosol generator and coolant to combine to extinguish the fire.
44	Document shelf	-
45	Fire action signal port	Dry contact signal interface, normally NC (normally closed). Voltage: 0-24Vdc, current: 0.3A. Connect the audible and visual alarm cable.
46	Maintenance hook shelf	When disassembling Pack and PCU, you can take out the maintenance hook from here for operation.

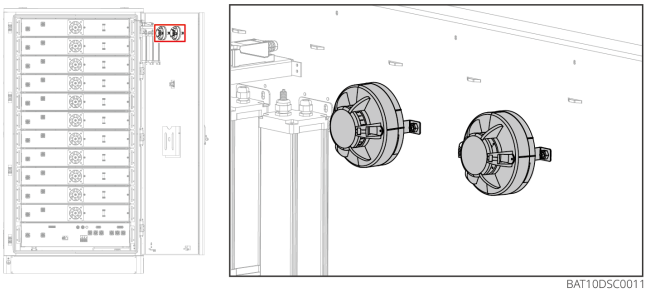
No.	Name	Description
47	Lifting ring mounting hole	-
48	Air conditioner switch	Connect air conditioner power cable, control air conditioner power supply

Fire Protection System Description



1	2	3	4
Smoke detector	Heat detector	Aerosol fire extinguishing device	Explosion-proof valve

- **Heat Detector&Smoke Detector**

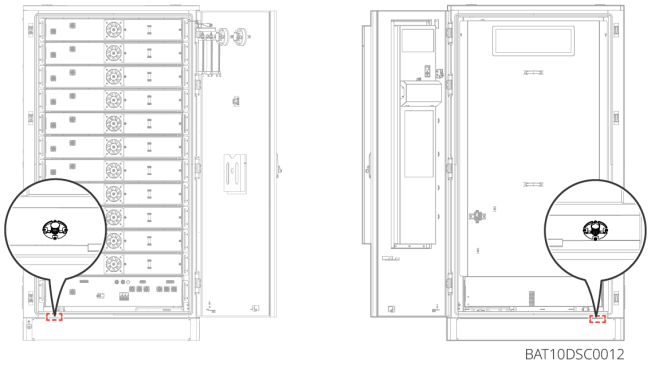


Temperature detection principle: The detector uses a negative temperature coefficient thermistor as the sensor, leveraging the thermistor's sensitivity to ambient temperature to obtain environmental temperature information. The internal circuit converts this information into a voltage signal and transmits it to the microcontroller. The microcontroller analyzes and processes the signal through built-in intelligent algorithms, while determining whether the current state is a fire alarm or a fault condition.

Smoke detection principle: The detector uses the infrared scattering principle to detect fire. In a smoke-free state, it only receives very weak infrared light. When smoke enters the optical smoke detection chamber, the received light signal is enhanced due to scattering. When the smoke reaches a certain concentration, an alarm signal can be output.

Technical Specifications	Heat Detector	Smoke Detector
Dimensions (mm)	102 × 55	
Installation Requirements	Screw Fixing	
Indicator Light (Red)	Flashes during monitoring, steady on during alarm	
Operating Temperature (°C)	-40~+85	
Relative Humidity	≤95% RH (Non-Condensing)	

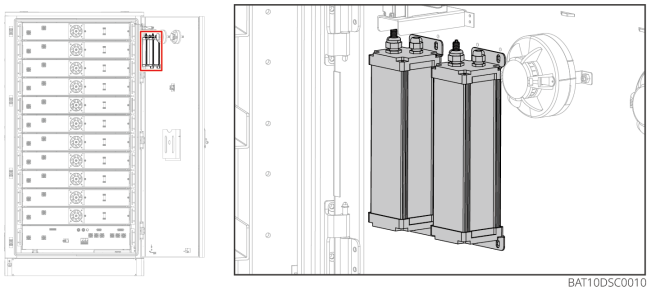
- **Explosion-Proof Valve**


BAT10DSC0012

When the internal pressure of sealed products such as enclosures increases rapidly, the explosion-proof check valve opens its exhaust port to quickly and directionally release the internal gas, thereby preventing explosion of the battery enclosure or other sealed products.

Technical Specifications	Explosion Relief Valve
Protection Grade	IP68
Opening Area	570 mm^2
Operating Temperature	-40℃ ~ +130℃
Flame Retardancy	UL94-V0

- **Aerosol Fire Extinguishing Device**

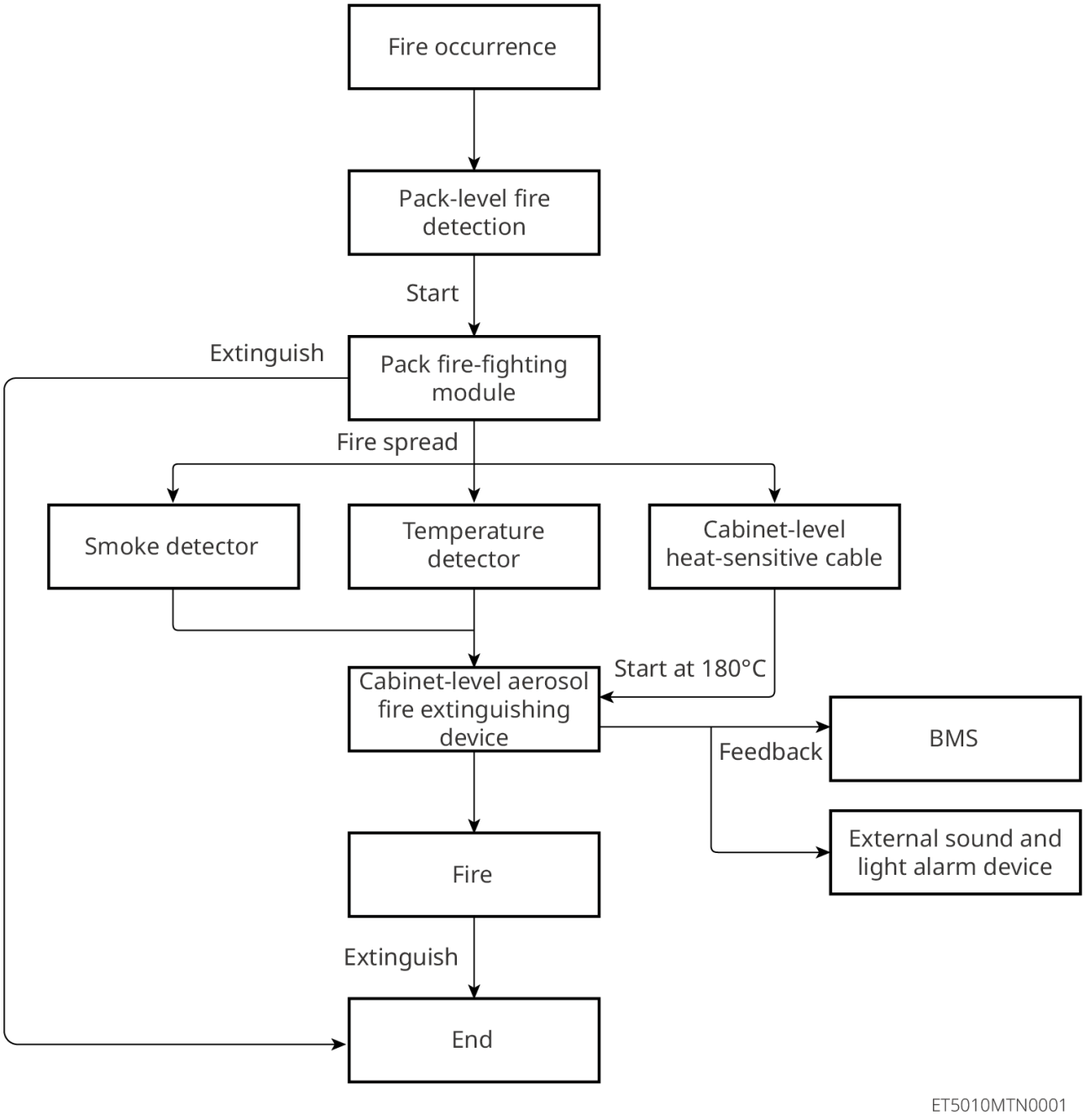

BAT10DSC0010

When a fire occurs, upon receiving an electrical start signal or when an open flame ignites the thermal fuse, the fire extinguishing device's electric initiator or thermal fuse burns, activating the aerosol generating agent inside the device. The aerosol generating agent releases heat through an oxidation-reduction reaction, causing the chemical coolant to decompose, enabling both the aerosol generating agent and coolant to participate in fire suppression.

Technical Indicators	Aerosol Fire Extinguishing Device
Working Ambient Temperature Range	-30℃ ~ +70℃
Working Ambient Relative Humidity	≤95%RH
Thermal Activation Temperature	185±10℃

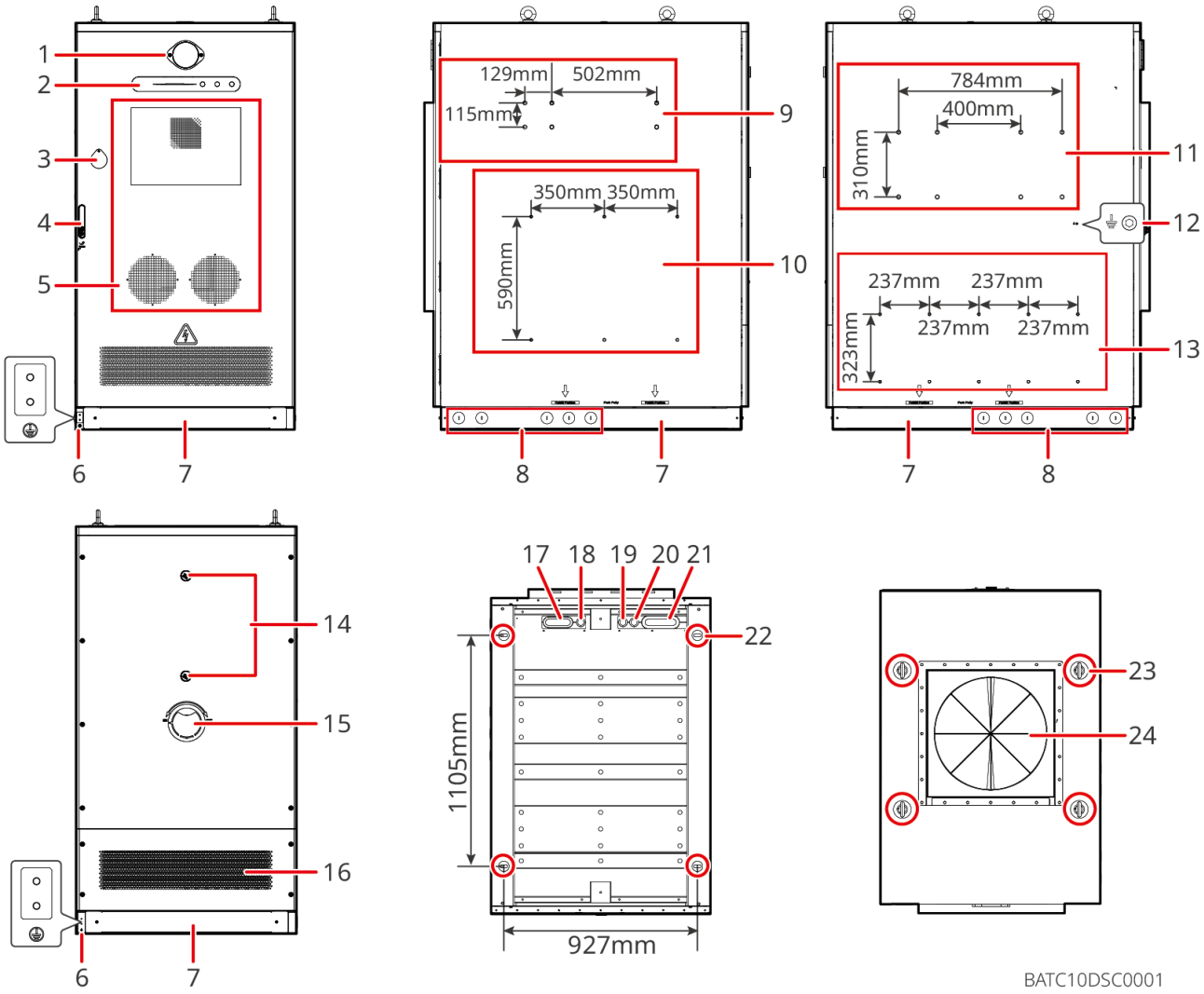
Fire Protection Logic

The fire protection of this battery system adopts a graded response design. When a fire occurs inside a battery Pack, it is first detected by the Pack-level detector, and the aerosol fire extinguishing device inside the Pack is immediately activated for initial suppression. If the fire cannot be controlled and spreads further, cabinet-level fire protection is triggered. When both the smoke detector and temperature detector detect a fire, or when an open flame ignites the thermal fuse (temperature reaches 180°C), the cabinet-level aerosol fire extinguishing device is automatically activated for full fire suppression. The aerosol generating agent produces extinguishing agents through a combustion reaction. The heat released during the reaction decomposes the chemical coolant, and the aerosol extinguishing agent and coolant work together to extinguish the fire. Simultaneously, the BMS receives feedback signals from the fire protection system and activates external audible and visual alarms until the fire is completely extinguished.



2.2.3.3 BAT-C Series 208.9kWh Commercial and Industrial Battery System

2.2.3.3.1 Appearance Introduction



No.	Name	Description
1	Exhaust Fan	Used to quickly expel gas from the cabinet.
2	Indicator Light	Indicates the operating status of the battery system
3	Emergency Stop Switch	Press the emergency stop button to power off the battery system
4	Door Lock	-
5	Liquid Cooling Unit	Used to dissipate heat and control temperature of the battery system

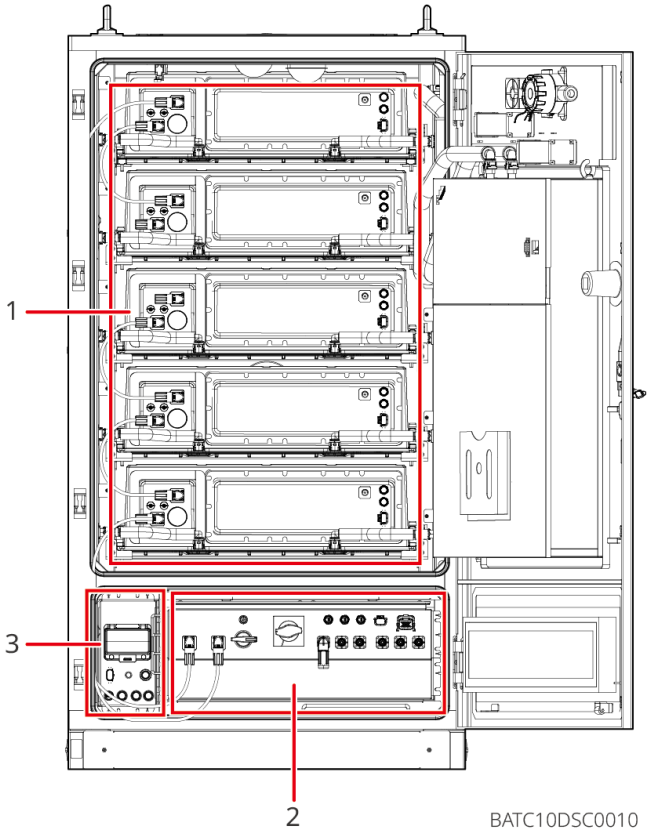
No.	Name	Description
6	Protective Grounding Point	Used to connect the battery grounding cable
7	Bottom Baffle	-
8	Side Cable Entry Hole	-
9	SEC3000C Mounting Hole	Used to install SEC3000C, compatible with both old and new versions.
10	SEC3000C Cable Tray Mounting Hole	Used to install the cable tray of SEC3000C
11	Inverter Mounting Hole	Used to install the inverter
12	Inverter Grounding Point	Used to connect the inverter grounding cable
13	Cable Protection Cover / Circuit Breaker Waterproof Box Mounting Hole	Used to install the cable protection cover / circuit breaker waterproof box
14	Explosion-Proof Valve	Prevents explosion of the battery system
15	Fire Water Connection	In case of fire, water can be injected for extinguishing
16	Rear Cover Plate	-
17	Cable Entry Hole 1	Used for routing power cables from the battery to the inverter
18	Cable Entry Hole 2	Used for routing communication cables from the battery to the inverter
19	Cable Entry Hole 3	Used for routing power cables of the liquid cooling unit
20	Cable Entry Hole 4	Used for routing inter-cluster communication cables of the battery

No.	Name	Description
21	Cable Entry Hole 5	Used for routing inter-cluster power cables of the battery
22	Battery System Fixing Hole	Used to secure the battery system to the foundation
23	Lifting Ring	Used for lifting and handling
24	Explosion Vent Panel	(Optional) Prevents the battery pack casing from exploding.

2.2.3.3.2 Component Introduction

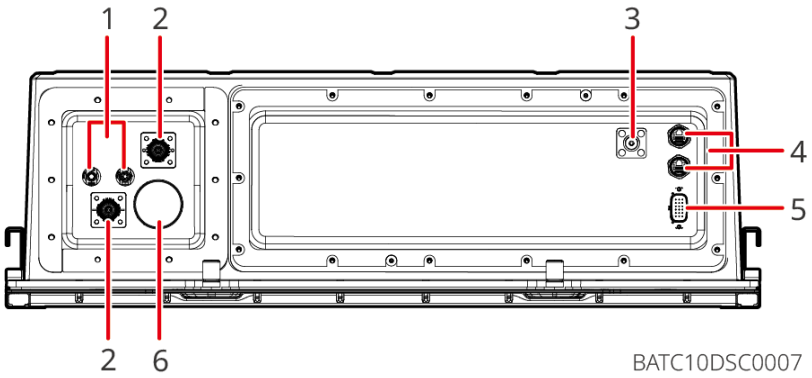
2.2.3.3.2.1 Power Supply and Distribution System

The power supply and distribution system mainly consists of PACK, PCU, and distribution box:



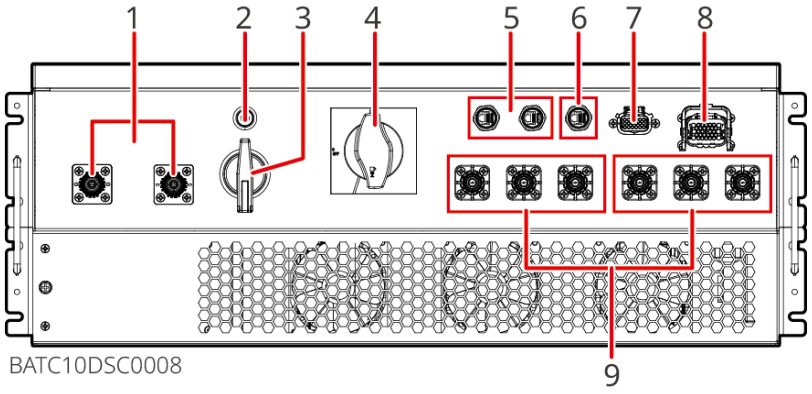
1	2	3
PACK	PCU	Distribution Box

PACK



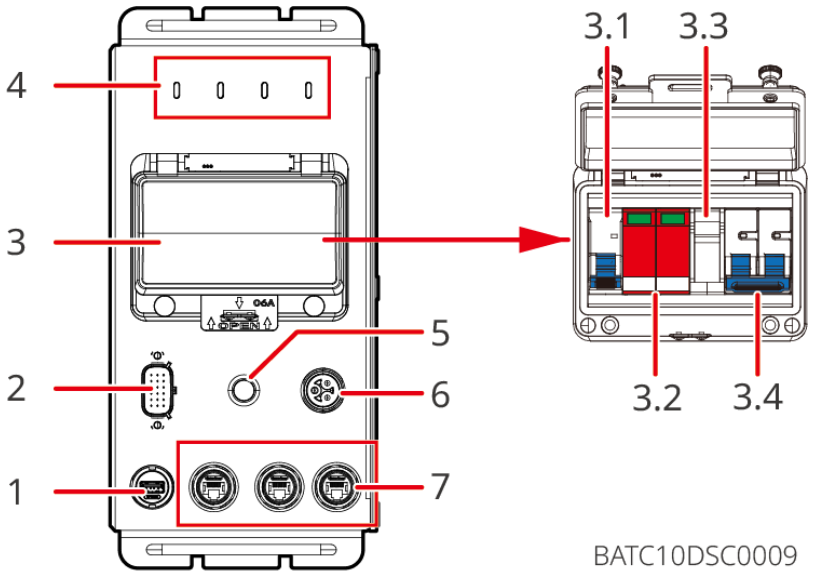
No.	Name	Description	Remarks
1	PBM- / PBM+	PACK-level equalizer positive and negative interfaces.	Optional
2	B+ / B-	PACK positive and negative wiring ports.	-
3	Fire nozzles	PACK fire nozzle.	Optional
4	COM1 / COM2	Inter-PACK communication port.	-
5	COM3	Inter-PACK communication port.	Optional
6	Explosion-proof valves	Explosion-proof valve.	-

PCU



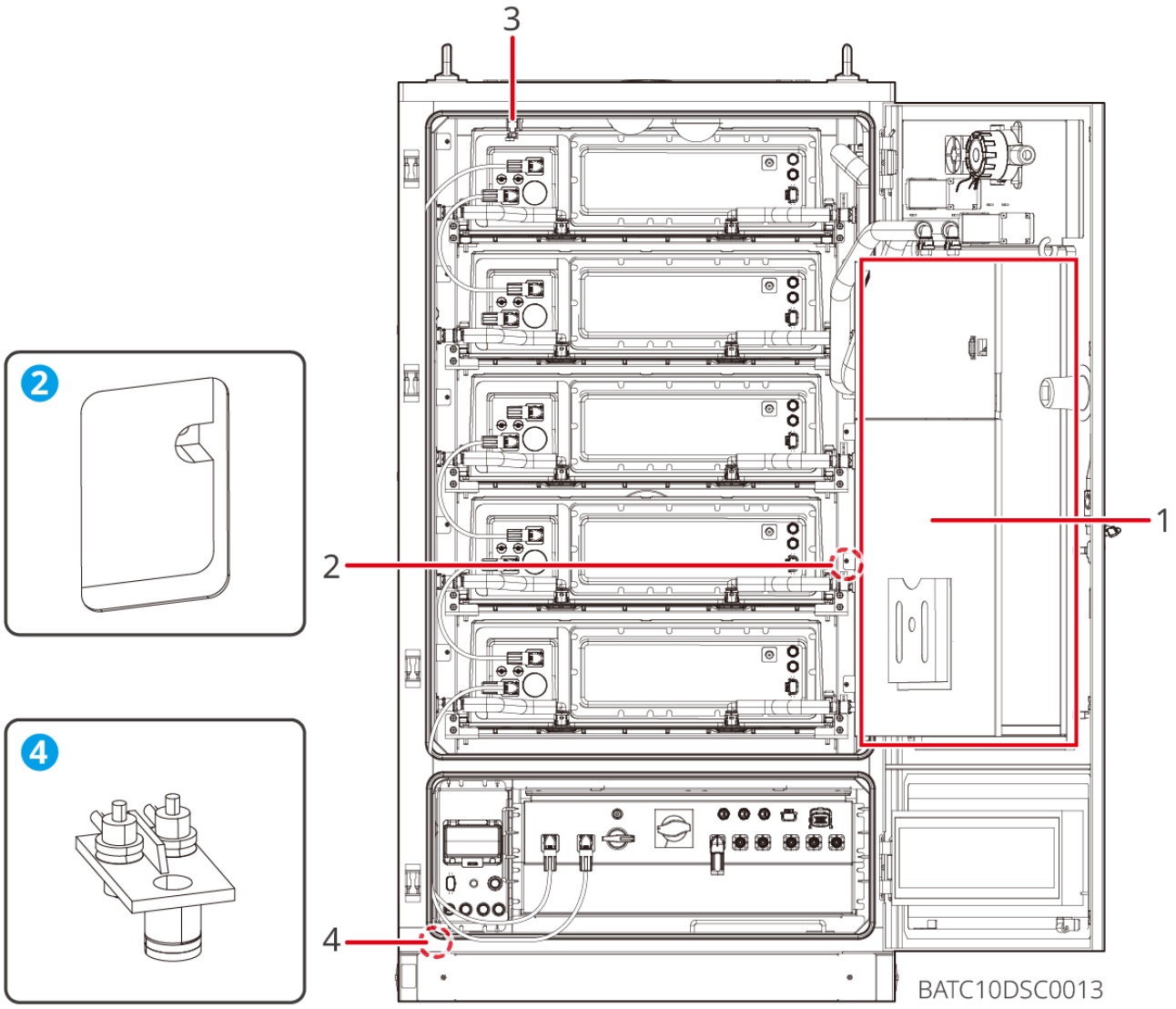
Serial No.	Name	Description	Remarks
1	B+ / B-	Battery system positive and negative terminal connection port	-
2	BLACK START	Black start switch button	-
3	BMS PWR	BMS power supply circuit breaker	-
4	DC BREAKER	Output circuit breaker	-
5	COM1	Used for communication connection between battery system and inverter, or battery system cluster communication connection	-
6	COM2	Used for communication connection between PCU and PACK	-
7	COM3	Battery cabinet internal communication port	With isolation
8	COM4	Battery cabinet internal communication port	Non-isolated
9	P+ / P-	DCDC output positive and negative terminal port.	-

Distribution Box



No.	Name	Description	Remarks
1	USB	USB interface	-
2	JX	Water leakage interface, for connecting water leakage detector	-
3	6P circuit breaker protective cover	-	-
3.1	UPS BAT	UPS switch	Optional
3.2	SPD	SPD lightning protection module	-
3.3	FU	FU2 fuse	-
3.4	AC BREAKER	AC circuit breaker	-
4	Indicator light	Indicates operation status of cloud board	-
5	RST	Cloud board reset button	-
6	AC PWR	Liquid cooling unit power supply port	-
7	FE1 / FE2 / FE3	Cloud board communication port	-

2.2.3.3.2.2 Environmental Control System

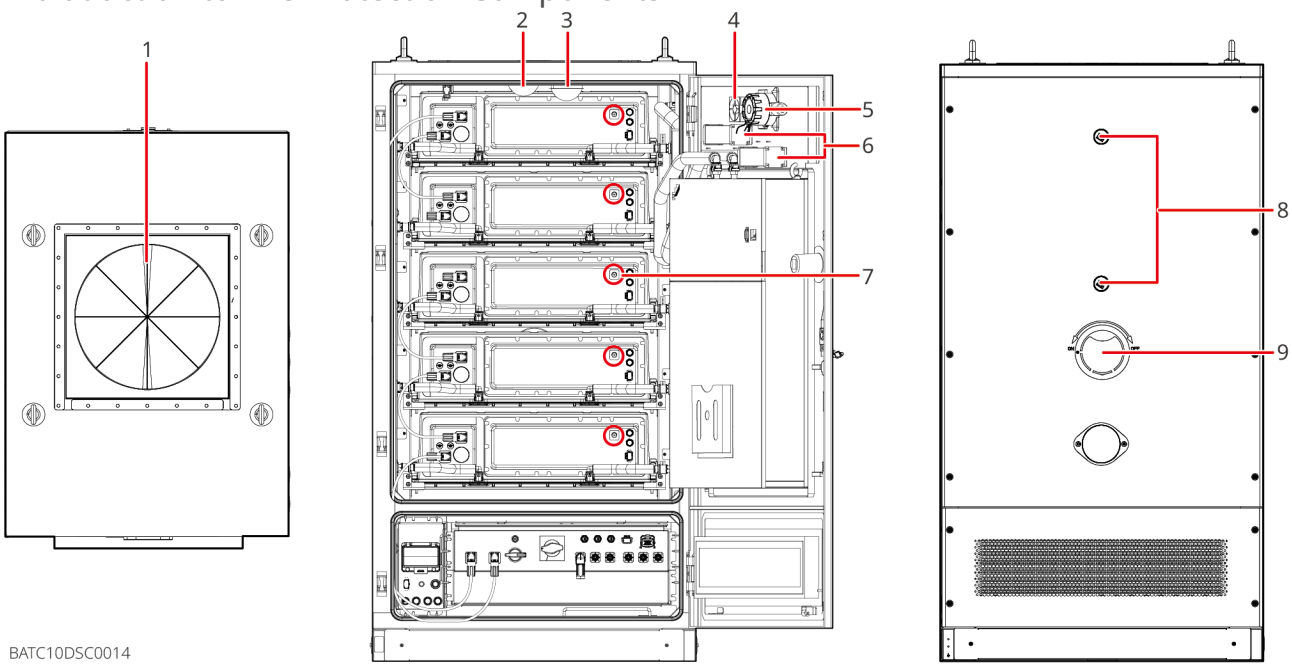


No.	Name	Description
1	Liquid Cooling Unit	The liquid cooling unit can precisely control the temperature and flow rate of the coolant, maintain the battery system within a suitable temperature range, and balance the temperature difference between cells, thereby ensuring battery performance, safety, and lifespan.
2	Temperature and Humidity Sensor	Monitor the temperature and humidity in the environment.

No.	Name	Description
3	Access Switch	The energy storage system automatically powers off when the door is opened.
4	Water Leak Detector	Real-time monitoring of whether there is water accumulation or liquid leakage in the installation area of the energy storage equipment, and issuing timely alarms or triggering control system actions in the event of flooding to prevent equipment damage and safety accidents.

2.2.3.3.2.3 Fire Protection System

Introduction to Fire Protection Components



1	2	3	4	5	6	7	8	9
Explosion vent panel (optional)	Temperature detector	Smoke detector	Exhaust fan	Combustible gas detector	Aerosol fire extinguishing device	PACK box nozzle (optional)	Explosion-proof valve	Fire water interface

Explosion Vent Panel

Working principle: When the internal pressure of the battery pack rises sharply due to thermal runaway or other reasons and exceeds the design threshold, the explosion vent panel will rupture or pop open first, forming a rapid pressure relief channel, directionally discharging high-temperature and high-pressure gas and ejecta out of the pack, thereby preventing the battery pack casing from bursting and ensuring the safety of personnel and equipment.

Technical Indicator	Explosion Vent Panel
Operating Temperature Range	-40℃ ~ +125℃
Maximum Vent Area	0.363609m^2
Flame Retardant Rating	UL94 V-0
Dust and Water Protection Rating	IP66

Temperature Detector & Smoke Detector

Working principle:

- The temperature detector uses a negative temperature coefficient thermistor as a sensor, utilizing the thermistor's sensitivity to ambient temperature to obtain temperature information. The internal circuit converts this information into a voltage signal and transmits it to the microcontroller, which processes the signal through built-in intelligent algorithms and determines whether it is in an alarm or fault state.
- The smoke detector uses infrared scattering principles to detect fire. In a smoke-free state, it only receives very weak infrared light. When smoke enters the optical smoke detection chamber, due to the scattering effect, the received light signal is enhanced. When the smoke reaches a certain concentration, an alarm signal can be output.

Technical Specifications	Heat Detector	Smoke Detector
Dimensions	• Diameter 100mm • Height 44.5mm (without base)	• Diameter 100mm • Height 43.3mm (without base)
Weight	Approx. 110g (without base)	Approx. 105g (without base)
Mounting Hole Spacing	45mm~75mm	
Alarm Confirmation Light (Red)	When the inspection light is set to on, it flashes once periodically; when set to off, it does not light; it stays on during alarm, and flashes twice periodically during fault or dirt reporting.	
Ambient Temperature	-10℃~+50℃	
Relative Humidity	≤95% (non-condensing)	

Exhaust Fan

Working principle: When the air pressure/combustible gas concentration/temperature/smoke concentration inside the sealed enclosure rises to a preset value, the sensors inside the enclosure cooperate with the control system to send commands to the intake/exhaust valve. At this point, the intake/exhaust valve opens, and the sealed enclosure is fully connected to the outside. The gas inside the enclosure is rapidly discharged through the opened exhaust port (simultaneously providing a feedback signal that the valve has opened). When it needs to be closed, a signal is sent to the intake/exhaust valve, and it closes automatically (after complete closure, a feedback signal that the valve has closed is provided simultaneously). Different types of fans can also be installed according to actual working conditions to accelerate the discharge of harmful gases inside the enclosure, thereby achieving the purpose of preventing combustion and explosion.

Technical Indicator	Inlet/Exhaust Valve
Opening Stroke	30mm
Exhaust Area after Opening	>6000mm^2
Exhaust Volume after Opening	>35000L/min@5kPa
Opening Speed	4mm/s
Operating Temperature	-20℃ ~ +60℃
Protection Rating	IP66

Combustible Gas Detector

Working principle: When combustible gas is detected, the device will issue an alarm.

Technical Specification	Combustible Gas Detection Device
Operating Environment	
Temperature	-10℃ ~ +55℃
Relative Humidity	≤93%（No condensation）
Detected Gas Pressure	86~106kPa
Combustible Gas Performance	
Detection Principle	Catalytic Combustion
Detection Object	Combustible Gas
Detection Method	Diffusion Type
Indication Error	±3%LEL
Electrochemical Performance	
Detection Principle	Redox Reaction
Detection Object	Toxic and Harmful Gases
Detection Method	Diffusion Type

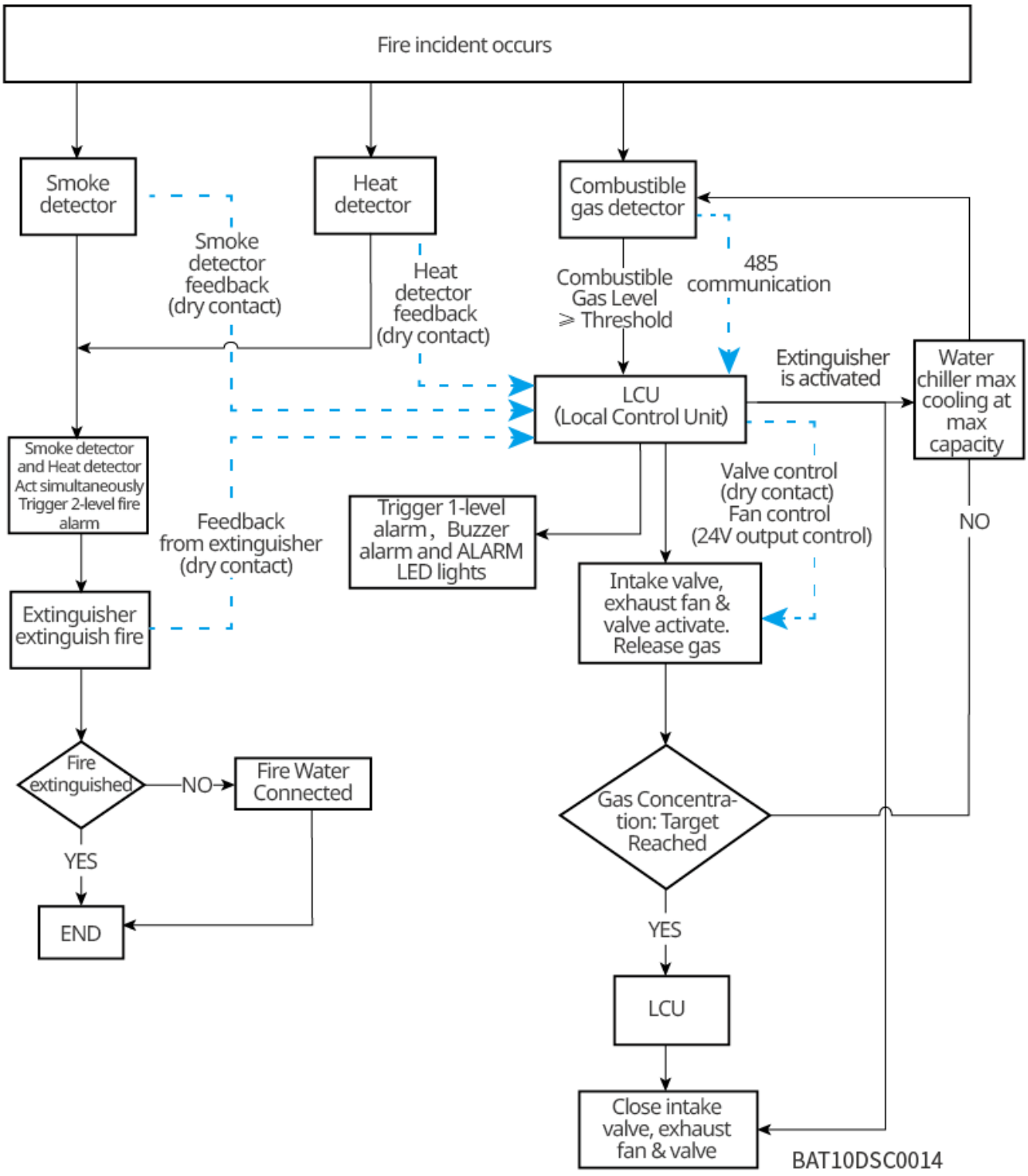
Technical Specification	Combustible Gas Detection Device
Indication Error	±5%FS
Physical Parameters	
Dimensions（Length×Width×Thickness）	200×178×98mm
Housing Material	Die-cast Aluminum
Weight	Approximately 2030g
Protection Rating	IP65

Explosion-proof Valve

Working principle: When the internal pressure of sealed products such as enclosures rises rapidly, the exhaust port of the explosion-proof check valve opens to quickly and directionally release internal gas, thereby preventing explosions of sealed products such as battery boxes.

Technical Indicator	Explosion-proof Valve
Protection Level	IP68
Opening Area	570 mm^2
Operating Temperature	-40℃ ~ +130℃
Flame Retardant Performance	UL94-V0

Introduction to Fire Protection Logic



The battery system strictly follows relevant standards and specifications, adopting an energy storage fire protection solution comprising an automatic fire suppression system, explosion-proof ventilation system, and emergency water system to ensure the scientific nature, rationality, and effectiveness of the solution. It comprehensively safeguards the fire safety of the electrochemical energy storage system, ensuring safe operation and efficient response to fire incidents.

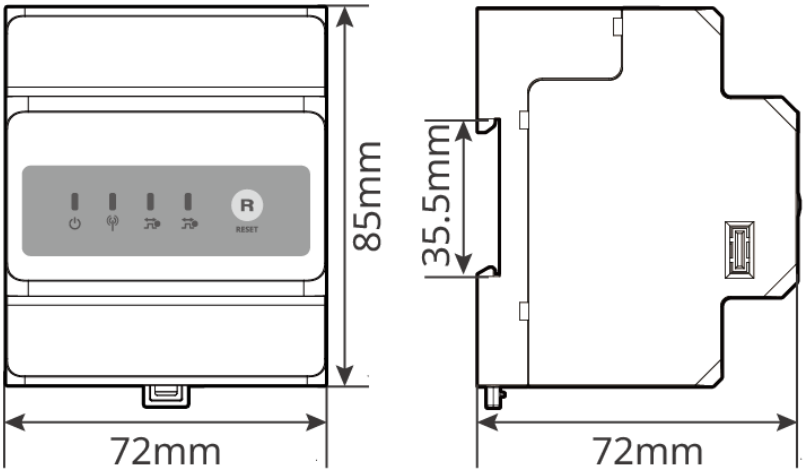
The battery system employs a multi-level response fire protection system, including PACK-level fire suppression and battery cabinet-level fire suppression. It integrates multiple fire control measures such as smoke detectors, temperature sensors, in-cabinet aerosol, pack aerosol, ventilation system, explosion relief system, and water fire suppression. When a PACK-level fire occurs, the PACK-level aerosol extinguishing is triggered first, eliminating hazards at the source. If the fire spreads within the cabinet, the cabinet-level fire suppression system and ventilation system interact, prioritizing the discharge of combustible gases in the early stages of a fire to reduce the risk of ignition.
Aerosol features two activation methods: electrical activation and thermal-sensitive line activation, ensuring timely action when a fire occurs to suppress the fire and ensure system safety and reliability. Fire detection signals can also be quickly transmitted to backend site personnel; alarms and fault indicators promptly alert staff of any fire anomalies.
In extreme cases, where the fire suppression system fails to extinguish a fire, the rear side of the cabinet is pre-reserved with fire water interfaces for manual connection to an emergency water system as a last resort.
The battery system can be optionally equipped with a fixed top explosion relief panel. During explosion relief, the panel will not eject, avoiding potential risks of injury to on-site personnel.

2.2.4 Smart Meter

The smart meter can measure parameters such as grid voltage, current, power, frequency, and energy, and transmit the information to the inverter to control the input and output power of the energy storage system.
GM330 meter is supplied with the inverter. CT can be purchased from the manufacturer or by yourself. CT ratio requirement: nA/5A

- nA: CT primary side input current, n ranges from 200-5000
- 5A: CT secondary side output current

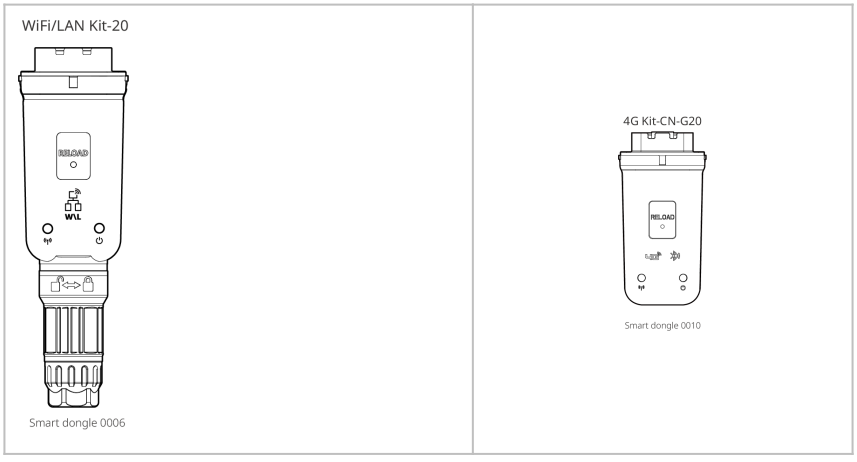
GM330



GMK10DSC0003

2.2.5 Smart Communication Stick

The Smart Communication Stick is mainly used to transmit various power generation data from the inverter in real time to the SEMS+ WEB remote monitoring platform, and to perform local device debugging by connecting the Smart Communication Stick via the SEMS+ App.



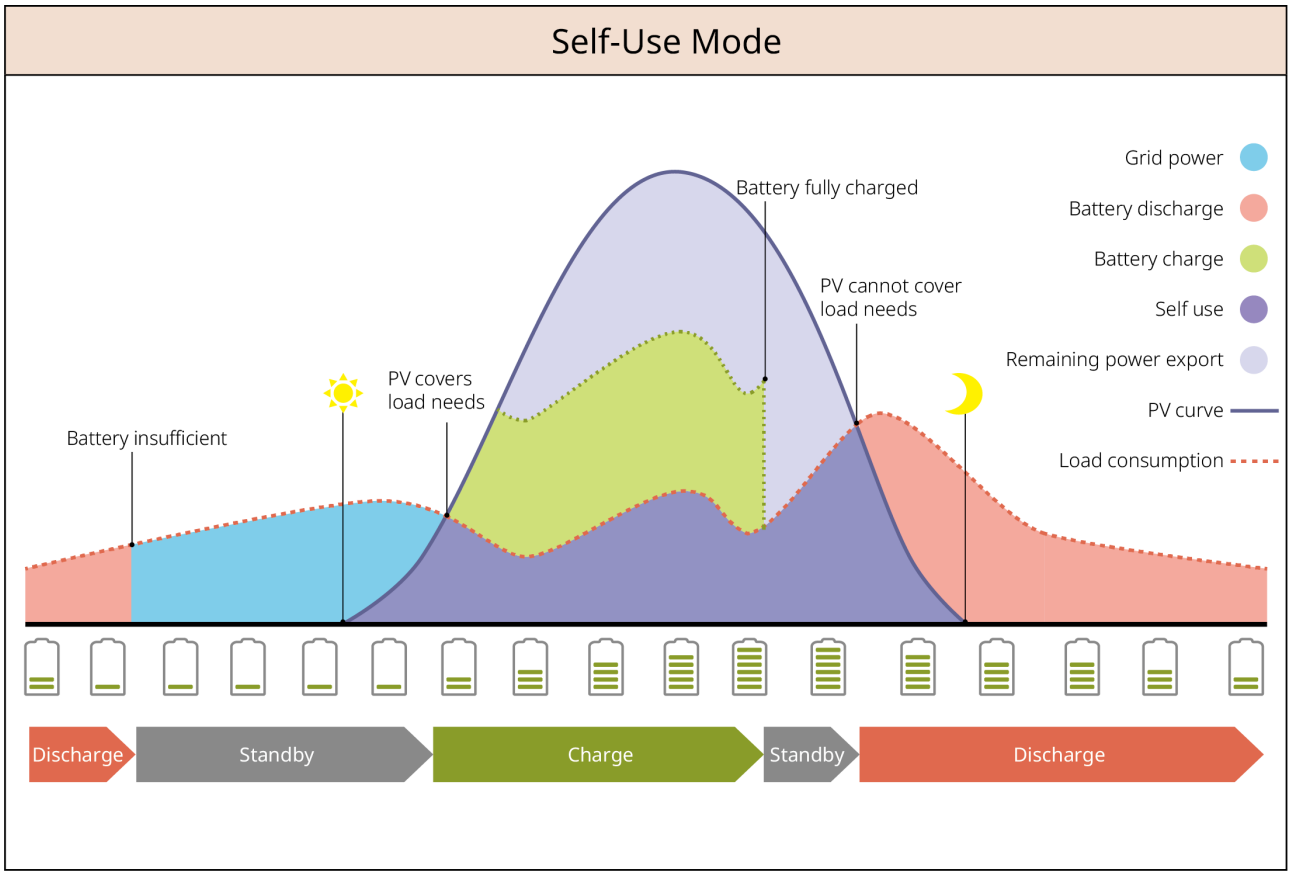
No.	Model	Signal Type	Application Scenario
1	WiFi/LAN Kit-20	Bluetooth, WiFi, LAN	Used in single inverter scenario
2	4G Kit-CN-G20 4G Kit-G20	Bluetooth, 4G	

2.3 Supported Grid Forms

2.4 System Mode

Self-Use Mode

- The basic mode of system operation.
- PV generation prioritizes powering loads, excess charges batteries, and any remaining is sold to the grid. When PV generation is insufficient for loads, batteries supply power; if batteries also insufficient, grid supplies power.

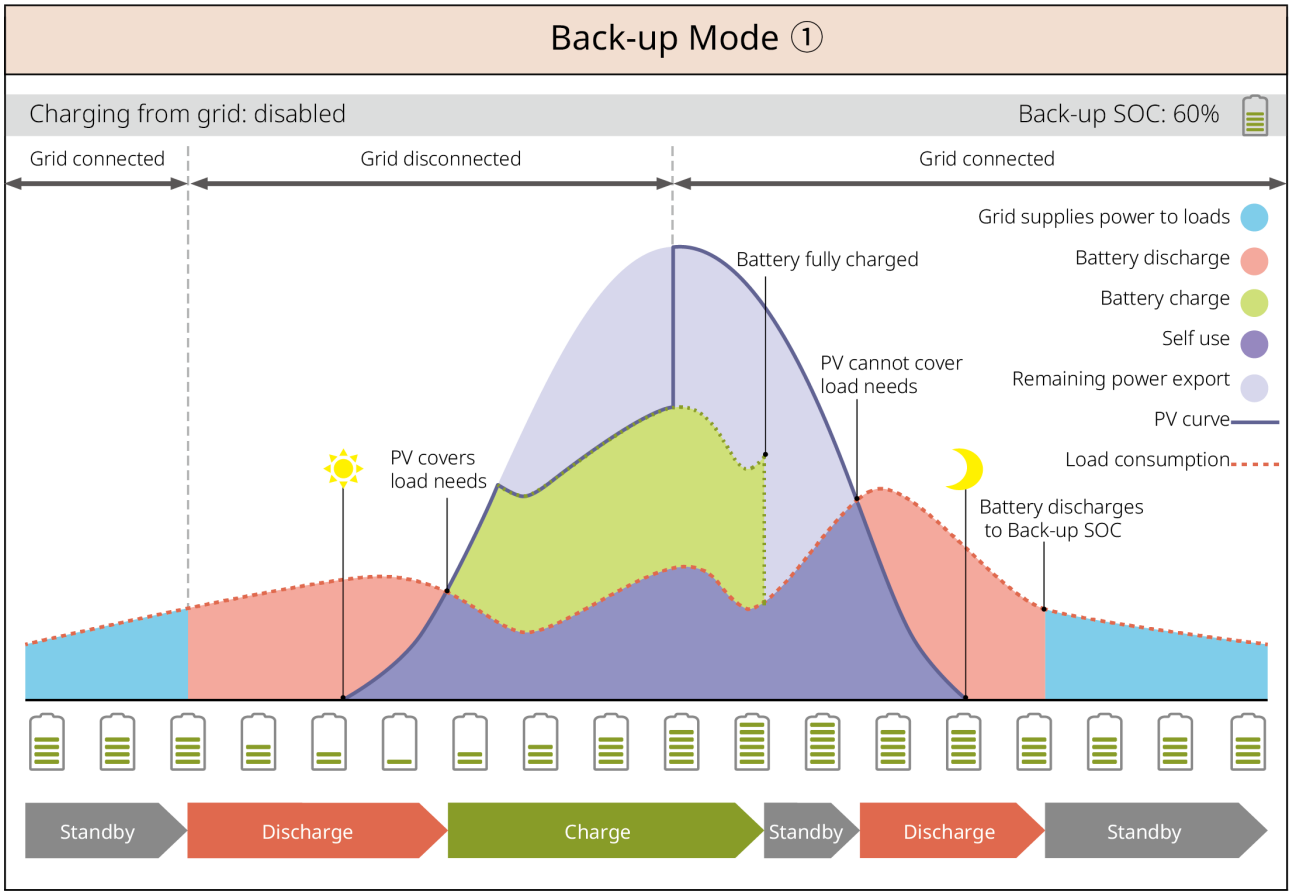


SLG00NET0009

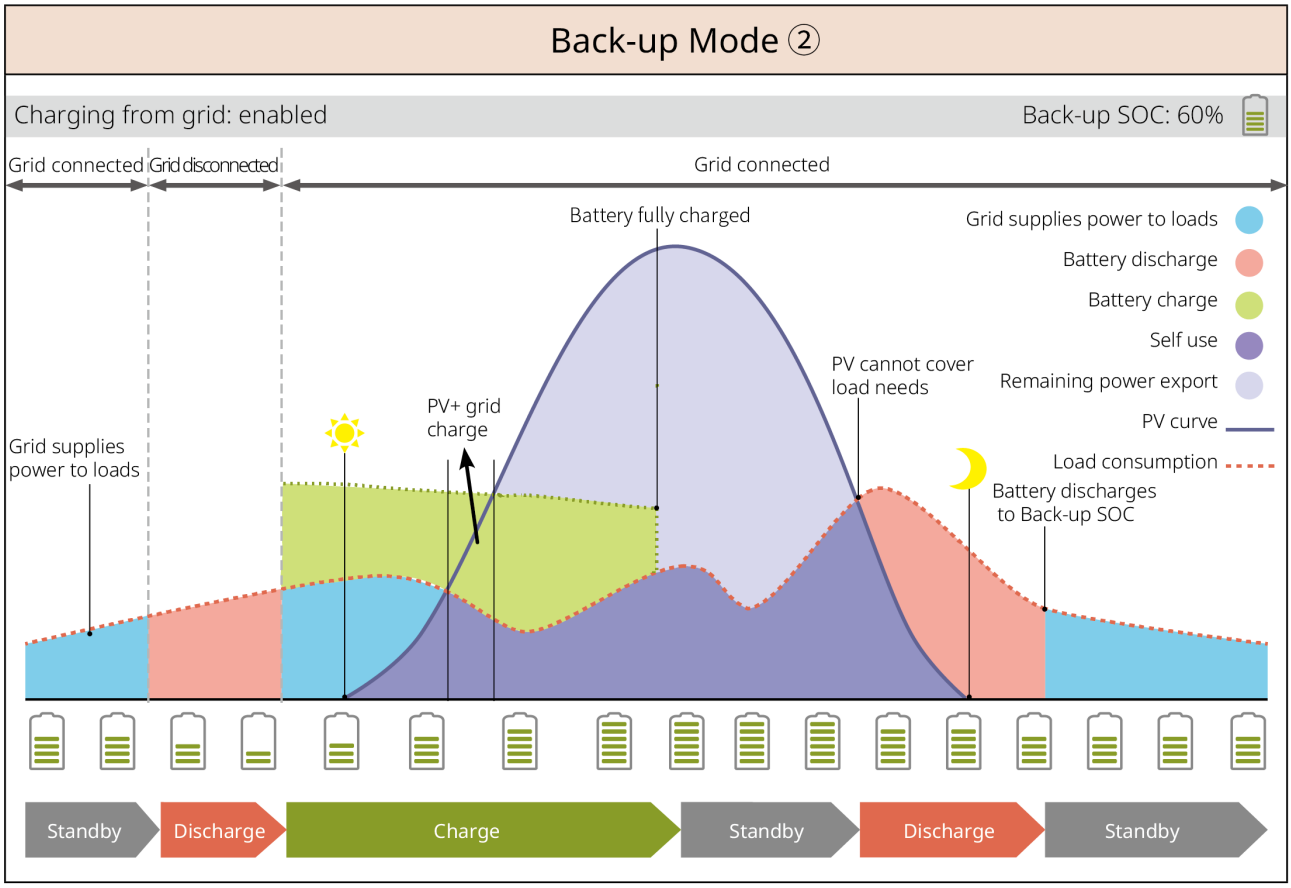
Backup Mode

- Recommended for areas with unstable grid.
- When grid power fails, the inverter switches to off-grid mode, batteries discharge to power loads ensuring backup loads remain powered; when grid is restored, inverter switches to grid-tied operation.
- To ensure battery SOC is sufficient for off-grid operation, during grid-tied operation the battery will charge to backup power SOC using PV or purchased grid power. If purchasing grid power to charge the battery, ensure compliance with

local grid regulations.



SLG00NET0002



SLG00NET0003

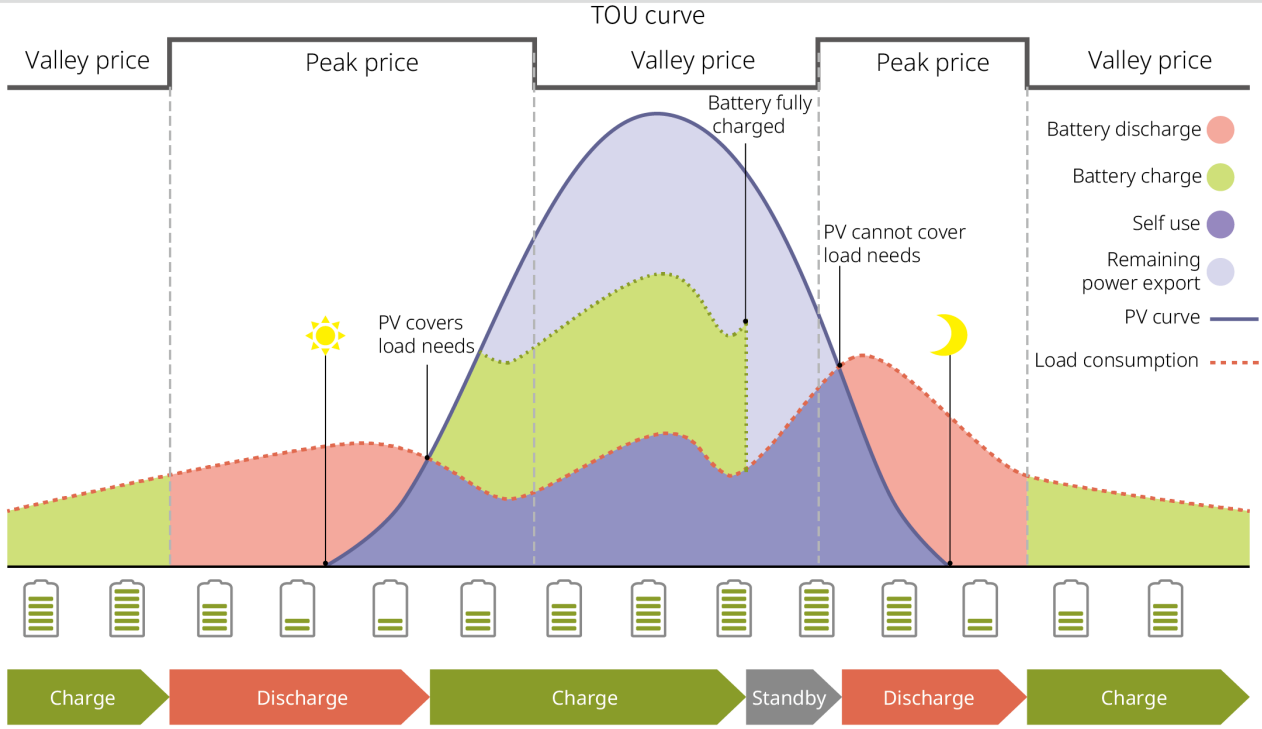
TOU Mode

When compliant with local regulations, set different buying/selling periods based on grid peak/off-peak electricity price differences.

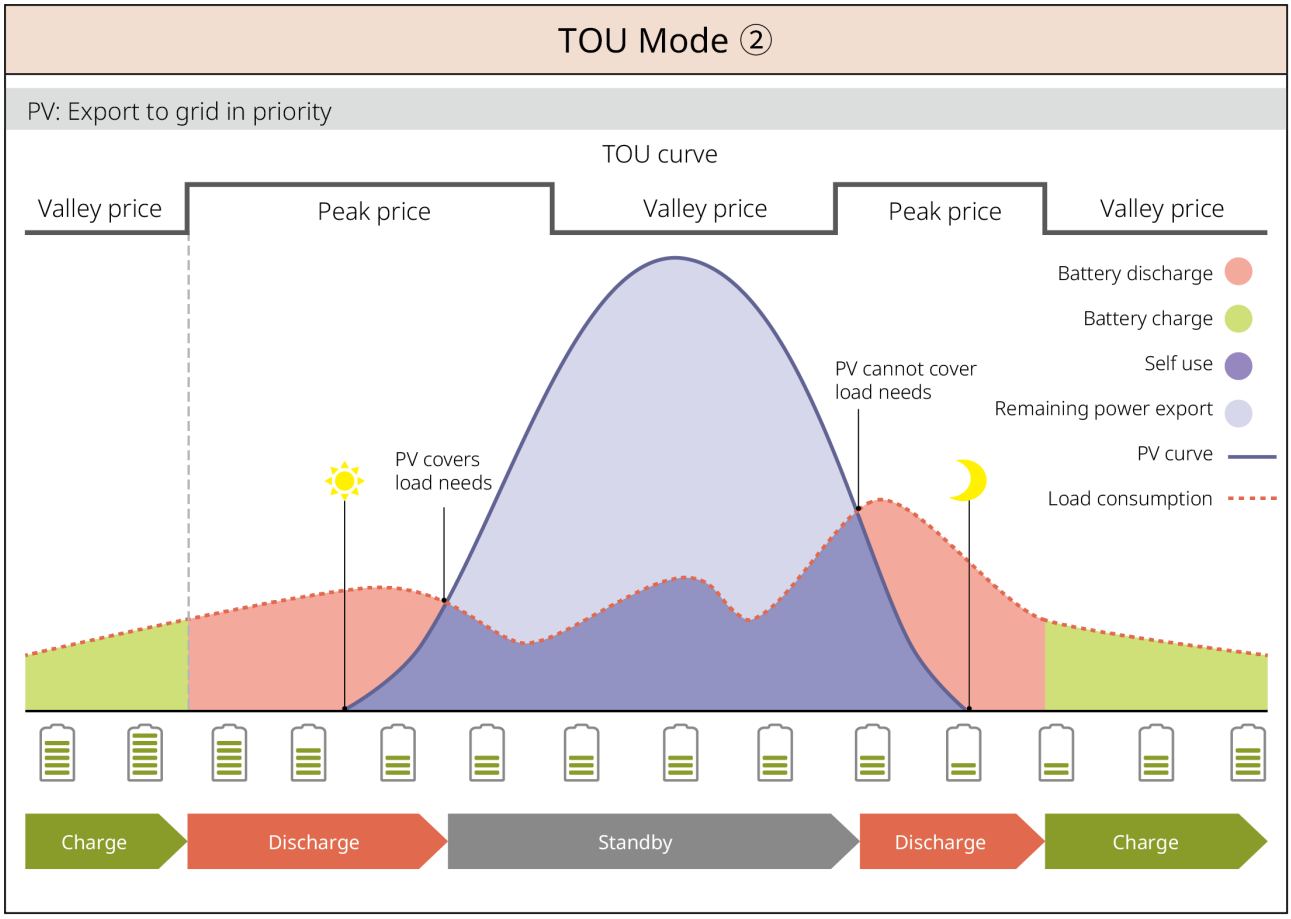
For example: during off-peak hours, set battery to charge mode and buy power from grid; during peak hours, set battery to discharge mode to supply loads.

TOU Mode ①

PV: Charge battery in priority



SLG00NET0004



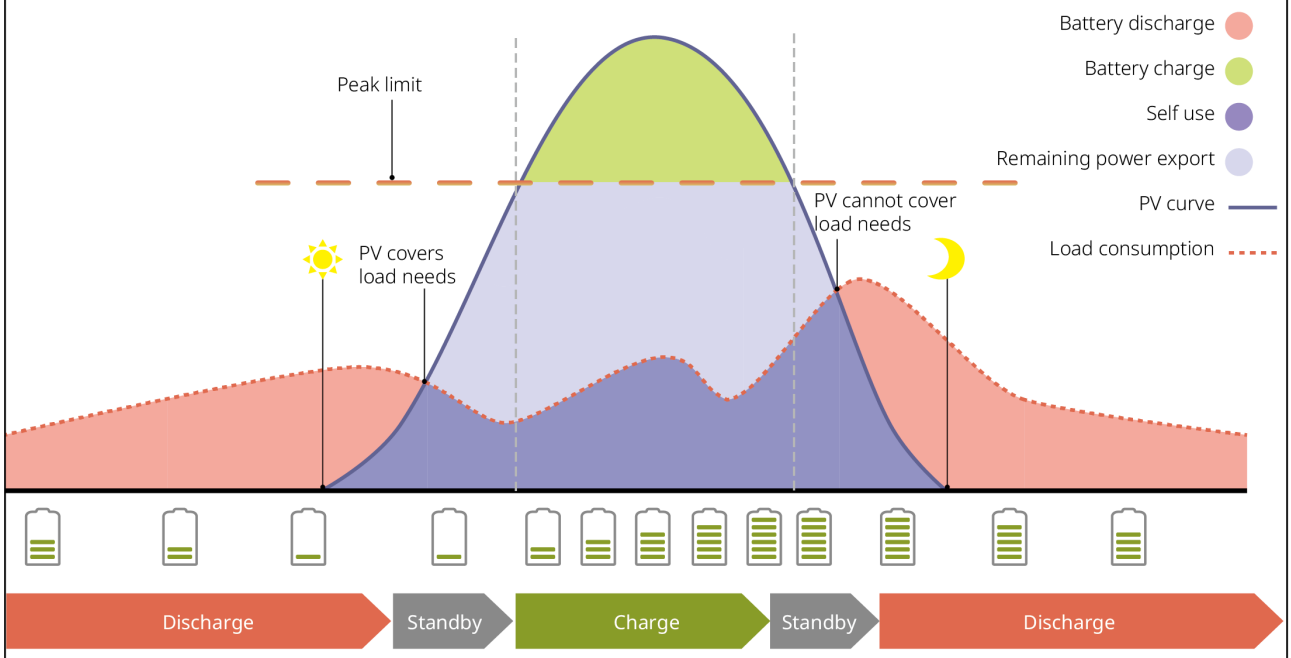
SLG00NET0005

Delayed Charging Mode

- Applicable for areas with grid-tied output power limits.
- Set peak power limit to use excess PV generation beyond grid limit for battery charging; or set PV charging periods to charge battery using PV within those periods.

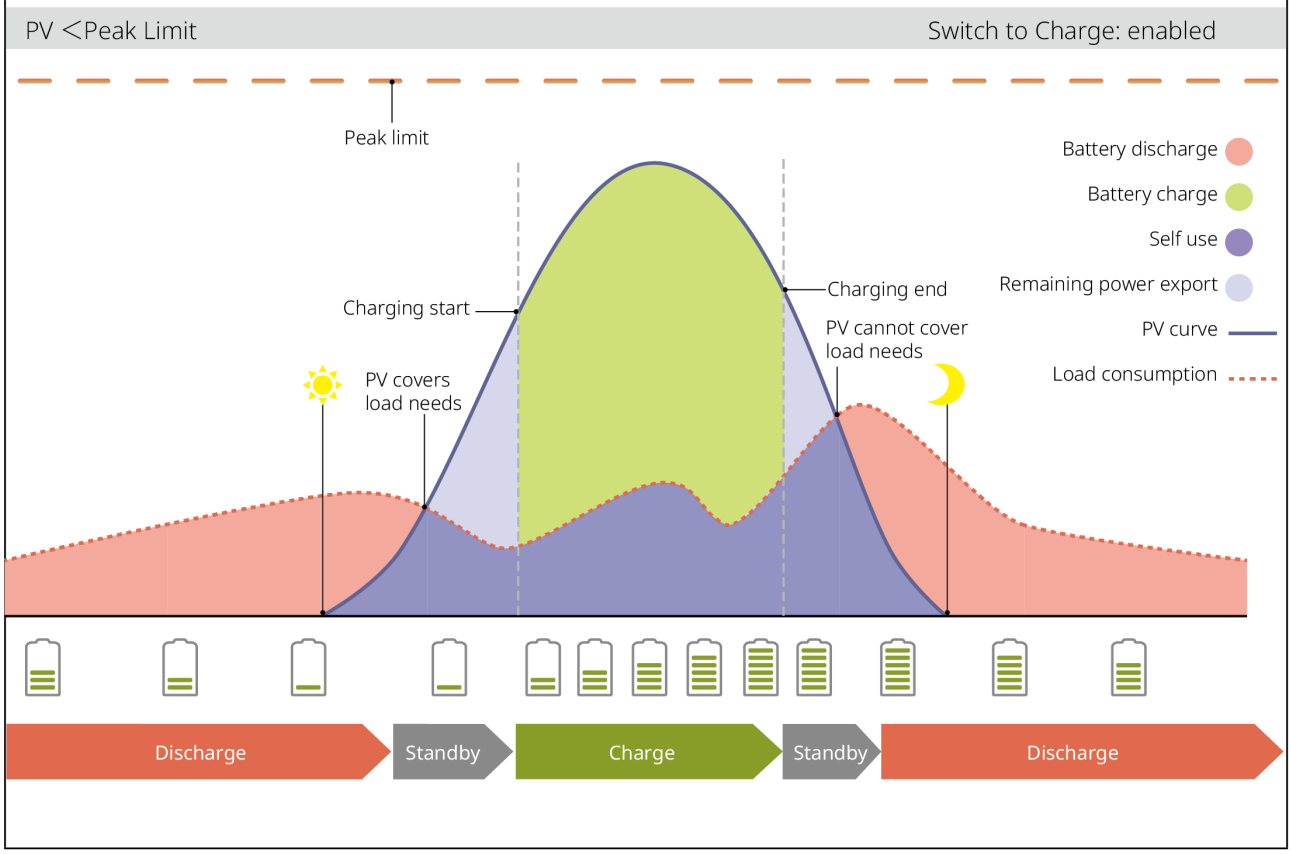
Delayed Charging ①

PV > Peak Limit | Switch to Charge: enabled/disabled

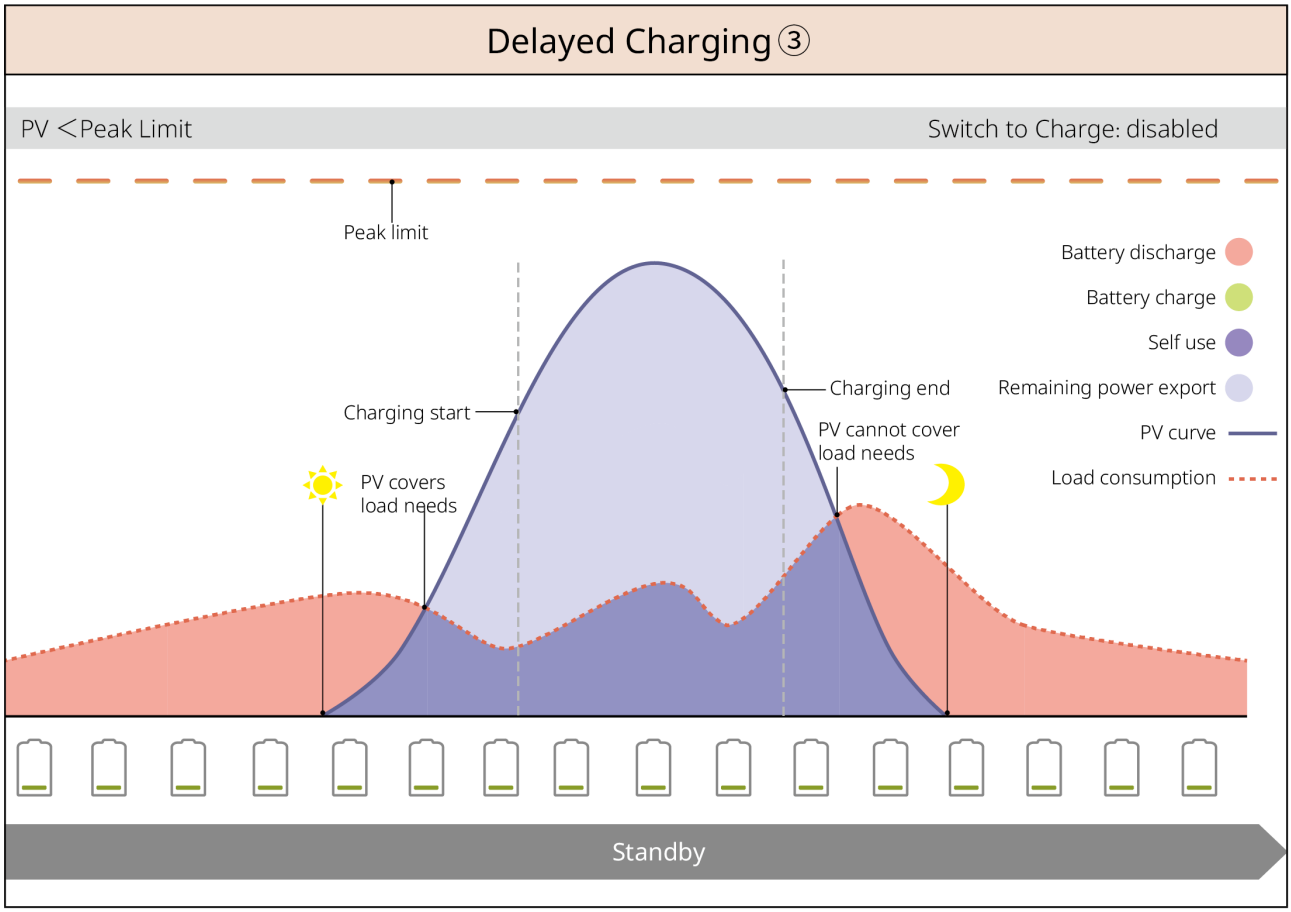


SLG00NET0006

Delayed Charging ②



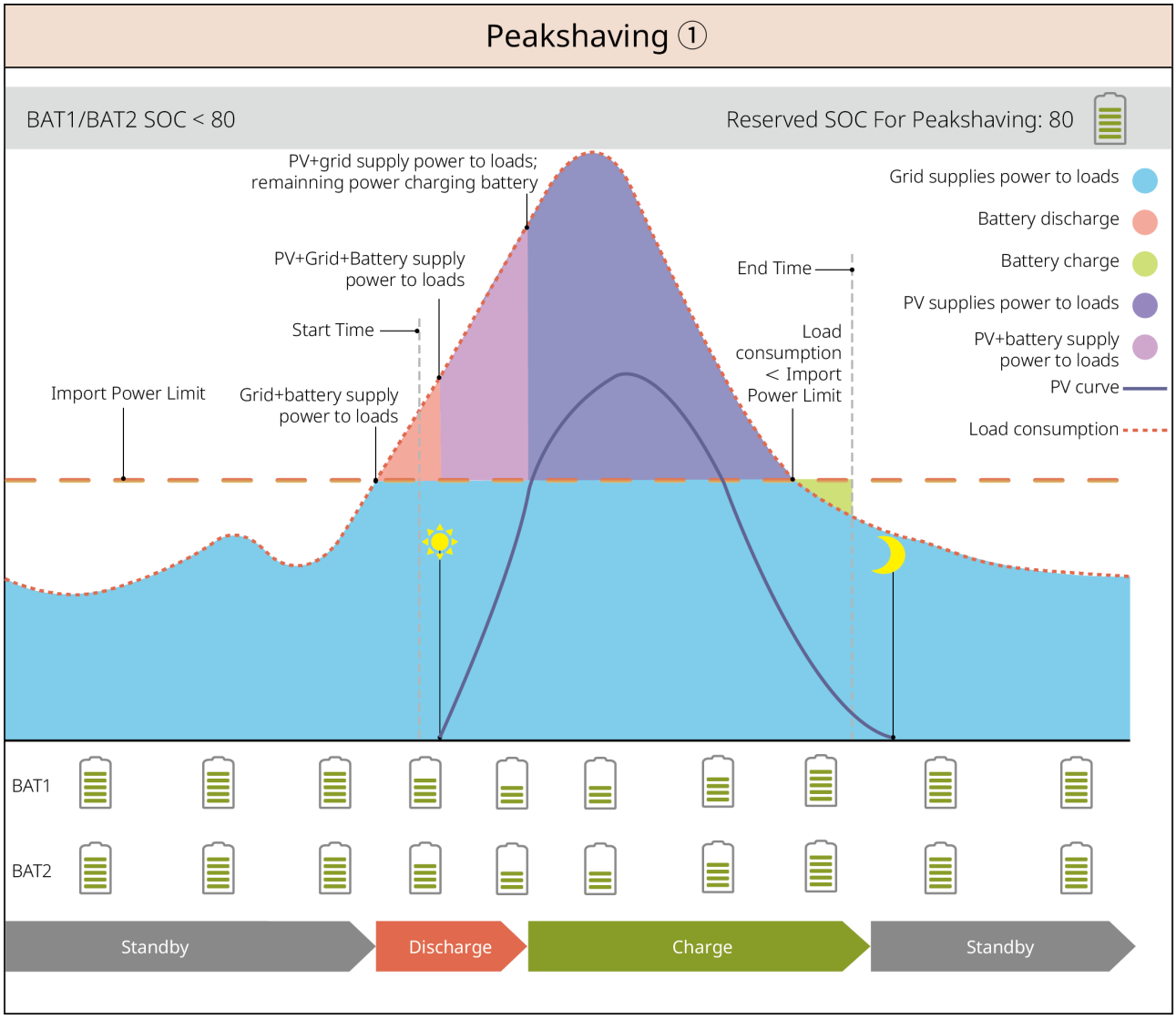
SLG00NET0007



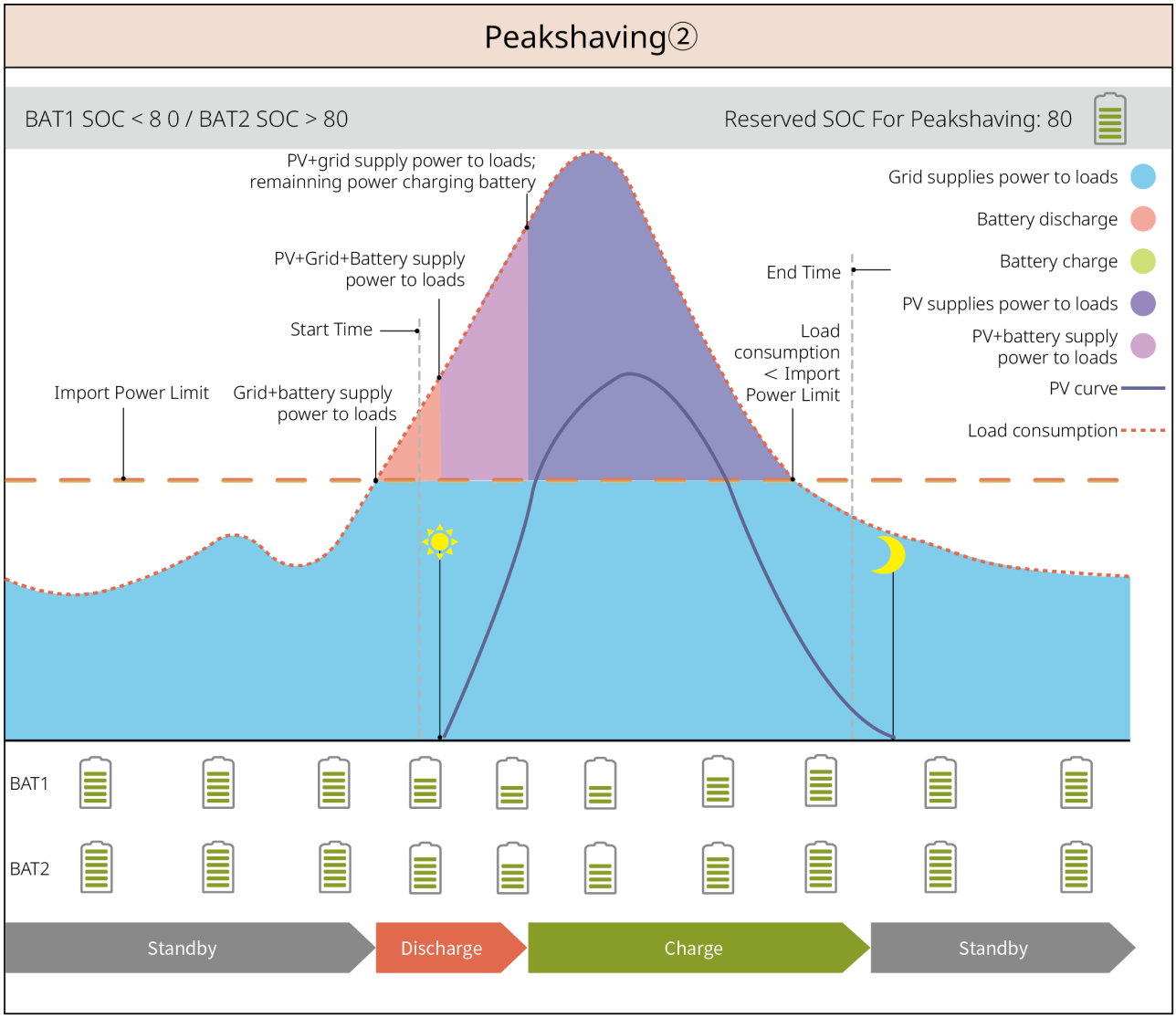
SLG00NET0008

Demand Management Mode

- Mainly applicable for commercial and industrial scenarios.
- When total load power exceeds the quota in a short period, battery discharge can reduce the excess consumption.
- When both battery SOC values are below the reserved SOC for demand management, the system purchases power from grid based on time period, load consumption, and purchased power peak limit; when only one battery SOC is below the reserved SOC, the system purchases power based on load consumption and purchased power peak limit.



SLG00NET0010



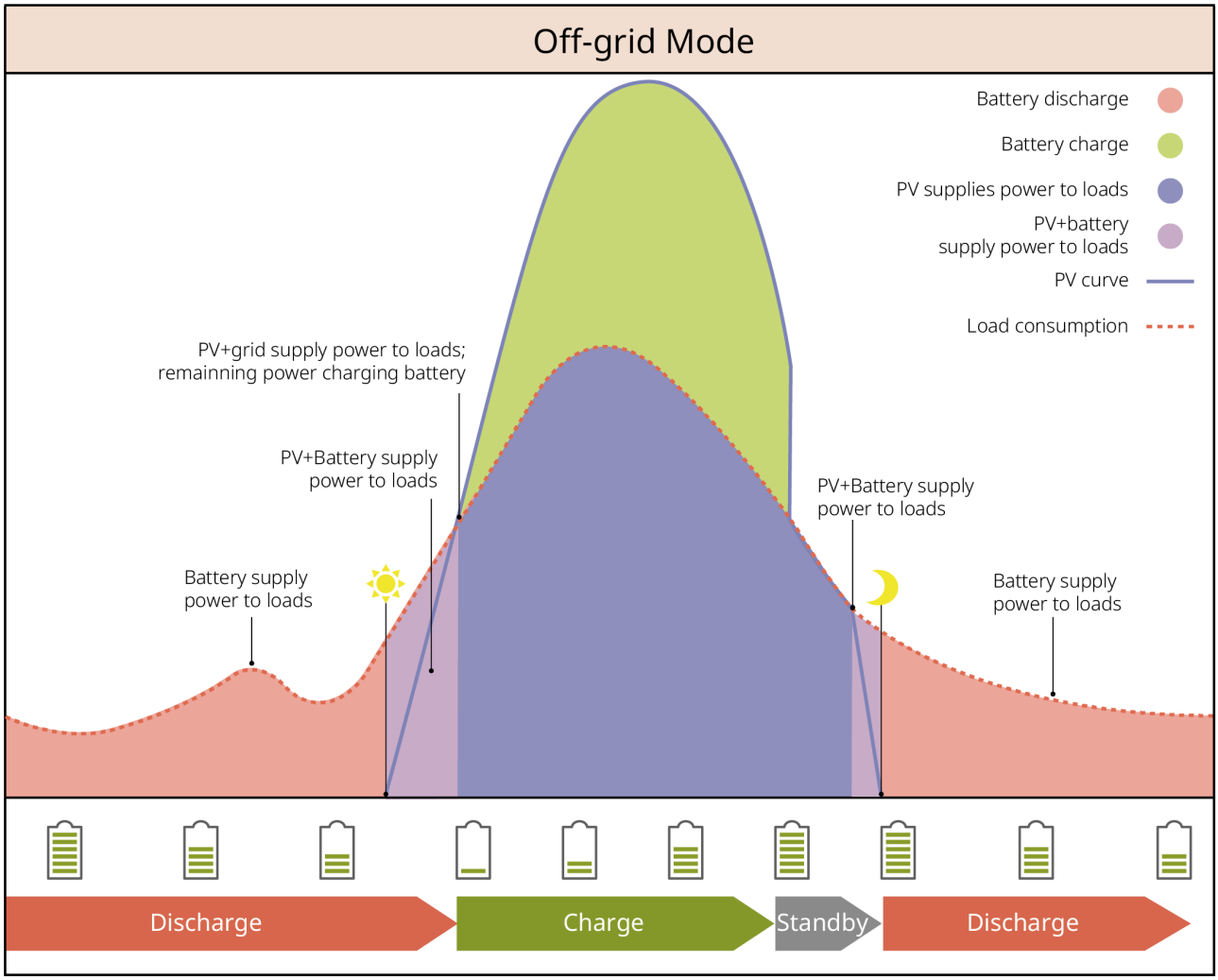
SLG00NET0011

Off-Grid Mode

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

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

- During the day, PV generation prioritizes powering loads, excess charges batteries.
- At night, batteries discharge to power loads ensuring backup loads remain powered.
- Off-grid SOC recovery: After off-grid operation, the battery gradually recovers to minimum SOC through PV or other generation methods.



SLG00NET0012

2.5 Features

Three-phase Unbalanced Output

The inverter's grid-connected terminal and BACK-UP terminal both support three-phase unbalanced output. Each phase can connect to loads of different power. The maximum output power per phase for different models is shown in the following table:

Model	Maximum output power per phase
GW50K-ET-L-G10	1/3 x 50kW
GW75K-ET-G10	1/3 x 75kW

GW80K-ET-G10	1/3 x 88kW
GW99.99K-ET-G10	1/3 x 99.99kW
GW100K-ET-G10	1/3 x 110kW

AFCI

The inverter integrates an AFCI circuit protection device to detect arc faults and quickly cut off the circuit when detected, thereby preventing electrical fires.
Causes of arc:

- Damage to connector connections in the photovoltaic system.
- Incorrect or damaged cable connections.
- Aging of connectors and cables.

Fault handling method:

1. When an arc is detected, the fault type can be viewed on the inverter display or via the App.
2. If the inverter triggers a fault <5 times within 24 hours, the machine will automatically restore grid-connected protection after 5 minutes. After the 5th arc fault, the fault must be cleared before the inverter can operate normally. For specific operations, please refer to the SEMS+ App User Manual.

Standard for Brazil machines, optional for machines in other regions.

Model	Label	Description
GW50K-ET-L-G10 GW75K-ET-G10 GW80K-ET-G10 GW99.99K-ET-G10 GW100K-ET-G10	F-I-AFPE-1-4-4	F (Full coverage): Full coverage inverter PV input ports I (Integrated): Integrated in the inverter AFPE (arc fault protection equipment): Combines AFD and AFI 2 types of arc detection functions 1: One pair of PV input ports (PV+, PV-) connects one string of PV input 4: Number of PV input ports detected by one arc detection sensor 4: Number of arc detection sensors

Load Control (Optional)

The inverter's dry contact control port supports connecting an additional contactor to control the on/off of loads. Supports household loads, heat pumps, etc.
Load control methods are as follows:

- Time control: Set the time to turn the load on or off. The load will automatically turn on or off within the set time period.
- Switch control: When the control mode is set to ON, the load will turn on; when set to OFF, the load will turn off.
- BACK-UP load control: The inverter has a built-in relay dry contact control port, which can control whether the load is turned off via the relay. In off-grid mode, if it is detected that the BACK-UP terminal is overloaded and the battery SOC value is lower than the battery off-grid protection setting, the load connected to the relay port can be turned off.

Rapid Shutdown (RSD) (Optional)

In the rapid shutdown system, the rapid shutdown transmitter and receiver work together to achieve rapid system shutdown. The receiver maintains 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, thereby shutting down the modules.
External transmitter:

- Transmitter model: GTP-F2L-20, GTP-F2M-20

https://www.goodwe.com/Ftp/Installation-instructions/RSD2.0-transmitter.pdf

- Receiver model: 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 trigger device: External switch
- Receiver model: GR-B1F-20, GR-B2F-20

https://en.goodwe.com/Ftp/EN/Downloads/User%20Manual/GW_RSD-20_Quick-Installation-Guide-POLY.pdf

3 Equipment Inspection and Storage

3.1 Equipment Inspection

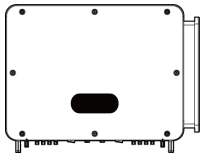
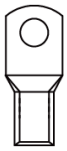
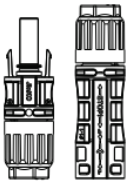
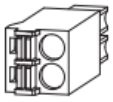
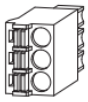
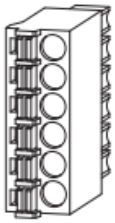
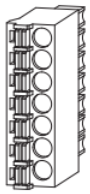
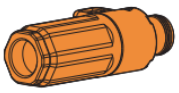
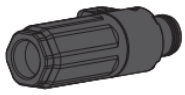
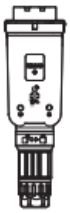
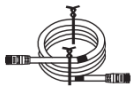
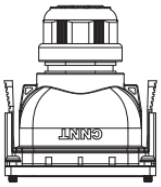
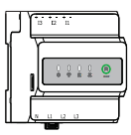
Before accepting the product, please carefully check the following:

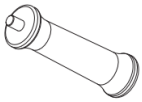
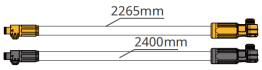
1. Check the outer packaging for damage, such as deformation, openings, cracks, or other signs that could cause damage to the equipment inside the box. If damaged, do not open the packaging and contact your dealer.
2. Check the anti-tilt label on the battery cabinet outer packaging. If the circular indicator is white, it indicates no abnormality during transport; if red, it indicates tilting during transport. Do not open the packaging and contact your dealer.
3. Check whether the inverter model is correct. If not, do not open the packaging and contact your dealer.
4. After opening the box, check the battery anti-tilt labels on the inside of the front door and side walls. If the circular indicator is white, it indicates no abnormality during transport; if red, it indicates tilting during transport. Do not use this battery and contact the after-sales service center for inspection.

3.2 Deliverables

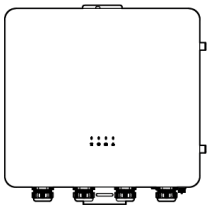
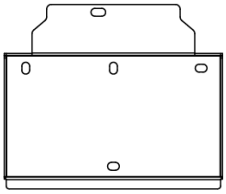
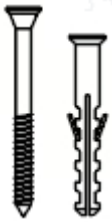
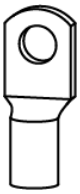
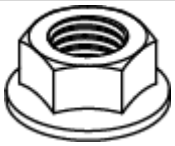
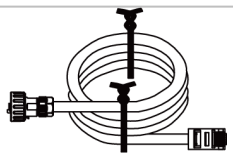
⚠Warning
Check that the type and quantity of the delivered items are correct, and that there is no visible damage. If damaged, contact your dealer. After removing the delivered items from the packaging, do not place them on rough, uneven, or sharp surfaces to avoid paint chipping.

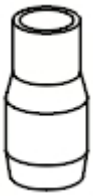
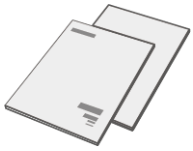
3.2.1 Inverter Delivery Items

Component	Description	Component	Description
	Inverter x 1		Backplate x 1
	Expansion Bolts x 4		Protective Earth Terminals x 2
	PV DC Wiring Terminals x 16		Tubular Terminals x 21
	2-PIN Communication Terminal x 2		3-PIN Communication Terminal x 2
	6-PIN Communication Terminal x 1		7-PIN Communication Terminal x 1
	Battery Connector (Positive) x 2		Battery Connector (Negative) x 2
	Communication Stick x 1		Meter Communication Cable x 1
	Communication Connector x 2		Meter and Accessories x 1

Component	Description	Component	Description
	PV Unlocking Tool x 1		Inverter Lifting Bar x 3
	Product Documentation x 1		Communication Adapter Cable (Inverter to STS) x 1
	Inverter Battery Connection Cable x 1[1]		Crossbeam x N[1]
Note: [1] Only required when inverter is installed on battery-side cabinet. Order separately.			

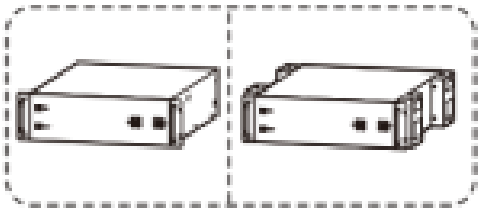
3.2.2 STS Deliverable

Component	Description	Component	Description
	STS x 1		Backplate x 1
	Expansion bolts x 6		Ground terminal x 1
	Flange nut x 4		Inverter-to-STS communication cable x 1

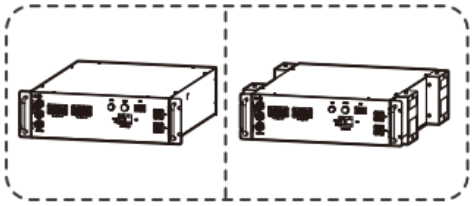
Component	Description	Component	Description
	AC insulation bushing		Product documentation x 1
	Communication cable adapter (inverter to STS) x 1		

3.2.3 Battery Delivery Unit (BAT Series 35.8-56.3kWh High Voltage Battery)

Battery PACK

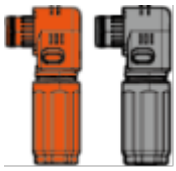
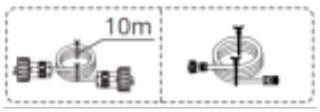
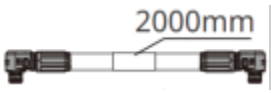
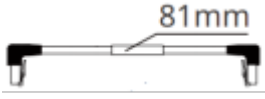
Component	Description
	Battery PACK • GW35.8-BAT-I-G10 x 7 • GW40.9-BAT-I-G10 x 8 • GW46.0-BAT-I-G10 x 9 • GW51.2-BAT-I-G10 x 10 • GW56.3-BAT-I-G10 x 11

PCU

Component	Description
	PCU x 1

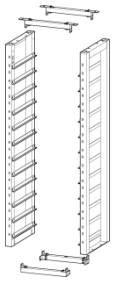
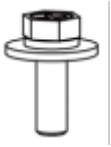
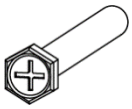
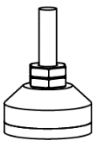
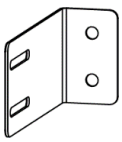
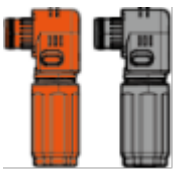
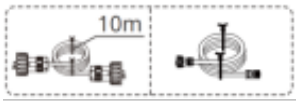
Accessories

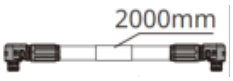
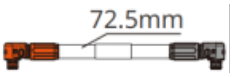
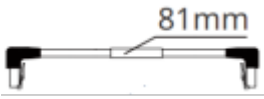
- **Stack Mounting**

Component	Description	Component	Description
	Floor locking bracket x 4		Wall locking bracket x 4
	Equipotential bonding strip x 15		M5 screw x N
	Cable grommet x 1		Expansion bolt x 8
	Adjustable foot x 4		Base x 1
	Power connector x 2		Battery and inverter communication cable x 1
	B- power cable x 1		B+ power cable x 1
	Battery internal power cable x N		Battery internal communication cable x N

Component	Description	Component	Description
	Protective earth terminal x 2		M12 expansion bolt x 4
	Nameplate x1		Cable tie x 10
	Product documentation x 1		

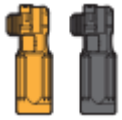
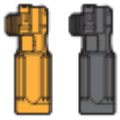
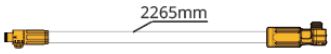
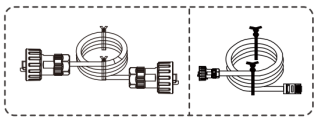
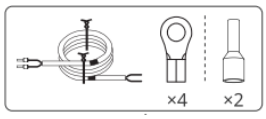
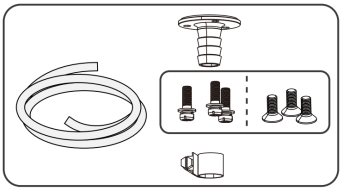
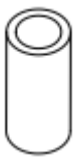
- **Rack Mounting**

Component	Description	Component	Description
	Battery rack x 1		Rubber pad x 4
	M5 screw x N		ST6.3 screw x 4
	Adjustable feet x 4		Wall-mount bracket x 2
	Power connector x 2		Battery-to-inverter communication cable x 1

Component	Description	Component	Description
	B- power cable x 1		B+ power cable x 1
	Battery internal power cable x N		Battery internal communication cable x N
	Protective grounding terminal x 2		M12 expansion bolt x 4
	Nameplate x1		Cable tie x 10
	Product documentation x 1		

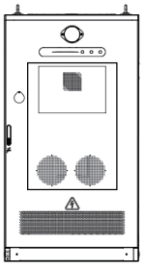
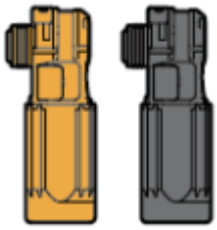
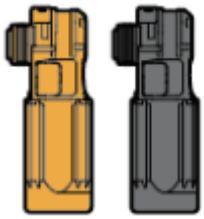
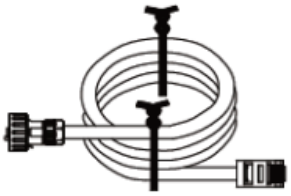
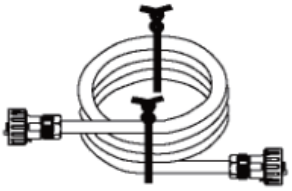
3.2.4 Battery Delivery Item (BAT Series 92.1-112.6kWh Commercial & Industrial Battery System)

Component	Description	Component	Description
	Battery cabinet x 1		Expansion bolts x 4
	Grounding M5 screws x 3		Grounding terminals x 3

Component	Description	Component	Description
	Inverter battery connection terminals 25mm² x 2		Inter-battery connection terminals 50mm² x 2
	Inter-Pack series wiring harness • GW92.1-BAT-AC-G10 x 8 • GW102.4-BAT-AC-G10 x 9 • GW112.6-BAT-AC-G10 x 10		Pack negative to high-voltage box negative wiring harness x 1
	Inverter battery connection (positive) x 1		Inverter battery connection (negative) x 1
	Battery and inverter communication network cable x 1		Air conditioner power supply harness kit x 1
	Fireproof putty x 8		Cable ties x 20
	Air conditioner water pipe kit x 1		Lifting rings x 4
	Corrugated tube connectors x 6		25mm² to 10mm² round tube terminals x 4

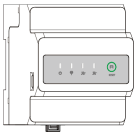
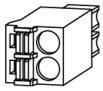
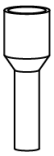
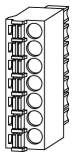
Component	Description	Component	Description
	Product documentation x 1		

3.2.5 Battery Delivery Unit (BAT-C Series 208.9kWh Commercial & Industrial Battery System)

Component	Description	Component	Description
	Battery system ×1		25mm^2 power cable ×2
	50mm^2 power cable terminal ×1		25mm^2 power cable terminal ×2
	Communication cable (10m) ×2		Communication cable (3.8m) ×1
	Expansion bolts ×4		Grounding terminal ×3

Component	Description	Component	Description
	AC connector ×1		Tubular terminal ×3
	M8 screw ×12		Corrugated tube connector ×4
	Flat-blade screwdriver ×1		Fireproof putty ×6
	Optimizer positive unlocking terminal ×1 (Optional)		Optimizer negative unlocking terminal ×1 (Optional)
	Cable ties ×20		Product documentation ×1

3.2.6 Smart Meter Deliverables

Component	Description	Component	Description
	Smart Meter GM330 x 1		2 PIN Communication Terminal x 1
	Tube Terminal x 6		7 PIN Communication Terminal x 1
	Screwdriver x 1		Product Documentation x 1

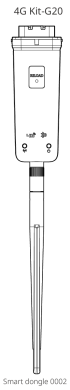
3.2.7 Smart Communication Stick

3.2.7.1 WiFi/LAN Kit-20

Component	Description	Component	Description
	Communication module x1		Product documentation x 1

3.2.7.2 Communication Module Deliverables (4G Kit-G20/4G Kit-CN-G20)

4G Kit-G20

Component	Description	Component	Description
	Smart Communication Stick x1		Product Documentation x 1

Component	Description	Component	Description
	Accessories x1		Tools x1 or 0

4G Kit-CN-G20

Component	Description	Component	Description
	Smart Communication Stick x1		Product Documentation x 1

3.3 Equipment Storage

If the equipment is not put into use immediately, store it according to the following requirements. After long-term storage, the equipment must be inspected and confirmed by professionals before continued use.

1. If the inverter has been stored for more than two years or has not been operated for more than 6 months after installation, it is recommended to be inspected and tested by professionals before putting into use.
2. To ensure good electrical performance of the internal electronic components of the inverter, it is recommended to power on every 6 months during storage. If not powered on for more than 6 months, it is recommended to be inspected and tested by professionals before putting into use.
3. To ensure battery performance and service life, it is recommended to avoid long-term idle storage. Long-term storage may cause deep discharge of the battery, leading to irreversible chemical loss, resulting in capacity degradation or even complete failure. It is recommended to use it in time. If the battery requires long-term storage, perform maintenance according to the following requirements:

Battery	Initial SOC Range for Battery Storage	Recommended Storage Temperature	Charge/Discharge Maintenance Cycle	Battery Maintenance Method
BAT Series 35.8-56.3kWh High Voltage Battery	30%~40%	0~35℃	-20~35℃ (≤12 months) 35~+45℃ (≤6 months)	For maintenance methods, please consult the dealer or after-sales service center.
BAT Series 92.1-112.6kWh Commercial & Industrial Battery System				
BAT-C 208.9kWh Commercial & Industrial Battery System	35%~45%			

Note
After the charge/discharge maintenance is completed and qualified, 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 by yourself and keep the data properly for future maintenance records.

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 range, and no condensation. If there is condensation on the equipment

ports, do not install the equipment.
3. Ensure the equipment is stored away from flammable, explosive, corrosive, and other dangerous items.

Stacking Requirements:

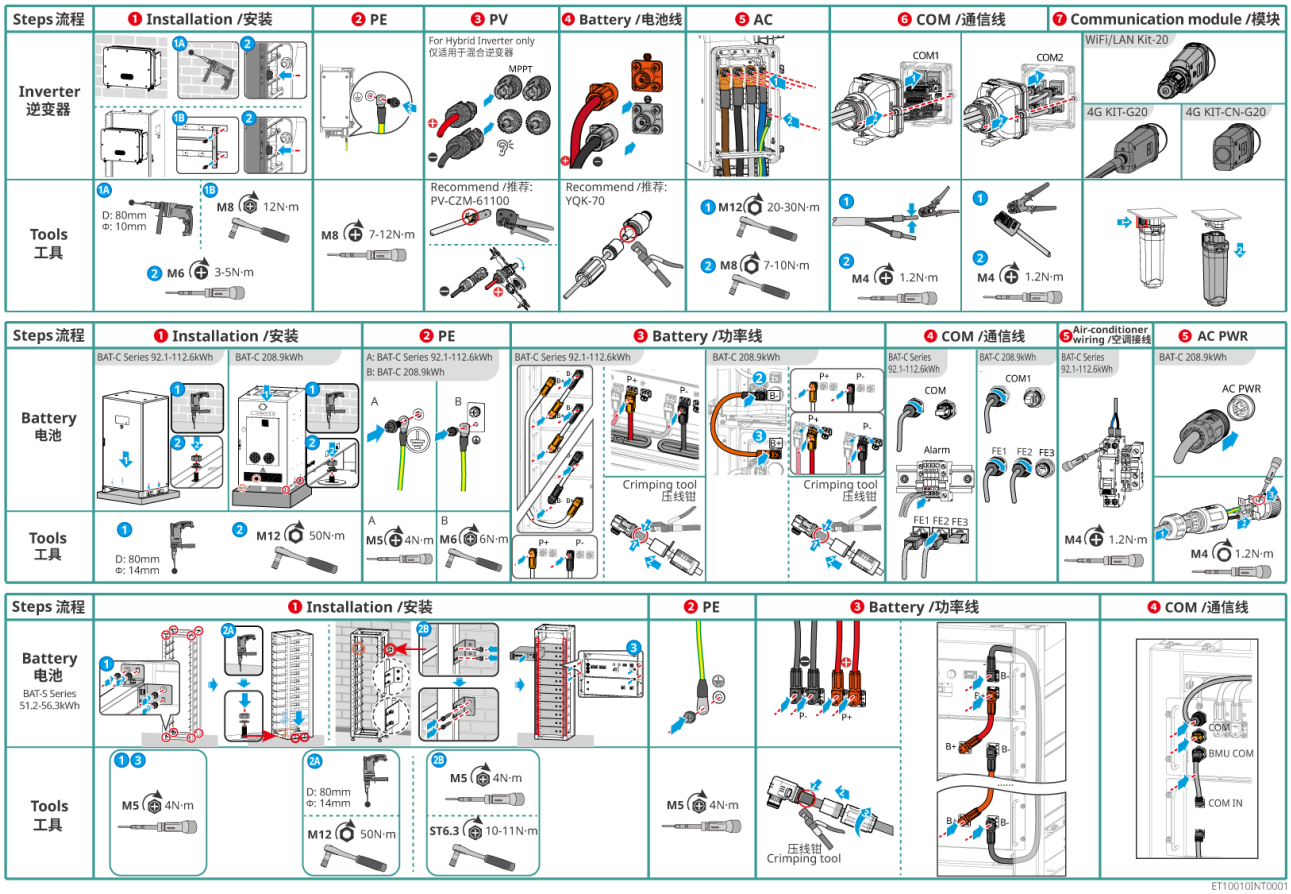
1. Ensure the stacking height and direction of the equipment comply with the label instructions on the packaging box.
2. Ensure there is no risk of tipping after stacking the equipment.

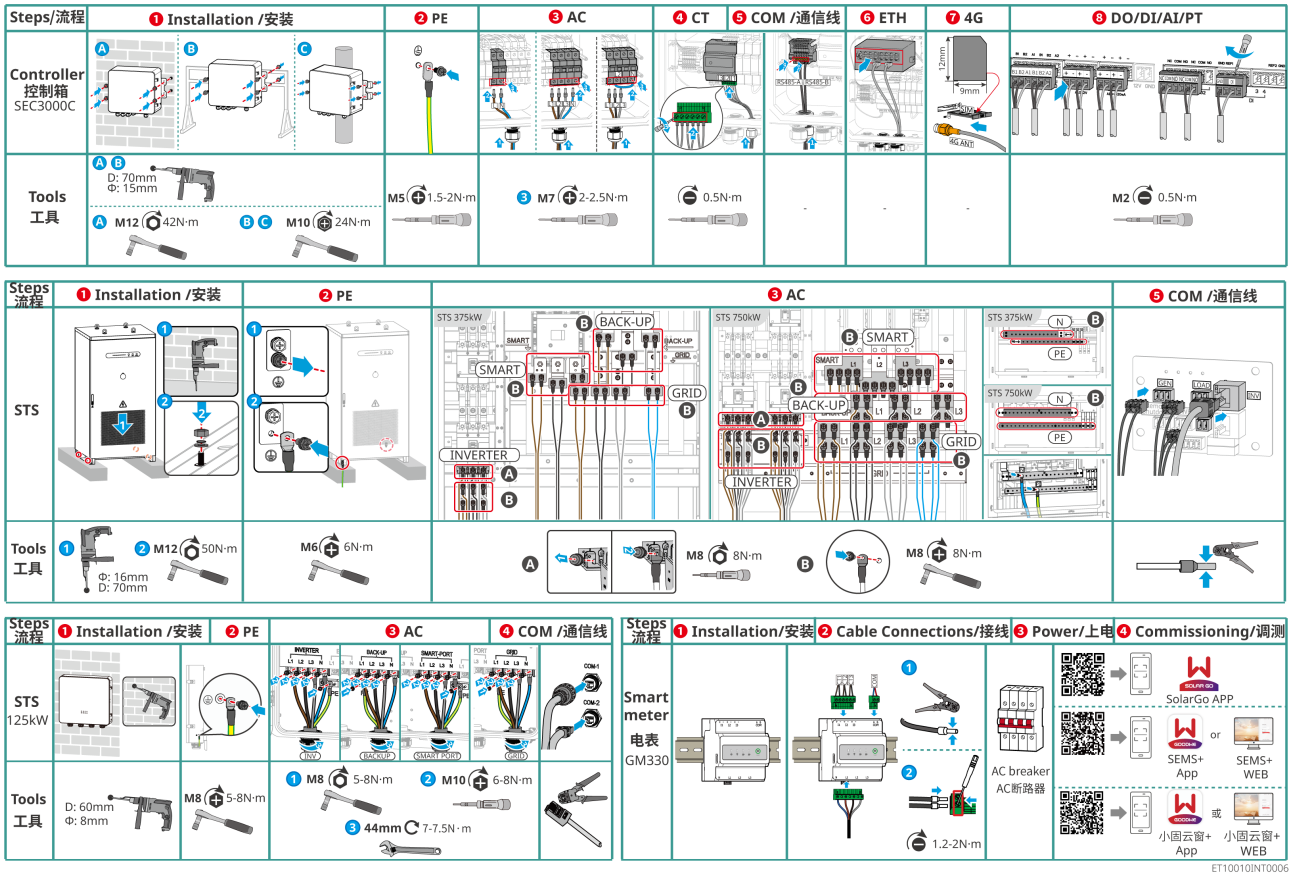
4 Installation

Danger

When installing equipment and making electrical connections, please use the delivery items shipped with the box. Otherwise, any damage caused to the equipment will not be covered by the warranty.

4.1 System Installation and Commissioning Process





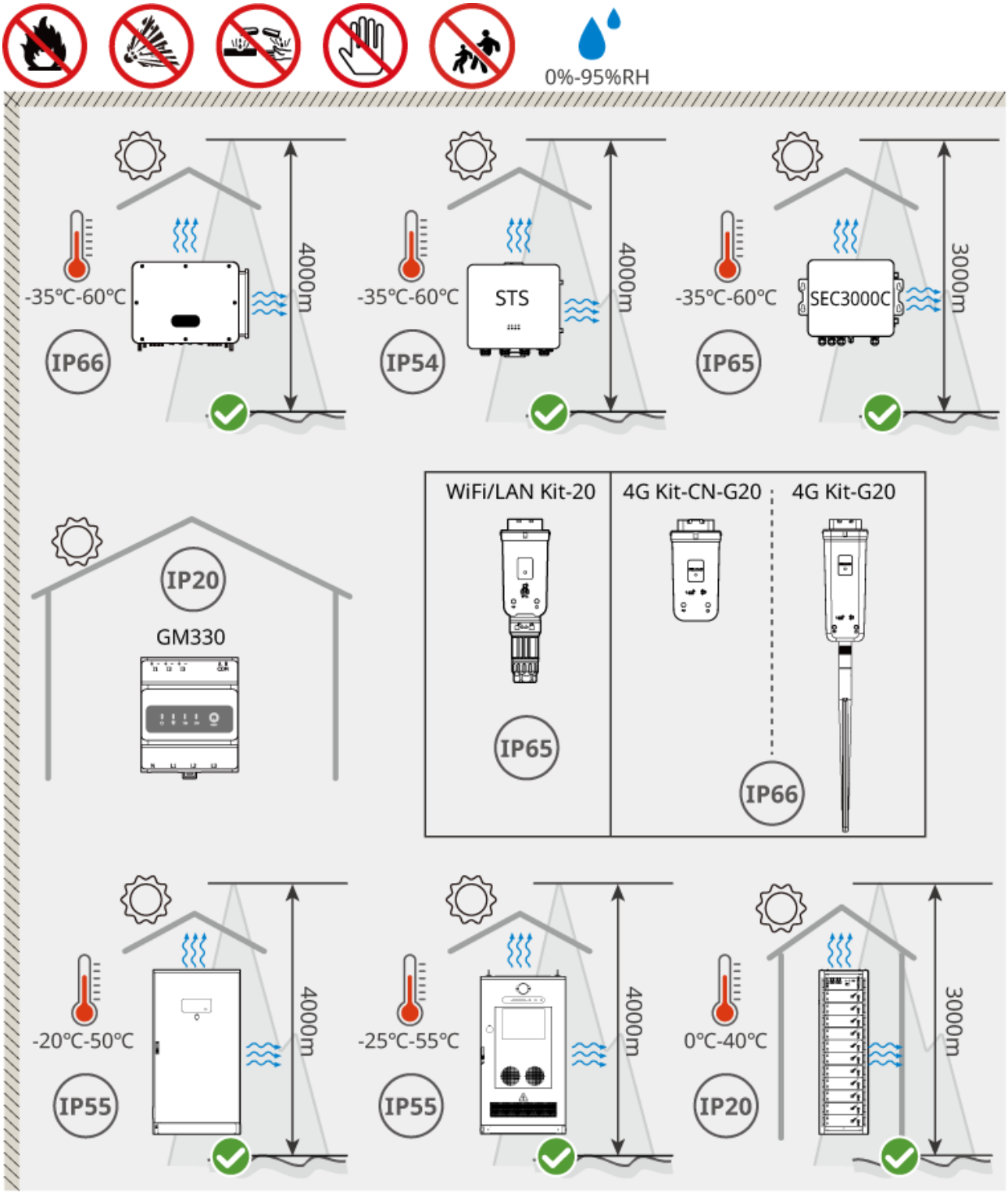
4.2 Installation Requirements

4.2.1 Installation Environment Requirements

1. The equipment must not be installed in environments that are flammable, explosive, or corrosive.
2. The temperature and humidity of the installation environment must be within the appropriate range.
3. The installation location must be out of reach of children and avoid locations where it can be easily touched.
4. The enclosure temperature may exceed 60°C during inverter operation. Do not touch the enclosure until it has cooled down to prevent burns.
5. The equipment must be installed away from sunlight, rain, snow, etc. It is recommended to install in a sheltered location, and if necessary, a sunshade can be built.
6. Adverse environmental conditions such as direct sunlight and high temperatures may cause derating of the inverter output power.

7. The installation space must meet the equipment's ventilation and heat dissipation requirements as well as operational space requirements.
8. The installation environment must meet the equipment's protection level.
   - The inverter and smart communication stick are suitable for indoor and outdoor installation.
   - The meter is suitable for indoor installation.
   - BAT series 92.1-112.6kWh commercial and industrial battery systems are suitable for indoor and outdoor installation.
   - BAT series 35.8-56.3kWh high-voltage batteries require indoor installation and must be kept ventilated.
   - BAT-C series 208.9kWh commercial and industrial battery systems are suitable for indoor and outdoor installation.
9. The installation height must facilitate operation and maintenance, ensuring that indicator lights and all labels are easy to view and terminals are easy to operate.
10. The installation altitude must be below the maximum operating altitude.
11. The battery system must be installed on a flat and dry ground without depressions or tilting, and must not be installed in waterlogged environments.
12. Do not install the battery system on ground prone to water accumulation or subsidence, and ensure the ground can bear the weight of the battery system.
13. Before installing equipment outdoors in salt-damage areas, consult the equipment manufacturer. Salt-damage areas mainly refer to regions within 500m from the coast. The affected area depends on sea breeze, precipitation, terrain, etc.
14. Stay away from strong magnetic field environments to avoid electromagnetic interference. If there are radio stations or wireless communication devices below 30MHz near the installation location, install the equipment according to the following requirements:

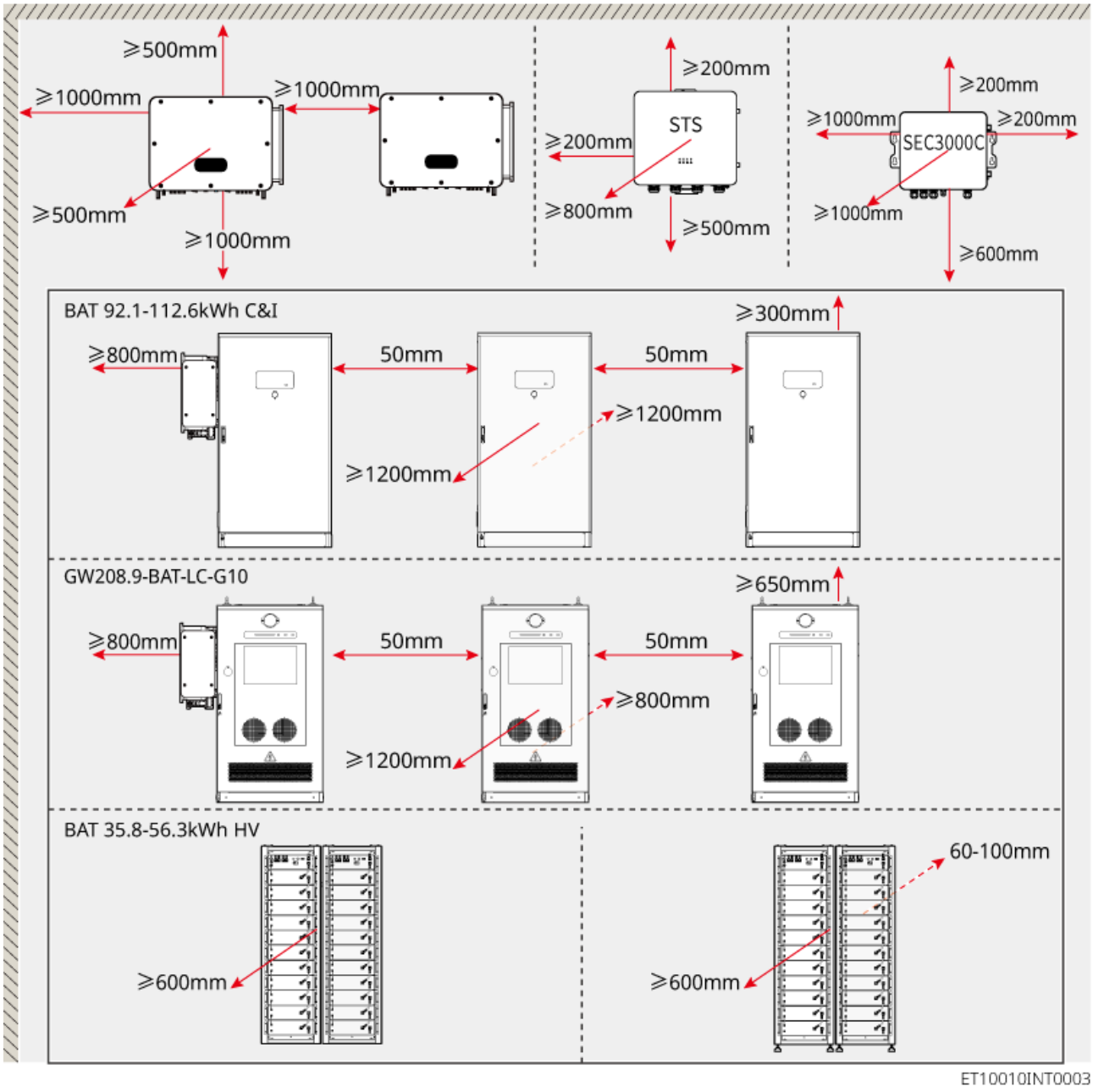
- Inverter: Add multi-turn ferrite cores on the DC input or AC output lines of the inverter, or add a low-pass EMI filter; or ensure the distance between the inverter and the wireless electromagnetic interference device exceeds 30m.
- Other equipment: The distance between the equipment and the wireless electromagnetic interference device must exceed 30m.



4.2.2 Installation Space Requirements

When installing equipment in the system, certain space should be reserved around

the equipment to ensure sufficient installation and heat dissipation space.



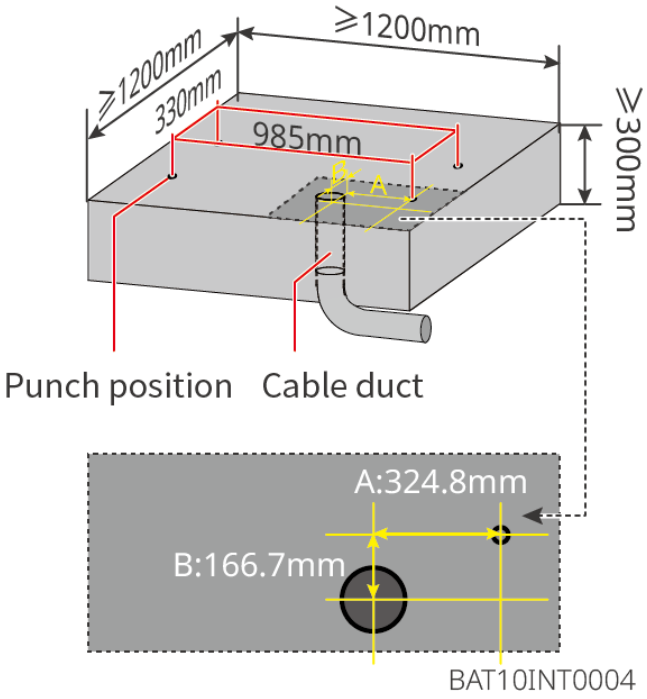
4.2.3 Foundation Requirements for Installation

Note

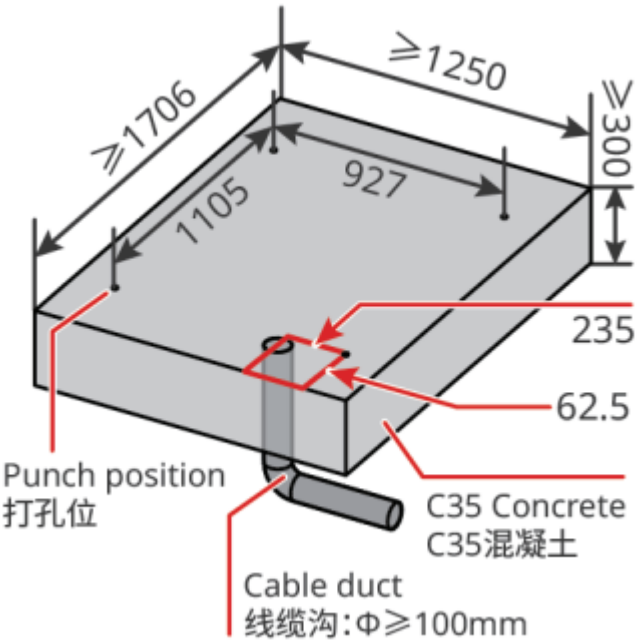
- BAT series 92.1-112.6kWh commercial and industrial battery systems and BAT-C series 208.9-261.2kWh commercial and industrial battery systems require a foundation.
- The conduit can be replaced with an appropriately sized PVC pipe according to site conditions.

1. Foundation material requirements:
   - For BAT series 92.1-112.6kWh commercial and industrial battery systems, the foundation must be a C25 plain concrete hardened ground or other non-combustible surface.
   - For BAT-C series 208.9-261.2kWh commercial and industrial battery systems, the foundation must be a C35 plain concrete hardened ground or other non-combustible surface.
2. The foundation must have reserved trenches or cable outlets for easy equipment wiring.
3. The equipment (including height, embedded expansion screws, conduits, etc.) should be adjusted according to the process and site conditions.
4. The top elevation of the equipment foundation can be adjusted based on the actual requirements of the equipment and site.
5. Ensure the equipment is installed level, not tilted or inverted.
6. Trench requirements:
   - If the equipment uses bottom cable entry, the trench must have dust and rodent prevention design to prevent foreign objects from entering.
   - The trench must have waterproof and moisture-proof design to prevent cable aging and short circuits, ensuring normal equipment operation.
   - Since the equipment cables are thick, the trench design must fully reserve space for cables to ensure smooth connections without abrasion.

BAT series 92.1-112.6kWh commercial and industrial battery system:



BAT series 208.9kWh commercial and industrial battery system:



4.2.4 Handling Requirements

⚠Warning

1. During transportation, transfer, installation, and other operations, the laws, regulations, and relevant standards of the country and region must be complied with.
2. Freight forwarders engaged in the transport of dangerous goods must obtain relevant qualifications and strictly comply with local dangerous goods transport regulations.
3. The tilt angle of the cabinet during transportation and movement must be less than 10 degrees.
4. Before installation, the equipment must be moved to the installation site. During the move, to avoid personal injury or equipment damage, please note the following:
   - Based on the weight of the equipment, deploy an appropriate number of personnel to prevent the equipment from exceeding the weight range that can be carried by humans and causing injury.
   - Wear safety gloves to avoid injury.
   - Ensure the equipment remains balanced during handling to avoid falling.
   - Ensure the cabinet doors are locked during equipment handling.
5. When using lifting methods to move equipment, use flexible slings or straps. The load capacity of a single strap must be ≥2t.
6. When using a forklift to move equipment, the load capacity of the forklift must be ≥5t.

⚠Caution

Forklift handling must meet the following requirements:

- Before use, confirm that the forklift's load capacity is ≥5 tons, fork length >1.65m, fork width between 350–600mm, and fork thickness between 40–80mm.
- Before moving the equipment, pay attention to its center of gravity, and use ropes or strapping belts or other securing measures to firmly fasten the equipment to the forklift.
- Designate a dedicated person to supervise during forklift transportation.
- Refer to the label instructions on the equipment packaging for the forklift entry position.
- During forklift transportation, maintain low speed, stability, and slow down when turning.

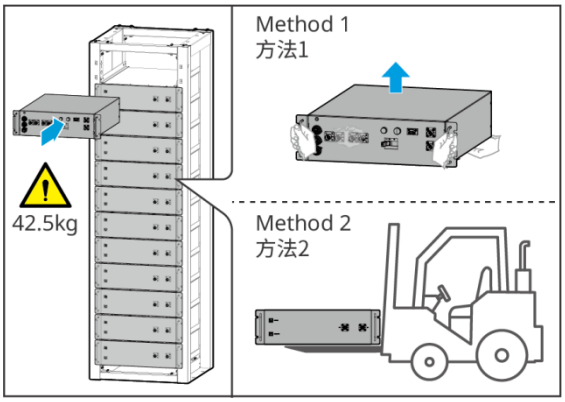
Lifting and handling must meet the following requirements:

- The crane operator must have good operating skills and safety awareness, must be trained and certified, and operate in accordance with local laws and regulations.
- Crane lifting capacity ≥5 tons, lifting radius >2 meters.
- Before lifting, confirm:
  1. Lifting tools are complete, tested, and completely safe
  2. Equipment doors are closed and locked to prevent accidental opening
  3. The quality of the lifting ropes must meet standards, and they must be fully secured to avoid falling and wear
- Do not lift outdoors in adverse weather such as rain, snow, or strong wind.

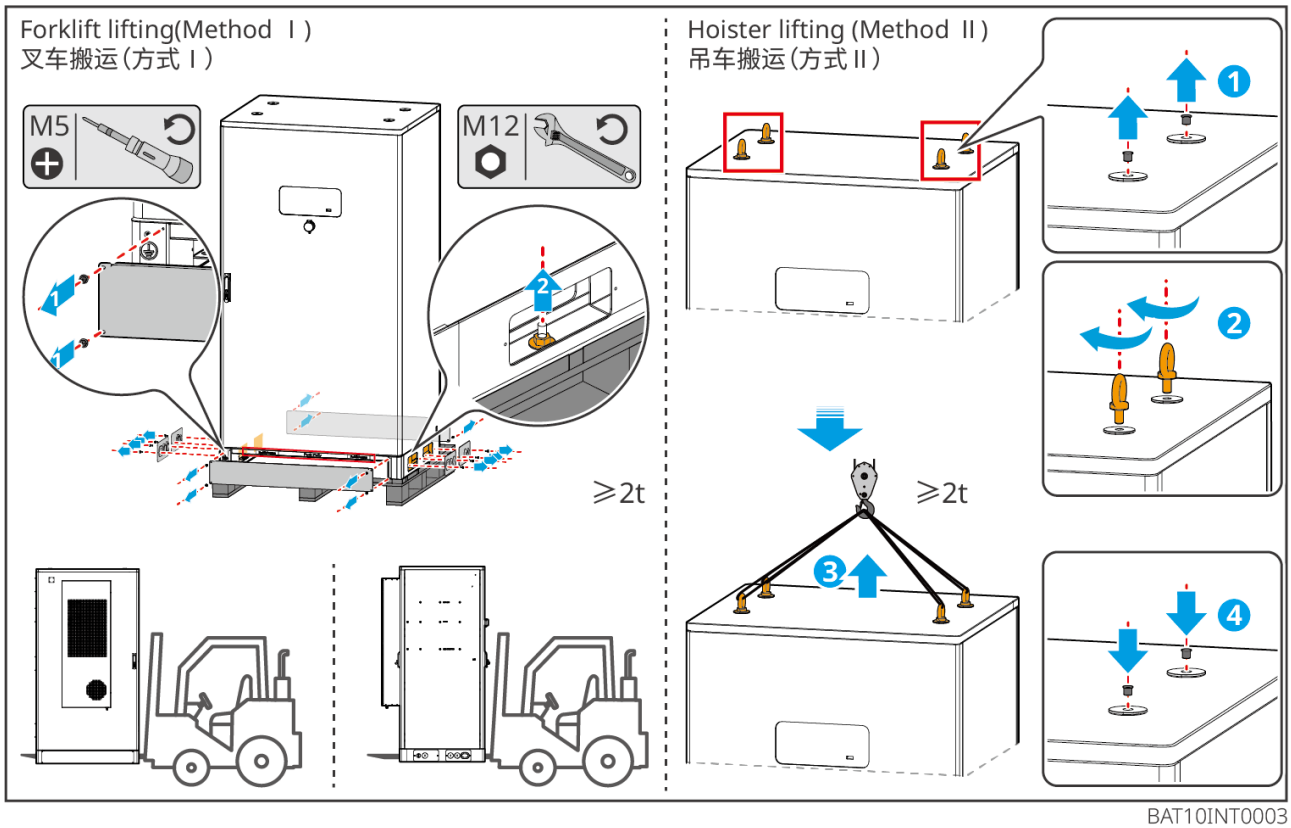
Note

- For cabinet-type battery systems, there is a baffle at the bottom. Remove the baffle before using a forklift to move the equipment.
- When a cabinet-type battery system is shipped, it is fixed to the base with screws. Remove the base before installation.

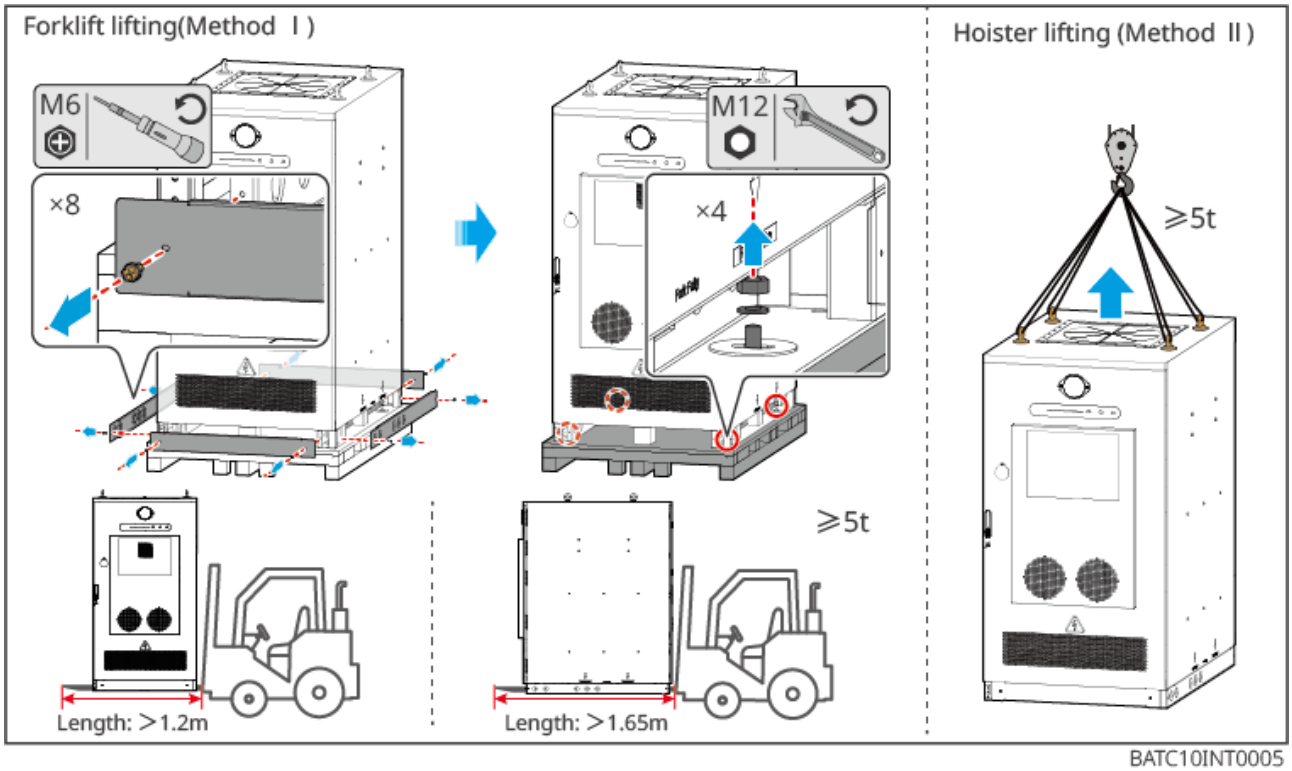
- **BAT Series 35.8-56.3kWh High Voltage Battery**



- **BAT Series 92.1-112.6kWh Commercial & Industrial Battery System**



- **BAT Series 208.9-261.2kWh Commercial & Industrial Battery System**



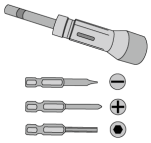
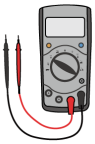
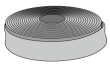
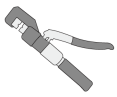
BATC10INT0005

4.2.5 Tool Requirements

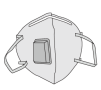
Note
During installation, it is recommended to use the following installation tools. If necessary, other auxiliary tools can be used on site.

Installation Tools

Tool Type	Description	Tool Type	Description
	Diagonal Pliers		RJ45 Crimping Pliers
	Wire Stripper		Level

Tool Type	Description	Tool Type	Description
	Open-end Wrench		PV Terminal Crimping Tool A-2546B
	Impact Drill (Φ8mm drill bit)		Torque Wrench M4, M5, M8
	Rubber Mallet		Socket Wrench Set
	Marker Pen		Multimeter Range ≤600V
	Heat Shrink Tubing		Heat Gun
	Cable Ties		Vacuum Cleaner
	YQK-70 Hydraulic Pliers		

Personal Protective Equipment

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

4.3 Install Inverter

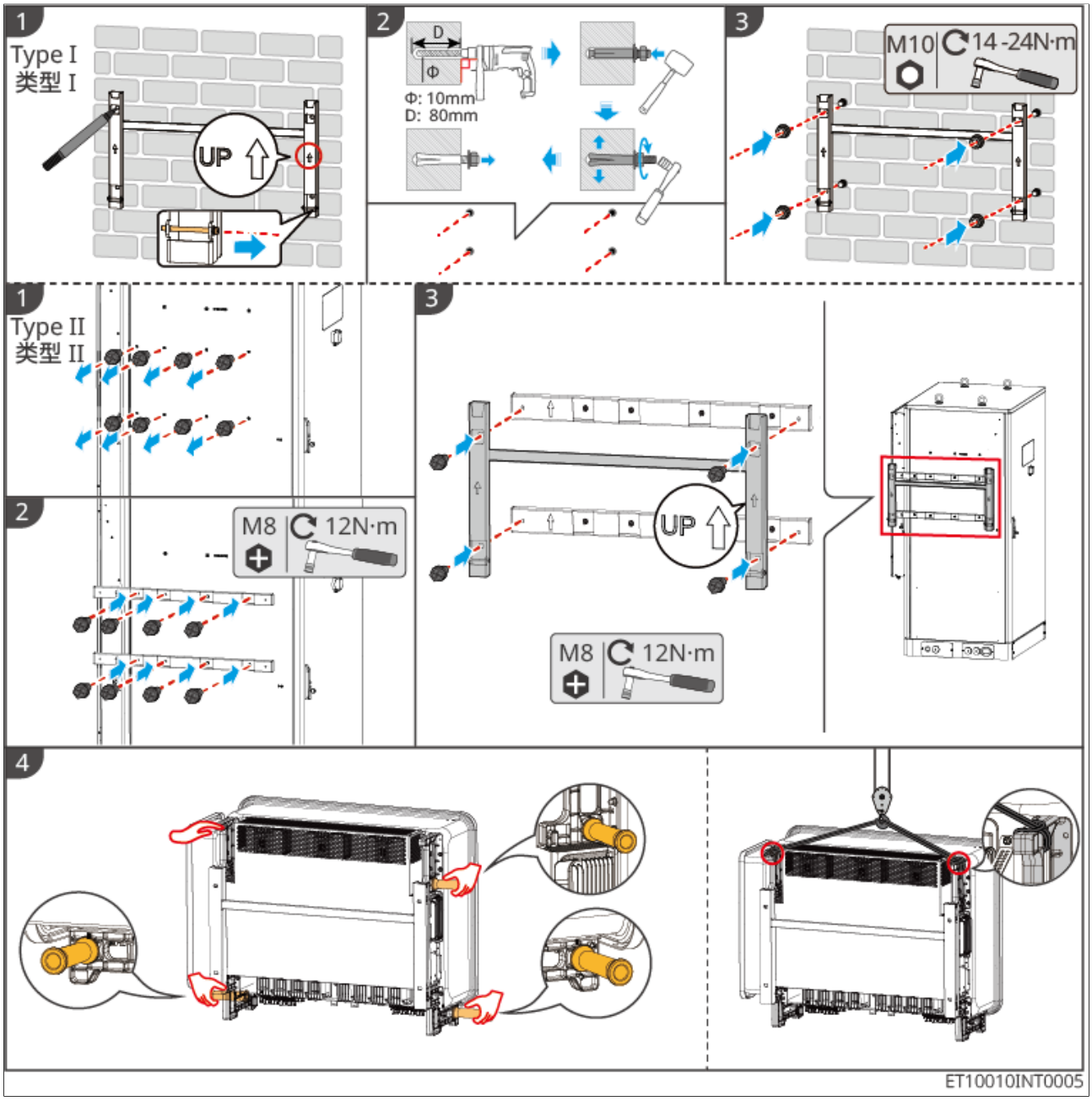
⚠Caution

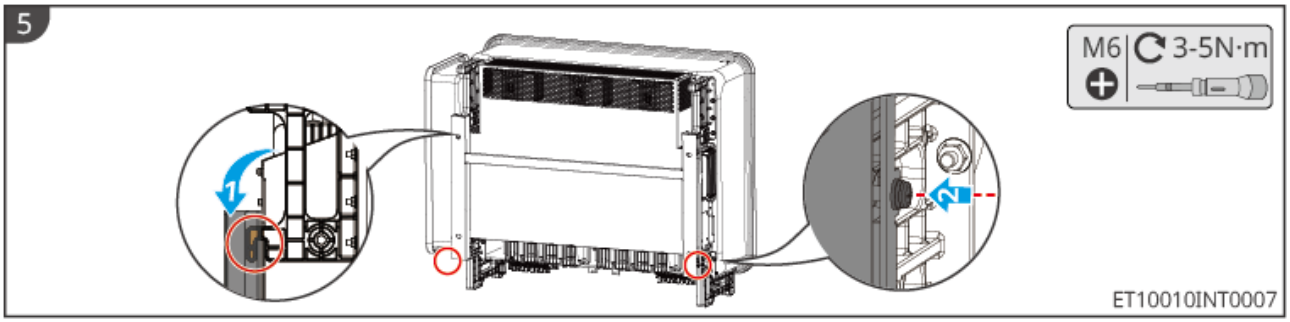
- When drilling, ensure the drilling position avoids water pipes, cables, etc., inside the wall to avoid danger.
- When drilling, wear safety goggles and a dust mask to prevent inhalation of dust or it getting into your eyes.
- Ensure the inverter is securely installed to prevent injury from falling.

Step 1: Place the backplate horizontally on the wall and mark the drilling positions with a marker pen (wall-mounted installation); or remove the screws (battery cabinet side-mounted installation).
Step 2: Drill holes using a hammer drill, then insert expansion bolts into the holes (wall-mounted installation); or install the crossbeam (battery cabinet side-mounted installation).
Step 3: Fix the inverter backplate to the wall or the battery cabinet side panel.
Step 4: Transport the inverter.

- Manual handling: After installing the inverter handle, hold the handle to carry it.
- Lifting transport: Thread the lifting sling through the lifting holes and secure it, then use a crane to transport it.

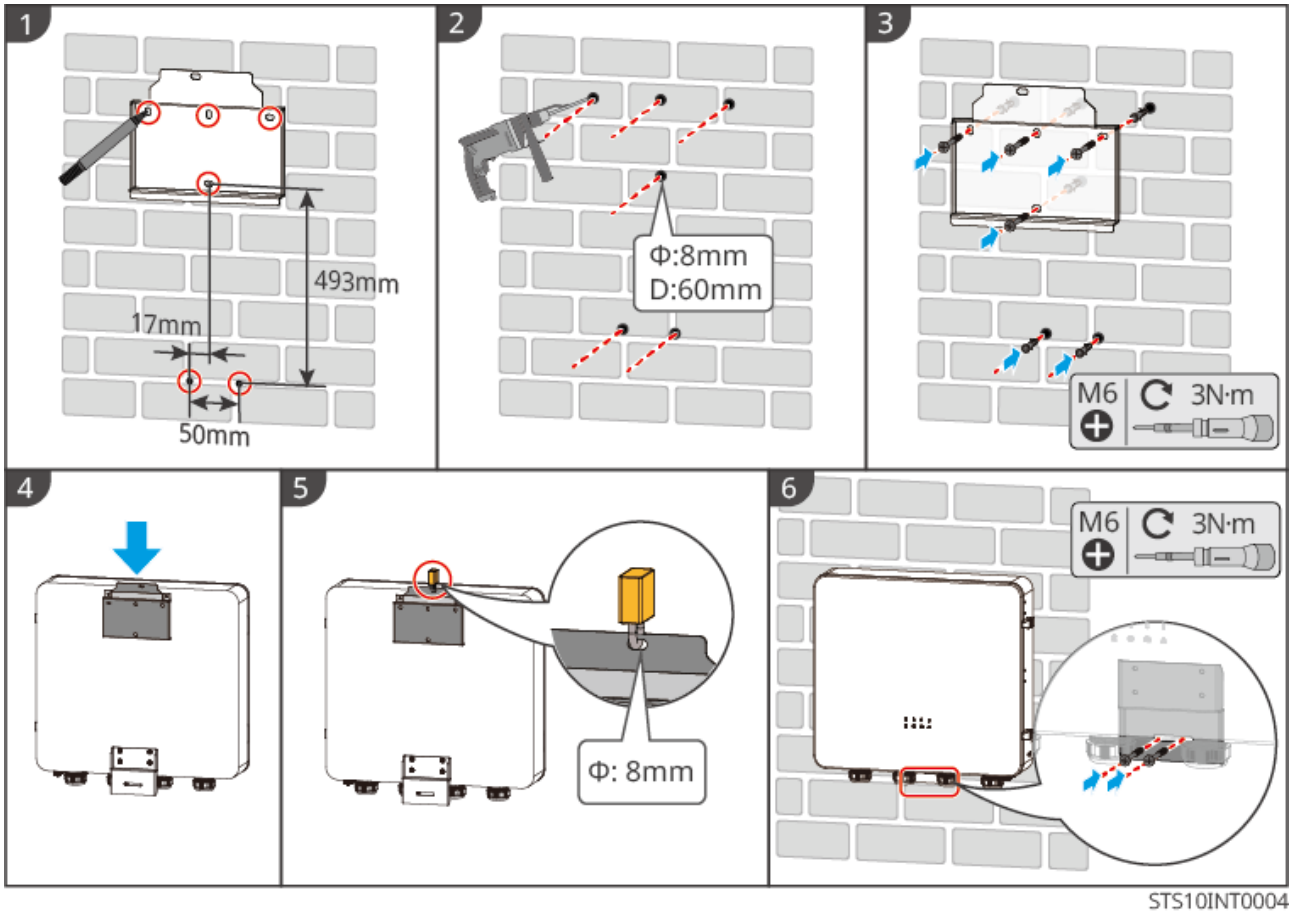
Step 5: Hang the inverter onto the backplate and secure it to the backplate.


1
Type I
类型 I
UP
2
D
Φ
Φ: 10mm
D: 80mm
3
M10
14 -24N·m
1
Type II
类型 II
2
M8
12N·m
3
UP
M8
12N·m
4
ET10010INT0005


5
M6
3-5N·m
ET10010INT0007

4.4 Installing STS

Step 1: Place the backplate horizontally against the wall and mark the drilling positions with a marker.
Step 2: Drill holes using an impact drill.
Step 3: Secure the backplate to the wall using expansion bolts.
Step 4: Mount the STS onto the backplate.
Step 5: Install the anti-theft lock.
Step 6: Secure the fixing bracket to the wall using M6 screws.



STS10INT0004

4.5 Install the battery

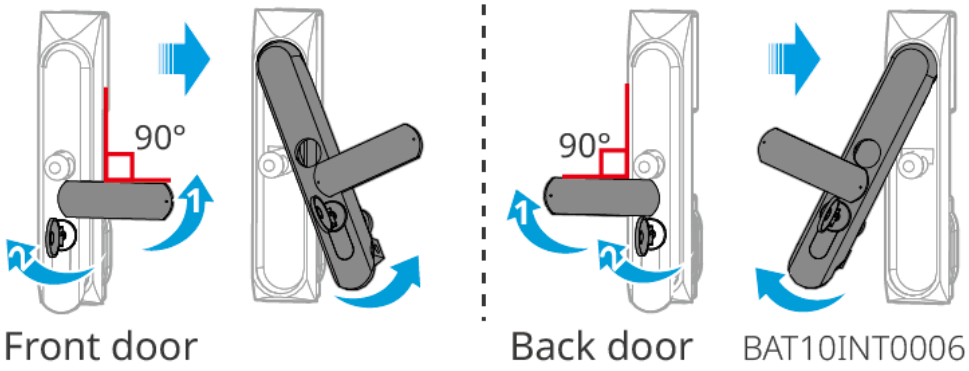
4.5.1 Open the Cabinet Door

Note

- Do not open the cabinet door during equipment handling.
- After completing equipment installation, wiring, commissioning, etc., please close the cabinet door.

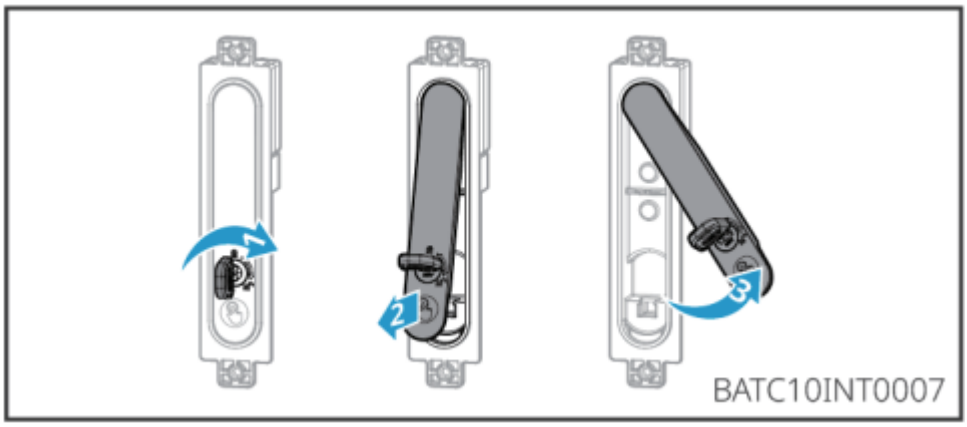
- **BAT Series 92.1-112.6kWh Industrial and Commercial Battery System**

Step 1: Unscrew the lock core cover and use the key to unlock the cabinet door.
Step 2: Rotate the door handle to open the cabinet door.



- **BAT-C Series 208.9kWh Industrial and Commercial Battery System**

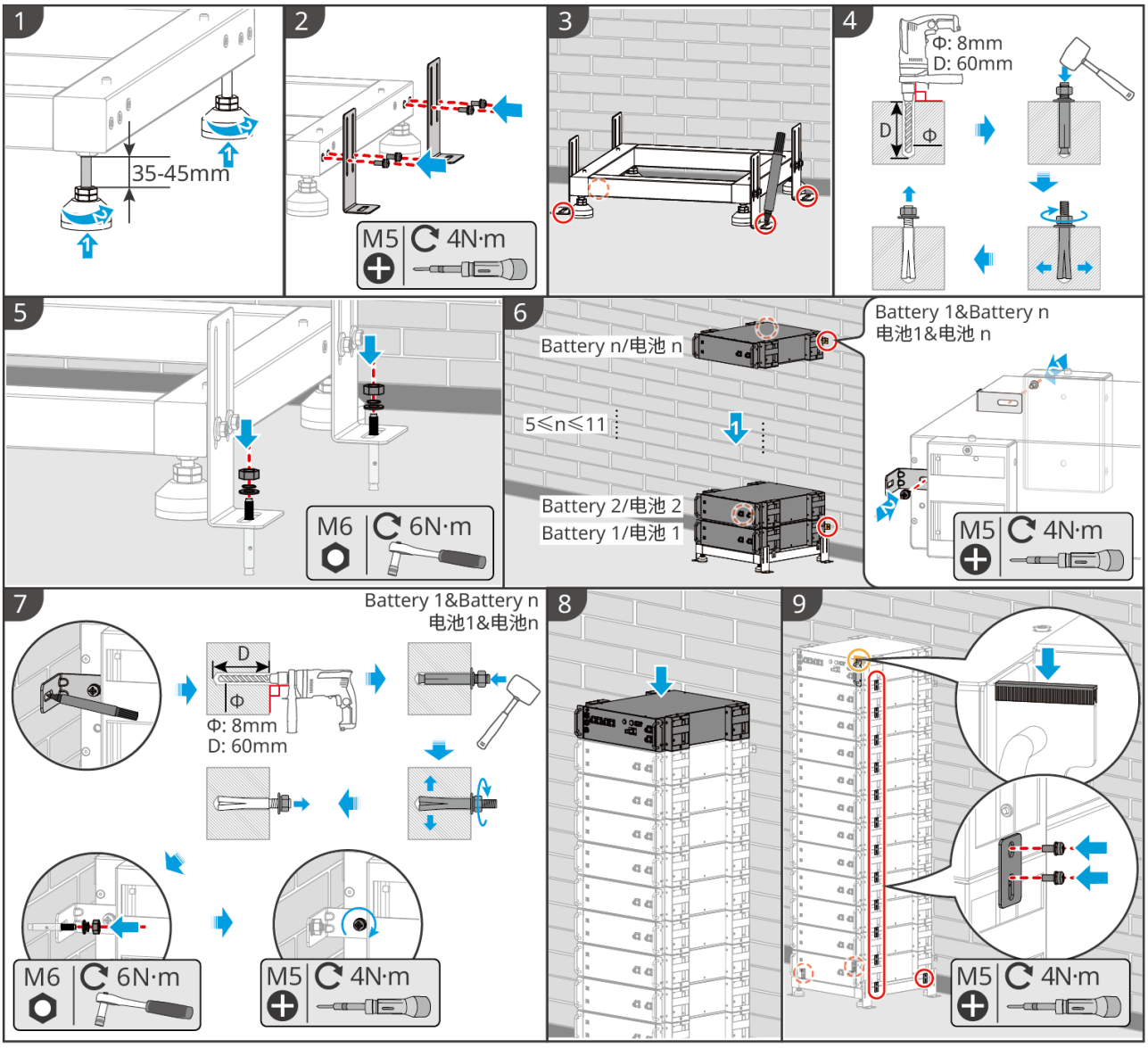
Step 1: Use the key to unlock the cabinet door.
Step 2: Pull the door handle upward.
Step 3: Rotate the door handle counterclockwise to open the cabinet door.



4.5.2 Installing BAT Series 35.8-56.3kWh High Voltage Battery

• Stacking Installation

Step 1: Install adjustable feet under the base, with a height adjustment range of 35-45mm.
Step 2: Secure the floor locking bracket onto the base.
Step 3: Mark the drilling positions for expansion bolts on the floor with a pen.
Step 4: Install expansion bolts.
Step 5: Secure the floor locking bracket to the ground using expansion bolts.
Step 6: Stack the battery PACKs, and pre-tighten the wall locking brackets on the first and last battery PACKs.
Step 7: Mark the drilling positions for expansion bolts on the wall with a pen, secure the wall locking bracket with expansion bolts, then tighten the wall locking bracket on the battery PACK.
Step 8: Place the high voltage box.
Step 9: Install equipotential bonding strips and cable grommets.



BAT10INT0021

• Battery Rack Installation

Install the Battery Rack

Step1: Place the bracket flat according to the arrow marks, and align each hole position according to the serial number silk screen.
Step2: Use M5 screws to fix the round holes first, then fix the slotted holes.

Secure the Battery Cabinet

◦ **Type I**

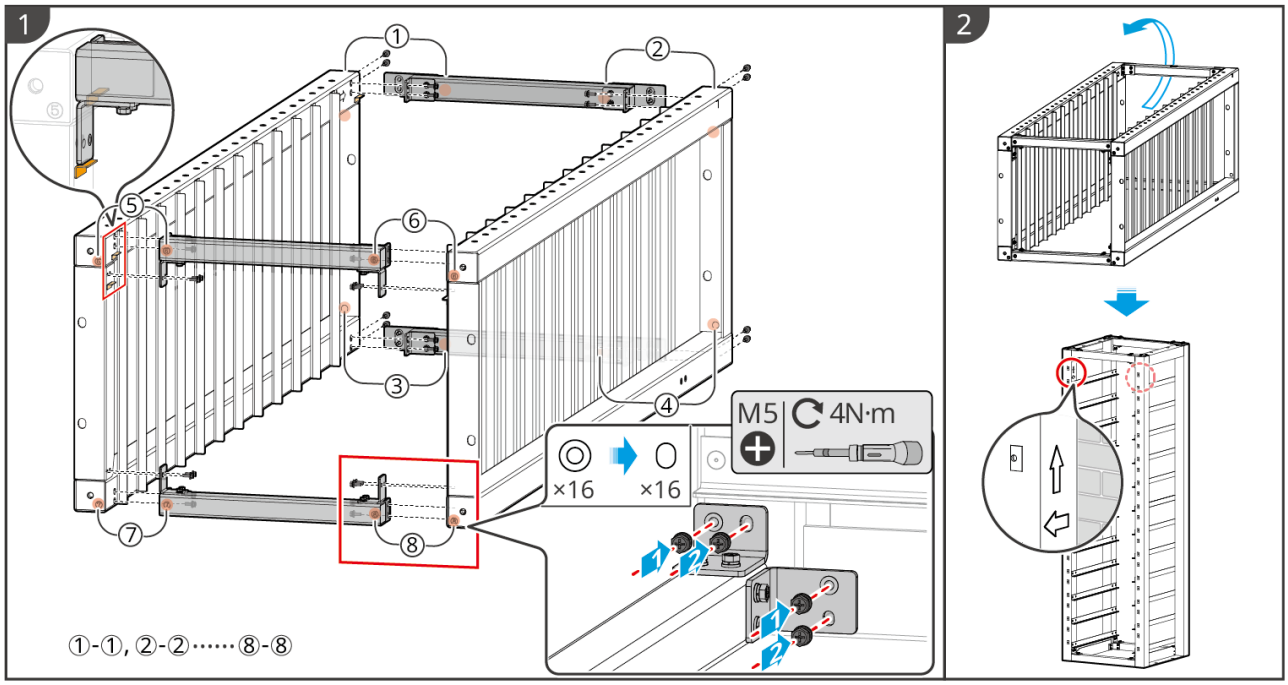
Step1: Use a marking pen to mark the drilling positions on the level ground.
Step2: Use a hammer drill to drill holes, and install expansion bolts.
Step3: Move the battery rack to the hole positions, and use a socket wrench to tighten the expansion bolts.

- **Type II**

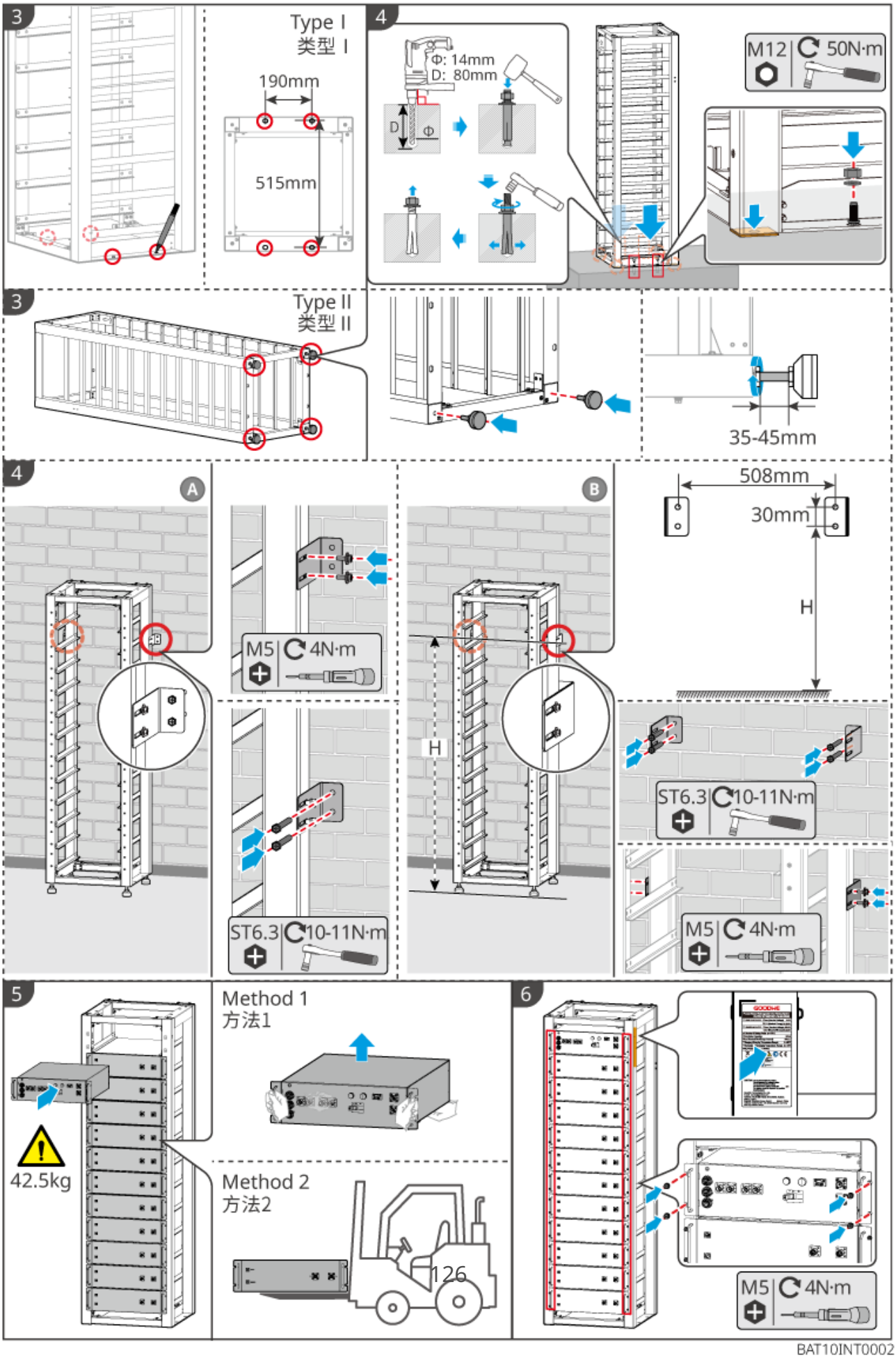
Step1: Lay the bracket down and install leveling feet at the bottom.
Step2: Stand the bracket upright, and use wall fixing brackets to secure the battery rack to the wall.

Install the High Voltage Box and Battery Pack

Step1: Push in directly or use a forklift to move the high voltage box and battery Pack.
Step2: Attach labels, and use M5 screws to fasten the high voltage box and battery Pack.



BAT10INT0001

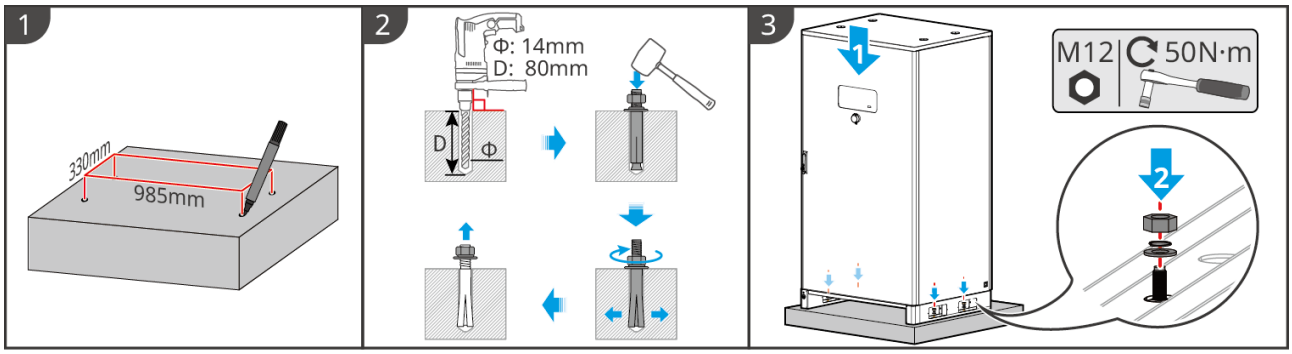


BAT10INT0002

Install BAT Series 92.1-112.6kWh Commercial and Industrial Battery System

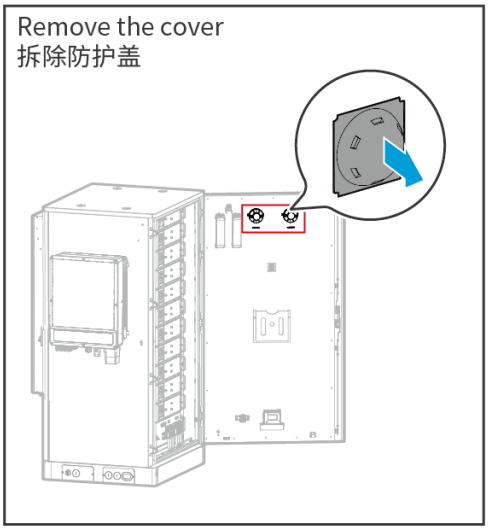
Step 1: Secure the battery system to the foundation.

1. Mark the drilling positions according to the dimensions shown.
2. Use a hammer drill to make holes and install expansion bolts.
3. Move the battery rack to the hole positions and fasten the battery to the foundation using expansion bolts.



BAT10INT0005

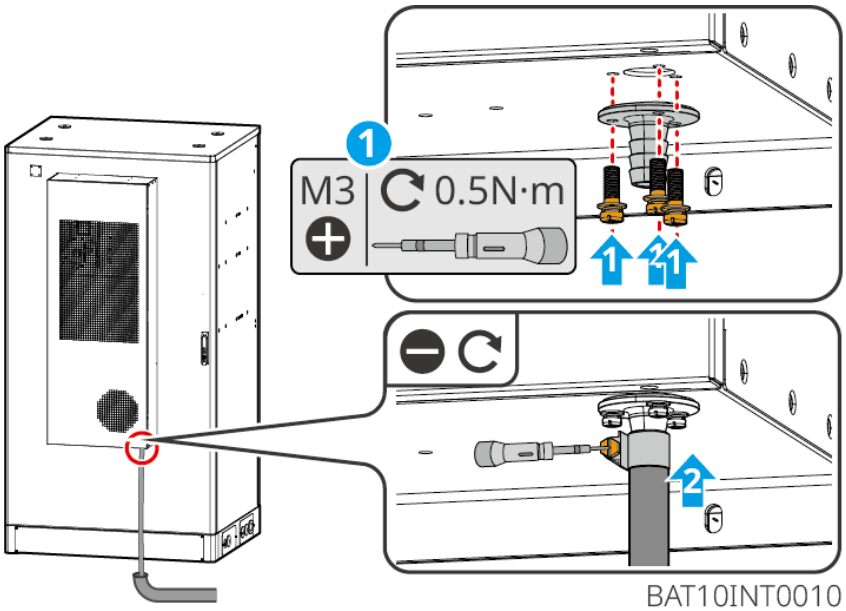
Step 2: Remove the protective covers of the smoke and temperature alarm sensors. When the battery is shipped, the alarm sensors for smoke and temperature have protective covers. Remove the covers for the alarms to function properly.



BAT10INT0016

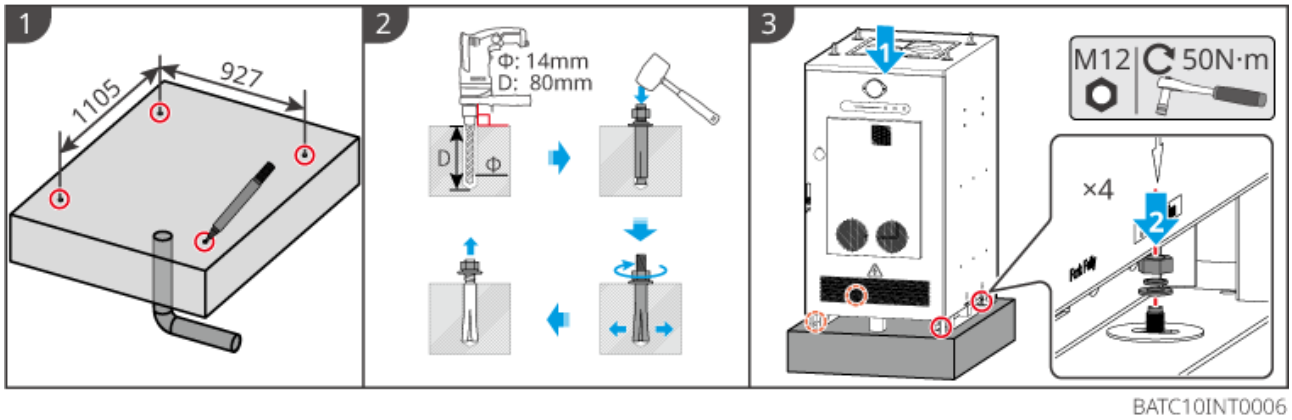
Step 3: Install the air conditioner drain pipe.

1. Install the air conditioner drain pipe connector.
2. Secure the air conditioner drain pipe to the connector.



4.5.4 Installing BAT-C Series 208.9kWh Commercial & Industrial Battery System

1. Mark the drilling positions on the foundation with a marker.
2. Install expansion bolts.
3. Secure the battery system to the foundation with expansion bolts.

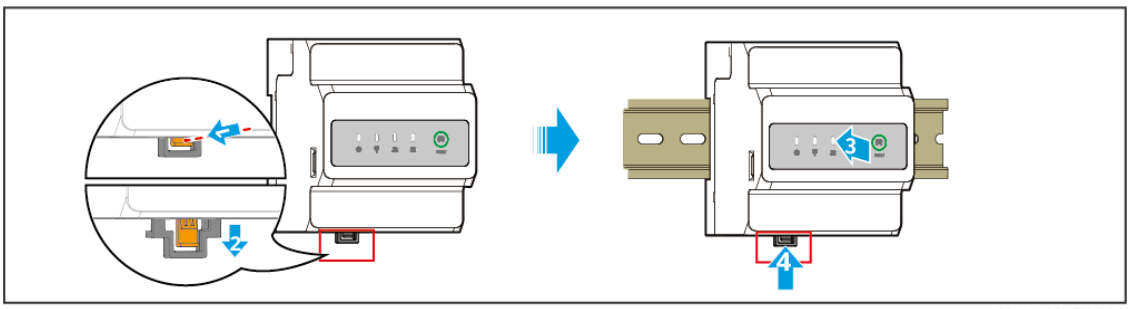


4.6 Install Electric Meter

⚠Warning

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

GM330



GMK10INT0003

5 System Wiring

⚠Danger

- The installation, routing, and connection of cables must comply with local laws, regulations, and standard requirements.
- All operations during electrical connection and the specifications of cables and components used must meet local legal and regulatory requirements.
- Before making electrical connections, disconnect the DC switch and AC output switch of the device to ensure the device is powered off. Operating with power on is strictly prohibited, otherwise risks such as electric shock may occur.
- Cables of the same type should be bundled together and routed separately from different types of cables. Twisting or crossing each other is prohibited.
- If the cable is subjected to excessive tension, it may cause poor connection. When wiring, reserve a certain length of cable before connecting to the inverter terminal port.
- When crimping terminals, ensure that the conductor part of the cable fully contacts the terminal. Do not crimp the cable insulation together with the terminal, otherwise it may cause the device to fail to operate, or after operation, unreliable connection may cause heating and damage to the inverter terminal block.

⚠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 must not be connected to the same AC circuit breaker.
- To ensure that the inverter can be safely disconnected from the grid in case of an abnormal situation, connect an AC circuit breaker on the AC side of the inverter. Select an appropriate AC circuit breaker according to local regulations.
- The BACK-UP function of the inverter must be implemented with the STS static transfer switch cabinet.

Caution

- When making electrical connections, wear personal protective equipment such as safety shoes, protective gloves, and insulated gloves as required.
- Only qualified personnel are allowed to perform electrical connection operations.
- The cable colors in the diagrams in this document are for reference only. The specific cable specifications must comply with local regulatory requirements.
- External overcurrent protection devices for battery ports and AC output ports should be provided during on-site installation and clearly specified in the installation manual.

5.1 System Wiring Electrical Block Diagram

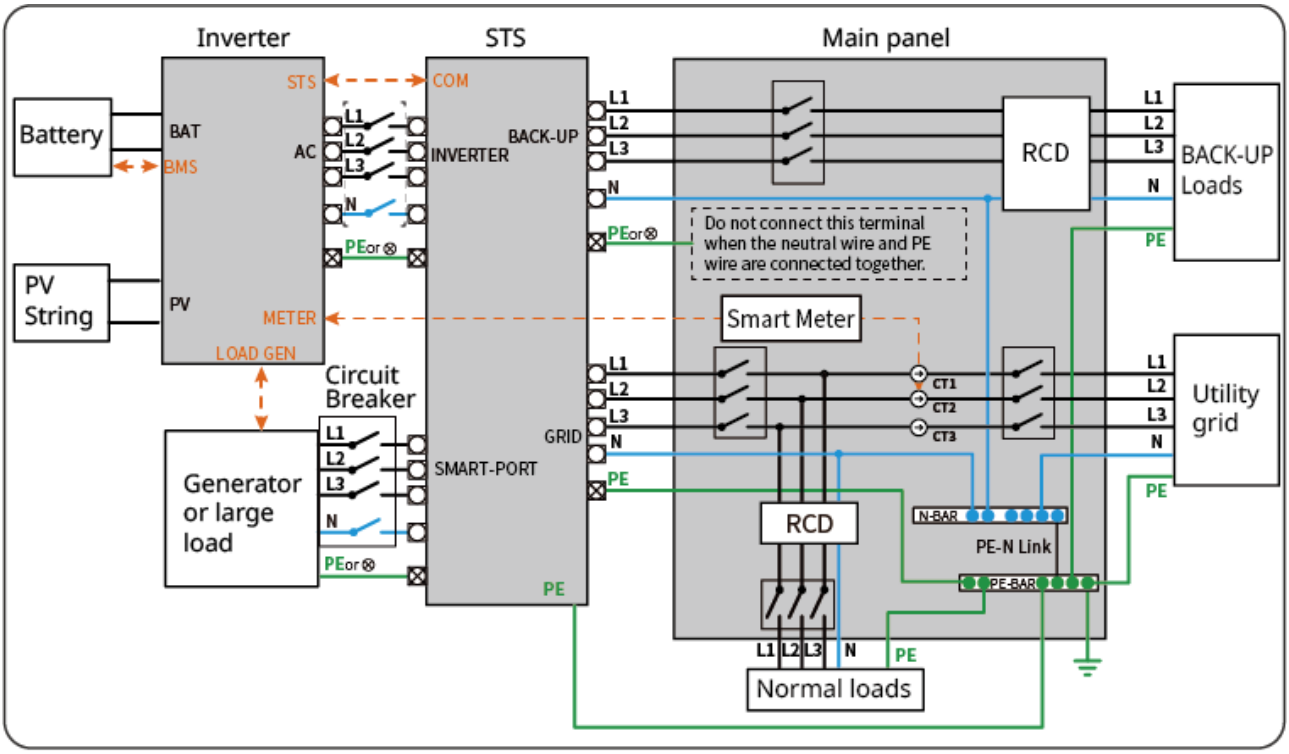
Note

- According to regional regulations, the wiring methods for the N and PE lines of the inverter GRID and BACK-UP ports vary. Refer to local regulations for details.
- The BACK-UP function is available only when the inverter is used with an STS.
- When the inverter is powered on, the BACK-UP AC port is live. To perform maintenance on the BACK-UP load, power off the inverter; otherwise, electric shock may occur.

N and PE wires are connected together in the distribution box for wiring

Note

- To maintain neutral integrity, the neutral wires on the grid-connected side and the off-grid side must be connected together, otherwise the off-grid function will not work properly.
- The diagram below is a schematic of the power grid system for regions such as Australia and New Zealand. The internal N relay is in the open state when the grid fails:



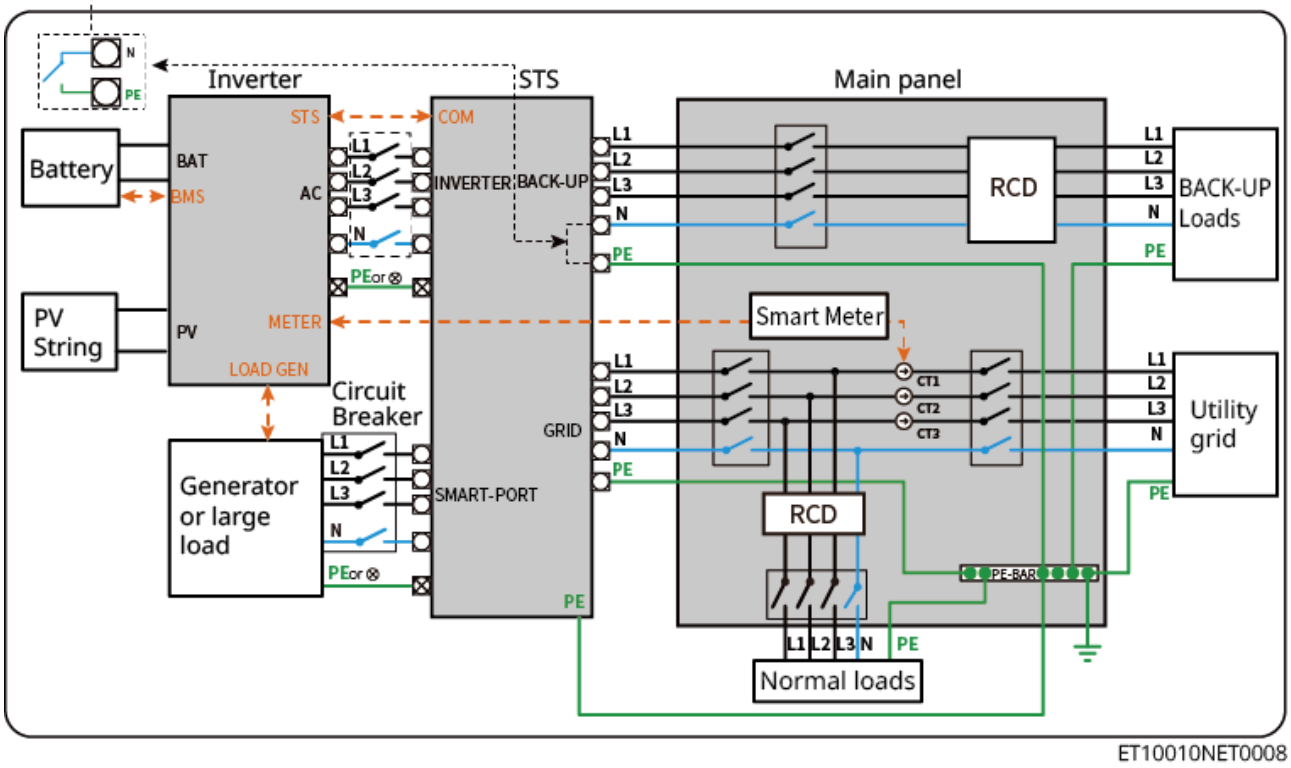
ET10010NET0009

N and PE wires are wired separately in the distribution box

Note

If the inverter is switched to off-grid mode and does not require connecting the N and PE wires, this function can be set via the "Backup Power N and PE Relay Switch" in the "Advanced Settings" interface of the SEMS+ App. The following wiring method applies to regions other than Australia, New Zealand, etc.:

- When the inverter switches to off grid mode, the STS internal relay automatically connects, connecting the PE and N cables.
- When the inverter switches to grid connection mode, the STS internal relay automatically disconnects, disconnecting the PE and N cables.



ET10010NET0008

5.2 System Wiring Detail

Note

- If the energy storage system requires off-grid functionality, it must be paired with a static transfer switch cabinet.
- No circuit breaker shall be installed between the inverter and the static transfer switch cabinet.

5.2.1 Grid-tied Scenario

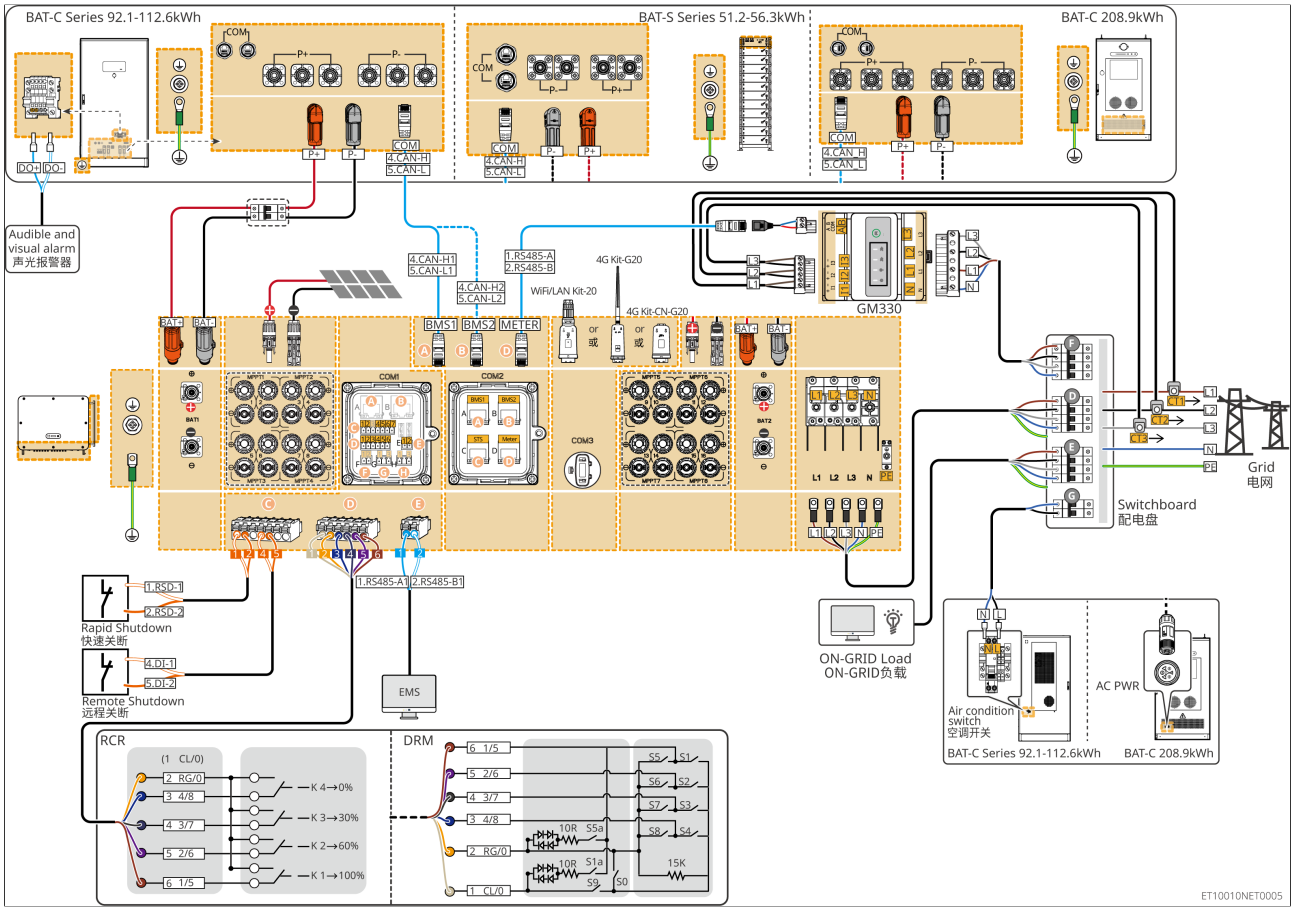


Figure11 Grid-tied scenario (single unit)

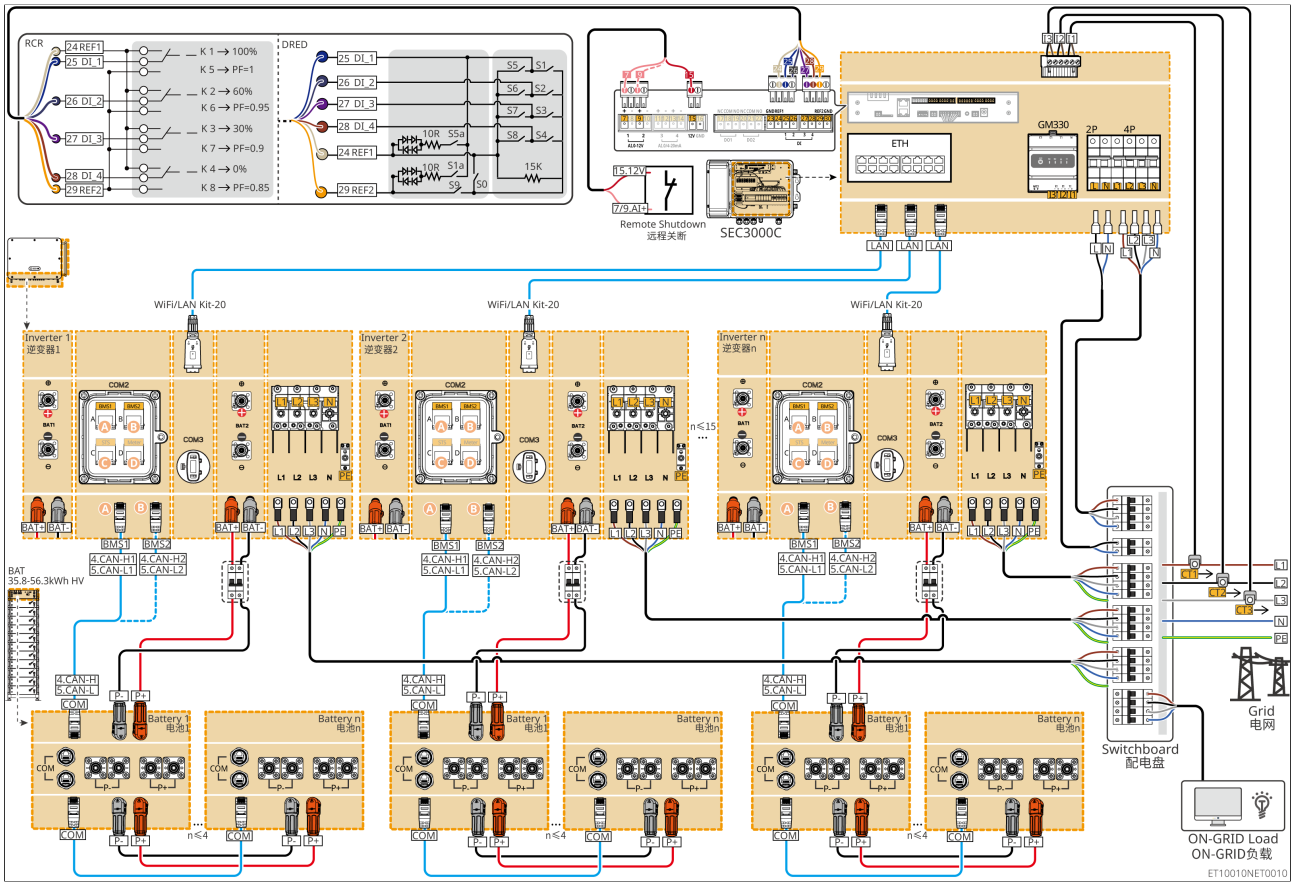


Figure12 Grid-tied scenario (multi-unit, withBAT 51.2-56.3kWh)

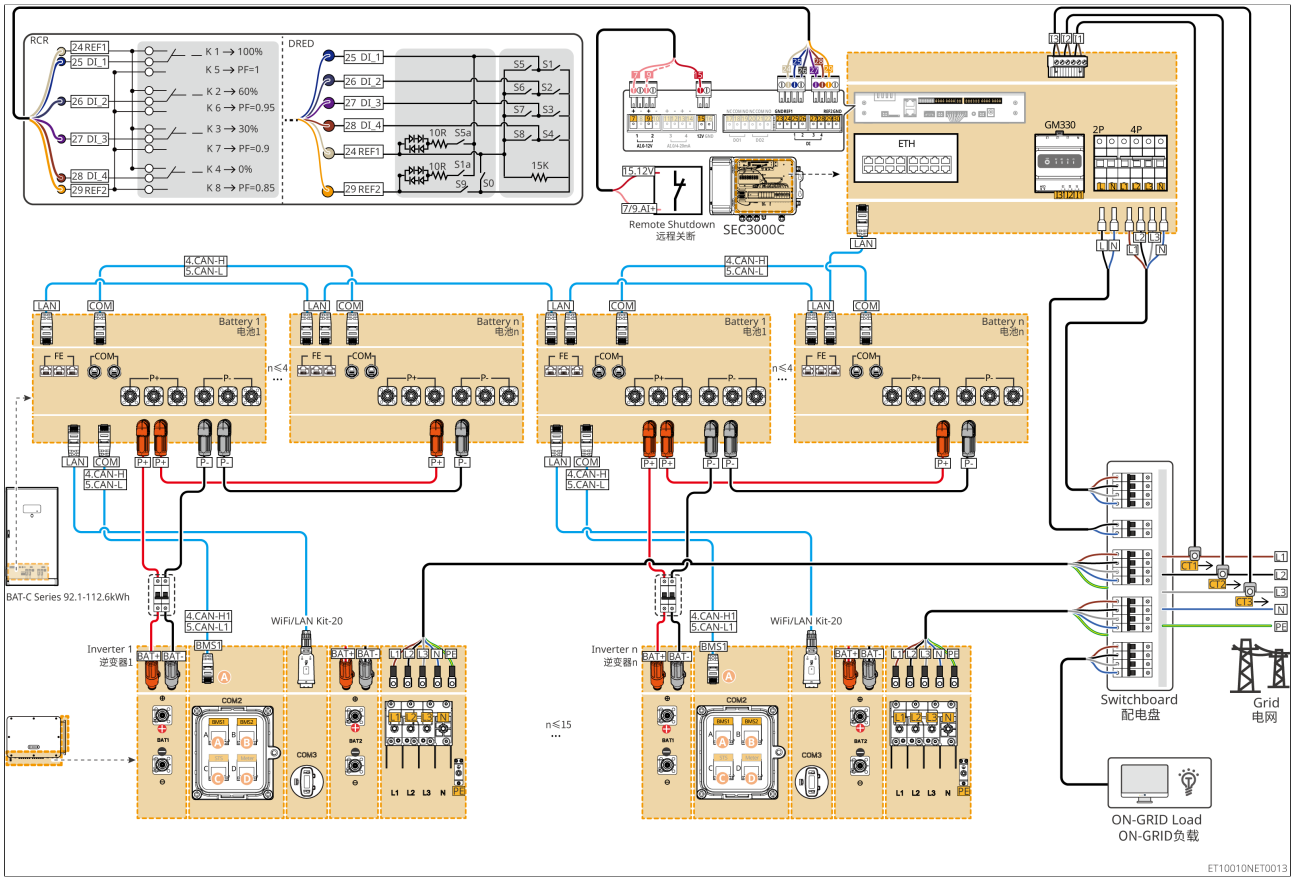


Figure13 Grid-tied scenario (multi-unit, with BAT 92.1-112.6kWh)

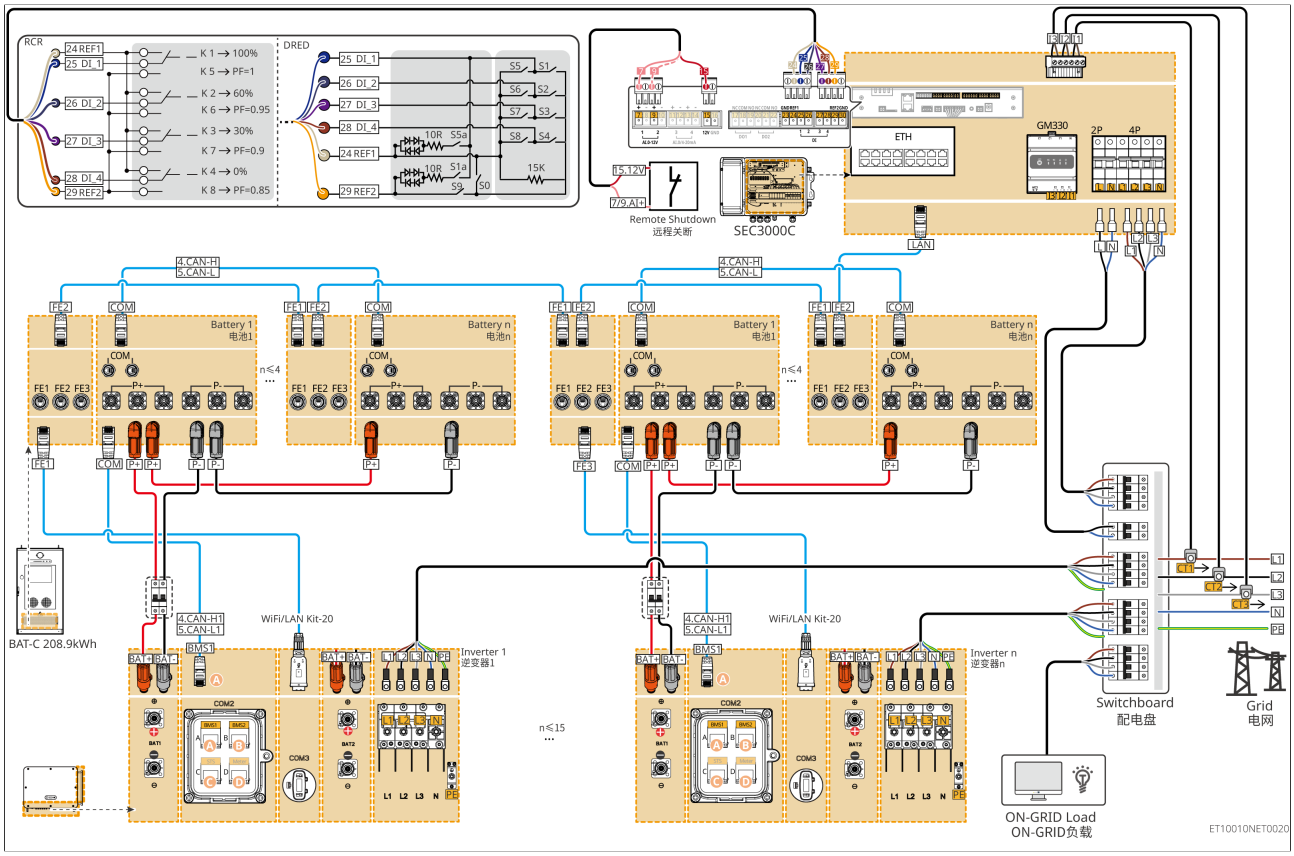


Figure14 Grid-tied scenario (multi-unit, withBAT-C 208.9kWh）

5.2.2 Grid-Tied and Off-Grid Scenario

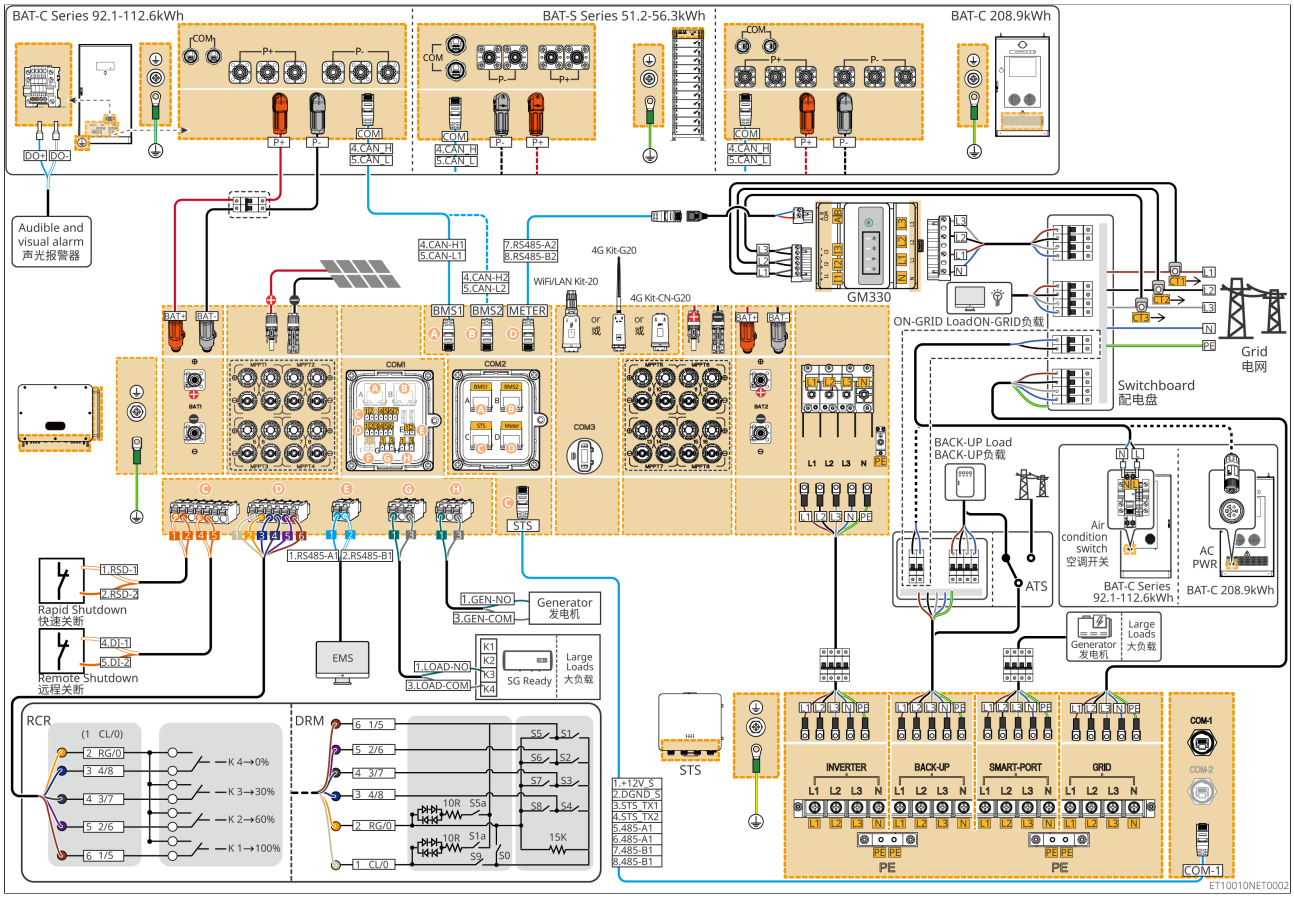


Figure15 Grid-Tied and Off-Grid Scenario (Single Unit, Partial Backup)

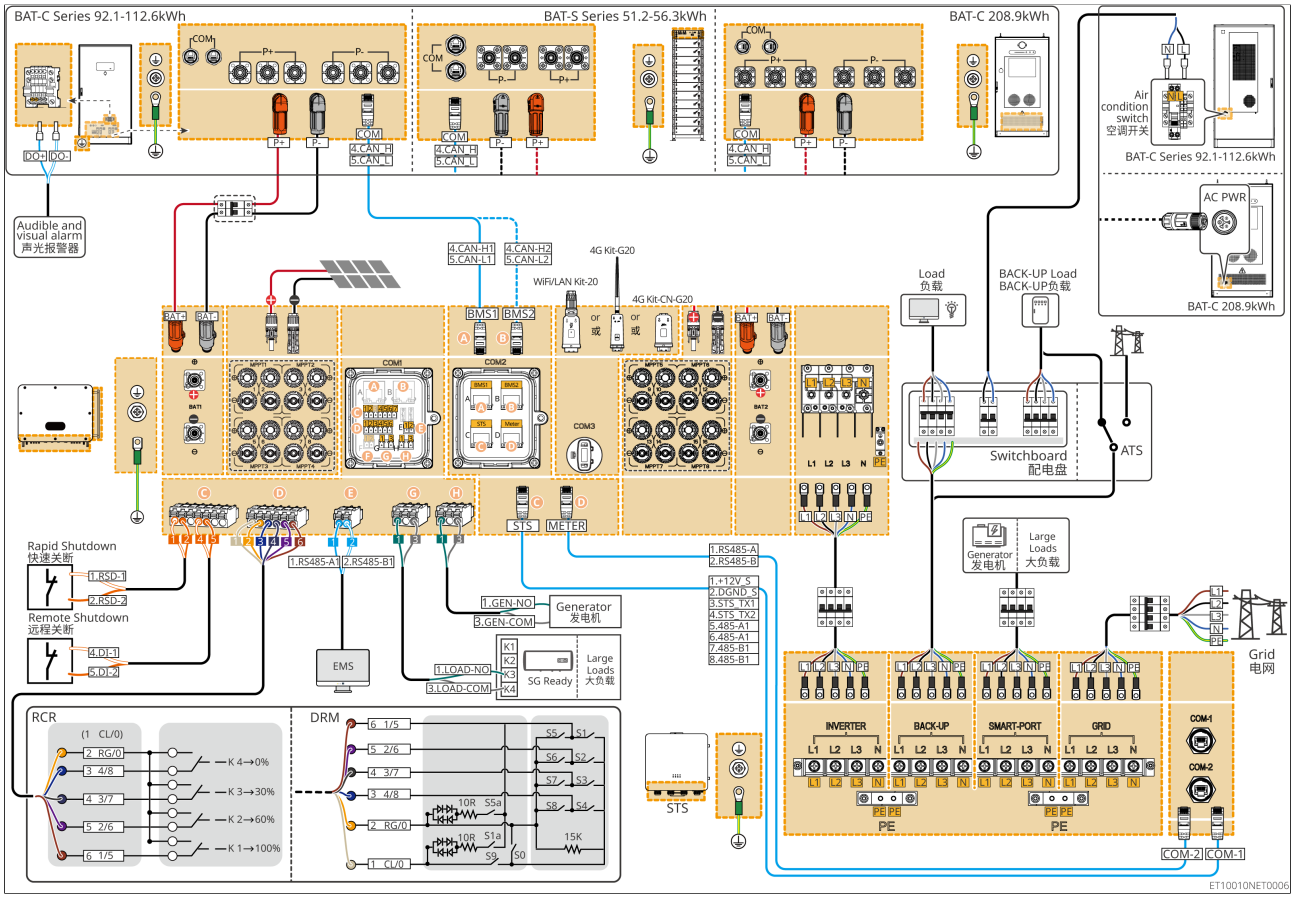


Figure16 Grid-Tied and Off-Grid Scenario (Single Unit, Whole-House Backup)

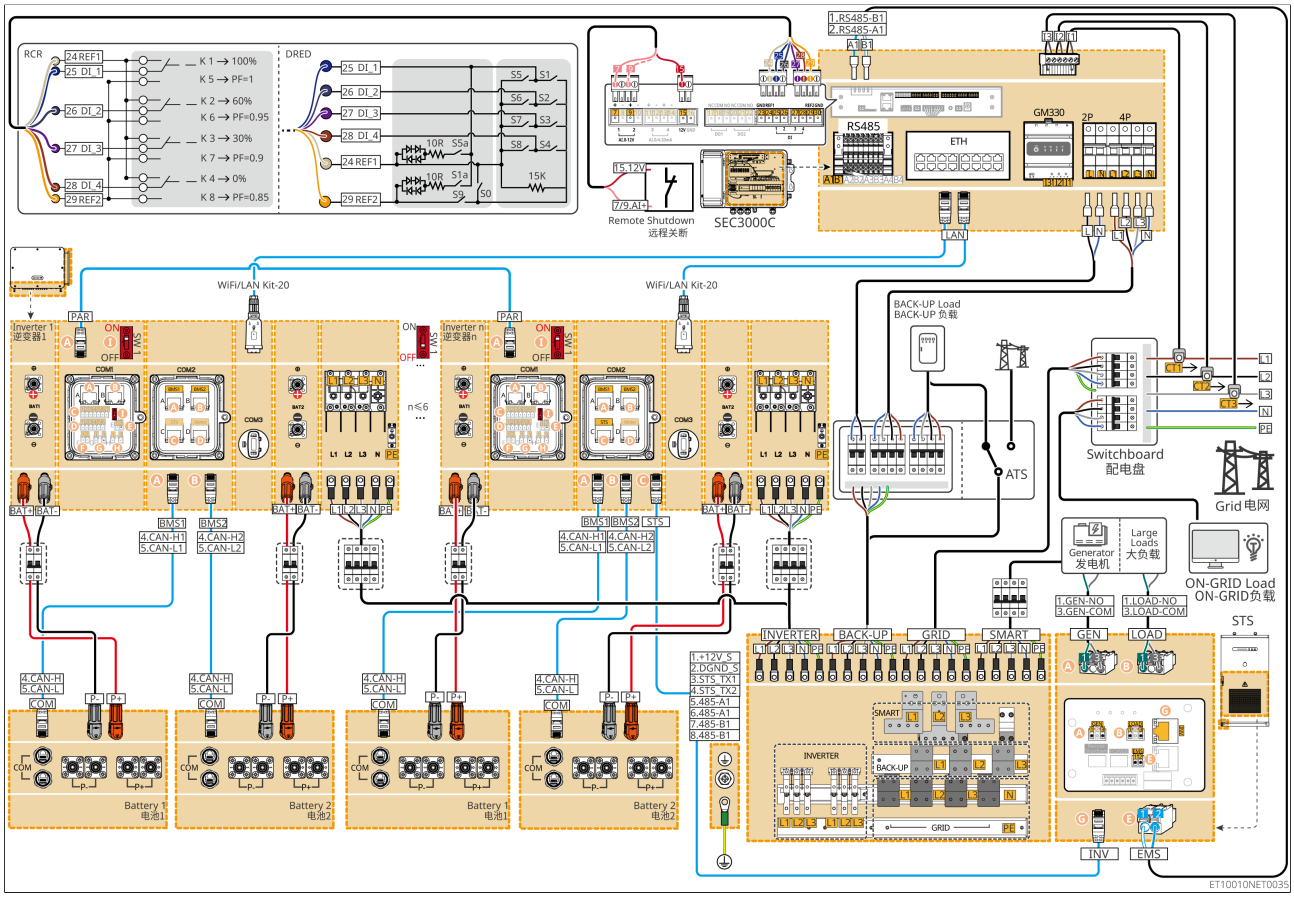


Figure17 Grid-Tied and Off-Grid Scenario (Multiple Units, with BAT 51.2-56.3kWh)

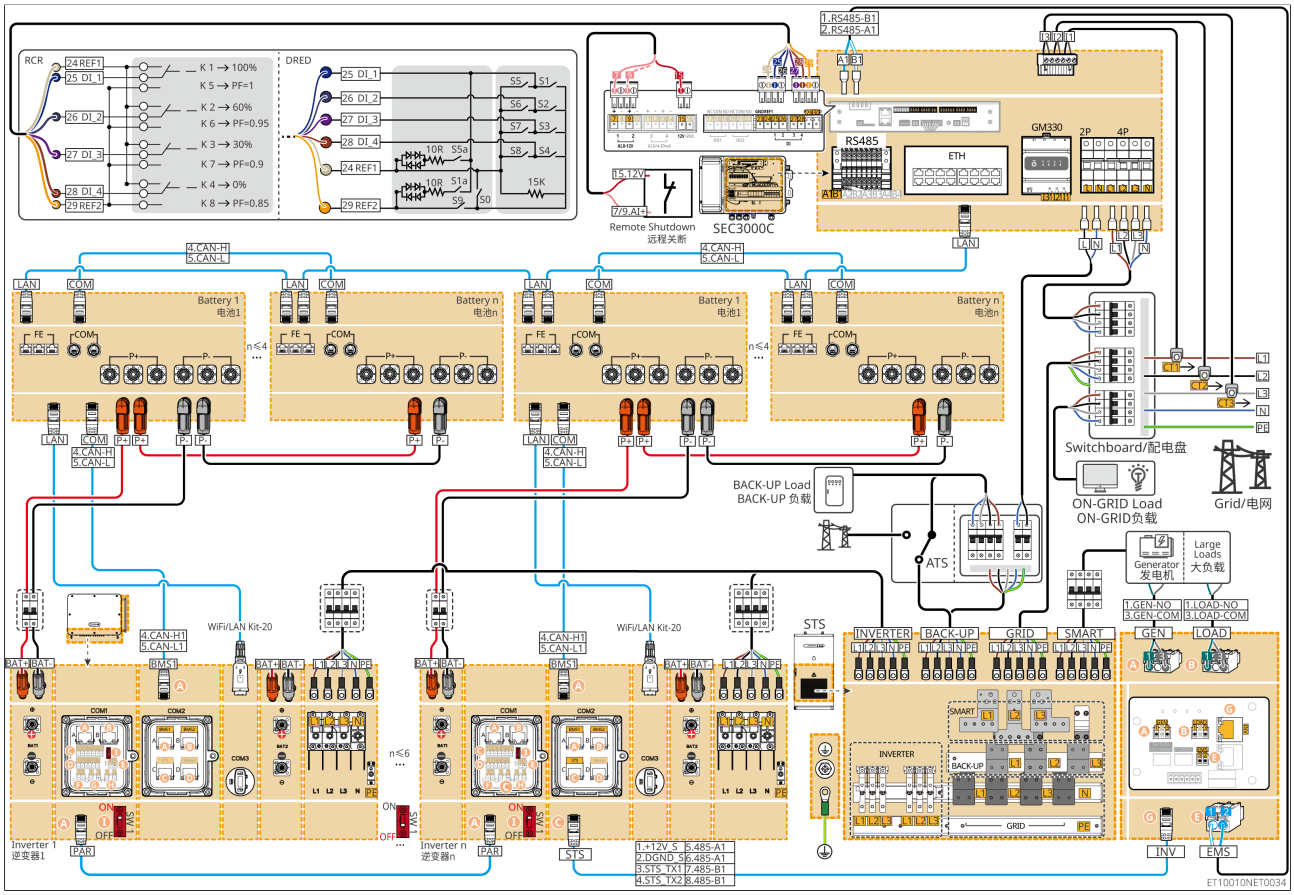


Figure18 Grid-Tied and Off-Grid Scenario (Multiple Units, with BAT 92.1-112.6kWh)

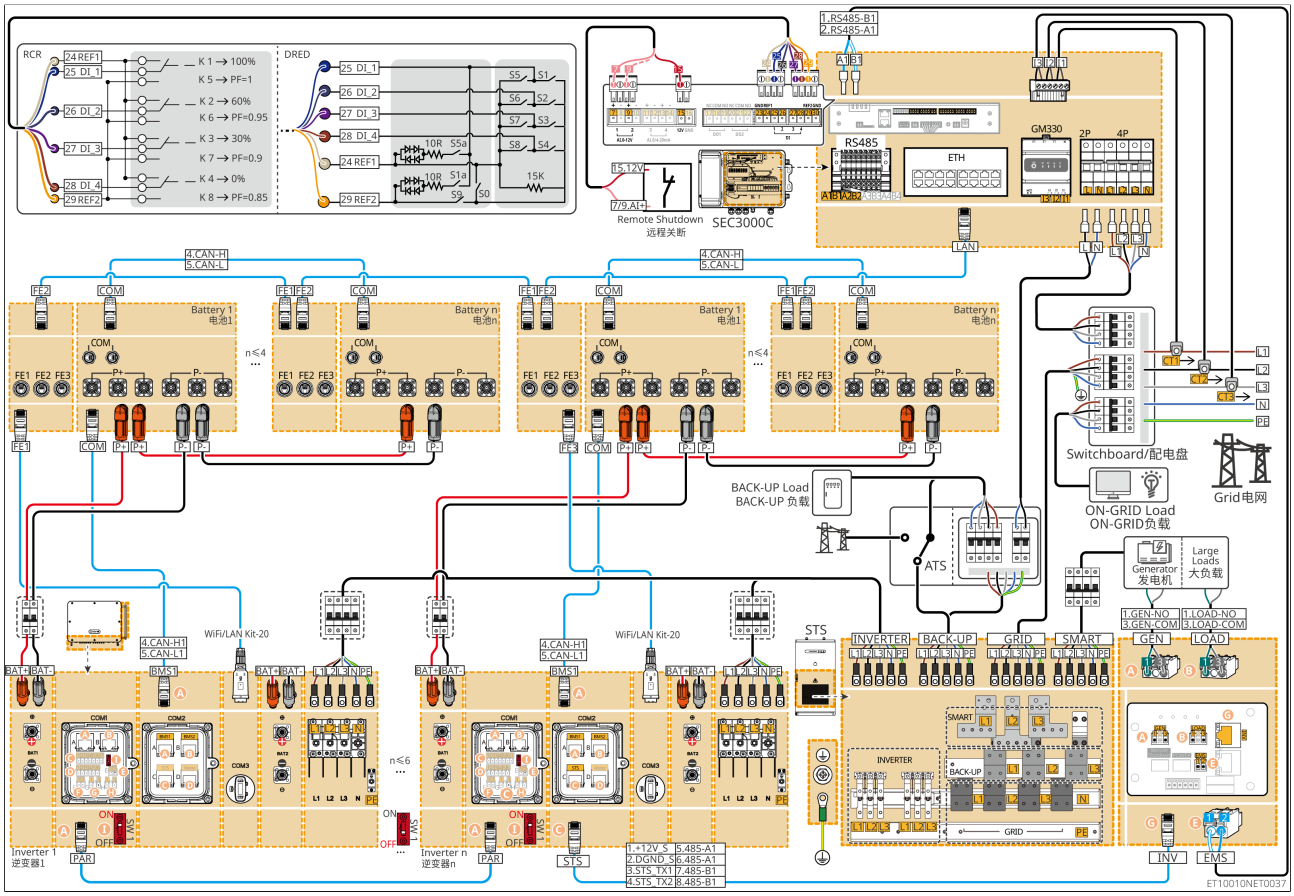


Figure19 Grid-Tied and Off-Grid Scenario (Multiple Units, with BAT-C 208.9kWh)

5.2.3 Microgrid Scenario

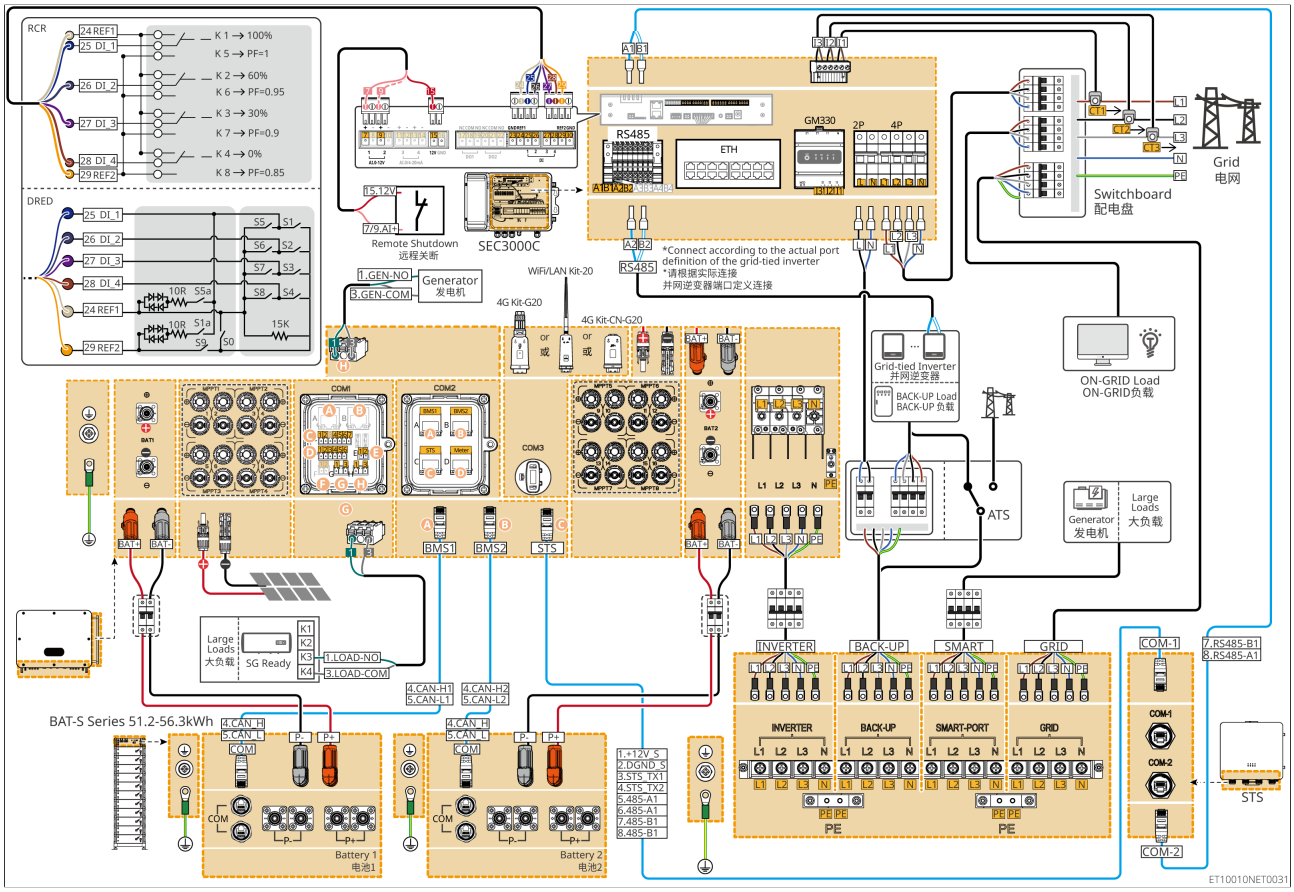


Figure20 Microgrid Scenario (Single Unit, with BAT 51.2-56.3kWh)

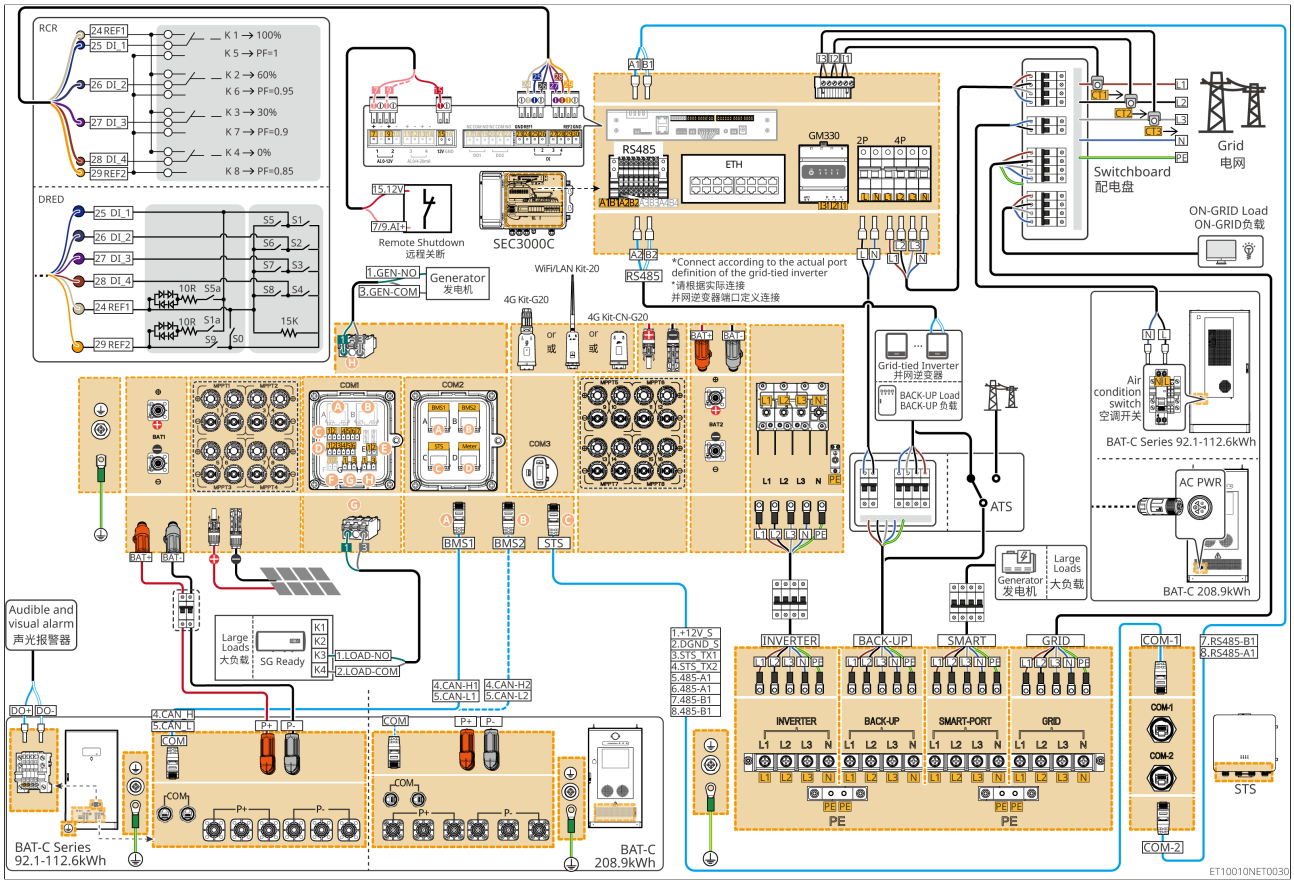


Figure21 Microgrid Scenario (Single Unit, with BAT 92.1-112.6kWh and BAT-C 208.9kWh)

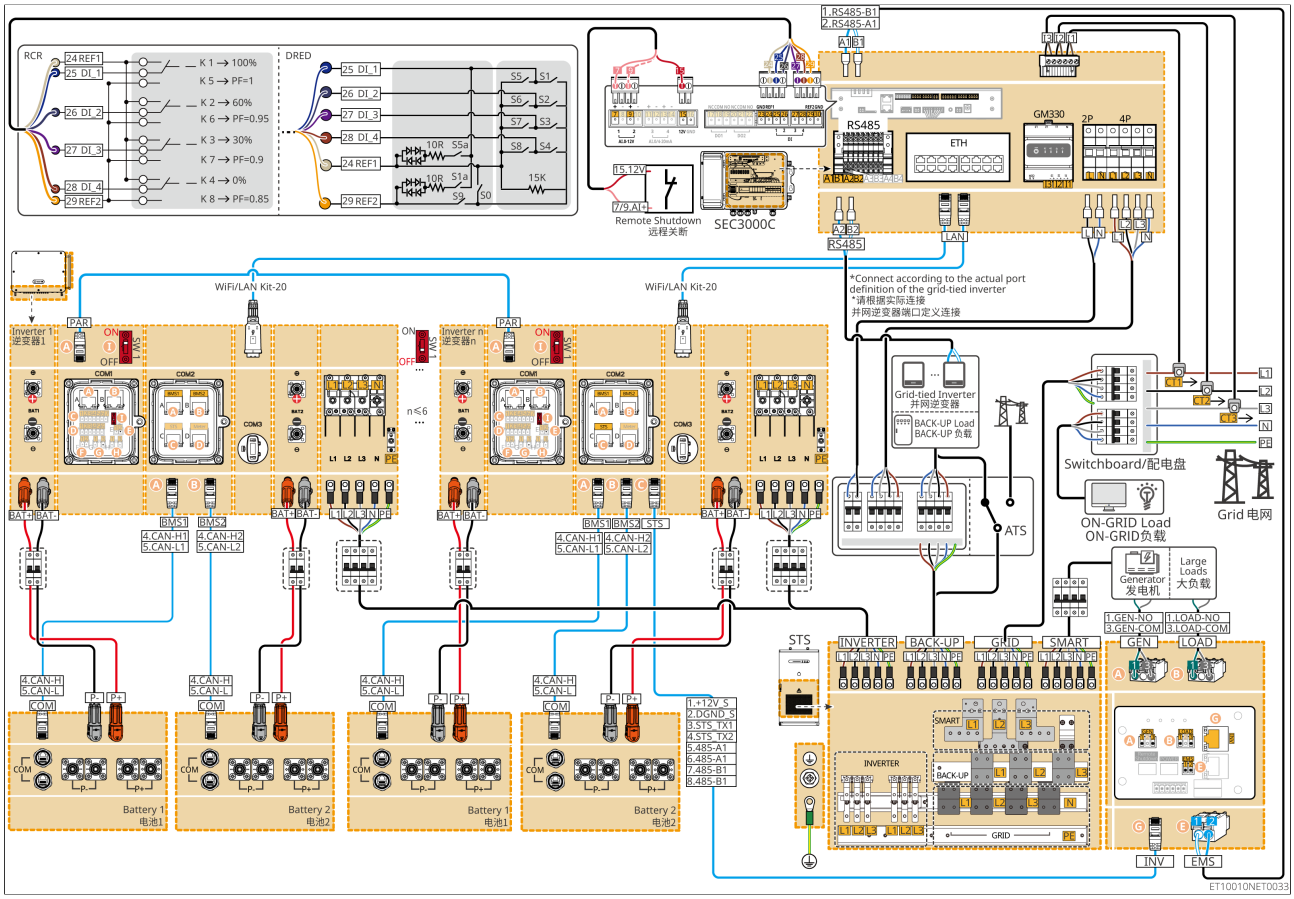


Figure22 Microgrid Scenario (Multiple Units, with BAT 51.2-56.3kWh)

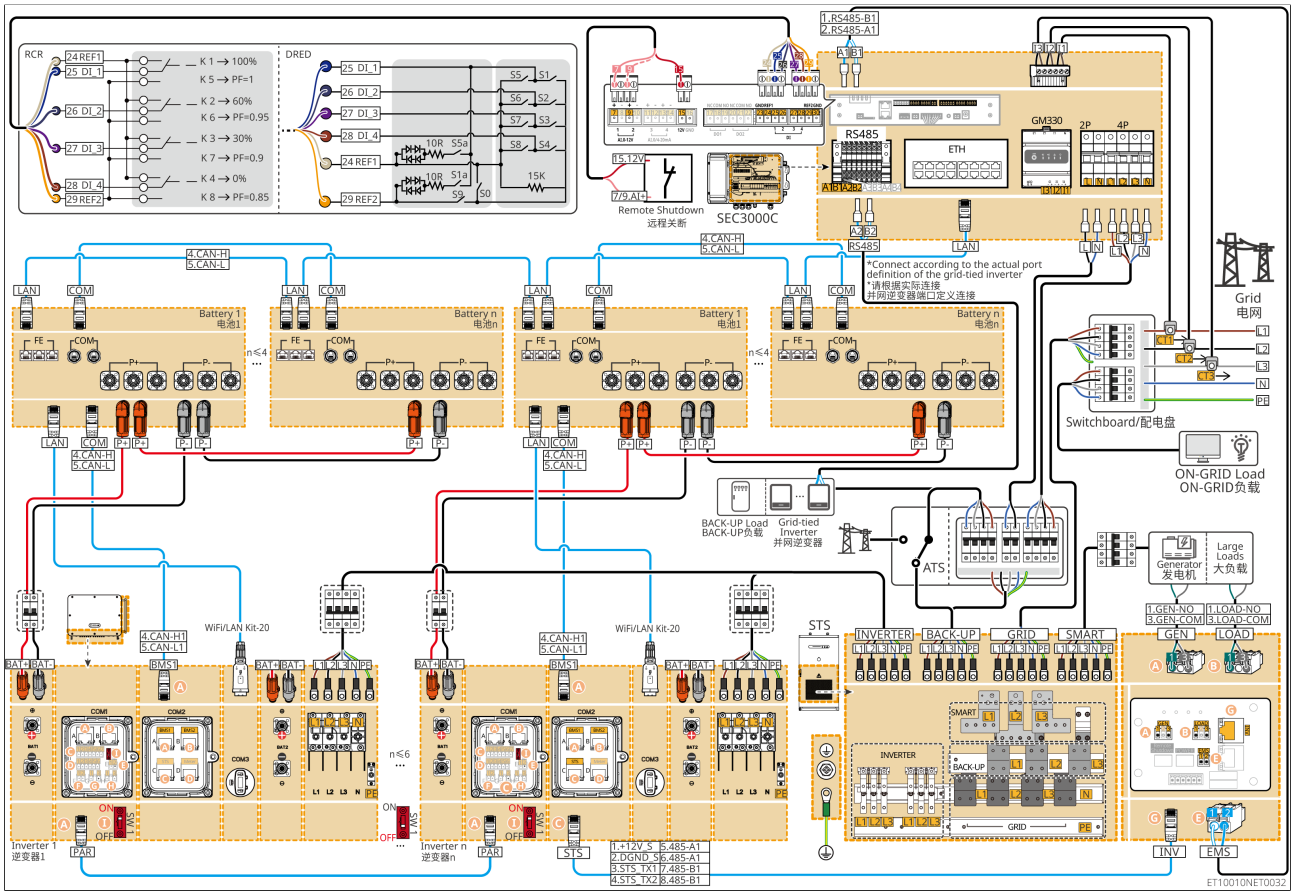


Figure23 Microgrid Scenario (Multiple Units, with BAT 92.1-112.6kWh)

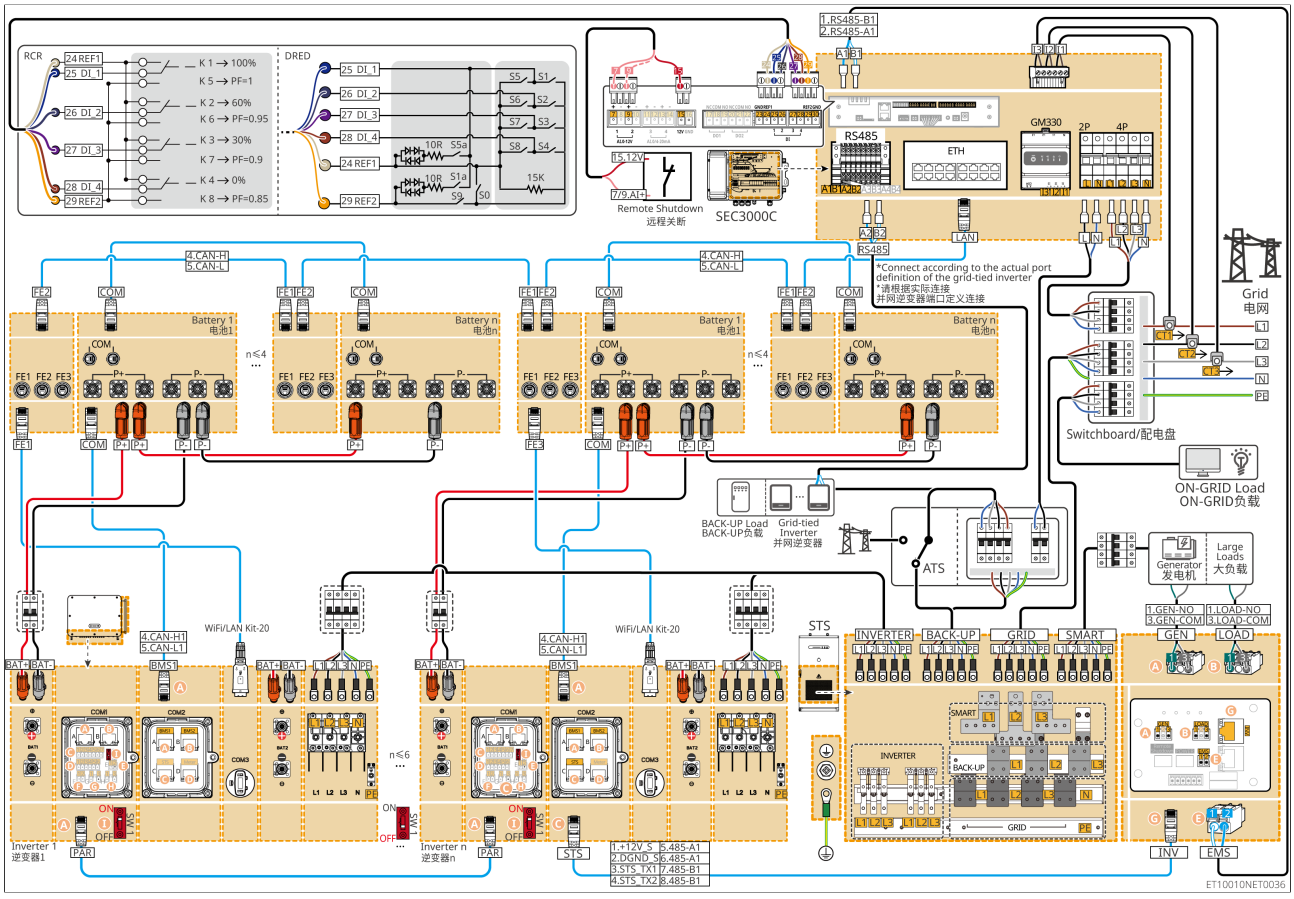


Figure24 Microgrid Scenario (Multiple Units, with BAT-C 208.9kWh)

5.2.4 Battery System Wiring Diagram

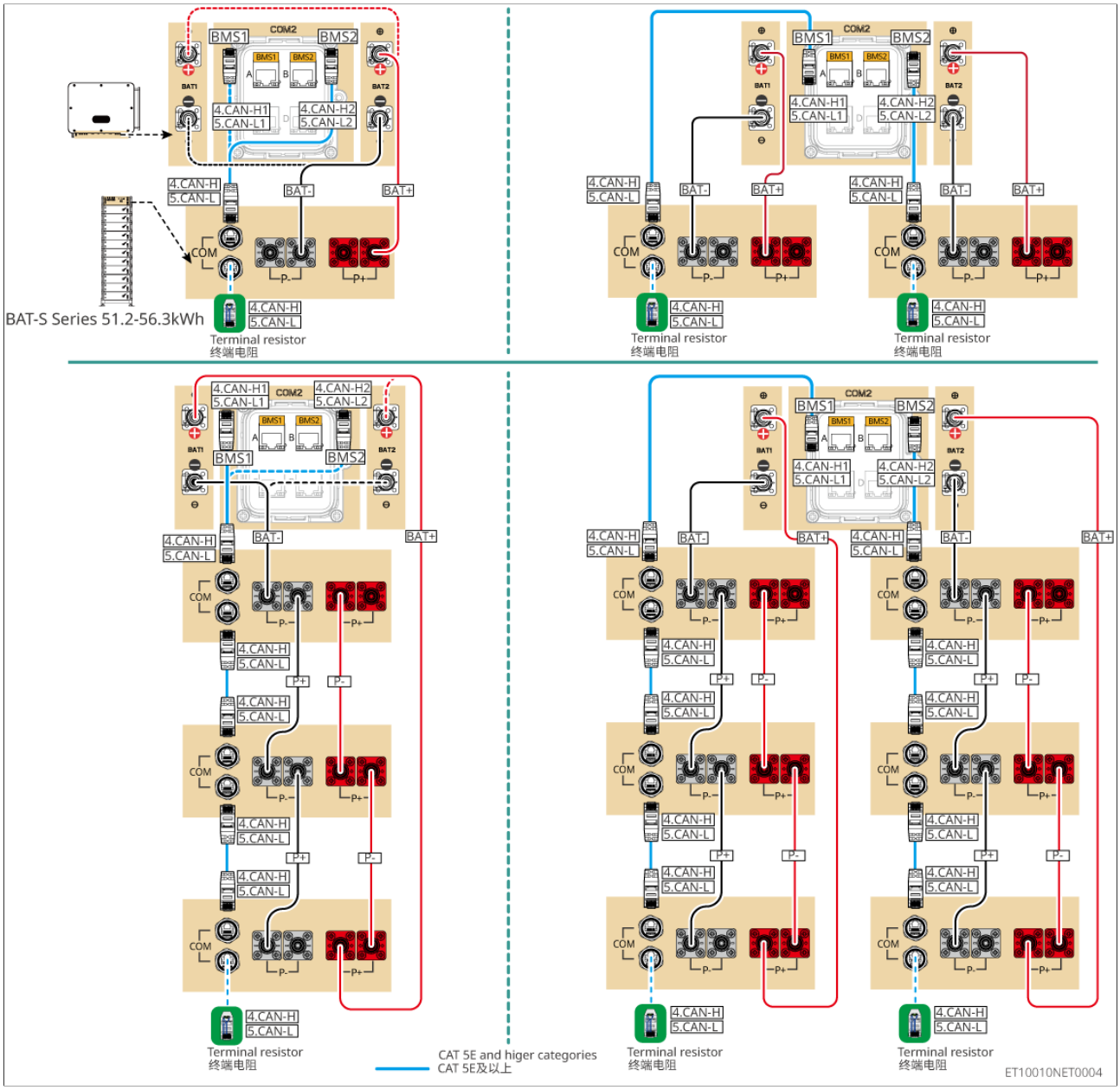


Figure25 Battery System Wiring Diagram (BAT 51.2-56.3kWh)

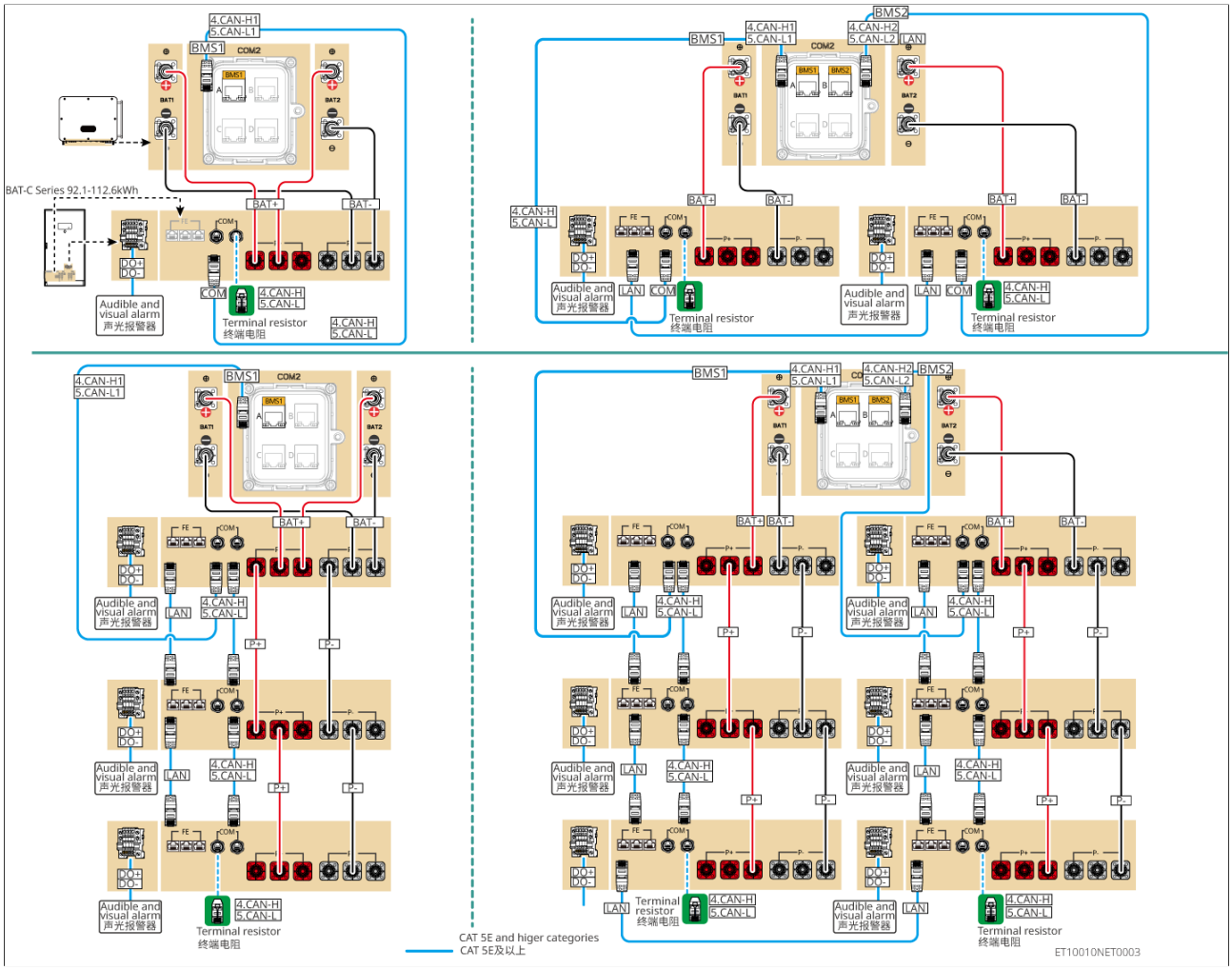


Figure26 Battery System Wiring Diagram (BAT 92.1-112.6kWh)

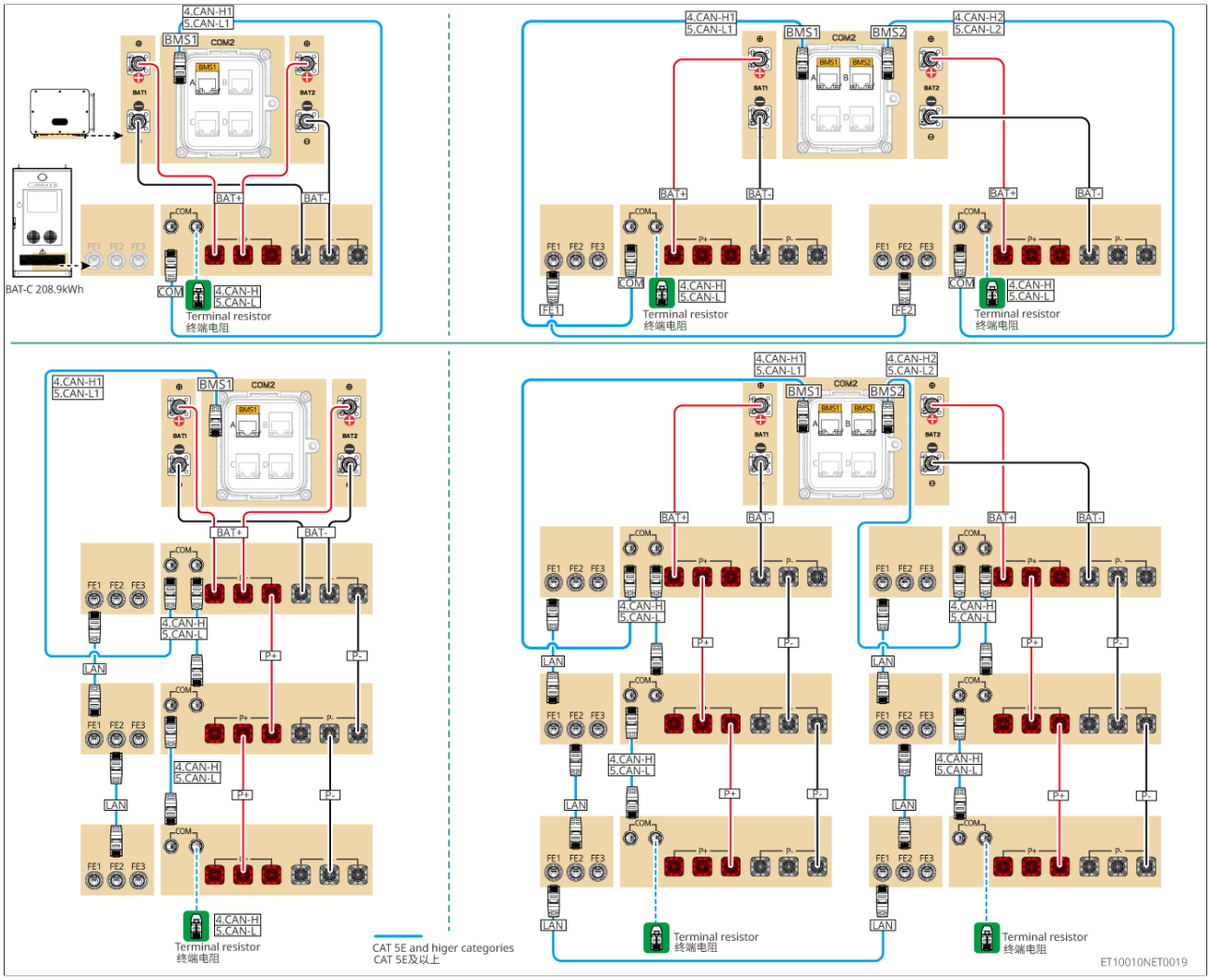


Figure27 Battery System Wiring Diagram (BAT-C 208.9kWh)

5.3 Material Preparation

5.3.1 Switch Preparation

No.	Circuit Breaker	Specification	Remarks
1	• GRID Circuit Breaker (Inverter & STS) • BACK-UP Load Breaker (STS) • Smart-Port Breaker STS (STS)	4P circuit breaker*1, Rated voltage ≥400V, Rated current requirements as follows: • GW100K-ET-G10: Rated current ≥225A • GW99.99K-ET-G10: Rated current ≥180A • GW80K-ET-G10: Rated current ≥160A • GW75K-ET-G10: Rated current ≥160A • GW50K-ET-G10: Rated current ≥160A	Provided by customer
2	Battery Switch	Optional based on local laws and regulations • 2P DC switch*2 • Rated current ≥125A • Rated voltage ≥1000V	Provided by customer
3	Residual Current Device (RCD)	Optional based on local laws and regulations • Type A • GRID side: 1000mA • BACK-UP side: 500-1000mA	Provided by customer
Meter Switch	Rated voltage: 380V/400V Rated current: 0.5A	Provided by customer	
5	Load Breaker	Specification requirements depend on actual load	Provided by customer
6	(Optional) Bypass Switch		
*1: In Australia and New Zealand regions, GRID and BACK-UP load breakers are 3P			

5.3.2 Cable Preparation

No.	Type	Cable	Recommended Specification	Acquisition Method
1	Protective Ground Wire	Inverter and STS Protective Ground Wire	• Single-core outdoor copper cable • Conductor cross-section: 25-35mm²	Provided by Customer
2		BAT Series 35.8-56.3kWh High Voltage Battery	• Single-core outdoor copper cable • Conductor cross-section: 6-10mm²	Provided by Customer
		BAT Series 92.1-112.6kWh Commercial & Industrial Battery System	• Single-core outdoor copper cable • Conductor cross-section: 16-25mm²	Provided by Customer
		BAT-C Series 208.9kWh Commercial & Industrial Battery System	• Single-core outdoor copper cable • Conductor cross-section: 16-25mm²	Provided by Customer
3	Power Cable	PV DC Cable	• Industry-standard outdoor PV cable • Conductor cross-section: 4-6mm² • Cable outer diameter: 4.7mm-6.4mm	Provided by Customer

No.	Type	Cable	Recommended Specification	Acquisition Method
4		Battery DC Cable	• Single-core outdoor copper cable • Conductor cross-section: 25mm² • Cable outer diameter: 9.4mm-10.6mm	Provided by Customer / Use pre-assembled cable harness shipped with equipment
5		Battery Parallel Connection Cable: BAT Series 35.8-56.3kWh High Voltage Battery	• Single-core outdoor copper cable • Conductor cross-section: 25mm² • Cable outer diameter: 9mm-11mm	Provided by Customer
		Battery Parallel Connection Cable: BAT Series 92.1-112.6kWh Commercial & Industrial Battery System	• Single-core outdoor copper cable • Conductor cross-section: 50mm² • Cable outer diameter: 13mm-14mm	Provided by Customer
		Battery Parallel Connection Cable: BAT-C Series 208.9kWh Commercial & Industrial Battery System		Provided by Customer

No.	Type	Cable	Recommended Specification	Acquisition Method
6		Inverter AC Cable SMART-PORT AC Cable (STS) BACK-UP AC Cable (STS) GRID AC Cable (STS)	• Single-core outdoor copper cable • Conductor cross-section: 50-70mm² • Cable outer diameter: 22mm-43mm	Provided by Customer
7		Smart Meter Power Cable	• Outdoor copper cable • Conductor cross-section: 0.5-1mm²	Provided by Customer
8		SEC3000C Three-Phase AC Cable	• Single-core outdoor copper cable • Conductor cross-section: 2.5mm²-6.0mm² • Cable outer diameter: 1.8mm-2.8mm	Provided by Customer
9	Communication Cable	Battery BMS Communication Cable	-	Supplied with Equipment
10		Meter RS485 Communication Cable	-	RJ45-to-2PIN terminal adapter cable and standard Ethernet cable, supplied with equipment

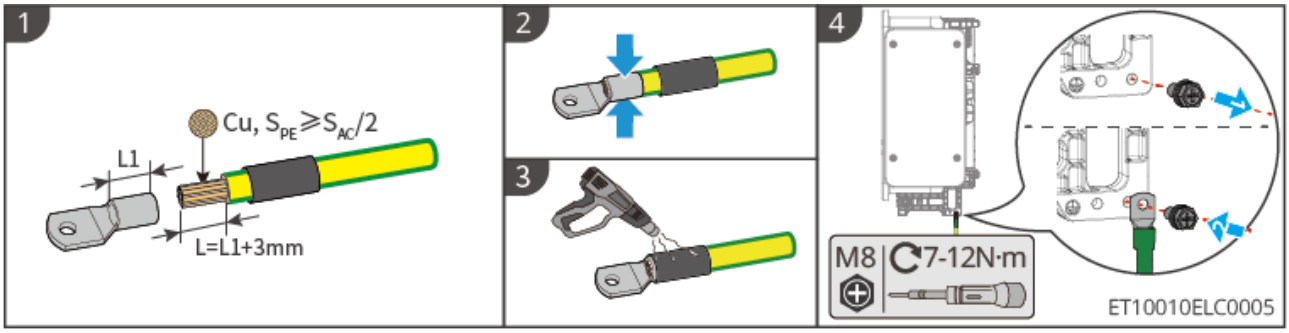
No.	Type	Cable	Recommended Specification	Acquisition Method
11		Battery Parallel Communication Cable / Cloud Board Communication Cable	CAT 5E or higher with RJ45 connectors, EIA/TIA 568B standard shielded Ethernet cable	Provided by Customer
12		Communication Cable (DO, GEN, Remote Shutdown, RSD, DRM/RCR, EMS, EV Charger)	• Shielded cable meeting local standards • Conductor cross-section: 0.2mm²-0.4mm² • Cable outer diameter: 5mm-8mm	Provided by Customer
13		Inverter and STS Communication Cable	• Standard Ethernet cable: CAT 5E or higher with RJ45 connectors • Length: 10m	Provided by Customer
14		Meter CT Cable	• Single-core outdoor copper cable • Conductor cross-section: 1.3mm²-2.3mm² • Cable outer diameter: 1.3-1.7mm	Provided by Customer

5.4 Connecting Protective Earth

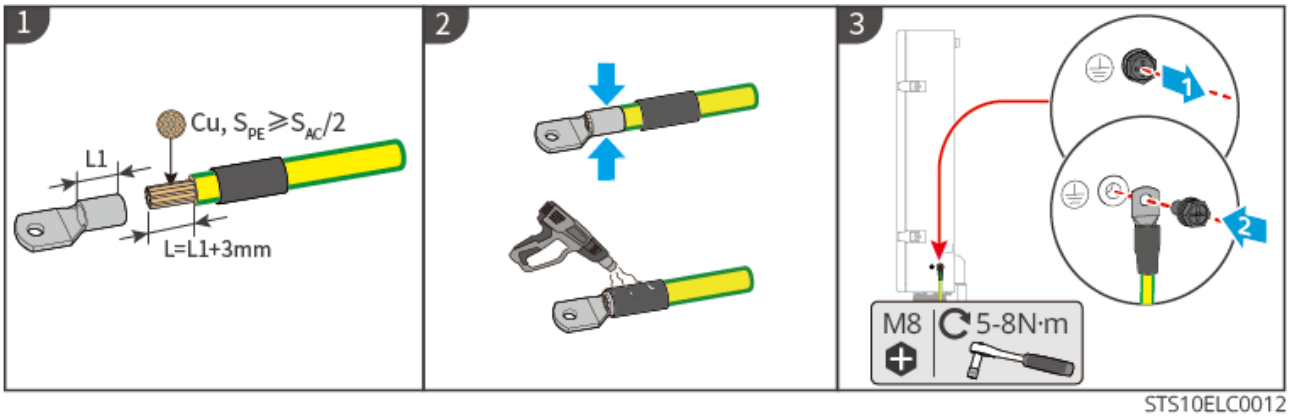
Warning

- The protective grounding of the chassis enclosure cannot replace the protective ground wire of the AC output port. When wiring, ensure reliable connection of the protective ground wire at both locations.
- For multiple devices, ensure equipotential connection of the protective grounding points of all device chassis enclosures.
- To improve the corrosion resistance of the terminals, it is recommended to apply silicone or paint on the outside of the grounding terminals after the protective ground wire connection is installed for protection.
- When installing equipment, the protective ground wire must be installed first; when removing equipment, the protective ground wire must be removed last.

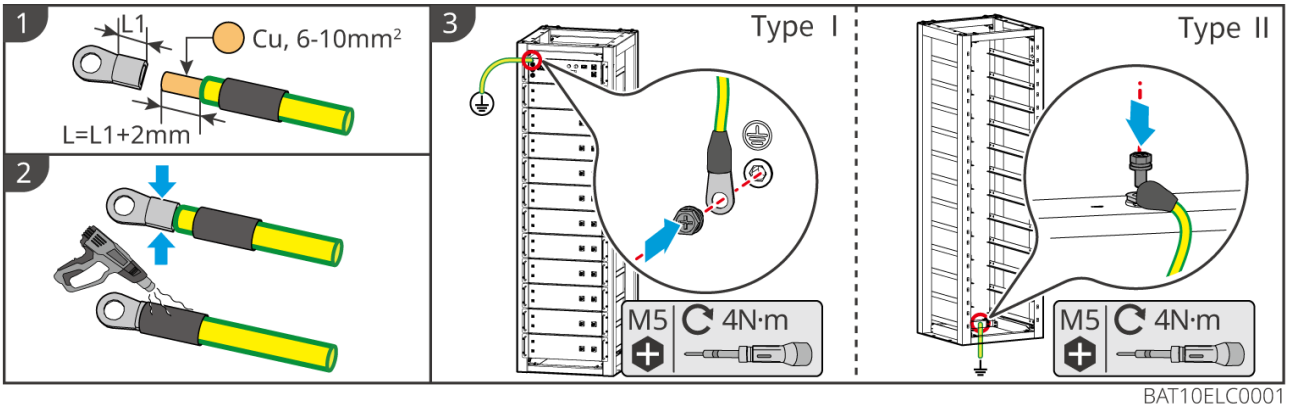
Inverter



Static Transfer Switch Cabinet (GW125K-STS-G10)

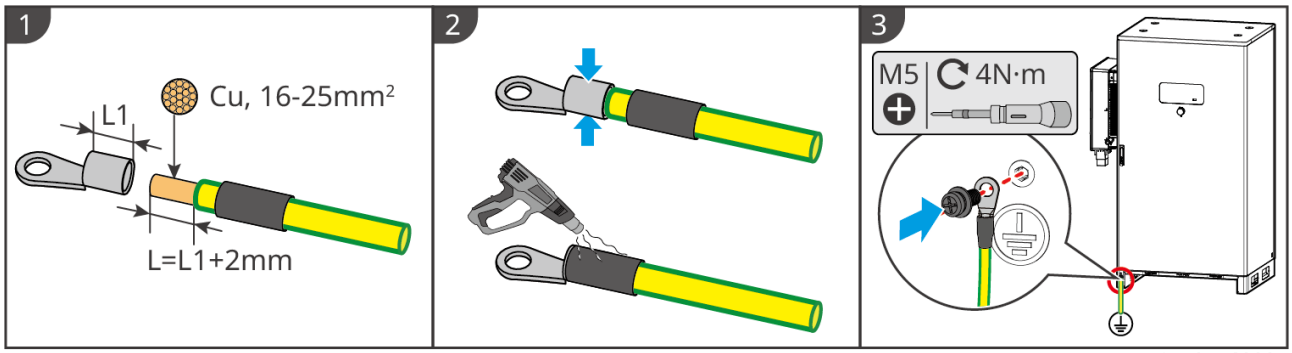


Battery System (BAT Series 35.8-56.3kWh High Voltage Battery)



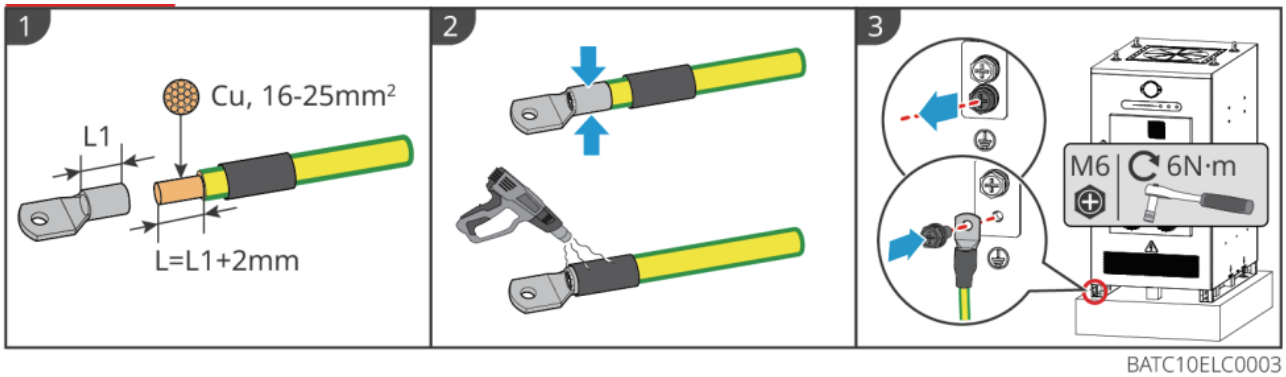
BAT10ELC0001

Battery System (BAT Series 92.1-112.6kWh Commercial & Industrial Battery System)



BAT10ELC0007

Battery System (BAT-C Series 208.9kWh Commercial & Industrial Battery System)



BATC10ELC0003

5.5 Connecting PV Cables

Note

The operations in this section apply only to non-coupled inverters.

⚠Danger

- Do not connect the same PV string to multiple inverters, otherwise the inverter may be damaged.
- PV strings generate high-voltage DC current under sunlight. Pay attention to safety during electrical connections.
- Before connecting PV strings to the inverter, confirm the following information, otherwise the inverter may be permanently damaged, and in severe cases, fire may cause personal injury and property loss.
  1. Ensure that the maximum short-circuit current and maximum input voltage of each MPPT are within the inverter's allowable range.
  2. Ensure that the positive terminal of the PV string is connected to the PV+ of the inverter, and the negative terminal of the PV string is connected to the PV- of the inverter.

⚠Warning

- PV string output does not support grounding. Before connecting PV strings to the inverter, ensure that the minimum insulation resistance of the PV strings to ground meets the minimum insulation impedance requirement (R = maximum input voltage / 30 mA).
- After connecting the DC cables, ensure that the cable connections are tight and not loose.
- Use a multimeter to measure the positive and negative poles of the DC cable to ensure correct polarity without reverse connection, and that the voltage is within the allowable range.
- MPPT string parallel connection must comply with local laws and regulations.
- Ensure that the voltage difference between different MPPT channels is less than or equal to 200V.
- For each MPPT channel, the two PV strings must use the same model, same number of panels, same tilt and azimuth to maximize efficiency.

PV String Connection Method

For optimal power generation, it is recommended to connect PV strings as follows:

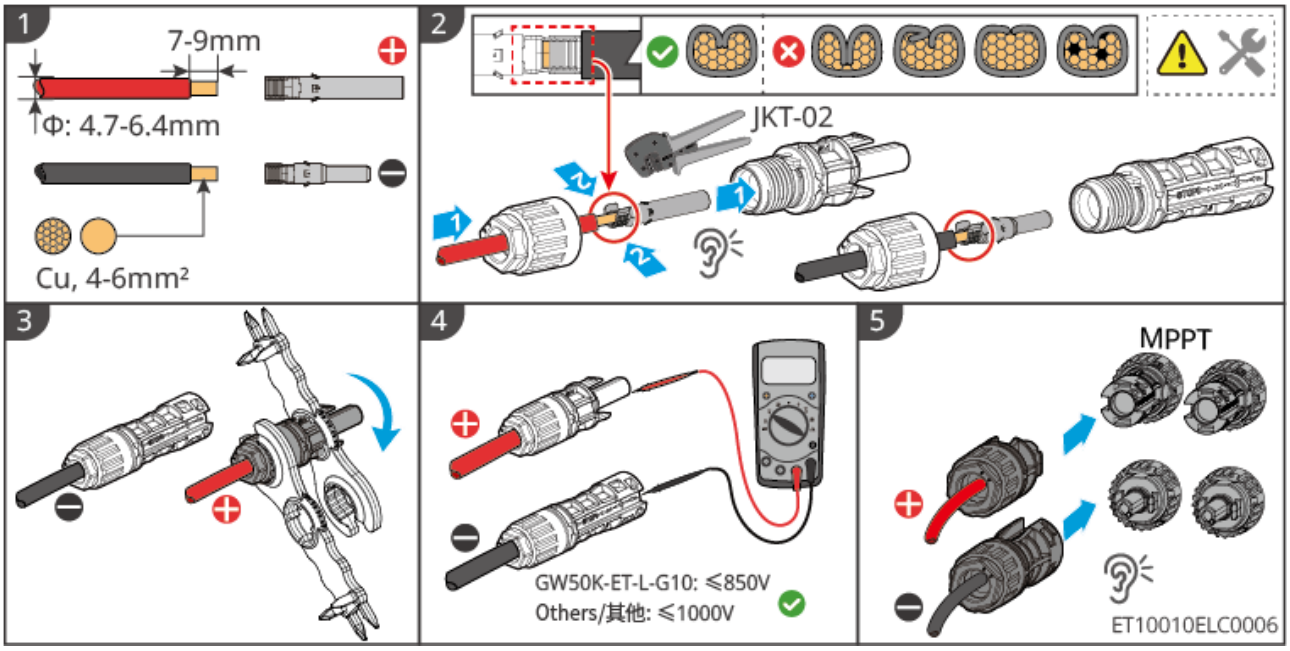
- When the number of PV strings is less than 9, connect PV strings to the inverter in order from MPPT1 to MPPT8.
- When the number of PV strings is 9 or more, connect PV strings to the inverter according to the table below.

•: Connect one PV string
••: Connect two PV strings

Number of PV Strings	MPPT1	MPPT2	MPPT3	MPPT 4	MPPT 5	MPPT 6	MPPT 7	MPPT8
9	••	•	•	•	•	•	•	•
10	••	•	••	•	•	•	•	•
11	••	•	••	•	••	•	•	•
12	••	•	••	•	••	•	••	•
13	••	••	••	•	••	•	••	•
14	••	••	••	••	••	•	••	•
15	••	••	••	••	••	••	••	•
16	••	••	••	••	••	••	••	••

Connection Steps

Step 1: Prepare DC cables.
Step 2: Disassemble DC connectors, crimp DC terminals, and assemble DC connectors.
Step 3: Tighten DC connectors.
Step 4: Check DC input voltage.
Step 5: Connect DC connectors to inverter DC terminals.



Note

If the inverter DC input terminals do not need to be connected to PV strings, use dust caps to seal the terminals, otherwise the device protection level will be affected.

5.6 Connect Battery Cables

⚠Danger

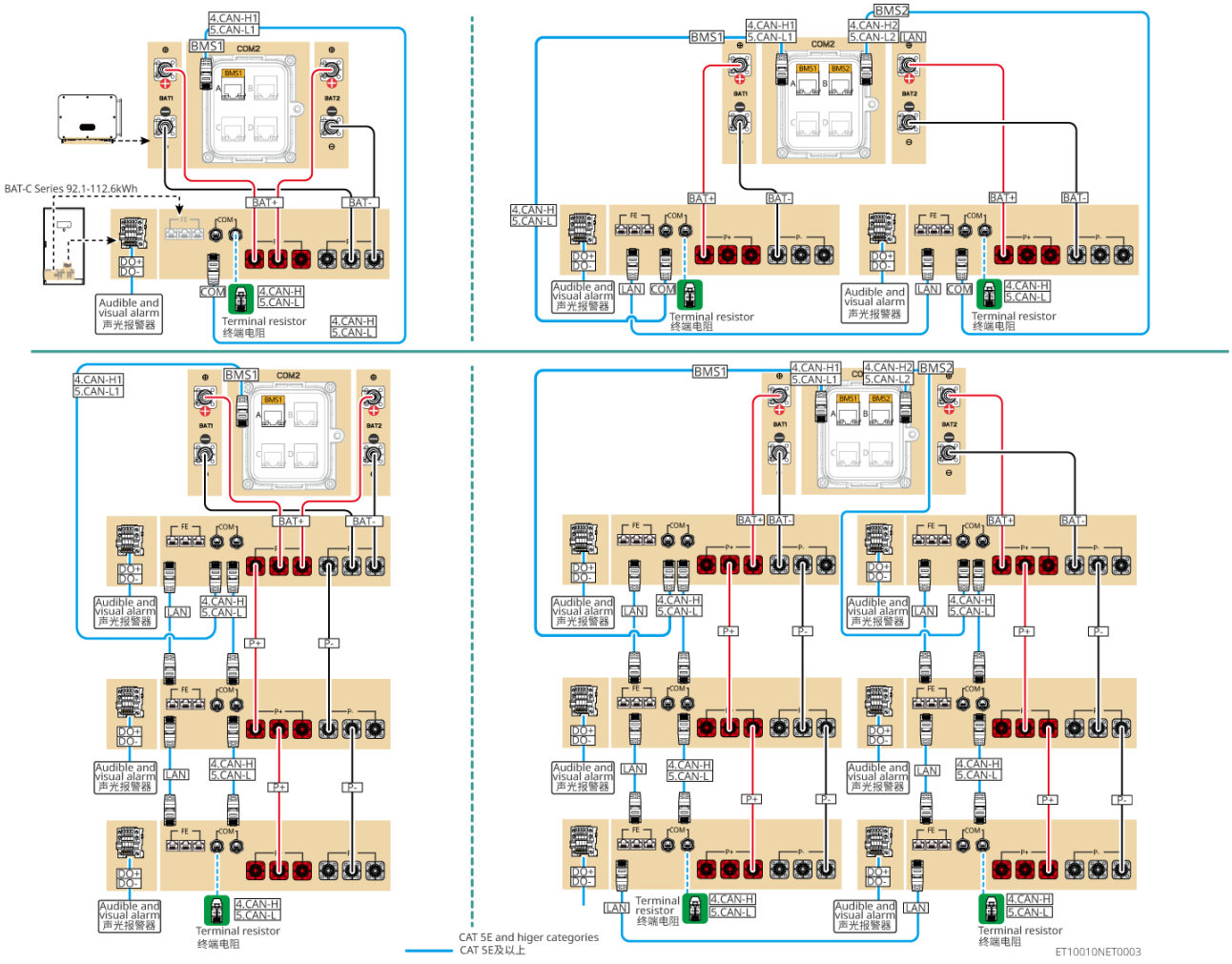
- IDo not connect loads between the inverter and the battery.
- When connecting battery cables, use insulated tools to prevent accidental electric shock or battery short circuit.
- Ensure the battery open-circuit voltage is within the inverter's allowable range.
- Between the inverter and the battery, decide whether to configure a DC switch according to local laws and regulations.

Note

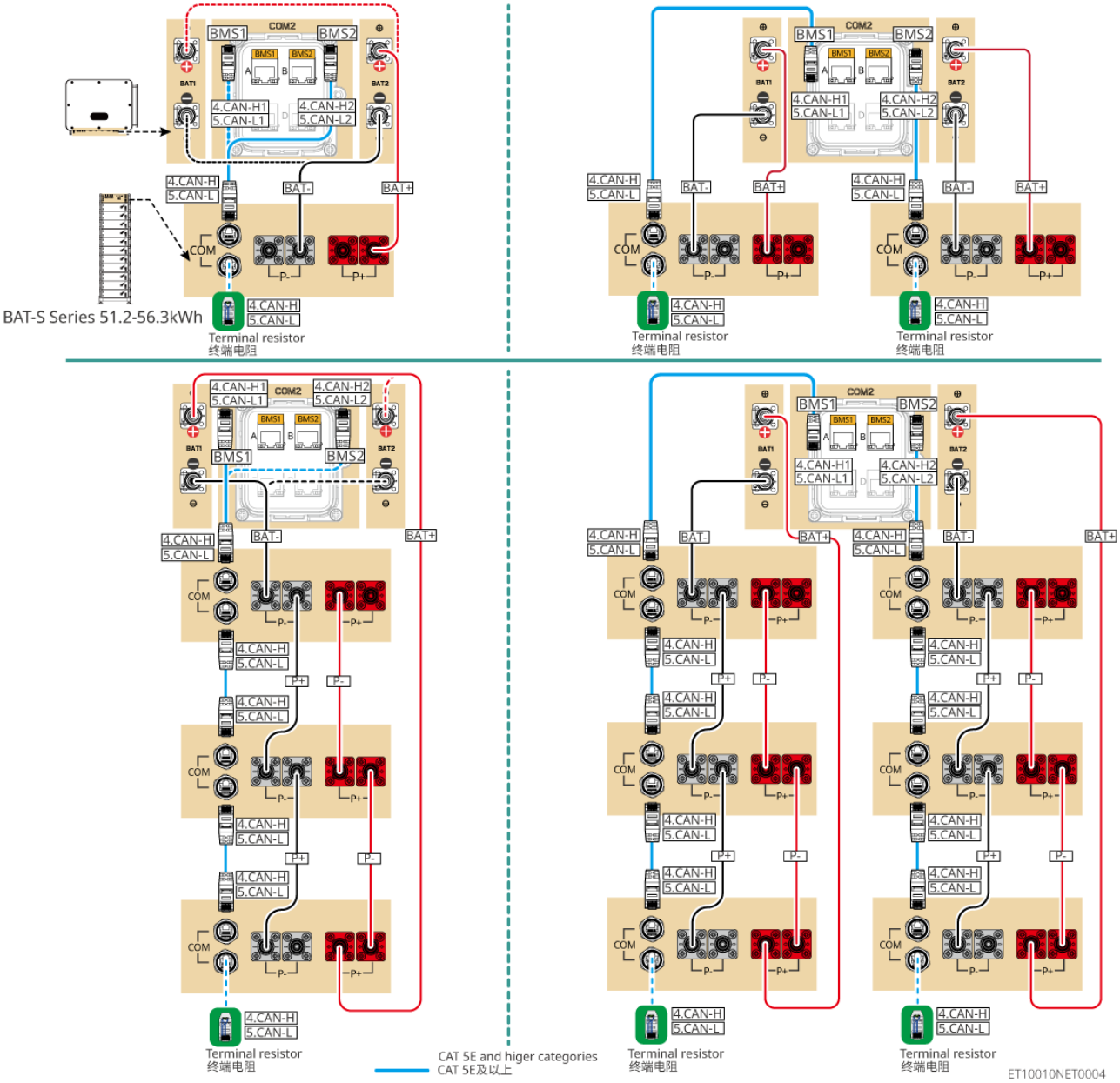
- When the inverter battery terminals are connected in parallel to the battery system, the battery communication cable must be connected to the BMS1 port of the inverter. Do not connect it to the BMS2 port.
- When the inverter battery terminals are connected independently to the battery system, the communication cable of the battery connected to the BAT1 port of the inverter must be connected to BMS1, and the communication cable of the battery connected to the BAT2 port must be connected to BMS2.

Battery System Wiring Diagram

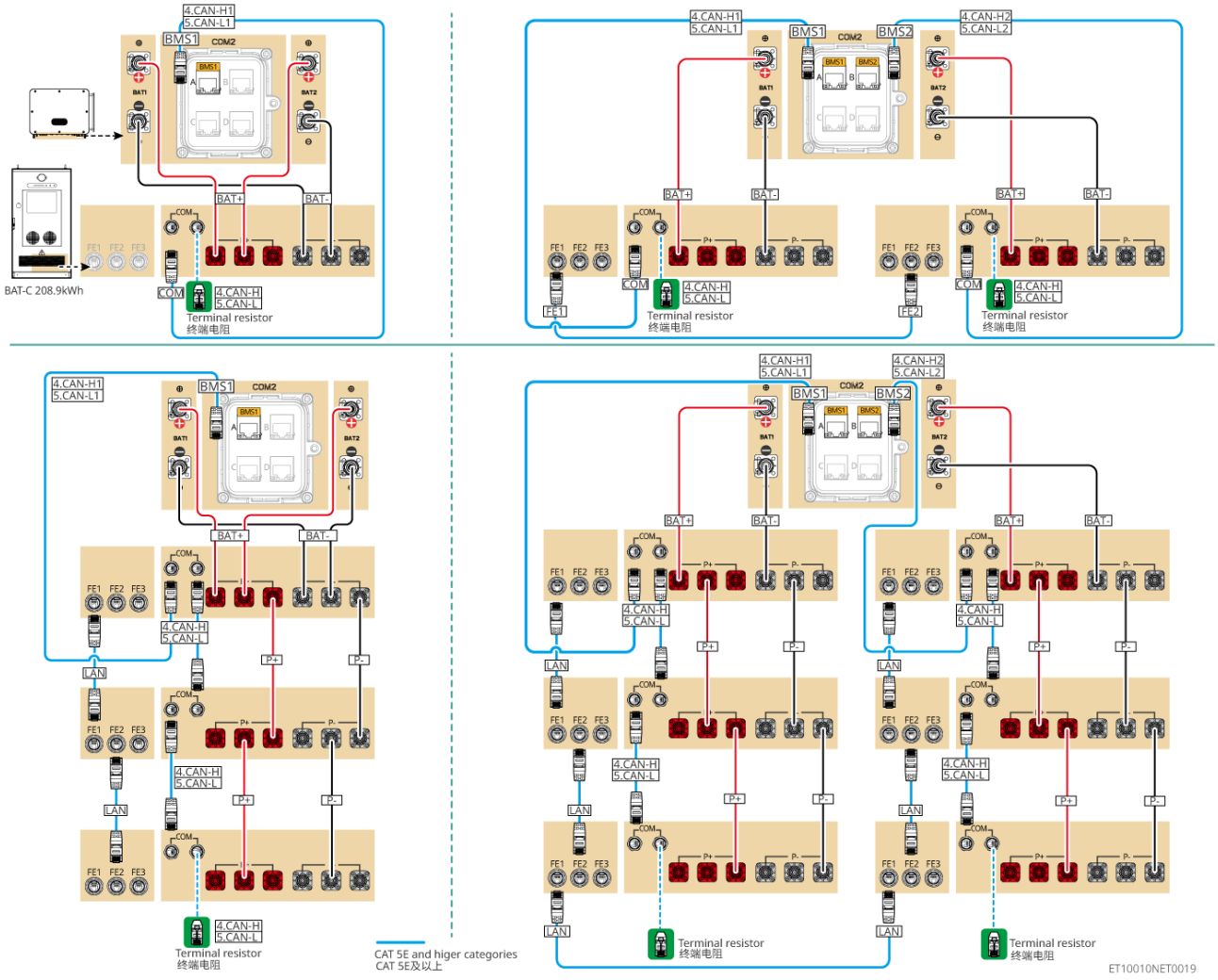
BAT Series 92.1-112.6kWh Commercial & Industrial Battery System



BAT Series 35.8-56.3kWh High Voltage Battery

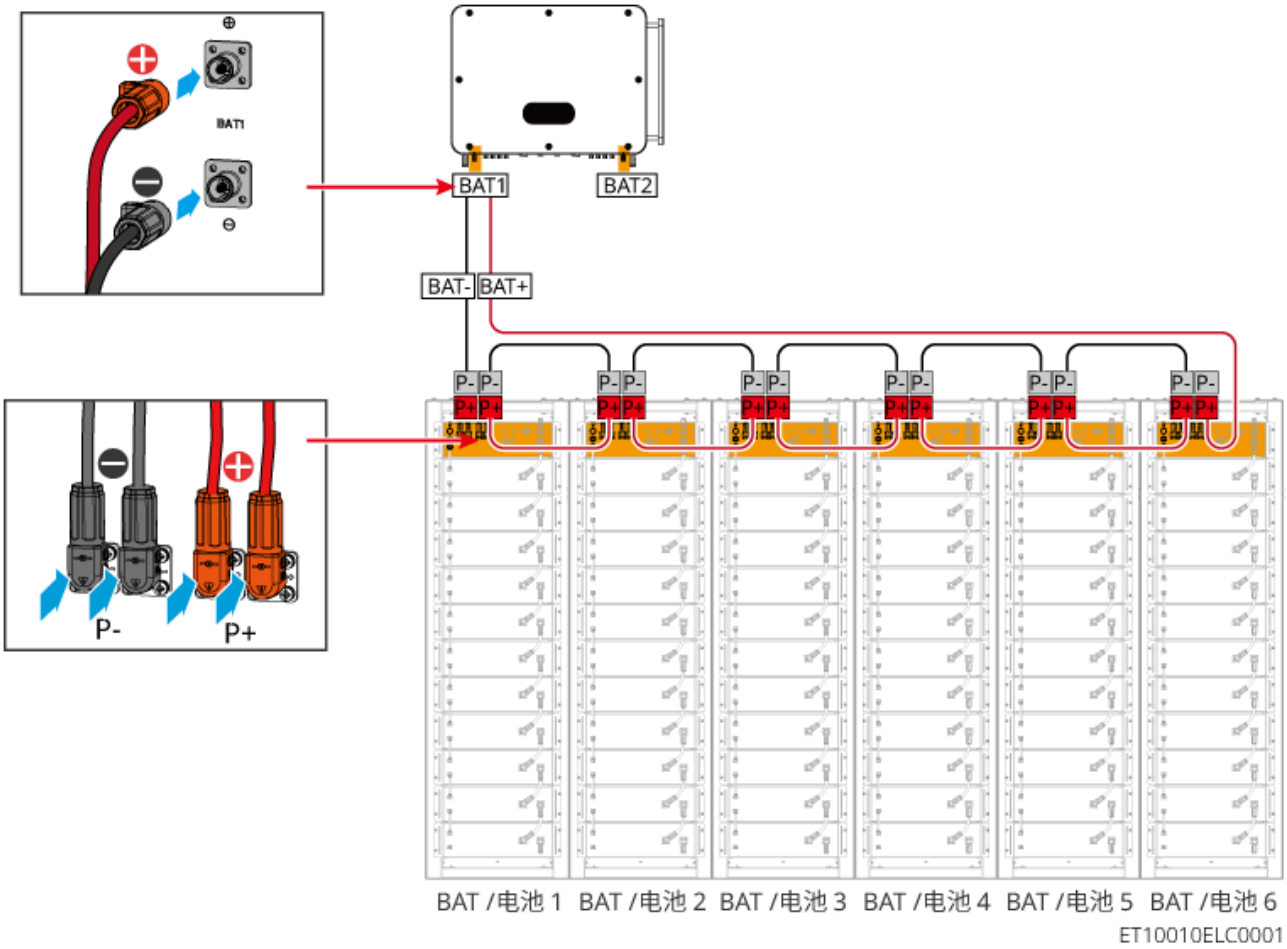


BAT-C Series 208.9kWh Commercial & Industrial Battery System

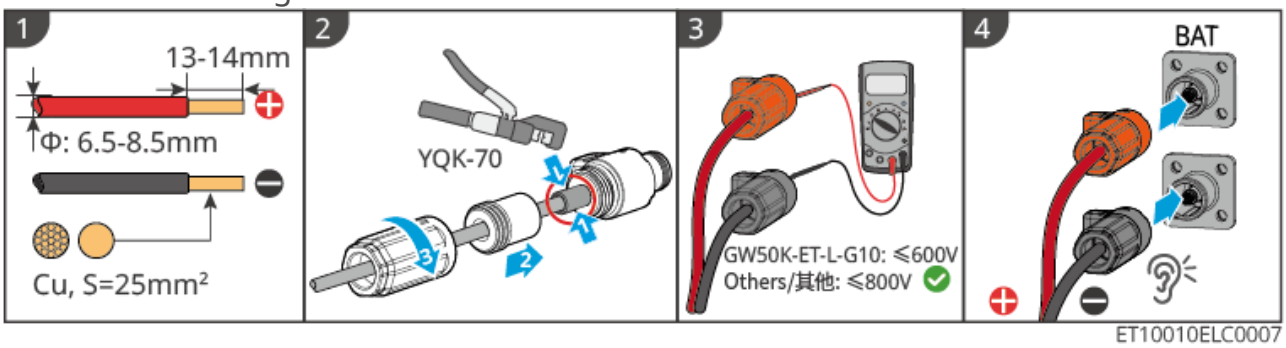


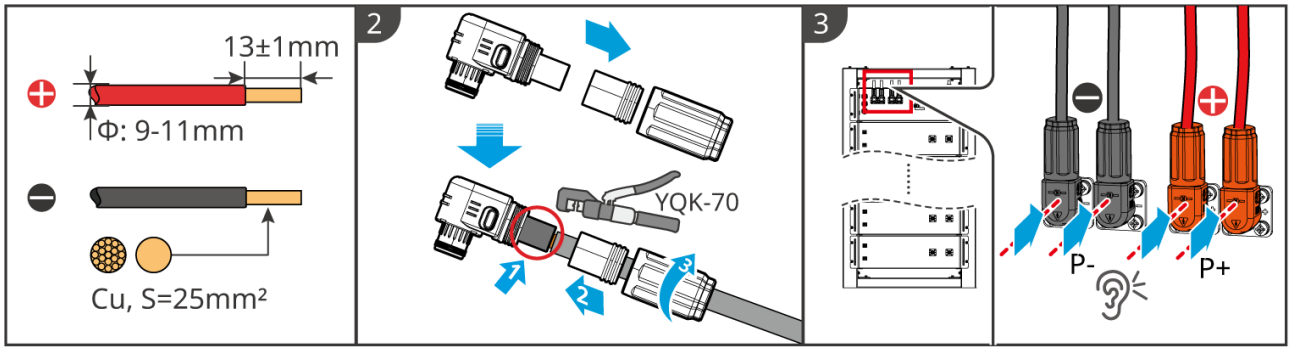
5.6.1 BAT Series 35.8-56.3kWh High Voltage Battery

5.6.1.1 Connecting the inverter and battery power cables



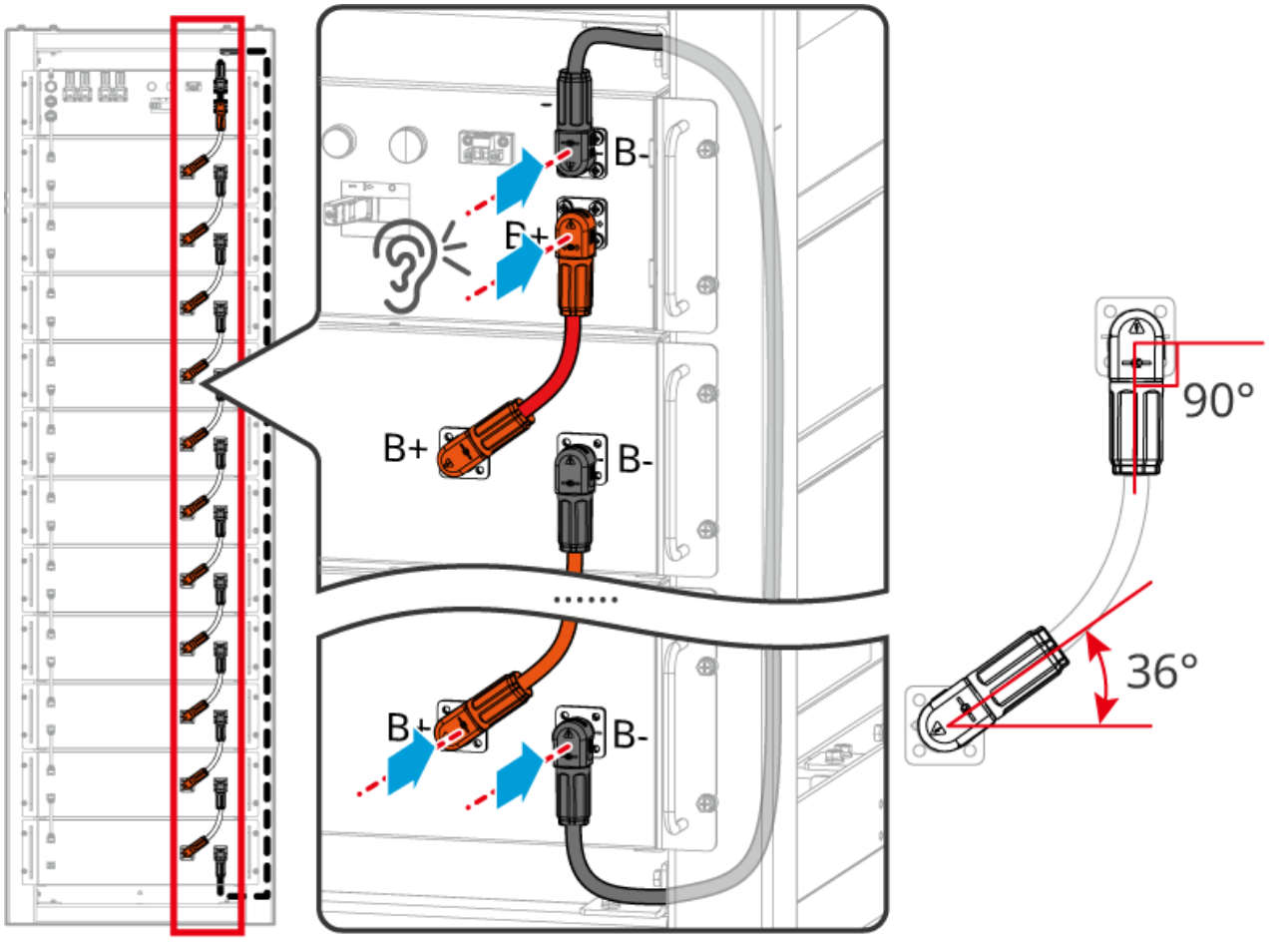
Method for making inverter end cables





BAT10ELC0002

5.6.1.2 Connect Power Cables Between Battery Compartments



BAT10ELC0003

5.6.1.3 Connect Communication Cable

Note

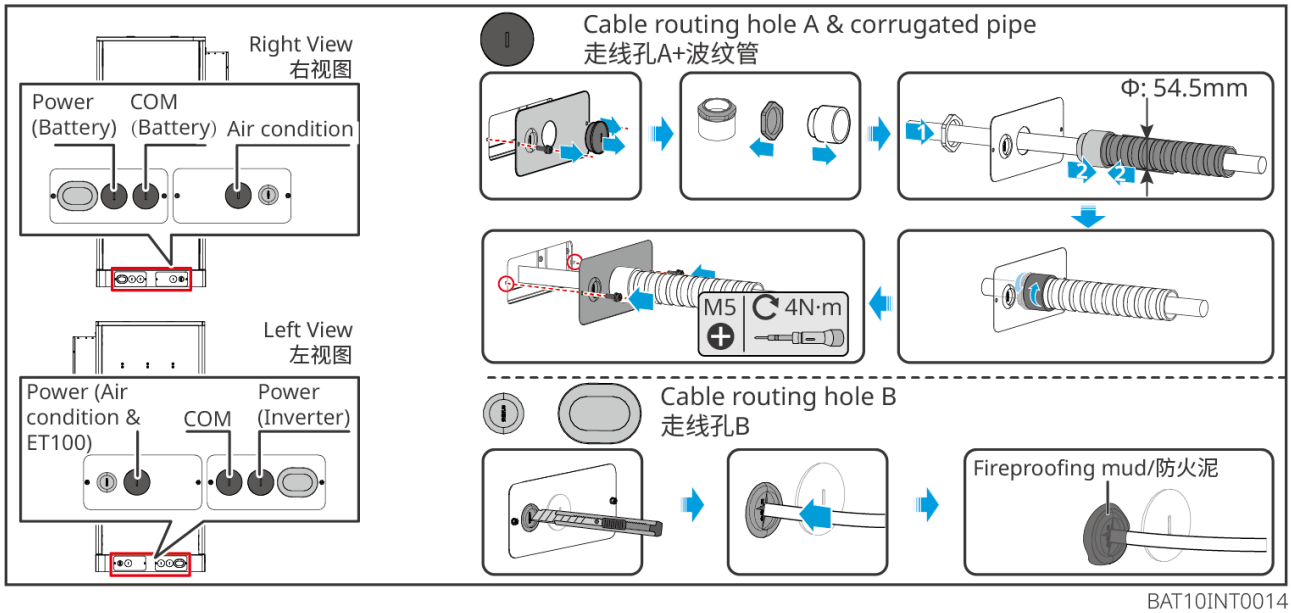
The battery system is shipped with a communication cable. Please use the communication cable provided with the package.

Explanation of BMS communication connection between inverter and battery:

Port	Definition	Description
COM1, COM2	1: RS485_A1 2: RS485_B1	Communication with inverter (reserved).
	4: CAN_H 5: CAN_L	Communication with inverter or parallel cluster communication.

5.6.2 BAT Series 92.1-112.6kWh Commercial and Industrial Battery System

5.6.2.1 Introduction to Battery Cable Pass-through and System Wiring



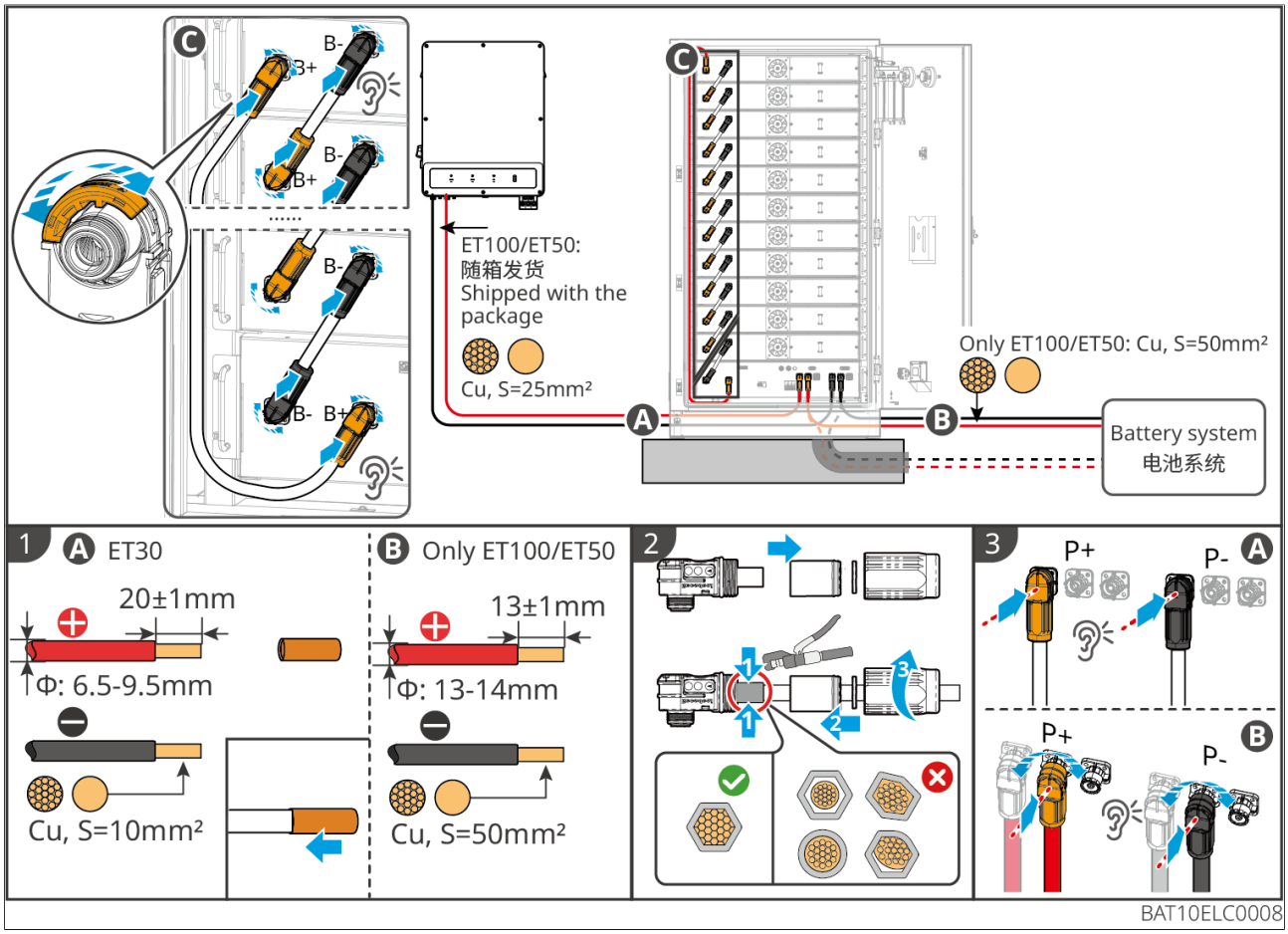
BAT10INT0014

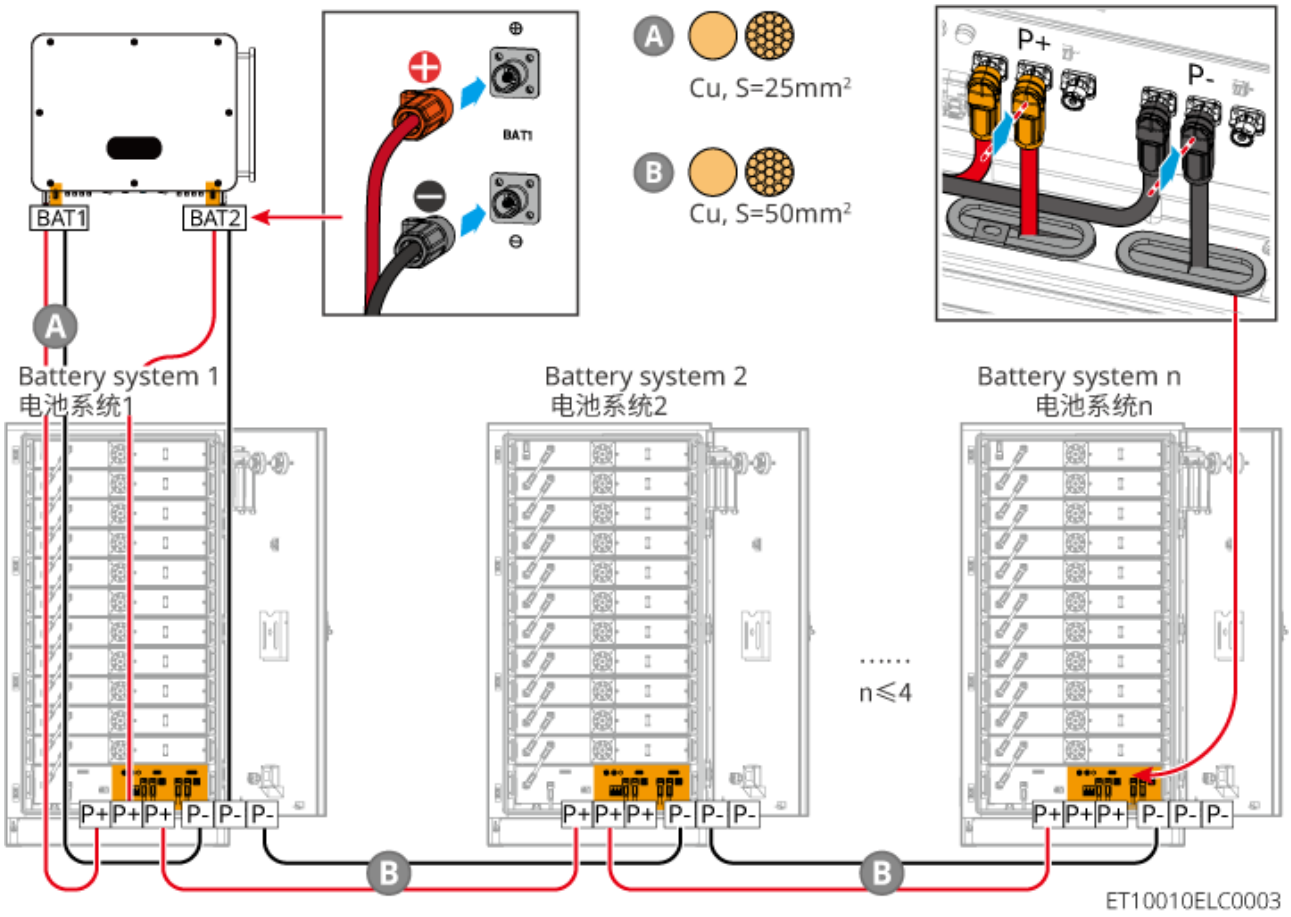
Note
All cut cable openings must be sealed with fireproof putty.

5.6.2.2 Connect inverter and battery power cables and inter-battery power cables

Note

- When connecting the inverter to the battery, use the finished cables shipped with the product. If the finished cable length is insufficient, select cables that meet the requirements and make the connections yourself.
- The BAT series 92.1-112.6kWh commercial and industrial battery system supports a maximum of 4 battery cabinet clusters in parallel.





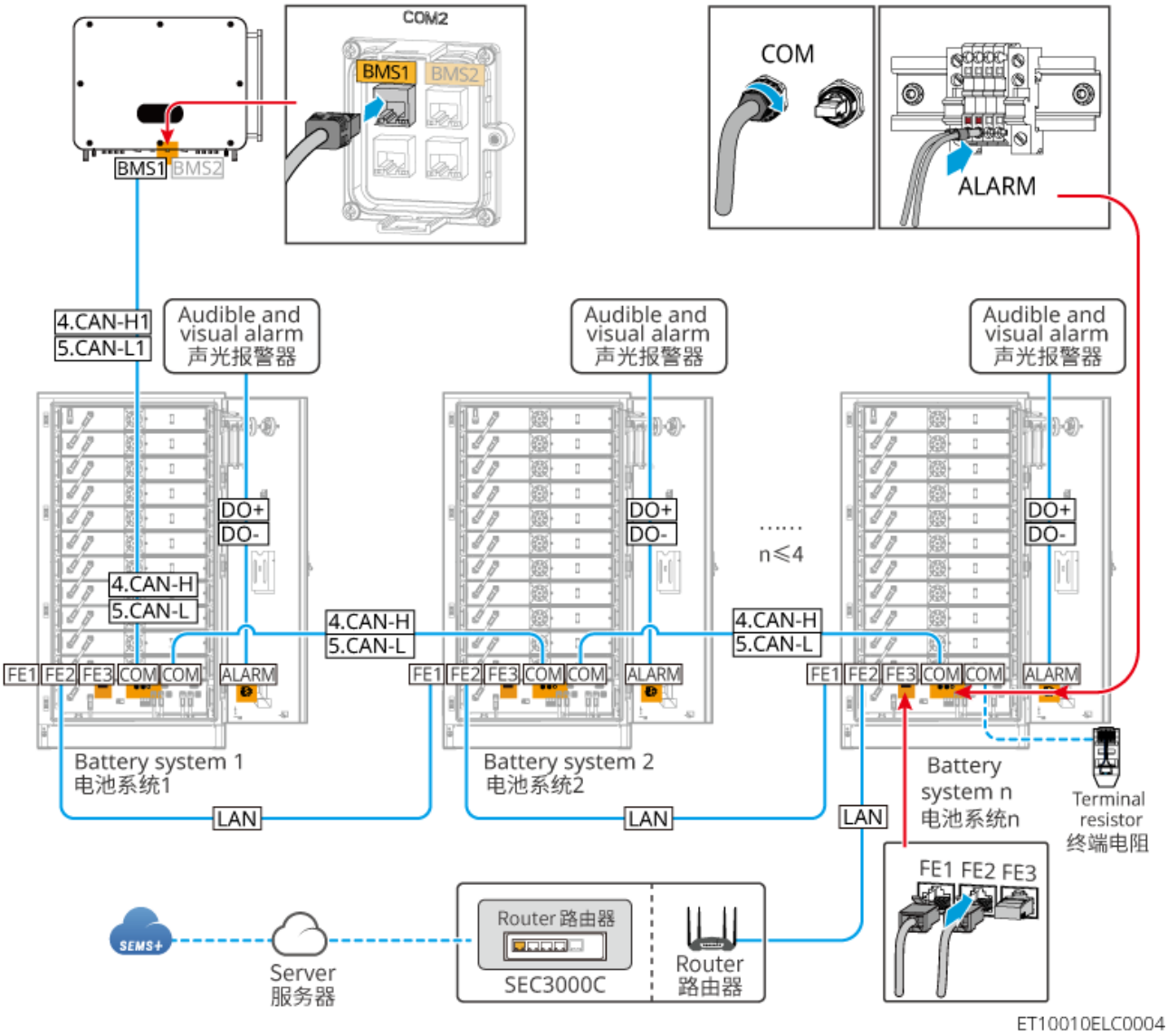
5.6.2.3 Connecting Communication Cables

Note

- The external communication ports of the battery system are equipped with terminal resistors at the factory. If you need to connect communication cables, remove the terminal resistors. For ports not connected to communication cables, keep the terminal resistors in place.
- LAN communication between batteries supports the transmission of cell-level information, supporting up to 40 battery systems in parallel. When using LAN communication, please use shielded network cables, and the connected router must be the same router used for the inverter's network configuration.
- When batteries are in parallel clusters, to enhance communication quality, the COM port on the battery farthest from the inverter must retain the terminal resistor.
- When batteries are in parallel clusters, ensure that the distance from the battery farthest from the inverter to the inverter does not exceed 50 meters.
- The battery system comes with communication cables in the box. Please use the communication cables provided in the box.

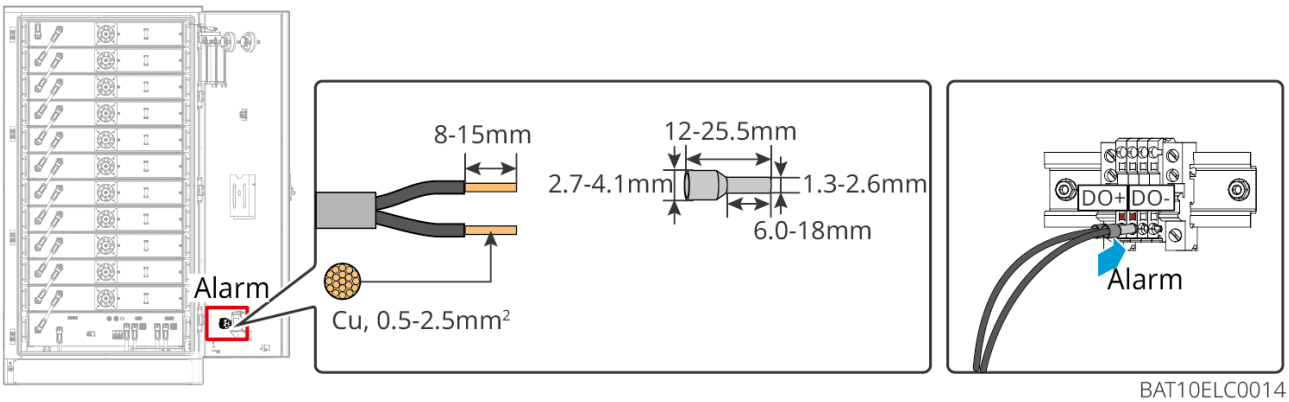
BMS Communication between Inverter and Battery

Port	Definition	Description
1-3，6-8	-	-
4	CAN_H	Communication with inverter and cluster CAN bus.
5	CAN_L	



ET10010ELC0004

Dry Contact Wiring



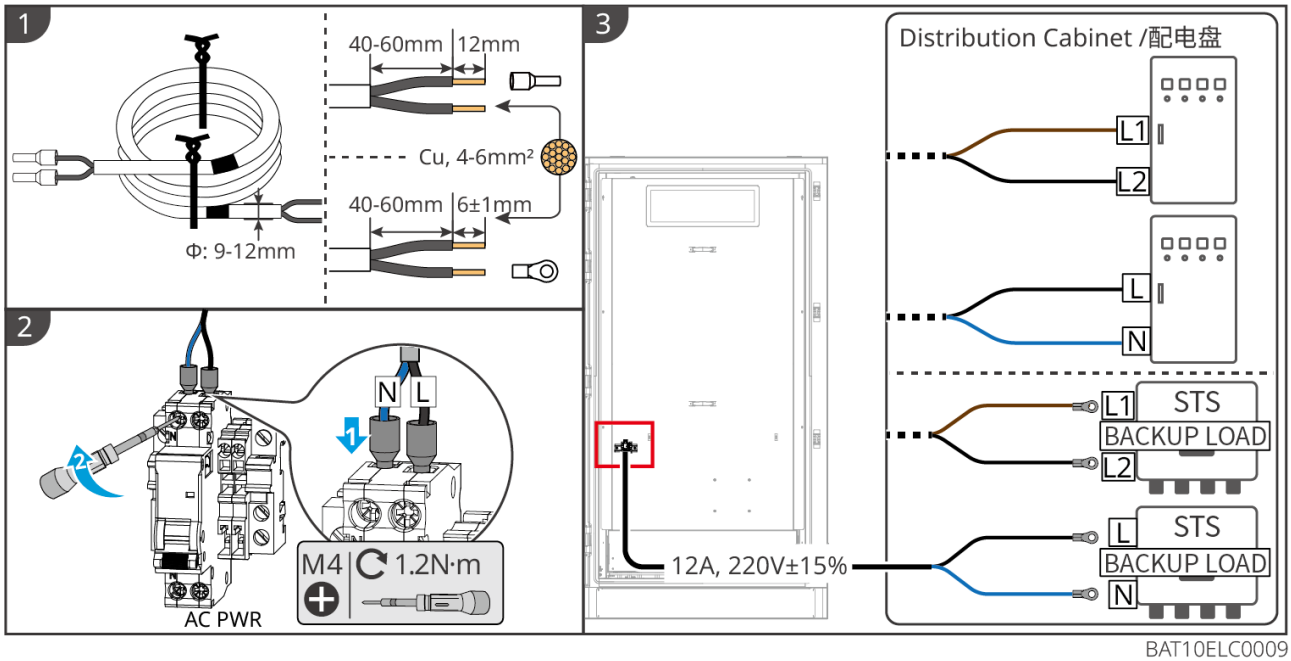
BAT10ELC0014

5.6.2.4 Connecting Battery Air Conditioner Cable

Step 1: Make the air conditioner cable.
Step 2: Connect the cable to the battery's air conditioner switch.
Step 3: Connect the cable to the distribution panel or to the inverter's BACKUP port via STS.

Note

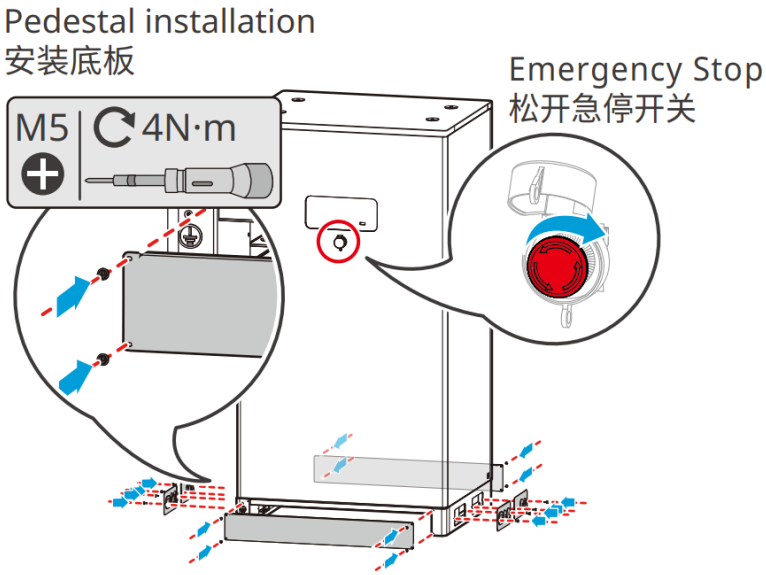
- When clustering battery systems, please wire the air conditioner power cables separately.
- Ensure the voltage of the air conditioner power cable is 220V±15% and the rated current is 12A.



BAT10ELC0009

5.6.2.5 Install the bottom plate and release the emergency stop switch

After wiring, please put the bottom cover of the battery back on the battery and turn it clockwise to release the emergency stop switch.



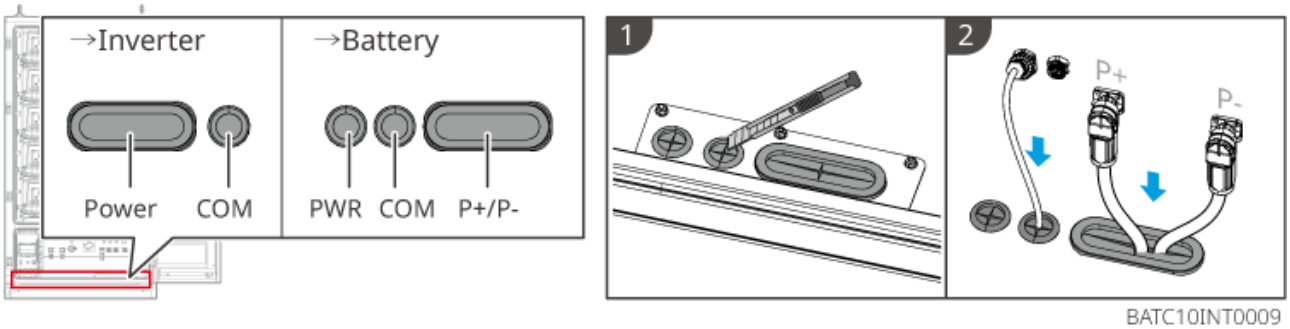
BAT10INT0009

5.6.3 BAT-C Series 208.9kWh Commercial and Industrial Battery System

5.6.3.1 Introduction to Cable Routing Holes

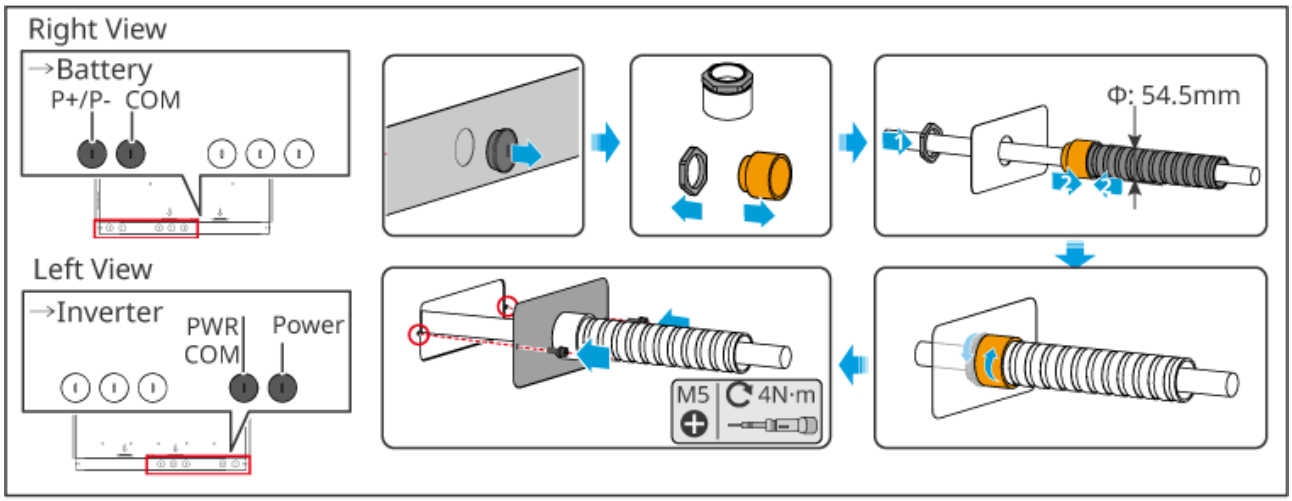
Note
All cut wiring holes must be sealed with fireproof putty!

Introduction to Internal Cable Routing Holes in the Cabinet



BATC10INT0009

Introduction to Side Cable Routing Holes in the Cabinet



5.6.3.2 Connect Power Cables

Note

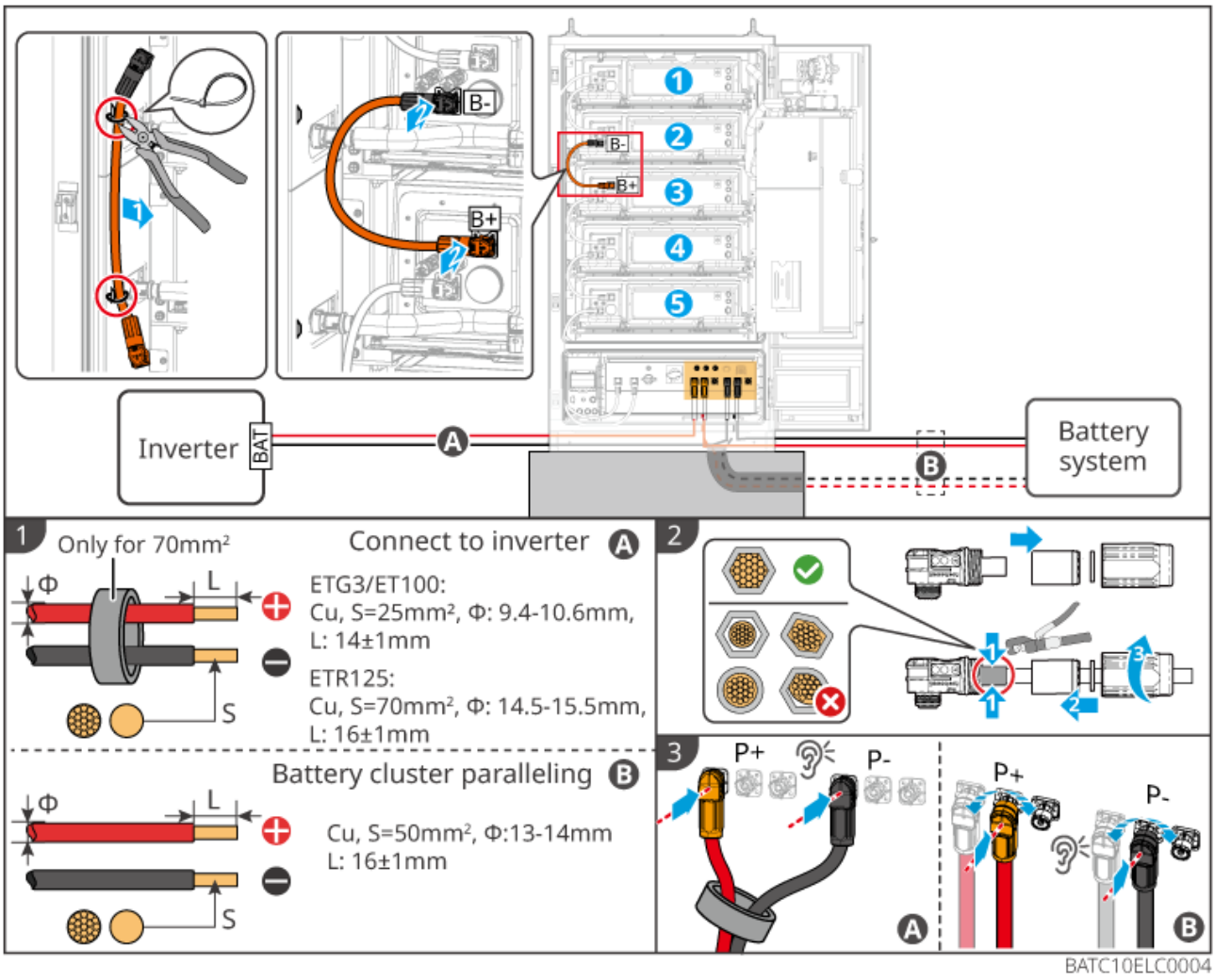
- When connecting the battery system to the inverter, use the finished cables shipped with the product. If the finished cables are not long enough, please select cables that meet the requirements and make them yourself.
- If the finished cables have magnetic rings, after making your own cables, remove the magnetic rings from the finished cables and place them onto the self-made wiring harness.
- The BAT-C series 208.9kWh commercial and industrial battery system supports a maximum of 4 battery cabinet parallel connections.

- **Connect Power Cables Between Batteries**

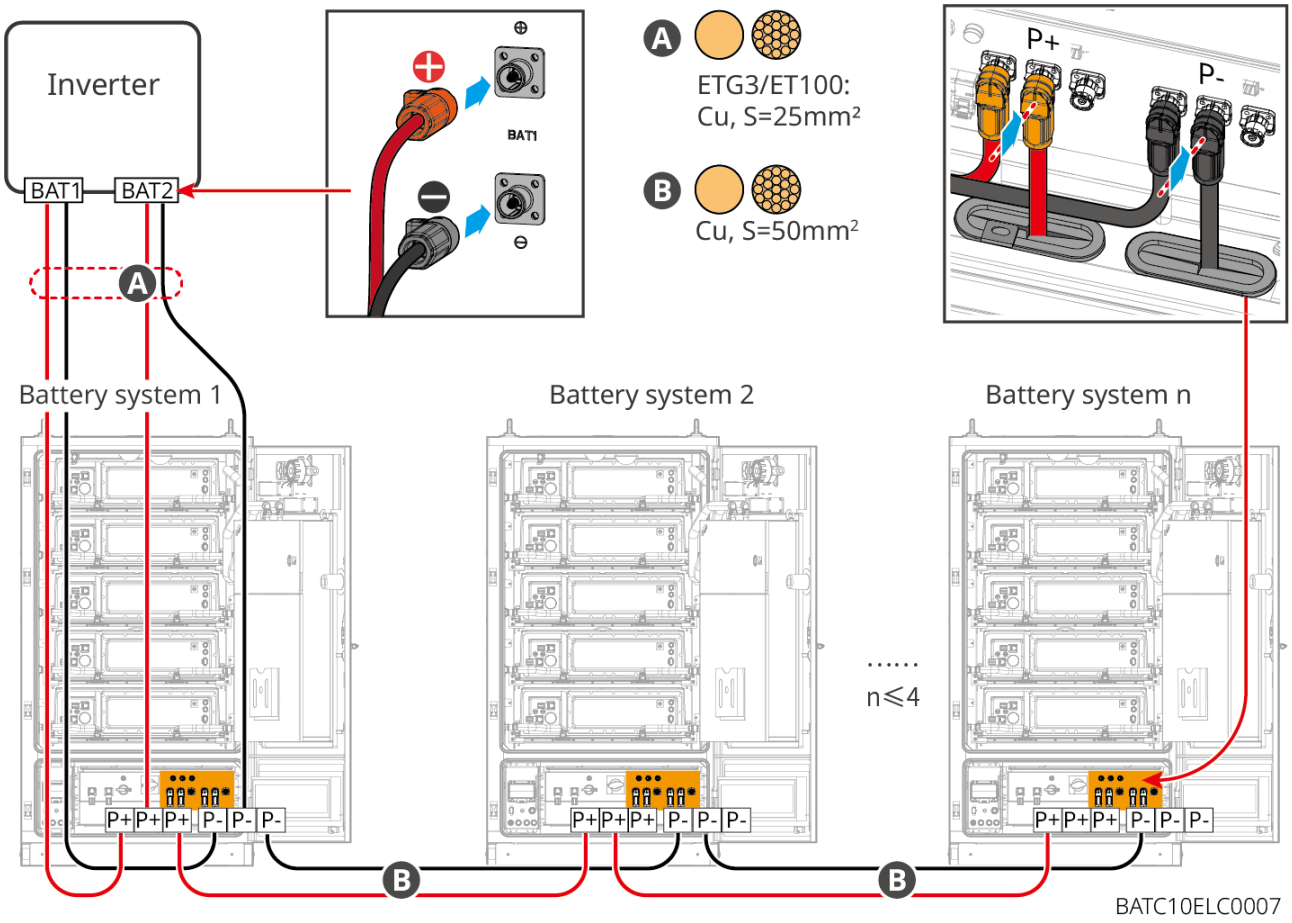
1. Use wire cutters to cut the cable ties and remove the power cables.
2. Connect the power cables to the PACK positive and negative terminals.

- **Connect Battery System Power Cables**

1. Prepare the cables.
2. Strip and prepare the wires.
3. Connect the cables to the corresponding ports.



Wiring Diagram



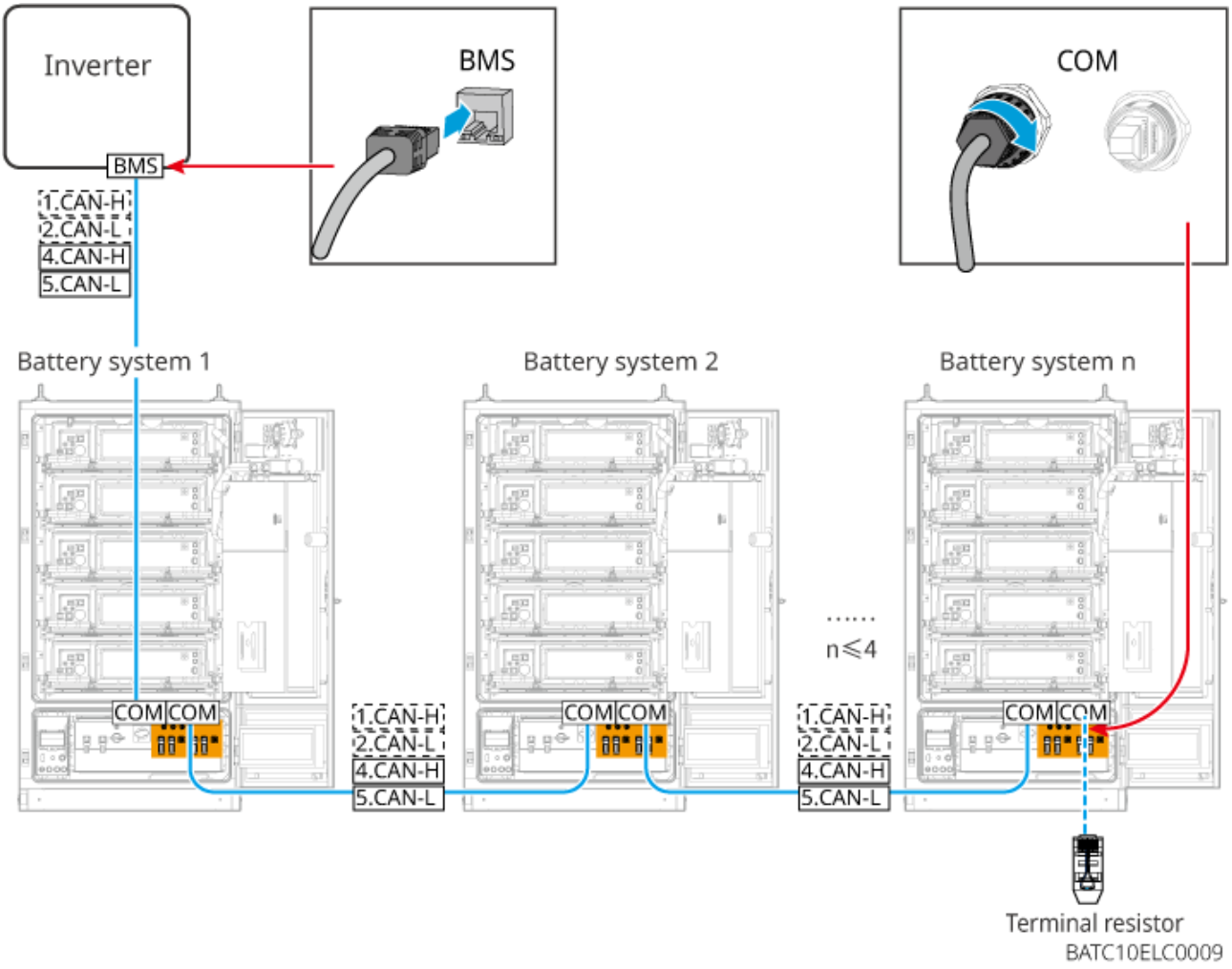
5.6.3.3 Connect Communication Cables

Note

- The external communication port of the battery system is pre-connected with a terminal resistor. If you need to connect a communication cable, remove the terminal resistor. Keep the terminal resistor on ports without communication cables.
- LAN communication between batteries supports cell-level information transmission, supporting up to 60 battery systems in parallel. For LAN communication, use shielded network cables, and the connected router must be the one used for inverter networking.
- When batteries are in parallel clusters, to enhance communication quality, keep the terminal resistor on the COM port of the battery farthest from the inverter.
- The distance between the battery directly connected to the inverter and the inverter must not exceed 3 meters.
- When batteries are in parallel clusters, ensure the distance from the battery farthest from the inverter to the inverter does not exceed 50 meters.
- When connecting communication cables, use the communication cables provided with the box.

BMS Communication between Inverter and Battery

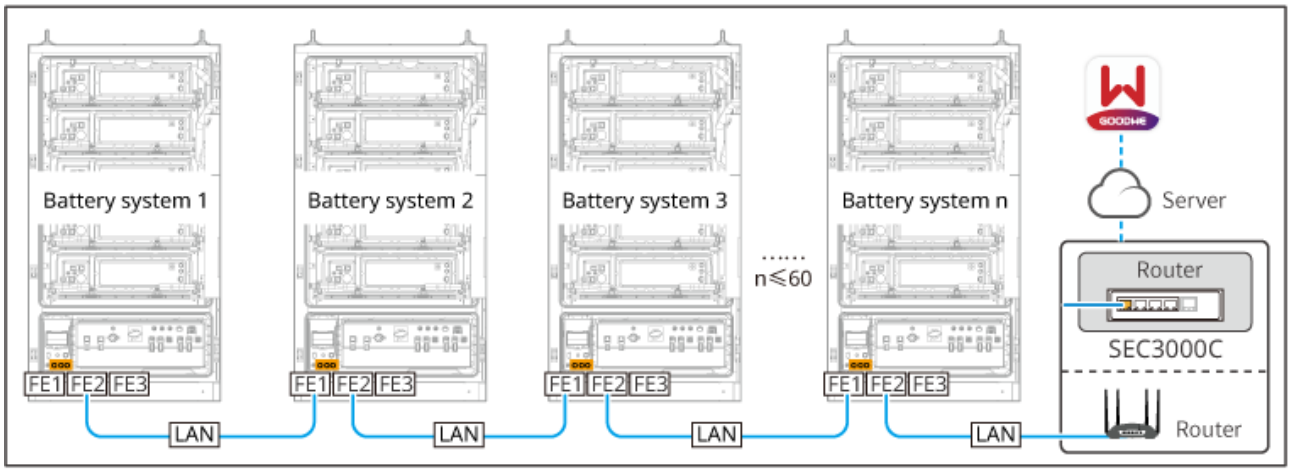
Port	Definition	Description
1	CAN_H	(Optional) DCDC to inverter communication & parallel cluster CAN bus
2	CAN_L	
3	-	-
4	CAN_H	Battery system to inverter communication & parallel cluster CAN bus.
5	CAN_L	
6-8	-	-



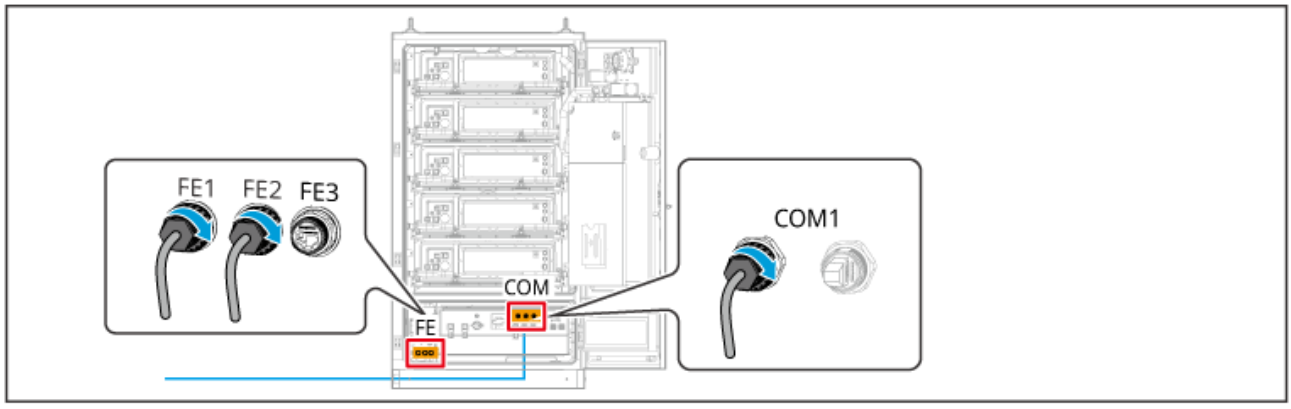
Cloud Board Communication between Batteries

Cloud board communication between batteries supports transmission of CELL-level data and allows a maximum of 60 battery systems to be connected in parallel. When using cloud board communication, please use standard shielded Ethernet cables, and the router to connect must be the one that was paired with the inverter.

Note
The device needs to be connected to the internet to view CELL-level information and PACK-level alarms; cluster-level system information and fault alarms can be viewed without an internet connection.



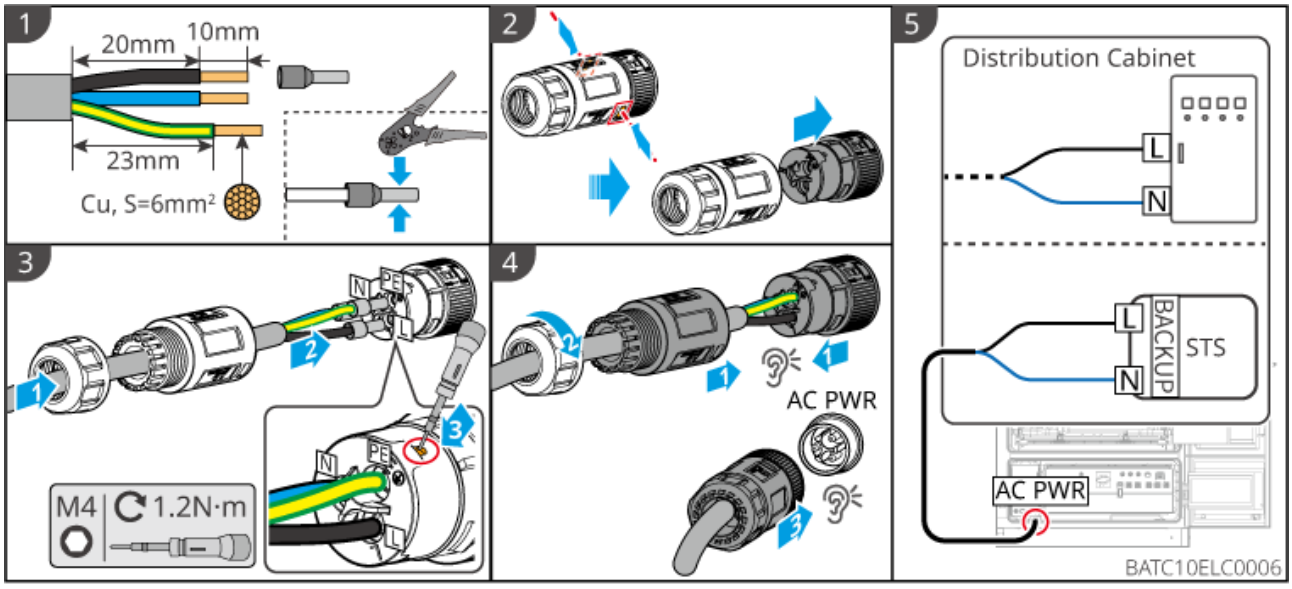
BATC10ELC0002



BATC10ELC0005

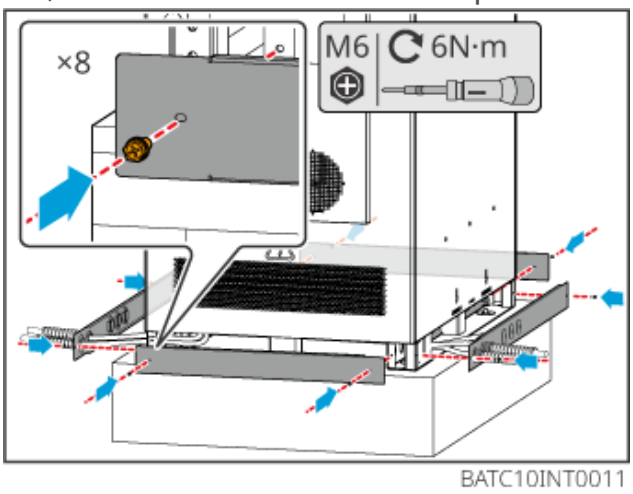
5.6.3.4 Connect power supply lines for liquid cooling unit

1. Prepare the cable and crimp the terminals.
2. Disassemble the AC connector.
3. Insert the crimped cable into the corresponding terminal hole and press the wire with a flat-head screwdriver.
4. Assemble the connector and tighten the nut, then insert the connector into the AC PWR port.
5. Connect the other end of the cable to the distribution panel or the BACK-UP port.

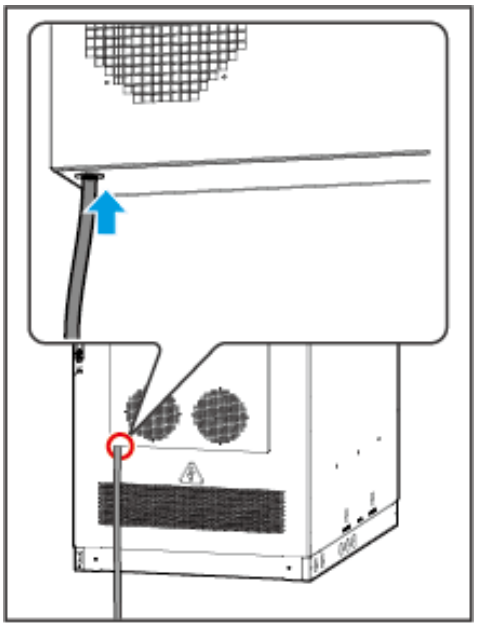


5.6.3.5 Post-wiring operations

1. After wiring is complete, reinstall the removed base plate.

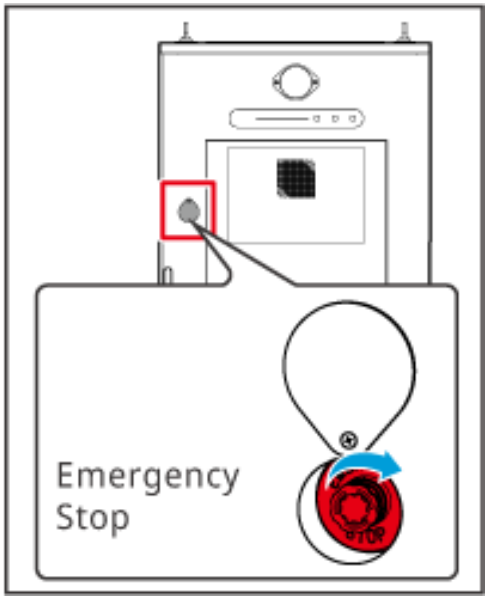


2. Install the liquid cooling unit drain pipe.



BATC10INT0017

3. Release the emergency stop switch.



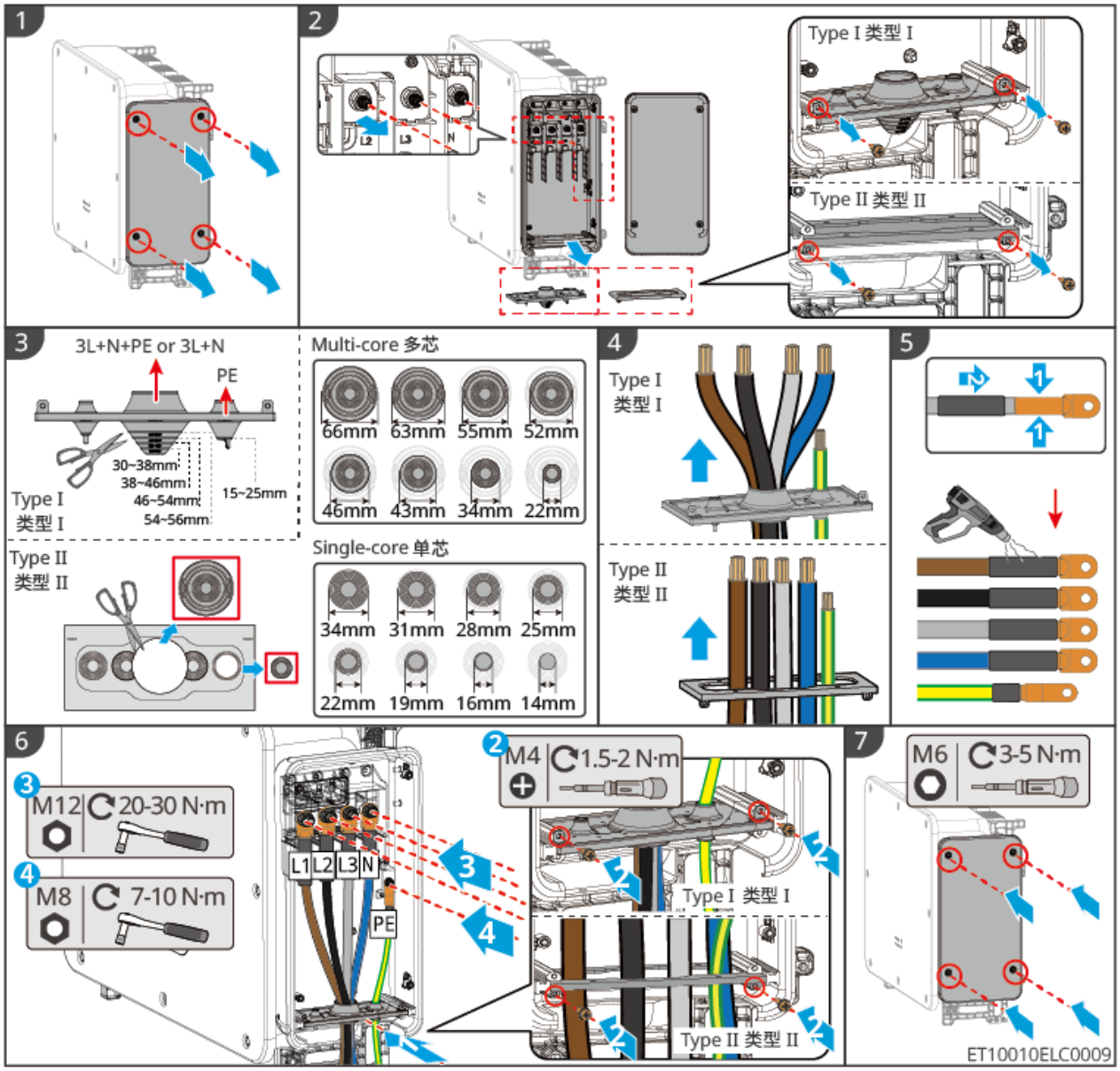
5.7 Connect AC Power Cables

⚠Warning

- The inverter integrates a residual current monitoring unit (RCMU) to prevent residual current from exceeding the specified value. When the inverter detects a leakage current greater than the allowable value, it will quickly disconnect from the grid.
- When wiring, the AC wires must exactly match the "L1", "L2", "L3", "N", and "PE" grounding ports of the AC terminal. Incorrect cable connection may cause equipment damage.
- Ensure that the wire cores are fully inserted into the terminal wiring holes without any exposed part.
- Ensure that the insulating plate at the AC terminal is tightly fastened and not loose.
- Ensure that the cable connections are tight; otherwise, the terminal may overheat during operation, causing equipment damage.
- To ensure that the BACK-UP port load can continue to operate when the inverter is powered down for maintenance, it is recommended to install a single-pole double-throw switch.

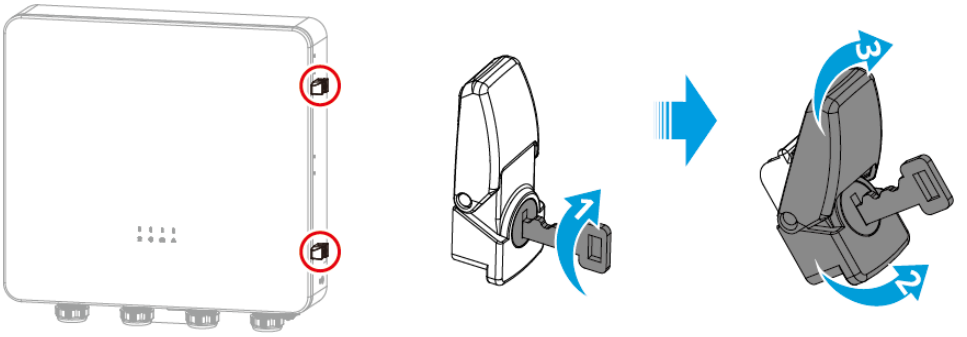
5.7.1 Connecting Inverter AC Wires

Connecting Inverter AC Wires



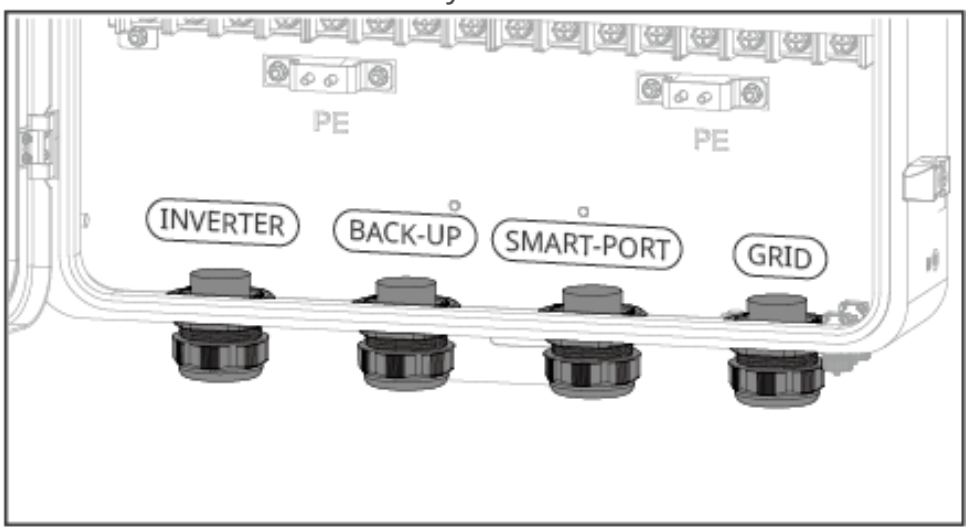
5.7.2 Connecting STS AC Power Cables (Optional)

Open the STS front cover



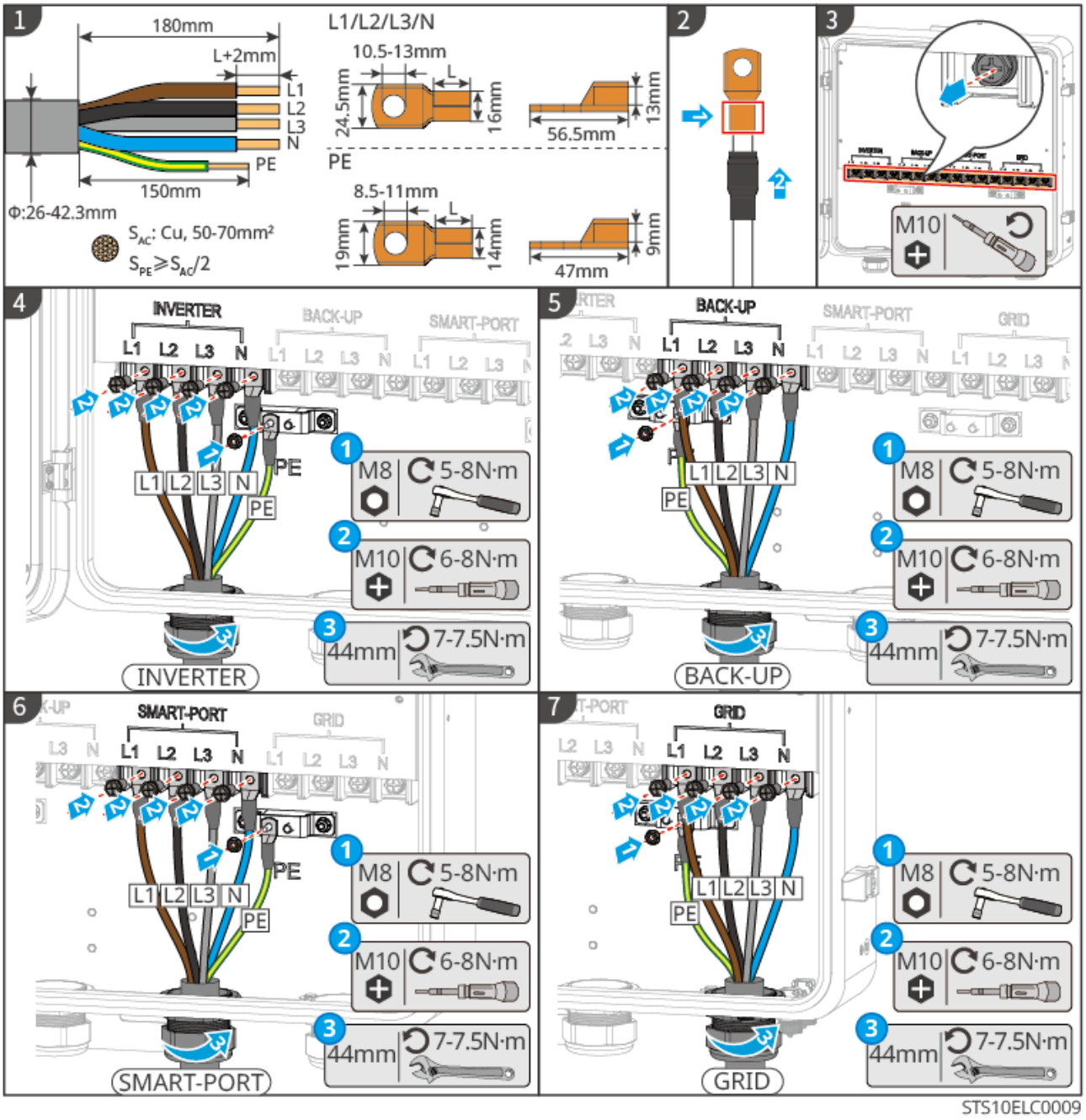
STS10INT0005

Introduction to the cable entry holes on the STS bottom



STS10ELC0007

Wiring steps

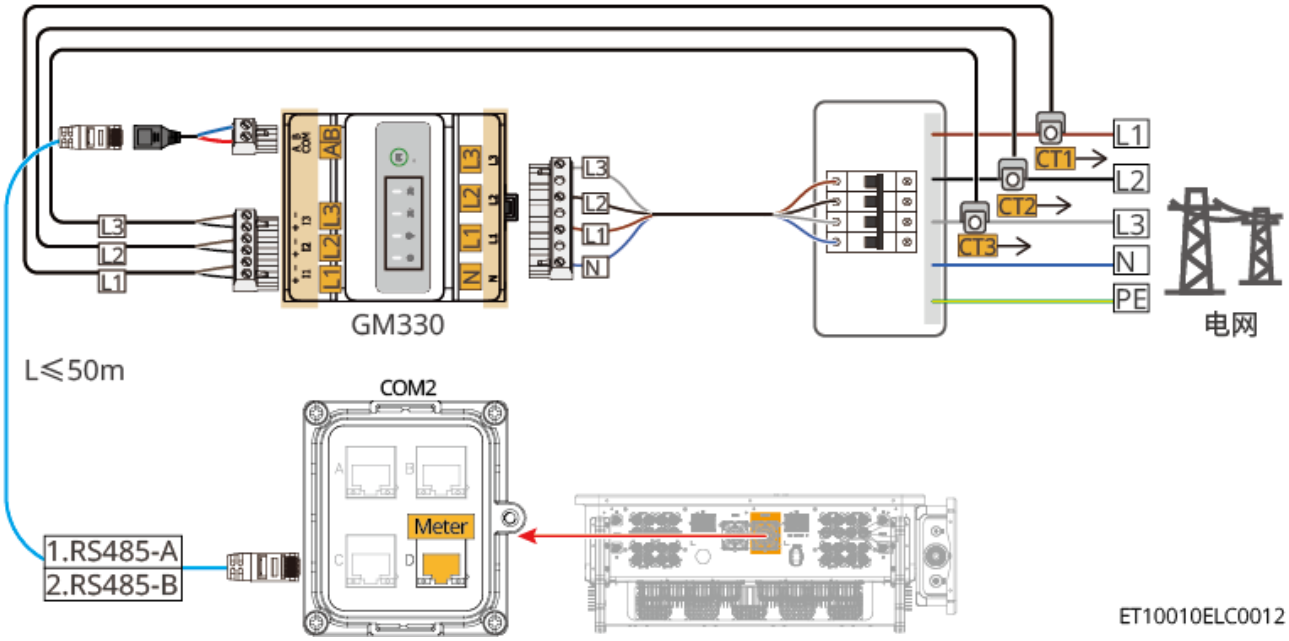


5.8 Connecting Meter Cables

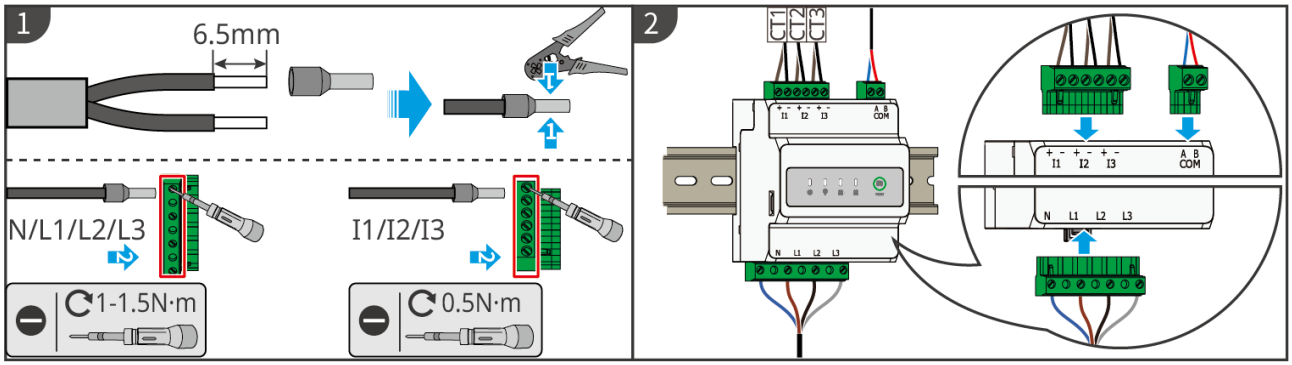
Note

- The meter shipped with the inverter is intended for use with only one inverter. Do not connect one meter to multiple inverters. If you need to use multiple inverters, please consult the manufacturer to purchase meters separately.
- Ensure that the CT connection direction and phase sequence are correct; otherwise, monitoring data may be inaccurate.
- Ensure that all cables are connected correctly, securely, and without looseness. Improper wiring may cause poor contact or damage to the meter.
- In areas with lightning risk, if the meter cable length exceeds 10m and the cable is not routed in a grounded metal conduit, it is recommended to install an external lightning protection device.

GM330 Meter Wiring

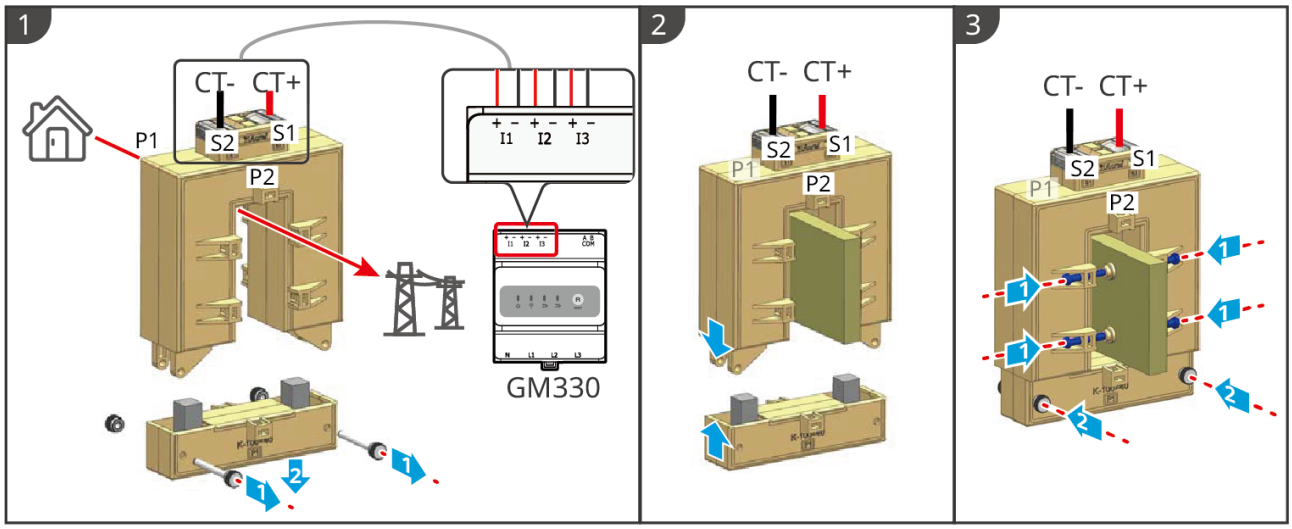


Wiring Steps



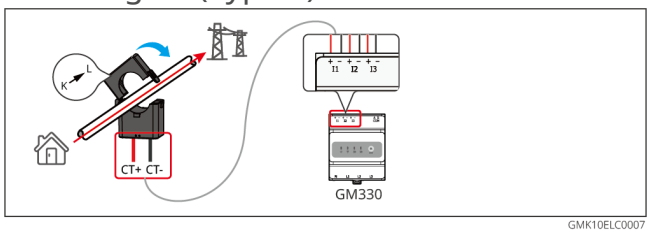
GMK10ELC0004

Installing CT (Type 1)



GMK10ELC0006

Installing CT (Type 2)



GMK10ELC0007

5.9 Connecting Communication Lines

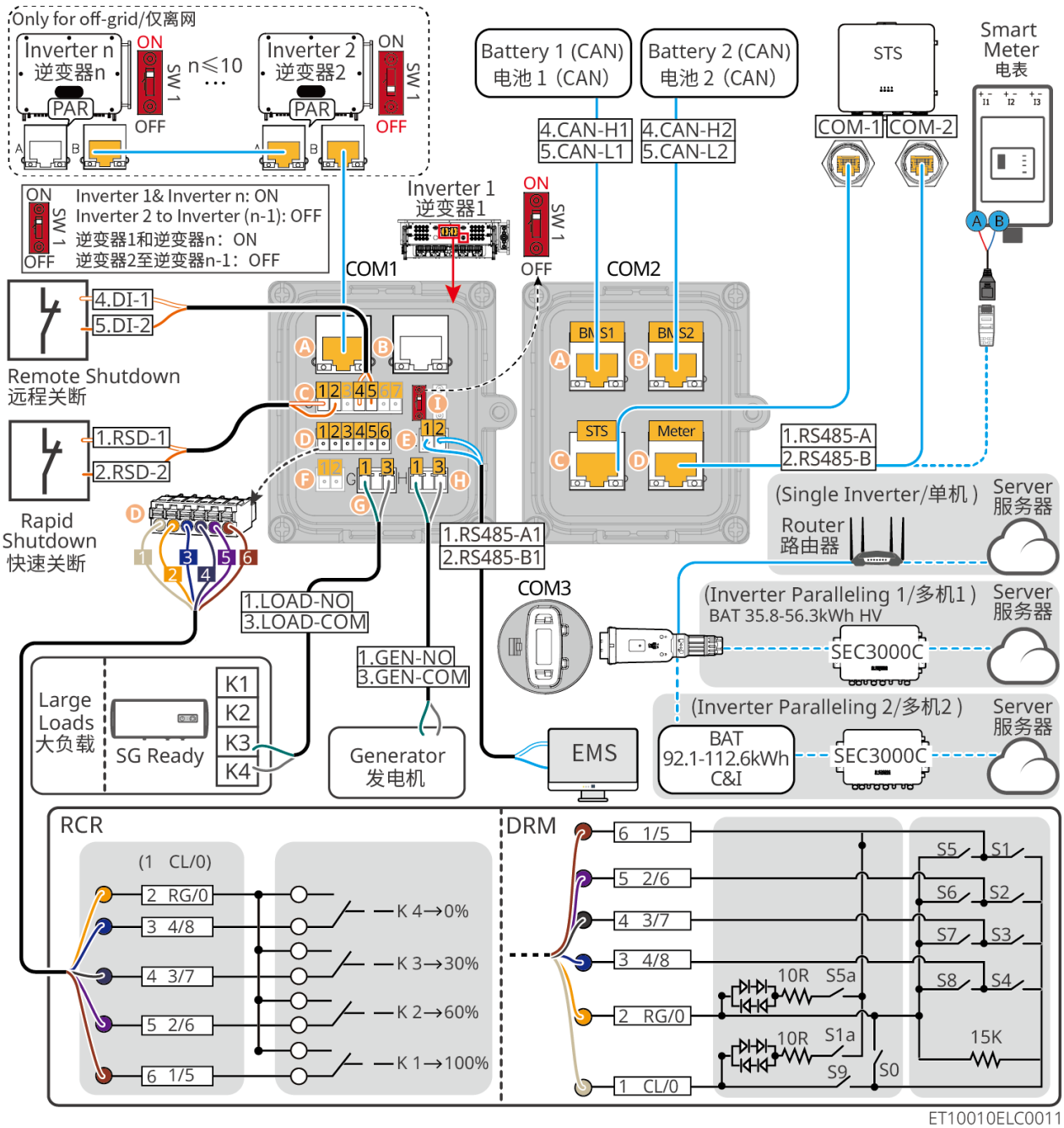
5.9.1 Connect Inverter Communication Cable

Note

- The inverter communication function is optional. Please choose according to the actual usage scenario.
- If you need to use DRM, RCR, or remote shutdown functions, enable the function in the SEMS+ App or the SEC3000C web interface after wiring.
- Do not enable the function in the SEMS+ App or the SEC3000C web interface if the inverter is not connected to a DRED or remote shutdown device, otherwise the inverter will not be able to operate on the grid.
- When the inverter communicates using a 4G module, note the following:
  - The 4G module is an LTE single-antenna device, suitable for applications with low data transmission rate requirements.
  - To ensure 4G signal communication quality, do not install the device indoors or in areas with metal signal interference.
  - The SIM card built into the 4G module is a mobile communication card. Please confirm that the device is installed in an area covered by mobile 4G signal.

Communication Function Description

ET10010ELC0009



ET10010ELC0011

Communication Port	Zone	No.	Function/Connected Device	Port Name	Function Description
	A, B	-	Off-grid Parallel	PAR1, PAR2	-
COM1	C	1		RSD-1	

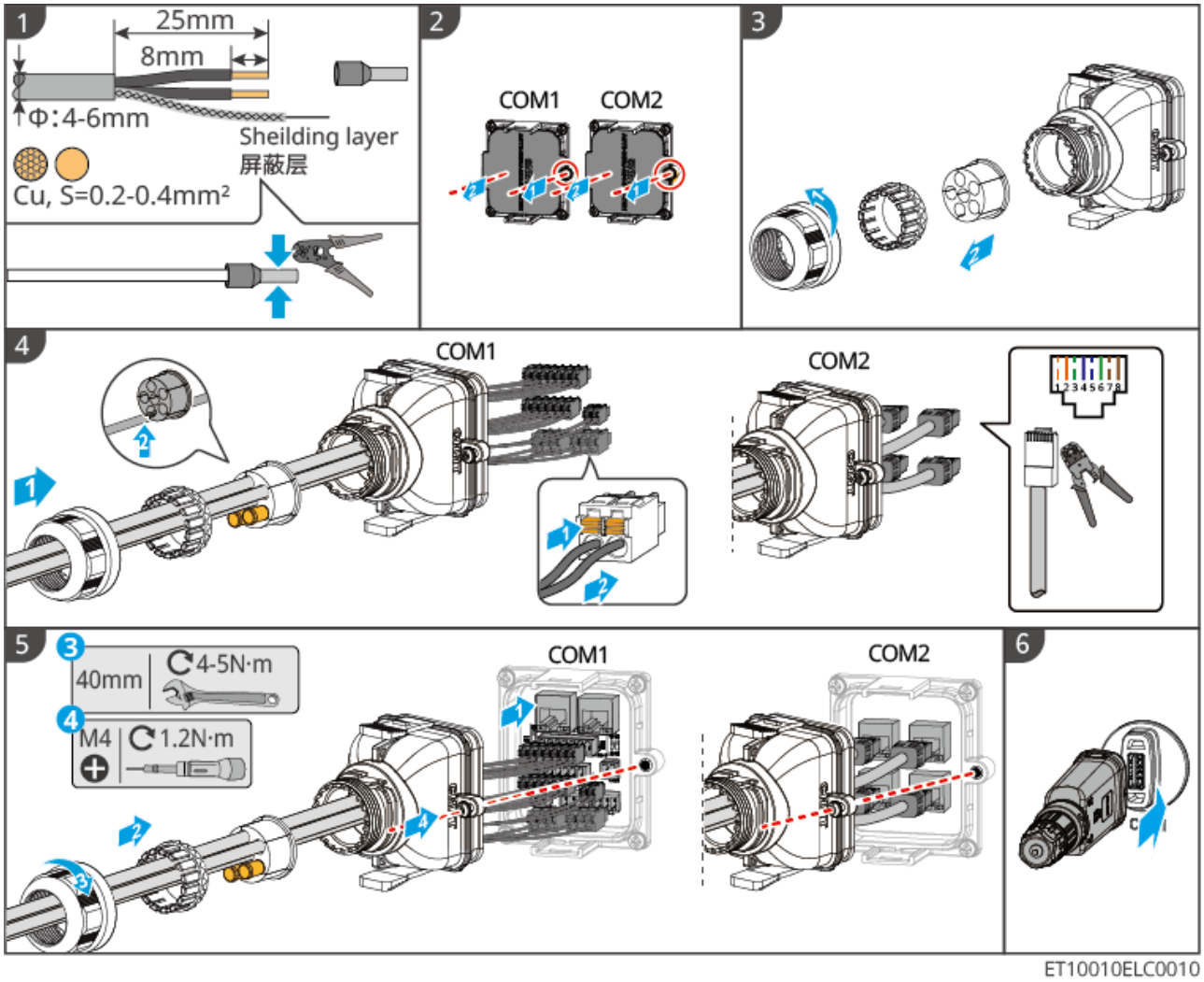
Communication Port	Zone	No.	Function/Connected Device	Port Name	Function Description
		2	Rapid Shutdown	RSD-2	Connect to rapid shutdown device. When an incident occurs, it can control the shutdown of PV modules.
		3	-	-	Reserved
		4	Remote Shutdown	DI-1	Connect to remote shutdown device. When an incident occurs, it can control the device to stop working.
		5		DI-2	
		6-7	-	-	Reserved
	D	1	DRM&RCR	CL/0	Complies with Australian DRM (Demand Response Modes) and provides DRED signal control port. RCR (Ripple Control Receiver): In Germany and parts of Europe, grid companies use Ripple Control Receiver to convert grid dispatch signals into dry contact signals, and the power station receives grid dispatch signals via dry contact communication.
		2		RG/0	
		3		4/8	
		4		3/7	
		5		2/6	
		6		1/5	
	E	1	EMS	RS485-A1	

Communication Port	Zone	No.	Function/Connected Device	Port Name	Function Description
		2		RS485-B1	Connect to EMS to enable communication between inverter and EMS.
	G	1	Large Load	LOAD-NO	Large load control port
		2		LOAD-COM	
	H	1	Generator	GEN-NO	Generator control port
		2		GEN-COM	
COM2	A	1-3, 5-6	-	-	Reserved
		4	Battery	CAN-H1	Connect to battery BMS to enable BMS communication between inverter and battery.
		5		CAN-L1	
	B	1-3, 5-6	-	-	Reserved
		4	Battery	CAN-H2	Connect to battery BMS to enable BMS communication between inverter and battery.
		5		CAN-L2	
	C	1	STS	+12V-S	Connect to STS COM1 port to enable communication between inverter and STS.
		2		DGND-S	
		3		STS-TX1	
		4		STS-TX2	
		5		485-A1	
		6		485-A1	

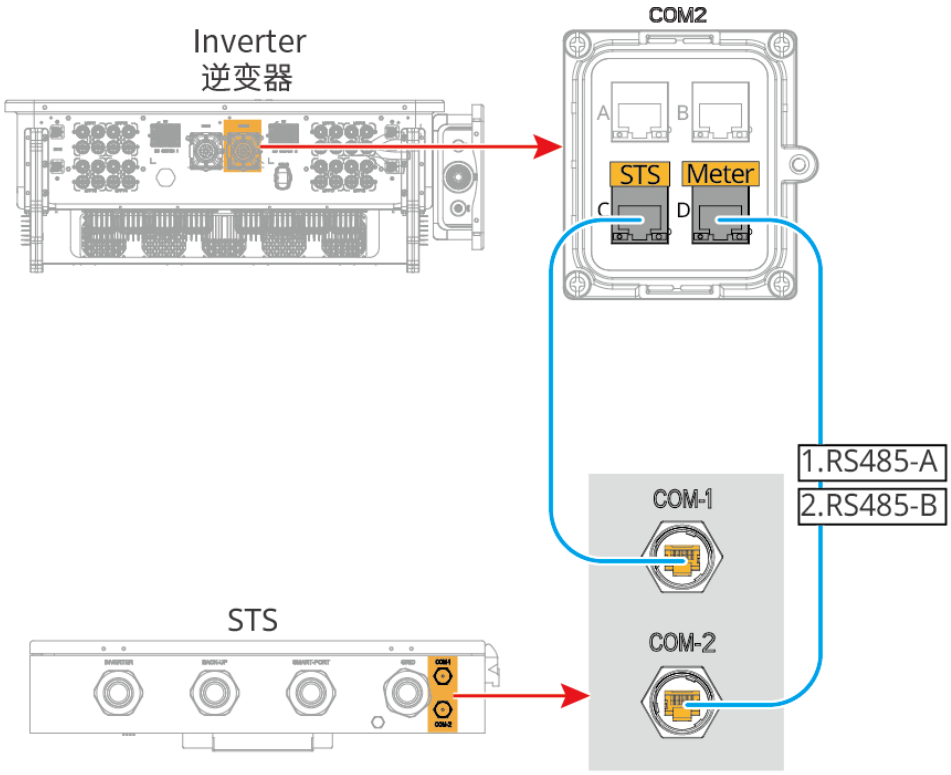
Communication Port	Zone	No.	Function/Connected Device	Port Name	Function Description
		7		485-B1	
		8		485-B1	
	D	7	Smart Meter/STS	RS485-B	Connect to smart meter or STS COM2 port to enable communication between inverter and meter.
		8		RS485-A	
		3-8		-	-
COM3	-	-	Smart Communication Dongle	-	Connect to smart communication dongle.

Reserved

Method for Connecting Communication Cable

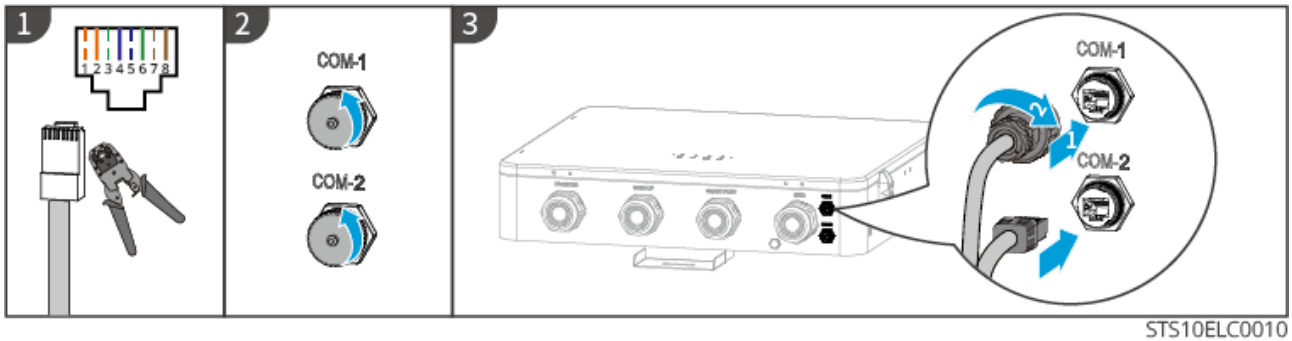


5.9.2 Connecting STS communication cable



STS10ELC0011

Wiring Steps:



STS10ELC0010

6 System Trial Run

6.1 Pre-power-on System Check

No.	Inspection Item
1	Equipment installed securely, installation position easy for operation and maintenance, installation space with adequate ventilation and heat dissipation, installation environment clean and tidy.
2	Protective ground wire, DC wire, AC wire, communication cable, and terminal resistor connections are correct and secure.
3	Cable bundling meets routing requirements, distributed reasonably, no damage.
4	For unused cable entry holes and ports, use the accessory terminals to connect reliably and seal them.
5	Ensure that used cable entry holes are sealed.
6	Voltage and frequency at the inverter grid connection point meet grid connection requirements.

6.2 System Power On

⚠Warning
When there are multiple inverters in the system, ensure that all slave inverters are powered on at the AC side within one minute after the master inverter's AC side is powered on.

Note

When there is no PV generation in the photovoltaic system and the grid is abnormal, if the inverter cannot work normally, the battery black start function can be used to force the battery to discharge and start the inverter. The inverter can enter off-grid mode and supply power to the load from the battery.

- BAT series 25.6-56.3kWh high voltage battery black start procedure: After closing the molded case circuit breaker, the RUN indicator flashes, and the FAULT indicator remains off. Press and hold RUN for 5 seconds. If the contactor closing sound is heard and RUN turns solid on, the black start is successful; if the RUN indicator remains flashing and the FAULT indicator remains off, the black start fails. After a failed black start, press and hold RUN for 5 seconds to repeat the black start procedure. If it fails again, please contact GoodWe after-sales personnel.
- BAT series 92.1-112.6kWh commercial and industrial battery system black start procedure: refer to the power on/off steps.
- Other battery black start procedures are the same as the power-on steps.

Before power-on operation of the BAT series 92.1-112.6kWh commercial and industrial battery system, ensure that the emergency stop switch of the battery is released. Release procedure: Turn the emergency stop switch clockwise.



6.2.1 Grid-Connected Scenario

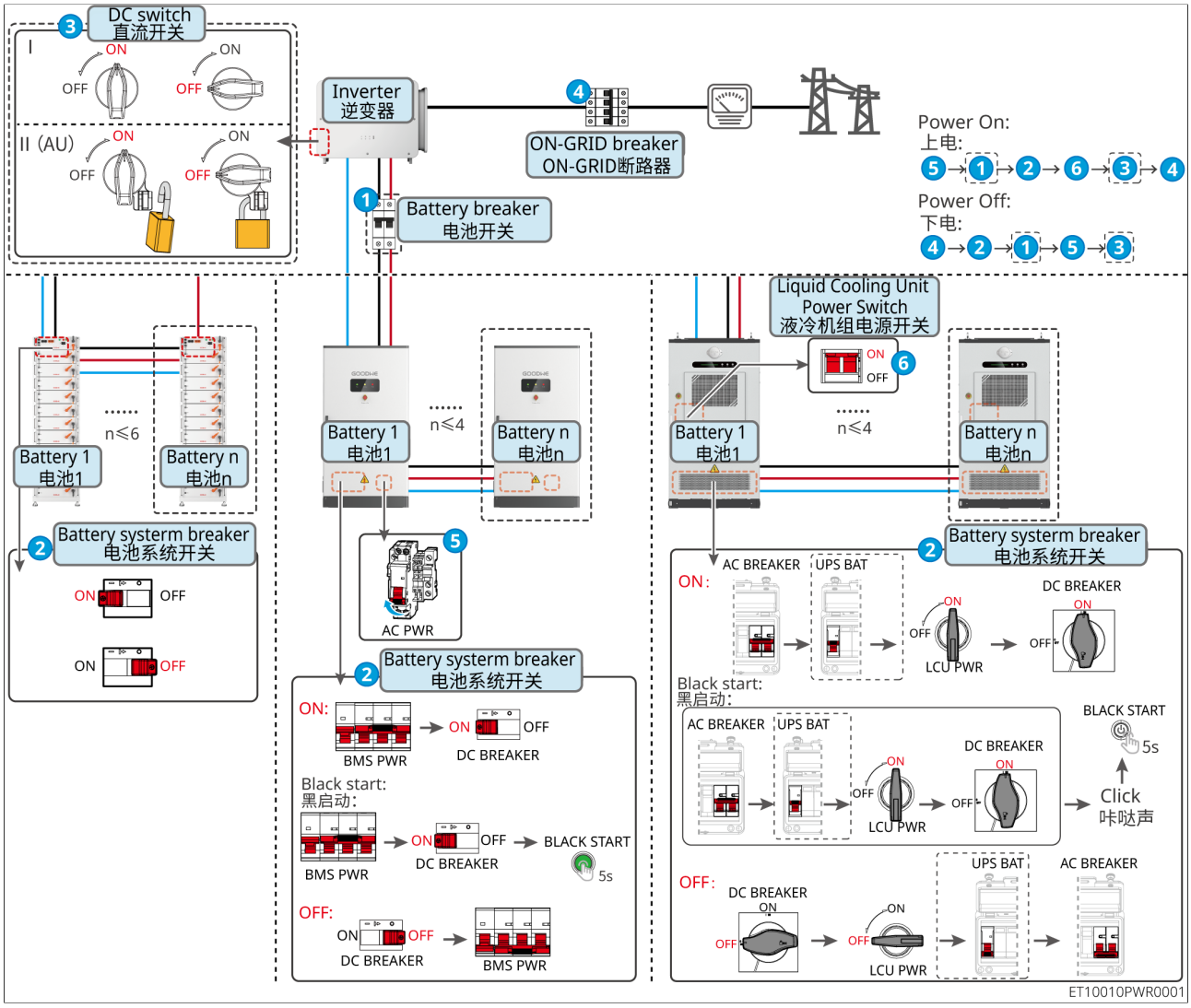


Figure28 Grid-Connected Scenario (Single Unit)

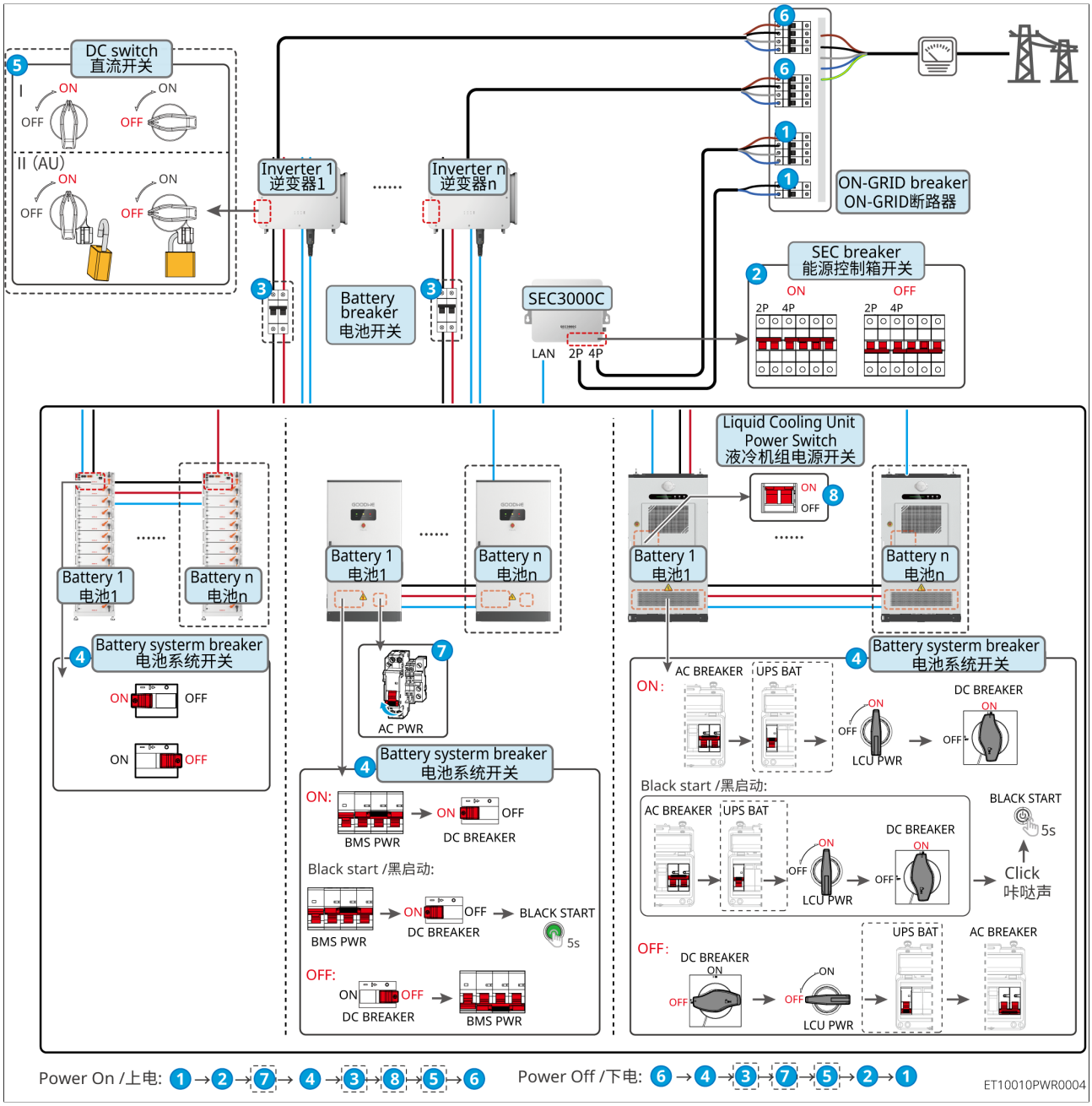


Figure29 Grid-Connected Scenario (Parallel Units)

6.2.2 Grid-connected and off-grid scenes & microgrid scenes

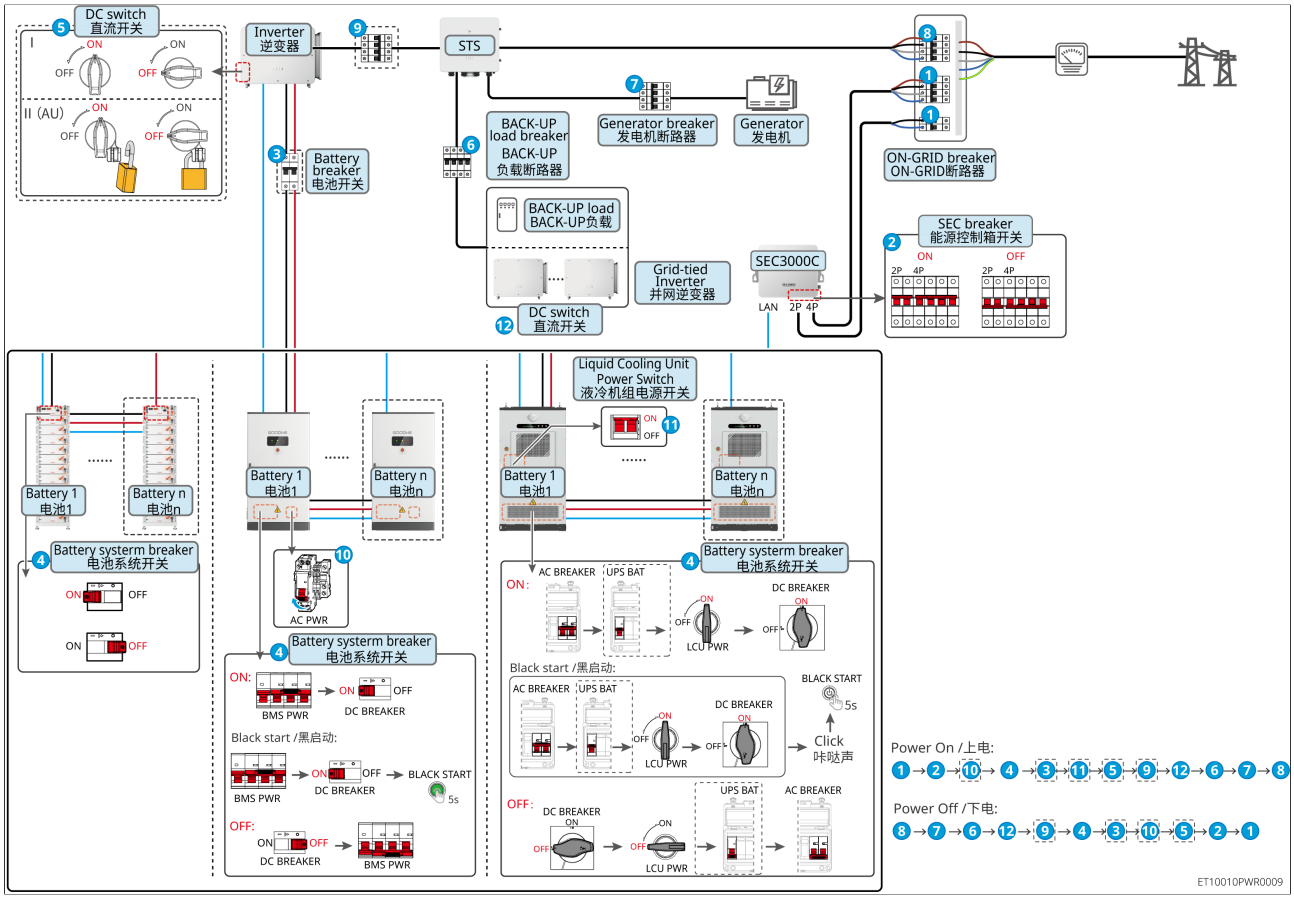


Figure30 Grid-connected and off-grid scenes & microgrid scenes (single machine)

6.3 Indicator Light Introduction

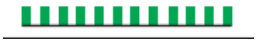
6.3.1 Inverter Indicator Light

LED

Indicator Light	Status	Description
		Inverter powered on, in standby mode
		Inverter starting up, in self-test mode
		Inverter operating normally in grid-tied or off-grid mode
		BACK-UP output overload
		System fault

		Inverter powered off
		Grid abnormal, inverter BACK-UP port power supply normal
		Grid normal, inverter BACK-UP port power supply normal
		BACK-UP port no power supply
		Inverter monitoring module resetting
		Inverter and communication terminal not connected
		Communication terminal failure with cloud server
		Inverter monitoring normal
		Inverter monitoring module not started

LCD

Indicator	Status	Description
		Inverter starting up, in self-test mode
		Inverter operating normally in grid-tied or off-grid mode
		BACK-UP output overload
		System fault
		LCD ON: Power on Inverter OFF, LCD OFF: Power off
		Grid abnormal, inverter BACK-UP port power supply normal
		Grid normal, inverter BACK-UP port power supply normal
		BACK-UP port no power supply
		Inverter monitoring module resetting
		No connection established between inverter and communication terminal
		Communication failure between communication terminal and cloud server
		Inverter monitoring normal
		Inverter monitoring module not started

6.3.2 Battery Indicator

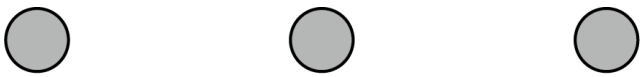
- **BAT Series 35.8-56.3kWh High-Voltage Battery**



BAT10DSC0003

Indicator Light	Status	Description
Run		Steady green: Device operating normally
		Single green flash: Battery running normally, not communicating with inverter
		Double green flash: Device in standby
Fault		Steady: Device fault
		Single red flash: System undervoltage 3~4 level
		Double red flash: SN anomaly

- **BAT Series 92.1-112.6kWh Commercial Battery System**

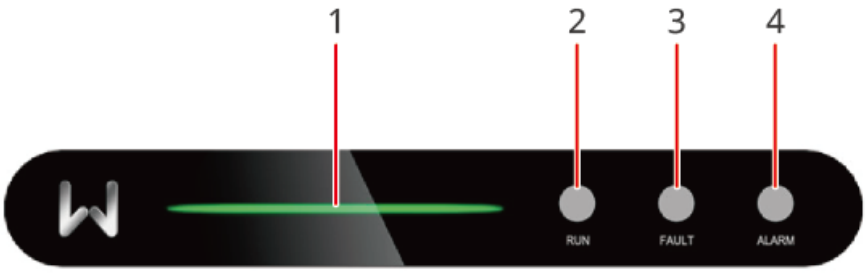


LXC10010DSC0002

Indicator	Status	Description
Run		Green light steady: Device is working normally
		Green single flash: Battery operating normally, not communicating with inverter

Indicator	Status	Description
		Green double flash: Device in standby
		Green off, yellow steady: Device alarm Green off, red steady: Device fault Green, yellow, and red all off: Device not powered
Warning		Steady: Device alarm
		Off: No alarm
Fault		Steady: Device fault
		Off: No fault
		Red single flash: Sleep (undervoltage)
		Red double flash: SN abnormal

- **BAT-C Series 208.9kWh Commercial Battery System**



BAT10CON0002

No.	Indicator	Status	Description
1			SOC: 100%
			SOC: 75%
			SOC: 50%

No.	Indicator	Status	Description
			SOC: 25%
			SOC: 0%
2	 RUN	Steady on	System working normally
		Single flash	System idle
		Double flash	System in standby
3	 FAULT	Yellow light steady on	Fault alarm
		Red light steady on	System fault
4	 ALARM	Red light steady on + buzzer	Combustible gas/smoke alarm

6.3.3 Smart Meter Indicator Lights

GM330 Smart Meter Indicator Lights:

Type	Status	Description
Power Light 	Steady on	Meter powered on, no RS485 communication
	Flashing	Meter powered on, RS485 communication normal
	Off	Meter powered off
Communication Light 	Off	Reserved
	Flashing	Press the Reset button ≥5s, Power light and Buy/Sell power light flash: Meter reset
Buy/Sell Power Light 	Steady on	Buying power from the grid
	Flashing	Selling power to the grid
	Off	Selling power to the grid

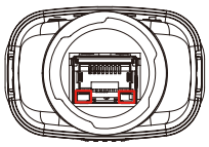
	Reserved

6.3.4 Smart Communication Stick Indicator

- **WiFi/LAN Kit-20**

Notice
• After double-clicking the Reload button to turn on Bluetooth, the communication indicator changes to a single flash state. Please connect to the SEMS+ App within 5 minutes, otherwise Bluetooth will automatically turn off. • The single flash state of the communication indicator only appears after double-clicking the Reload button to turn on Bluetooth.

Indicator Light	Status	Description
Power Light 		Steady on: Smart communication stick is powered on.
		Off: Smart communication stick is not powered on.
Communication Light 		Steady on: Communication normal in WiFi or LAN mode.
		Single flash: Bluetooth signal of smart communication stick is on, waiting to connect to SEMS+ App.
		Double flash: Smart communication stick is not connected to the router.
		Four flashes: Smart communication stick communicates normally with the router, but not connected to the server.
		Six flashes: Smart communication stick is identifying the connected device.
		Off: Smart communication stick is in software reset or not powered on.

Indicator	Color	Status	Description
LAN Port Communication Light 	Green	Solid On	100Mbps wired network connection is normal.
		Off	• Ethernet cable not connected. • 100Mbps wired network connection abnormal. • 10Mbps wired network connection is normal.
	Yellow	Solid On	10/100Mbps wired network connection is normal, no data transmission.
		Blinking	Data transmission in progress.
		Off	Ethernet cable not connected.

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

- **4G Kit-G20/4G Kit-CN-G20**

Indicator Light	Status	Description
Power Light 		Steady on: Smart communication stick is powered on.
		Off: Smart communication stick is not powered on.
Communication Light 		Steady on: Smart communication stick is connected to the server, communication is normal.
		Two flashes: Smart communication stick is not connected to the base station.
		Four flashes: Smart communication stick is connected to the base station, but not connected to the server.

		Six flashes: Communication between the smart communication stick and the inverter is disconnected.
		Off: Smart communication stick is in software reset or not powered on.

Button	Description
Reload	Press and hold for 0.5~3 seconds to restart the smart communication stick.
	Press and hold for 6~20 seconds to restore the smart communication stick to factory settings.

6.3.5 STS Indicator Light

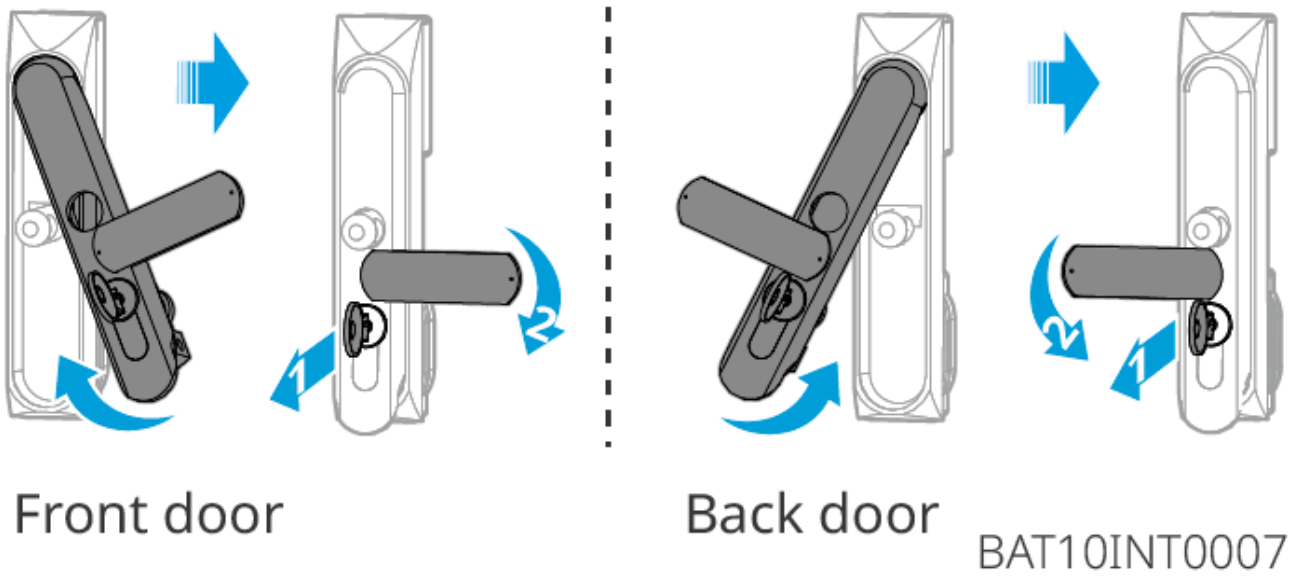
Indicator	Status	Description
		Grid port voltage normal
		Grid port no voltage
		Backup port voltage normal
		Backup port no voltage
		SMART-PORT port voltage normal
		SMART-PORT port no voltage
		Device fault
		Device no fault

6.4 Close Cabinet Door

Note
• After the system power-on is complete, please close the battery system cabinet door. • After closing the cabinet door, please keep the cabinet door key properly.

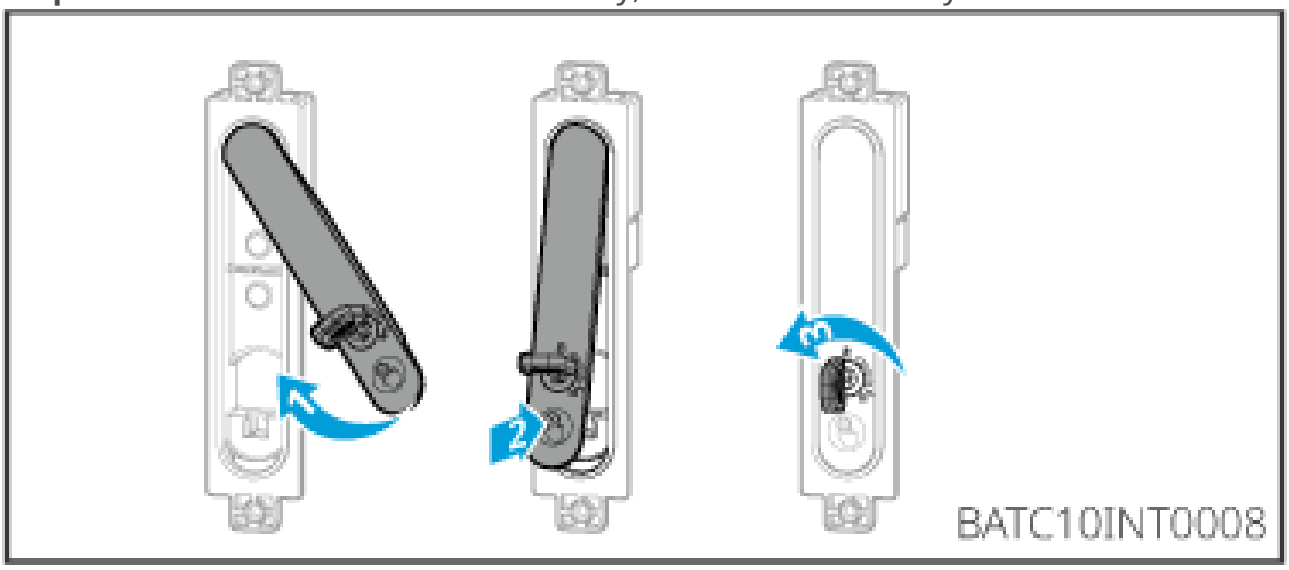
- **BAT Series 92.1-112.6kWh Commercial & Industrial Battery System**

Step 1: Close the cabinet door and latch the handle.
Step 2: Lock the cabinet door with the key, remove the key, then close the keyhole cover.



- **BAT-C Series 208.9kWh Commercial & Industrial Battery System**

Step 1: Close the cabinet door and turn the handle clockwise.
Step 2: Latch the handle.
Step 3: Lock the cabinet door with the key, then remove the key.



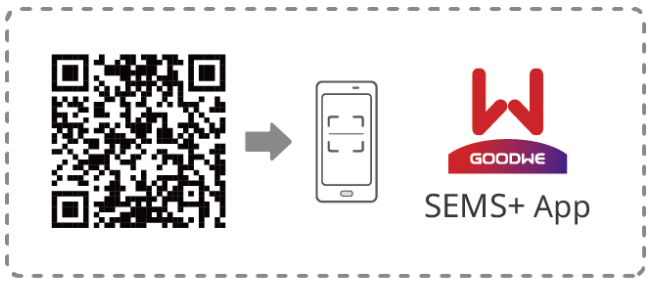
7 System Debugging

7.1 Power Station Monitoring via SEMS+

SEMS+ is a monitoring platform that can communicate with devices via WiFi, LAN, or 4G. The following are common functions of SEMS+:

1. Manage organization or user information, etc.
2. Add and monitor power station information, etc.
3. Maintain equipment.

Scan the following QR code to download and install.



SEMS0164

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

7.2 Commissioning via SEC3000C

For SEC3000C commissioning content, please refer to the corresponding user manual: SEC3000C User Manual.

8 System Maintenance

8.1 System Power Off

⚠Danger

- When performing operation and maintenance on equipment in the system, please power off the system. Operating equipment while powered on may cause equipment damage or electric shock hazard.
- After the equipment is powered off, it takes time for the internal components to discharge. Please wait for the equipment to fully discharge according to the time requirement on the label.
- When shutting down the battery system, strictly follow the battery system power-off requirements to prevent damage to the battery system.
- When encountering an emergency requiring the battery to be turned off, press the emergency stop switch, and the battery will be immediately powered off.

Note

Circuit breakers between the inverter and the battery, and between battery systems, must be installed in accordance with local laws and regulations.

8.1.1 Grid-Connected Scenario

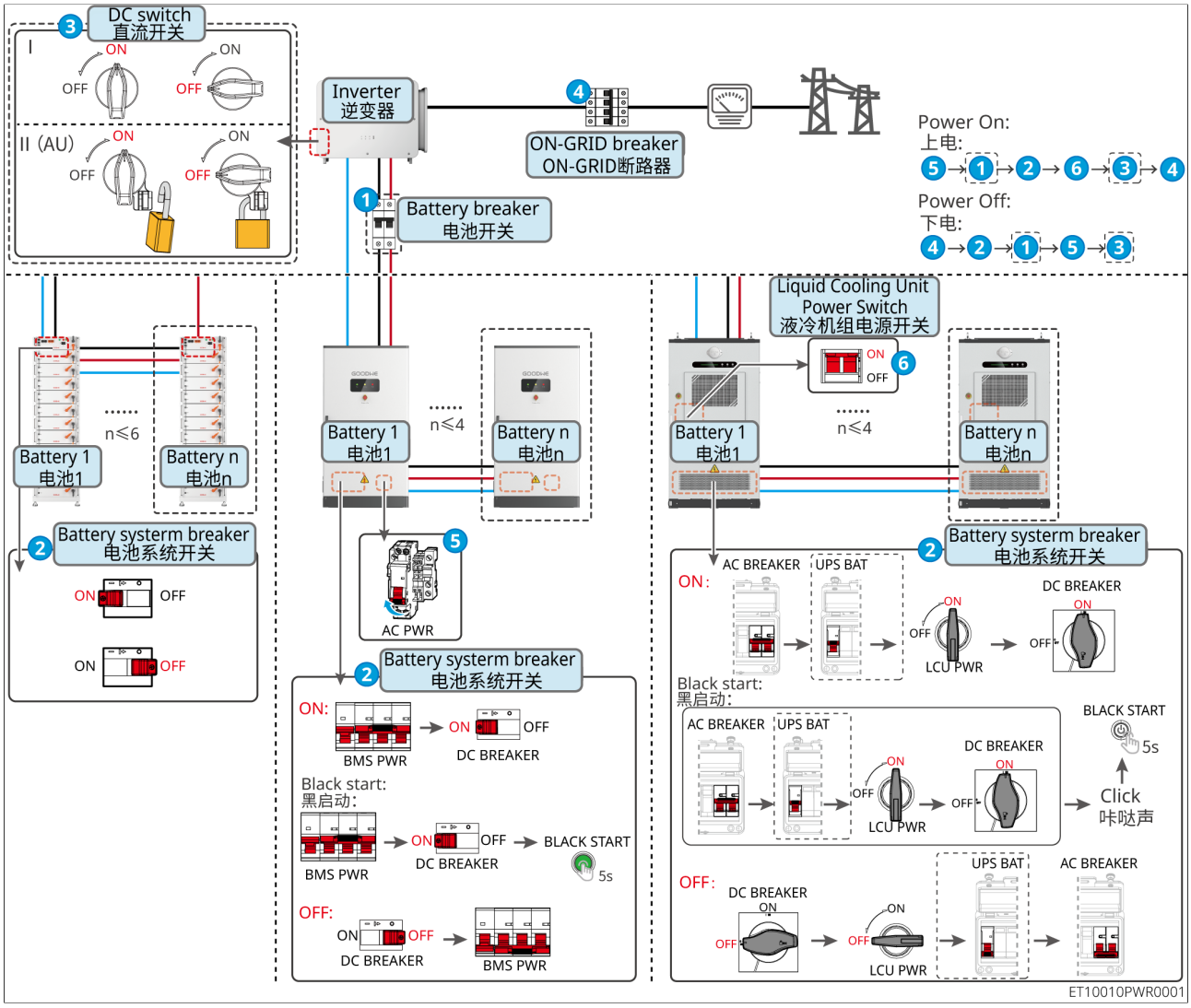


Figure31 Grid-Connected Scenario (Single Unit)

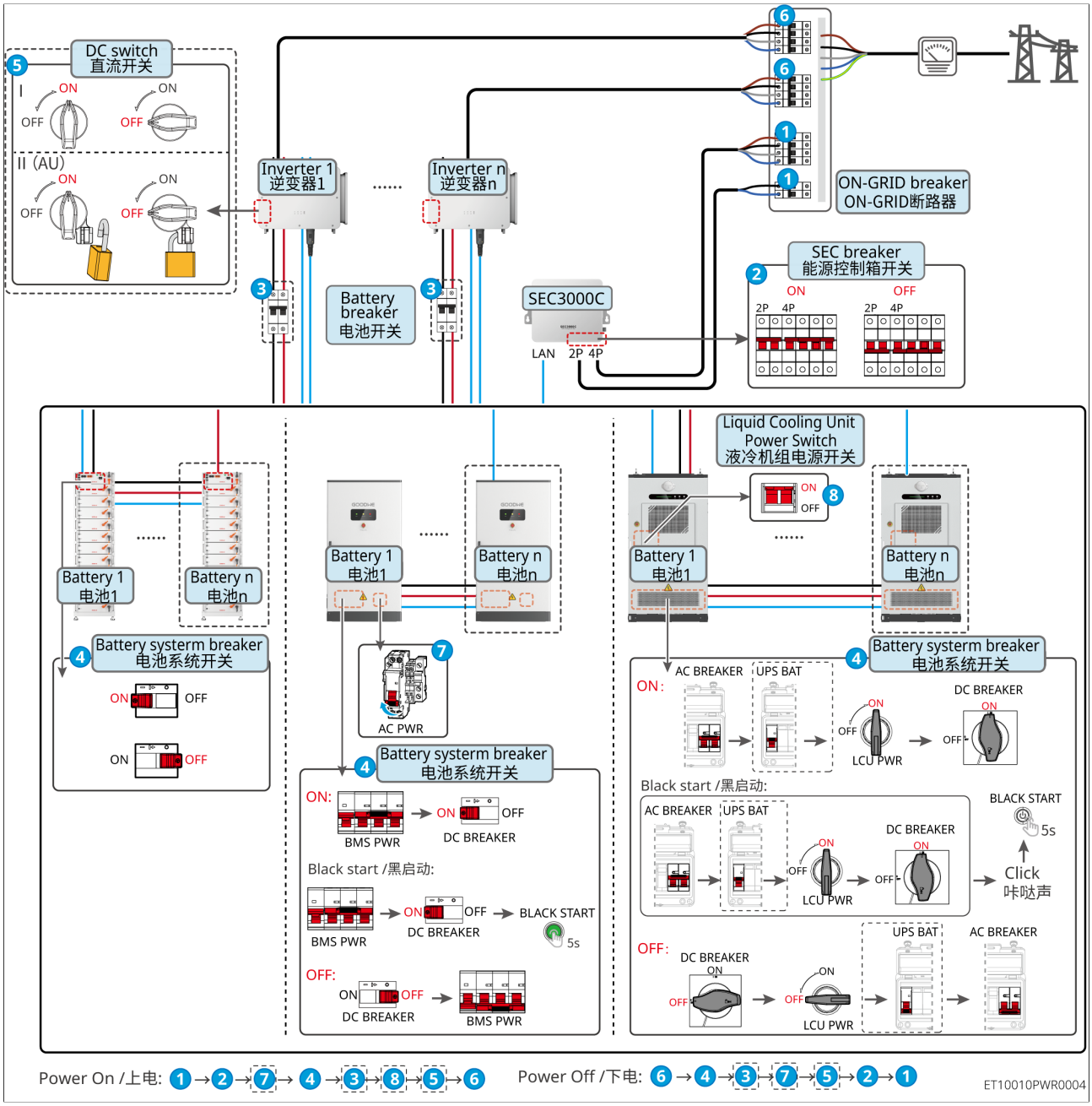


Figure32 Grid-Connected Scenario (Parallel Units)

8.1.2 Grid-connected and off-grid scenes & microgrid scenes

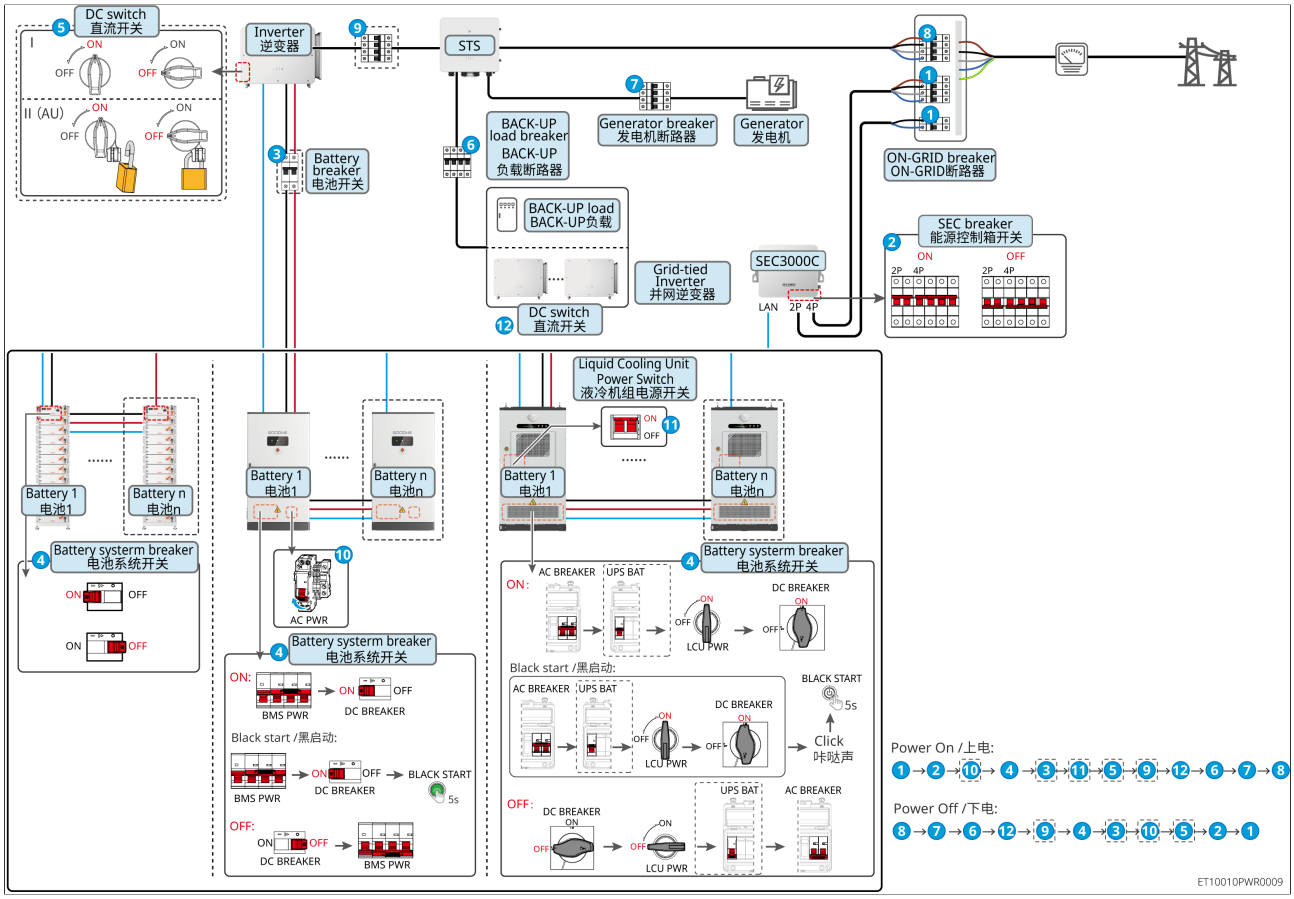


Figure33 Grid-connected and off-grid scenes & microgrid scenes (single machine)

8.2 Equipment Removal

⚠Danger

- Before disassembly, ensure the device is powered off.
- Wear personal protective equipment when operating the device.
- Use standard disassembly tools when removing terminal blocks to avoid damaging the terminals or the device.
- Unless otherwise specified, the disassembly procedure is the reverse of the installation procedure; this document will not repeat it.

1. Power off the system.
2. Label the types of cables connected in the system.

3. Disconnect the cables connecting the inverter, battery, and smart meter in the system, such as: DC cables, AC cables, communication cables, and protective ground wires.
4. Remove devices such as the smart communication stick, inverter, battery, and smart meter.
5. Properly store the equipment. If it is to be used again in the future, ensure that the storage conditions meet the requirements.

8.3 Equipment Disposal

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

8.4 Scheduled Maintenance

⚠Warning

- If any issues that may affect the battery or energy storage inverter system are found, please contact after-sales personnel. Unauthorized disassembly is prohibited.
- If any exposed copper wires are found inside the conductive wire, do not touch. High voltage hazard. Please contact after-sales personnel. Unauthorized disassembly is prohibited.
- In case of any other emergencies, contact after-sales personnel immediately and operate under their guidance or wait for on-site assistance.

Maintenance Item	Maintenance Method	Maintenance Interval	Maintenance Purpose
System Cleaning	Check for foreign objects and dust on heat sinks, fans, and air inlets/outlets. Check if installation space meets requirements and check for clutter around the device.	1 time/6 months	Prevent cooling failures.
System Installation	Check if the device is securely installed and if fastening screws are loose. Check for damage or deformation on the device exterior.	1 time/6 months to 1 year	Verify device installation stability.
Electrical Connection	Check if electrical connections are loose, if cables are damaged, or if copper is exposed.	1 time/6 months to 1 year	Confirm electrical connection reliability.
Sealing	Check if the sealing of cable entry holes meets requirements. If gaps are too large or unsealed, reseal.	1 time/year	Ensure machine 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 recharge it periodically.	1 time/15 days	Protect battery service life.

8.5 Fault

1. View Fault/Alarm Details

All fault and alarm details of the energy storage system are displayed in **[SEMS+ App]**, **[SEMS+ WEB]** and the LCD screen. If your product behaves abnormally and you do not see relevant fault information in **[SEMS+ App]**, **[SEMS+ WEB]** or the LCD

screen, please contact the after-sales service center.

- **Method 1: LCD Screen**
  Tap or select the fault information icon on the screen to view alarm or fault information of the energy storage system.
- **Method 2: SEMS+ App**
  Go to **[Home]** > **[Parameters]** > **[Alarm]** to view alarm information of the energy storage system.
- **Method 3: SEMS+ WEB**
  a. Open SEMS+ WEB and log in with any account.
  b. Go to **[Power Station]** > **[Alarm]** to view fault information of all power stations.
  c. Click on a specific fault name to view the time of occurrence, possible causes, and solutions.

2. **Fault Information and Handling Methods**

Please follow the methods below for troubleshooting. If the troubleshooting methods cannot help you, contact the after-sales service center.
When contacting the after-sales service center, please collect the following information to help resolve the issue quickly.

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

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

8.5.1 System Communication Failure

No.	Fault	Solution

1	Unable to find Smart Communication Stick wireless signal	1. Ensure the Smart Communication Stick is powered normally and the blue indicator light is flashing or steady on. 2. Ensure the smart device is within the communication range of the Smart Communication Stick. 3. Refresh the App device list. 4. Restart the inverter.
2	Unable to connect to Smart Communication Stick wireless signal	1. Ensure no other smart device is connected to the inverter WiFi signal. 2. Restart the inverter and reconnect to the inverter WiFi signal. 3. If connecting via Bluetooth, ensure the Bluetooth pairing is successful.
3	Unable to find router SSID	1. Place the router closer to the Smart Communication Stick, or add a WiFi repeater to strengthen the WiFi signal. 2. Reduce the number of devices connected to the router. 3. Confirm whether the router is a 2.4G router.
4	After all configurations, the Smart Communication Stick fails to connect to the router	1. Restart the inverter. 2. Check whether the network name, encryption method, and password in the WiFi configuration 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 strengthen the WiFi signal.

5	After all configurations, the Smart Communication Stick fails to connect to the server	Restart the router and inverter.
6	Unable to find GSA-*** when using the 4G Kit-CN-G20 module	1. Ensure the Smart Communication Stick on the inverter is powered normally and the blue indicator light is flashing or steady on. 2. Ensure the smart device is within the communication range of the Smart Communication Stick. 3. Refresh the App device list. 4. Restart the inverter.
7	Unable to connect to GSA-*** when using the 4G Kit-CN-G20 module	1. Ensure the Bluetooth pairing is successful. 2. Restart the inverter and reconnect to GSA-***. 3. In the phone's Bluetooth settings, unpair from GSA-***, then reconnect via the App.
8	 When using the 4G Kit-CN-G20 module, the indicator light flashes six times	Ensure the Smart Communication Stick is properly connected to the inverter.
9	Inverter cannot recognize the 4G Kit-CN-G20 communication module	Restart the inverter.

8.5.2 Inverter Fault

8.5.2.1 Troubleshooting (Fault Codes F01-F40)

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestions
F01	Grid Power Failure	1. Grid power outage. 2. AC line or AC switch disconnected.	1. The alarm will clear automatically after grid power is restored. 2. Check the AC lines and AC switch for disconnection.
F02	Grid Overvoltage Protection	Grid voltage exceeds the allowable range, or the duration of high voltage exceeds the HVD ride-through setpoint.	1. If it occurs occasionally, it may be due to a brief grid anomaly. The inverter will resume normal operation once normal grid conditions are detected; manual intervention is not required. 2. If it occurs frequently, check whether the grid voltage is within the allowable range. If not, contact the local power utility. If it is, modify the grid overvoltage protection setpoint after obtaining the consent of the local power utility. 3. If the fault cannot be cleared for a long time, check whether the AC-side circuit breaker and output cables are connected properly.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestions
F03	Grid Undervoltage Protection	Grid voltage is lower than the allowable range, or the duration of low voltage exceeds the LVD ride-through setpoint.	1. If it occurs occasionally, it may be due to a brief grid anomaly. The inverter will resume normal operation once normal grid conditions are detected; manual intervention is not required. 2. If it occurs frequently, check whether the grid voltage is within the allowable range. If not, contact the local power utility. If it is, modify the grid undervoltage protection setpoint after obtaining the consent of the local power utility. 3. If the fault cannot be cleared for a long time, check whether the AC-side circuit breaker and output cables are connected properly.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestions
F04	Grid Overvoltage Fast Protection	Abnormal grid voltage detection or extremely high voltage triggering a fault.	1. If it occurs occasionally, it may be due to a brief grid anomaly. The inverter will resume normal operation once normal grid conditions are detected; manual intervention is not required. 2. If it occurs frequently, check whether the grid voltage is within the allowable range. If not, contact the local power utility. If it is, modify the grid undervoltage protection setpoint after obtaining the consent of the local power utility. 3. If the fault cannot be cleared for a long time, check whether the AC-side circuit breaker and output cables are connected properly.
F05	10-minute Overvoltage Protection	The sliding average of grid voltage over 10 minutes exceeds the safety regulation range.	Check whether the grid voltage is operating at a high level for a long time. If it occurs frequently, check whether the grid frequency is within the allowable range. If not, contact the local power utility. If it is, modify the 10-minute overvoltage protection setpoint after obtaining the consent of the local power utility.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestions
F06	Grid Overfrequency Protection	Grid anomaly: Actual grid frequency exceeds local grid standard.	1. If it occurs occasionally, it may be due to a brief grid anomaly. The inverter will resume normal operation once normal grid conditions are detected; manual intervention is not required. 2. If it occurs frequently, check whether the grid frequency is within the allowable range. If not, contact the local power utility. If it is, modify the grid overfrequency protection setpoint after obtaining the consent of the local power utility.
F07	Grid Underfrequency Protection	Grid anomaly: Actual grid frequency is lower than local grid standard.	1. If it occurs occasionally, it may be due to a brief grid anomaly. The inverter will resume normal operation once normal grid conditions are detected; manual intervention is not required. 2. If it occurs frequently, check whether the grid frequency is within the allowable range. If not, contact the local power utility. If it is, modify the grid overfrequency protection setpoint after obtaining the consent of the local power utility.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestions
F08	Grid Frequency Shift Protection	Grid anomaly: Rate of change of actual grid frequency does not meet local grid standards.	1. If it occurs occasionally, it may be due to a brief grid anomaly. The inverter will resume normal operation once normal grid conditions are detected; manual intervention is not required. 2. If it occurs frequently, check whether the grid frequency is within the allowable range. If not, contact the local power utility.
F09	Islanding Protection	The grid has been disconnected, but voltage is maintained by the load. According to safety regulations, the inverter stops grid-connected operation.	1. If it occurs occasionally, it may be due to a brief grid anomaly. The inverter will resume normal operation once normal grid conditions are detected; manual intervention is not required. 2. If it occurs frequently, check whether the grid frequency is within the allowable range. If not, contact the local power utility.
F10	Voltage Ride-Through Undervoltage Fault	Grid anomaly: The time period of abnormal grid voltage exceeds the specified duration for low/high voltage ride-through.	1. If it occurs occasionally, it may be due to a brief grid anomaly. The inverter will resume normal operation once normal grid conditions are detected; manual intervention is not required. 2. If it occurs frequently, check whether the grid voltage and frequency are within the allowable range and stable. If not, contact the local power utility.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestions
F11	Voltage Ride-Through Overvoltage Fault	Grid anomaly: The time period of abnormal grid voltage exceeds the specified duration for low/high voltage ride-through.	1. If it occurs occasionally, it may be due to a brief grid anomaly. The inverter will resume normal operation once normal grid conditions are detected; manual intervention is not required. 2. If it occurs frequently, check whether the grid voltage and frequency are within the allowable range and stable. If not, contact the local power utility.
F12	30mA GFCI Protection	During inverter operation, the input-to-ground insulation resistance becomes low.	1. If it occurs occasionally, it may be due to an accidental anomaly in the external circuit. The fault will be cleared automatically and normal operation will resume without manual intervention. 2. If it occurs frequently or cannot be cleared for a long time, check whether the insulation resistance of the PV strings to ground is too low.
F13	60mA GFCI Protection	During inverter operation, the input-to-ground insulation resistance becomes low.	1. If it occurs occasionally, it may be due to an accidental anomaly in the external circuit. The fault will be cleared automatically and normal operation will resume without manual intervention. 2. If it occurs frequently or cannot be cleared for a long time, check whether the insulation resistance of the PV strings to ground is too low.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestions
F14	150mA GFCI Protection	During inverter operation, the input-to-ground insulation resistance becomes low.	1. If it occurs occasionally, it may be due to an accidental anomaly in the external circuit. The fault will be cleared automatically and normal operation will resume without manual intervention. 2. If it occurs frequently or cannot be cleared for a long time, check whether the insulation resistance of the PV strings to ground is too low.
F15	GFCI Slow Change Protection	During inverter operation, the input-to-ground insulation resistance becomes low.	1. If it occurs occasionally, it may be due to an accidental anomaly in the external circuit. The fault will be cleared automatically and normal operation will resume without manual intervention. 2. If it occurs frequently or cannot be cleared for a long time, check whether the insulation resistance of the PV strings to ground is too low.
F16	DCI Level 1 Protection	The DC component of the inverter output current exceeds the safety regulation or default machine allowable range.	1. If the anomaly is caused by an external fault, the inverter will resume normal operation automatically after the fault clears; manual intervention is not required. 2. If this alarm occurs frequently and affects normal power generation, contact your dealer or after-sales service center.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestions
F17	DCI Level 2 Protection	The DC component of the inverter output current exceeds the safety regulation or default machine allowable range.	1. If the anomaly is caused by an external fault, the inverter will resume normal operation automatically after the fault clears; manual intervention is not required. 2. If this alarm occurs frequently and affects normal power generation, contact your dealer or after-sales service center.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestions
F18	Low Insulation Resistance	1. PV string short circuit to protective earth. 2. The installation environment of the PV strings is persistently humid and the wiring insulation to ground is poor. 3. Low insulation resistance of battery port wiring to ground.	1. Check the resistance of the PV strings/battery port to the protective earth. A value greater than 80kΩ is normal. If the measured resistance is less than 80kΩ, locate and rectify the short circuit point. 2. Check whether the protective earth wire of the inverter is properly connected. 3. If it is confirmed that the impedance is indeed lower than the default value in rainy/humid weather, reset the inverter's "Insulation Resistance Protection Setpoint" via the App. For inverters in the Australian and New Zealand markets, when an insulation resistance fault occurs, the following alarm methods are also available: 1. The inverter is equipped with a buzzer. When a fault occurs, the buzzer sounds continuously for 1 minute; if the fault is not resolved, the buzzer sounds again every 30 minutes. 2. If the inverter is added to a monitoring platform and alarm notification methods are set, alarm information can be sent to the customer via email.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestions
F19	System Grounding Fault	1. The protective earth wire of the inverter is not connected. 2. When the output of the PV strings is grounded, the output side of the inverter is not connected to an isolation transformer.	1. Ensure the protective earth wire of the inverter is properly connected. 2. If the PV string output is grounded, ensure an isolation transformer is connected to the inverter output side.
F20	Hard Anti-Reverse Power Protection	Abnormal load fluctuation	1. If the anomaly is caused by an external fault, the inverter will resume normal operation automatically after the fault clears; manual intervention is not required. 2. If this alarm occurs frequently and affects normal power generation, contact your dealer or after-sales service center.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestions
F21	Internal Communication Disconnection	Secondary DSP1 communication timeout - Main DSP, Secondary DSP2 communication timeout - Main DSP, Secondary DSP2 communication timeout - Secondary DSP1, Main DSP communication timeout - Secondary DSP1, Main DSP communication timeout - Secondary DSP2 or Secondary DSP1 communication timeout - Secondary DSP2: 1. Chip not powered on 2. Chip program version error	Turn off the AC output side switch and DC input side switch. After 5 minutes, turn them back on. If the fault persists, contact your dealer or after-sales service center.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestions
		Main DSP can module error, Secondary DSP1 can module error or Secondary DSP2 can module error: 1. Frame format error 2. Parity check error 3. CAN bus offline 4. Hardware CRC check error 5. Control bit set to receive (transmit) when sending (receiving) 6. Transmission to an unauthorized unit	
F22	Generator Waveform Detection Fault	1. This fault will persist if the generator is not connected. 2. When the generator is running, this fault will be triggered if the generator does not meet safety regulations.	1. If the generator is not connected, ignore this fault. 2. It is normal for this fault to appear when the generator has a problem. 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. If both the generator and the grid are connected and meet safety regulations, the grid takes priority for grid-connected operation.
F23	Generator Abnormal Connection		
F24	Generator Low Voltage		
F25	Generator High Voltage		
F26	Generator Low Frequency		

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestions
F27	Generator High Frequency		
F28	Parallel I/O Self-Test Fault	The parallel communication cable is not securely connected or the parallel IO chip is damaged.	Check whether the parallel communication cable is securely connected, then check if the IO chip is damaged. If so, replace the IO chip.
F29	Parallel Grid Connection Reversed	Some machines have grid lines reversed compared to others.	Reconnect the grid lines correctly.
F30	AC Sensor Self-Test Fault	Sampling anomaly in the AC sensor.	Turn off the AC output side switch and DC input side switch. After 5 minutes, turn them back on. If the fault persists, contact your dealer or after-sales service center.
F31	Leakage Current Sensor Self-Test Fault	Sampling anomaly in the leakage current sensor.	Turn off the AC output side switch and DC input side switch. After 5 minutes, turn them back on. If the fault persists, contact your dealer or after-sales service center.
F32	Inverter Internal Fault	An internal fault exists in the inverter.	Turn off the AC output side switch and DC input side switch. After 5 minutes, turn them back on. If the fault persists, contact your dealer or after-sales service center.
F33	Flash Read/Write Error	Possible causes: Flash content changed; Flash lifespan exhausted.	1. Upgrade to the latest firmware. 2. Contact your dealer or after-sales service center.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestions
F34	DC Arc Self-Test Fault	During the arc self-test, the arc detection module did not detect an arc fault as expected.	Turn off the AC output side switch and DC input side switch. After 5 minutes, turn them back on. If the fault persists, contact your dealer or after-sales service center.
F35	High Internal Temperature	High internal temperature. Possible causes: 1. The inverter is installed in a poorly ventilated location. 2. Ambient temperature is too high. 3. Internal fan malfunctions.	1. Check whether the inverter is installed in a well-ventilated area and whether the ambient temperature is within the maximum allowable range. 2. If ventilation is poor or ambient temperature is too high, improve ventilation and cooling. 3. If ventilation and ambient temperature are normal, contact your dealer or after-sales service center.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestions
F36	Bus Overvoltage	BUS overvoltage. Possible causes: 1. PV voltage is too high. 2. Inverter BUS voltage sampling is abnormal. 3. The isolation effect of the dual-split transformer at the inverter's downstream is poor, causing mutual interference when two inverters are grid-connected, resulting in a DC overvoltage alarm when one inverter connects.	Turn off the AC output side switch and DC input side switch. After 5 minutes, turn them back on. If the fault persists, contact your dealer or after-sales service center.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestions
F37	PV Input Overvoltage	PV input voltage too high. Possible cause: Incorrect configuration of the PV array; too many PV modules connected in series per string, causing the open-circuit voltage of the string to exceed the inverter's maximum operating voltage.	Check the series configuration of the corresponding PV array strings. Ensure the open-circuit voltage of the string does not exceed the inverter's maximum operating voltage. Once the PV array is correctly configured, the alarm will clear automatically.
F38	PV Persistent Hardware Overcurrent	1. Unreasonable module configuration 2. Hardware damage	Turn off the AC output side switch and DC input side switch. After 5 minutes, turn them back on. If the fault persists, contact your dealer or after-sales service center.
F39	PV Persistent Software Overcurrent	1. Unreasonable module configuration 2. Hardware damage	Turn off the AC output side switch and DC input side switch. After 5 minutes, turn them back on. If the fault persists, contact your dealer or after-sales service center.
F40, F98	String Reverse Connection (String 1-n) n: Determined by actual number of inverter strings	PV string reverse connection.	Check if the string is reverse connected.

8.5.2.2 Troubleshooting (Fault Codes F41-F80)

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestion
F41	Generator Port Overload	1. Off-grid side output exceeds specifications 2. Short circuit on off-grid side 3. Off-grid side voltage too low 4. When used as a large load port, the load exceeds specifications	Check off-grid side output voltage, current, power and other data to confirm the cause of the issue.
F42	DC Arc Fault (String 1-n) n: Determined based on the actual number of inverter strings	1. DC side connection terminal loose; 2. DC side connection terminal poor contact; 3. DC cable core damaged with poor contact	1. After reconnecting to the grid, check if the voltage and current of each channel are abnormally reduced to zero; 2. Check whether the DC side terminals are firmly connected.
F43	Voltage Waveform Detection Abnormal	Grid anomaly: Abnormal grid voltage detection triggers the fault.	1. If it occurs occasionally, it may be a short-term grid anomaly. The inverter will resume normal operation once the grid returns to normal. No manual intervention is required. 2. If it occurs frequently, check whether the grid voltage and frequency are within the allowable range and stable. If not, contact the local power operator.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestion
F44	Grid Phase Loss Protection	Grid anomaly: Single-phase voltage sag.	1. If it occurs occasionally, it may be a short-term grid anomaly. The inverter will resume normal operation once the grid returns to normal. No manual intervention is required. 2. If it occurs frequently, check whether the grid voltage and frequency are within the allowable range and stable. If not, contact the local power operator.
F45	Grid Voltage Unbalance	Excessive difference between grid phase voltages.	1. If it occurs occasionally, it may be a short-term grid anomaly. The inverter will resume normal operation once the grid returns to normal. No manual intervention is required. 2. If it occurs frequently, check whether the grid voltage and frequency are within the allowable range and stable. If not, contact the local power operator.
F46	Grid Phase Sequence Fault	Abnormal connection between inverter and grid: wiring is not in positive sequence	1. Check whether the inverter and grid wiring are in positive sequence. After correcting the wiring (e.g., swapping any two live wires), the fault will clear automatically. 2. If the wiring is correct but the fault persists, contact the dealer or after-sales service center.
F47	Grid Power Loss Fast Protection	Quick output shutdown upon detecting grid power loss	The fault clears automatically when grid power is restored.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestion
F48	Grid Neutral Loss (Split Grid)	Split-phase grid neutral loss	1. The alarm clears automatically when grid power is restored. 2. Check whether the AC line or AC switch is disconnected.
F49	Line-to-Ground Short Circuit	Low impedance or short circuit between output phase and PE	Check the impedance between the output phase and PE, locate the point of low impedance and repair it.
F50	DCV Level 1 Protection	Abnormal load fluctuation	1. If the anomaly is caused by an external fault, the inverter will resume normal operation automatically after the fault clears. No manual intervention is required. 2. If the alarm occurs frequently and affects normal power generation, contact the dealer or after-sales service center.
F51	DCV Level 2 Protection	Abnormal load fluctuation	
F52	Leakage Current (GFCI) Multiple Fault Shutdown	North American safety regulations require that after multiple faults, automatic recovery is not allowed; manual recovery or waiting 24h is required.	Check whether the PV string-to-ground impedance is too low.
F53	DC Arc Fault (AFCI) Multiple Fault Shutdown	North American safety regulations require that after multiple faults, automatic recovery is not allowed; manual recovery or waiting 24h is required.	1. After reconnecting to the grid, check if the voltage and current of each channel are abnormally reduced to zero; 2. Check whether the DC side terminals are firmly connected.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestion
F54	External Communication Disconnection	Communication loss with inverter external device. Possible causes: peripheral power supply issue, communication protocol mismatch, or corresponding peripheral not configured.	Determine based on the actual model and detection enable bits. For some models, unsupported peripherals will not be detected.
F55	Back-up Port Overload Fault	Prevents continuous overload output of the inverter.	Turn off some off-grid loads to reduce the inverter's off-grid output power.
F56	Back-up Port Overvoltage Fault	Prevents inverter output overvoltage from damaging loads.	1. If it occurs occasionally, it may be caused by load switching. No manual intervention is required. 2. If it occurs frequently, contact the dealer or after-sales service center.
F57	External Box Fault	Waiting too long for the Box relay to switch during grid-to-off-grid transition.	1. Check if the Box is working properly; 2. Check if the Box communication wiring is correct;
F58	CT Loss Fault	CT connection wire disconnected (Japanese safety regulations)	Check whether the CT wiring is correct;
F59	Parallel CAN Communication Abnormal	Parallel communication cable not connected firmly or some units not online	Check if all units are powered on and if the parallel communication cable is firmly connected.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestion
F60	Parallel Back-up Wiring Reversed	Backup wires of some units are reversed with others.	Reconnect the backup wires.
F61	Inverter Soft Start Failed	Inverter soft start failed during off-grid cold start.	Check whether the inverter module is damaged.
F62	AC Sensor Fault	HCT sensor abnormal	Turn off the AC output switch and DC input switch. After 5 minutes, turn them back on. If the fault persists, contact the dealer or after-sales service center.
F63	Leakage Current Sensor Fault	Leakage current sensor abnormal	Turn off the AC output switch and DC input switch. After 5 minutes, turn them back on. If the fault persists, contact the dealer or after-sales service center.
F64	Inverter Internal Fault	Inverter has a fault	Turn off the AC output switch and DC input switch. After 5 minutes, turn them back on. If the fault persists, contact the dealer or after-sales service center.
F65	AC Terminal Overtemperature	AC terminal temperature too high. Possible causes: 1. Inverter installation location lacks ventilation. 2. Ambient temperature too high. 3. Internal fan malfunction.	1. Check whether the inverter installation location has good ventilation and whether the ambient temperature exceeds the maximum allowed range. 2. If ventilation is poor or the temperature is too high, improve ventilation and heat dissipation. 3. If ventilation and ambient temperature are normal, contact the dealer or after-sales service center.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestion
F66	INV Module Overtemperature	Inverter module temperature too high. Possible causes: 1. Inverter installation location lacks ventilation. 2. Ambient temperature too high. 3. Internal fan malfunction.	1. Check whether the inverter installation location has good ventilation and whether the ambient temperature exceeds the maximum allowed range. 2. If ventilation is poor or the temperature is too high, improve ventilation and heat dissipation. 3. If ventilation and ambient temperature are normal, contact the dealer or after-sales service center.
F67	Boost Module Overtemperature	Boost module temperature too high. Possible causes: 1. Inverter installation location lacks ventilation. 2. Ambient temperature too high. 3. Internal fan malfunction.	1. Check whether the inverter installation location has good ventilation and whether the ambient temperature exceeds the maximum allowed range. 2. If ventilation is poor or the temperature is too high, improve ventilation and heat dissipation. 3. If ventilation and ambient temperature are normal, contact the dealer or after-sales service center.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestion
F68	Output Filter Capacitor Overtemperature	Output filter capacitor temperature too high. Possible causes: 1. Inverter installation location lacks ventilation. 2. Ambient temperature too high. 3. Internal fan malfunction.	1. Check whether the inverter installation location has good ventilation and whether the ambient temperature exceeds the maximum allowed range. 2. If ventilation is poor or the temperature is too high, improve ventilation and heat dissipation. 3. If ventilation and ambient temperature are normal, contact the dealer or after-sales service center.
F69	PV IGBT Short Circuit Fault	Possible causes: 1. IGBT short circuit 2. Inverter sampling circuit abnormal	Turn off the AC output switch and DC input switch. After 5 minutes, turn them back on. If the fault persists, contact the dealer or after-sales service center.
F70	PV IGBT Open Circuit Fault	1. Software issue causing no PWM output; 2. Driver circuit abnormal; 3. IGBT open circuit	
F71	NTC Abnormal	NTC temperature sensor abnormal	Turn off the AC output switch and DC input switch. After 5 minutes, turn them back on. If the fault persists, contact the dealer or after-sales service center.
F72	PWM Waveform Abnormal Fault	Abnormal PWM waveform	Turn off the AC output switch and DC input switch. After 5 minutes, turn them back on. If the fault persists, contact the dealer or after-sales service center.

Fault Code	Fault Name	Fault Cause	Troubleshooting Suggestion
F73	CPU Interrupt Abnormal	CPU interrupt abnormal	Turn off the AC output switch and DC input switch. After 5 minutes, turn them back on. If the fault persists, contact the dealer or after-sales service center.
F74	Microelectronic Fault	Functional safety detected anomaly	Turn off the AC output switch and DC input switch. After 5 minutes, turn them back on. If the fault persists, contact the dealer or after-sales service center.
F75	PV HCT Fault	Boost current sensor abnormal	Turn off the AC output switch and DC input switch. After 5 minutes, turn them back on. If the fault persists, contact the dealer or after-sales service center.
F76	1.5V Reference Abnormal	Reference circuit fault	Turn off the AC output switch and DC input switch. After 5 minutes, turn them back on. If the fault persists, contact the dealer or after-sales service center.
F77	0.3V Reference Abnormal	Reference circuit fault	
F78	CPLD Version Identification Error	CPLD version identification error	Turn off the AC output switch and DC input switch. After 5 minutes, turn them back on. If the fault persists, contact the dealer or after-sales service center.
F79	CPLD Communication Fault	Communication content error or timeout between CPLD and DSP	Turn off the AC output switch and DC input switch. After 5 minutes, turn them back on. If the fault persists, contact the dealer or after-sales service center.
F80	Model Identification Fault	Fault related to model identification error	Turn off the AC output switch and DC input switch. After 5 minutes, turn them back on. If the fault persists, contact the dealer or after-sales service center.

8.5.2.3 Fault Handling (Fault Codes F81-F121)

Fault Code	Fault Name	Fault Cause	Fault Handling Suggestion
F81	Upper Bus Overvoltage	BUS overvoltage, possible causes: 1. PV voltage too high; 2. Inverter BUS voltage sampling abnormality; 3. Poor isolation effect of the dual-split transformer at the inverter rear end, causing mutual interference when two inverters are grid-connected, and one inverter reports DC overvoltage when grid-connected;	Disconnect the AC output side switch and DC input side switch, close the AC output side switch and DC input side switch after 5 minutes. If the fault persists, contact the dealer or after-sales service center.
F82	Lower Bus Overvoltage		
F83	Bus Overvoltage (Auxiliary CPU1)		

Fault Code	Fault Name	Fault Cause	Fault Handling Suggestion
F84	Upper Bus Overvoltage (Auxiliary CPU1)	BUS overvoltage, possible causes: 1. PV voltage too high; 2. Inverter BUS voltage sampling abnormality; 3. Poor isolation effect of the dual-split transformer at the inverter rear end, causing mutual interference when two inverters are grid-connected, and one inverter reports DC overvoltage when grid-connected;	Disconnect the AC output side switch and DC input side switch, close the AC output side switch and DC input side switch after 5 minutes. If the fault persists, contact the dealer or after-sales service center.
F85	Lower Bus Overvoltage (Auxiliary CPU1)		
F86	Bus Overvoltage (Auxiliary CPU2)		Disconnect the AC output side switch and DC input side switch, close the AC output side switch and DC input side switch after 5 minutes. If the fault persists, contact the dealer or after-sales service center.
F87	Upper Bus Overvoltage (Auxiliary CPU2)		

Fault Code	Fault Name	Fault Cause	Fault Handling Suggestion
F88	Lower Bus Overvoltage (Auxiliary CPU2)	BUS overvoltage, possible causes: 1. PV voltage too high; 2. Inverter BUS voltage sampling abnormality; 3. Poor isolation effect of the dual-split transformer at the inverter rear end, causing mutual interference when two inverters are grid-connected, and one inverter reports DC overvoltage when grid-connected;	
F89	Upper Bus Overvoltage(CPLD)		Disconnect the AC output side switch and DC input side switch, close the AC output side switch and DC input side switch after 5 minutes. If the fault persists, contact the dealer or after-sales service center.

Fault Code	Fault Name	Fault Cause	Fault Handling Suggestion
F90	Lower Bus Overvoltage(CPLD)	BUS overvoltage, possible causes: 1. PV voltage too high; 2. Inverter BUS voltage sampling abnormality; 3. Poor isolation effect of the dual-split transformer at the inverter rear end, causing mutual interference when two inverters are grid-connected, and one inverter reports DC overvoltage when grid-connected;	
F91	Flying Capacitor Software Overvoltage	Flying capacitor overvoltage, possible causes: 1. PV voltage too high; 2. Inverter flying capacitor voltage sampling abnormality;	Disconnect the AC output side switch and DC input side switch, close the AC output side switch and DC input side switch after 5 minutes. If the fault persists, contact the dealer or after-sales service center.
F92	Flying Capacitor Hardware Overvoltage		

Fault Code	Fault Name	Fault Cause	Fault Handling Suggestion
F93	Flying Capacitor Undervoltage	Flying capacitor undervoltage, possible causes: 1. PV energy insufficient; 2. Inverter flying capacitor voltage sampling abnormality;	Disconnect the AC output side switch and DC input side switch, close the AC output side switch and DC input side switch after 5 minutes. If the fault persists, contact the dealer or after-sales service center.
F94	Flying Capacitor Pre-charge Failure	Flying capacitor pre-charge failure, possible causes: 1. PV energy insufficient; 2. Inverter flying capacitor voltage sampling abnormality;	Disconnect the AC output side switch and DC input side switch, close the AC output side switch and DC input side switch after 5 minutes. If the fault persists, contact the dealer or after-sales service center.
F95	Flying Capacitor Pre-charge Impossible	1. Unreasonable control loop parameters 2. Hardware damage	Disconnect the AC output side switch and DC input side switch, close the AC output side switch and DC input side switch after 5 minutes. If the fault persists, contact the dealer or after-sales service center.

Fault Code	Fault Name	Fault Cause	Fault Handling Suggestion
F96, F97	String Overcurrent(String 1-n) n: Determined by the actual number of strings of the inverter	Possible causes: 1. String overcurrent; 2. String current sensor abnormality	Disconnect the AC output side switch and DC input side switch, close the AC output side switch and DC input side switch after 5 minutes. If the fault persists, contact the dealer or after-sales service center.
F99, F100	String Missing(String 1-n) n: Determined by the actual number of strings of the inverter	String fuse blown (if any)	Check if the fuse is blown.
F101	Battery 1 Pre-charge Fault	Battery 1 pre-charge circuit fault (pre-charge resistor burned, etc.)	Check if the pre-charge circuit is good, and whether the battery voltage and bus voltage are consistent after the battery is powered on. If not, contact the dealer or after-sales service center.
F102	Battery 1 Relay Fault	Battery 1 relay cannot operate normally	After powering on the battery, check if the battery relay is working and if a closing sound is heard. If not, contact the dealer or after-sales service center.
F103	Battery 1 Input Overvoltage	Battery 1 input voltage exceeds machine rated range	Confirm whether the battery voltage is within the machine's rated range.

Fault Code	Fault Name	Fault Cause	Fault Handling Suggestion
F104	Battery 2 Pre-charge Fault	Battery 2 pre-charge circuit fault (pre-charge resistor burned, etc.)	Check if the pre-charge circuit is good, and whether the battery voltage and bus voltage are consistent after the battery is powered on. If not, contact the dealer or after-sales service center.
F105	Battery 2 Relay Fault	Battery 2 relay cannot operate normally	After powering on the battery, check if the battery relay is working and if a closing sound is heard. If not, contact the dealer or after-sales service center.
F106	Battery 2 Input Overvoltage	Battery 2 input voltage exceeds machine rated range	Confirm whether the battery voltage is within the machine's rated range.
F107	Grid-connection Synchronization Timeout Fault	Abnormality in carrier synchronization grid-connection	1. Check if the synchronization cable connection is normal 2. Check if the master-slave setting is normal; 3. Disconnect the AC output side switch and DC input side switch, close the AC output side switch and DC input side switch after 5 minutes. If the fault persists, contact the dealer or after-sales service center.
F108	DSP Communication Fault	-	-
F109	External STS Fault	Abnormality in the cable connecting inverter and STS	Check whether the wiring harness connection order between the inverter and STS corresponds one-to-one in sequence.

Fault Code	Fault Name	Fault Cause	Fault Handling Suggestion
F110	Anti-backflow Fault	1. Inverter reports error and disconnects from grid 2. Meter communication is unstable 3. Backflow condition occurs	1. Check if there are other error messages on the inverter. If so, handle them accordingly; 2. Check if the meter connection is reliable; 3. If this alarm occurs frequently and affects normal power generation of the power station, contact the dealer or after-sales service center.
F111	Bypass Overload	-	-
F112	Black Start Fault	-	-
F113	Off-grid Output Transient Overvoltage Fault	-	-
F114	Relay Fault 2	Relay abnormality, reasons: 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 DC input side switch, close the AC output side switch and DC input side switch after 5 minutes. If the fault persists, contact the dealer or after-sales service center.
F115	SVG Pre-charge Failure	SVG pre-charge hardware failure	Contact the dealer or after-sales service center.

Fault Code	Fault Name	Fault Cause	Fault Handling Suggestion
F116	Nighttime SVG PID Prevention Fault	PID prevention hardware abnormality	
F117	DSP Version Identification Error	DSP software version identification error	Disconnect the AC output side switch and DC input side switch, close the AC output side switch and DC input side switch after 5 minutes. If the fault persists, contact the dealer or after-sales service center.
F118	MOS Continuous Overvoltage	1. Software issue causes inverter drive to be turned off earlier than flyback drive; 2. Inverter drive circuit abnormality prevents activation; 3. PV voltage too high; 4. Mos voltage sampling abnormality;	Disconnect the AC output side switch and DC input side switch, close the AC output side switch and DC input side switch after 5 minutes. If the fault persists, contact the dealer or after-sales service center.
F119	Bus Short Circuit Fault	Hardware damage	If a BUS short circuit fault occurs and the inverter remains disconnected from the grid, contact the dealer or after-sales service center.
F120	Bus Sampling Abnormality	1. BUS voltage sampling hardware fault	Disconnect the AC output side switch and DC input side switch, close the AC output side switch and DC input side switch after 5 minutes. If the fault persists, contact the dealer or after-sales service center.

Fault Code	Fault Name	Fault Cause	Fault Handling Suggestion
F121	DC Side Sampling Abnormality	1. BUS voltage sampling hardware fault 2. Battery voltage sampling hardware fault 3. Dcrly relay fault	Disconnect the AC output side switch and DC input side switch, close the AC output side switch and DC input side switch after 5 minutes. If the fault persists, contact the dealer or after-sales service center.

8.5.2.4 Fault Handling (Fault Codes F122-F163)

Fault Code	Fault Name	Cause	Recommended Action
F122	PV connection mode setting error	PV connection mode has three modes, taking four-channel MPPT as an example: 1. Parallel mode: i.e., AAAA mode (same-source mode), PV1-PV4 share the same source, 4 PV channels connected to the same solar panel 2. Partial parallel mode: i.e., AACC mode, PV1 and PV2 share the same source, PV3 and PV4 share the same source 3. Independent mode: i.e., ABCD mode (different sources), PV1, PV2, PV3, PV4 independently connected, 4 PV channels each connected to one solar panel If the actual PV connection mode	Check whether the PV connection mode is set correctly (ABCD, AACC, AAAA), and reset the PV connection mode correctly. 1. Verify that the actual connected PV channels are correctly connected; 2. If PV is correctly connected, check the currently set "PV connection mode" via the APP or screen to see if it matches the actual connection mode; 3. If the currently set "PV connection mode" does not match the actual connection mode, set the "PV connection mode" to match the actual situation via the APP or screen. After setting, disconnect PV and AC power supply and restart; 4. If after setting, the current "PV connection mode" matches the actual connection mode but the fault still occurs, contact the dealer or after-sales service center.

Fault Code	Fault Name	Cause	Recommended Action
		does not match the PV connection mode set on the device, this fault will be reported.	
F123	Multi-channel PV phase error	PV input mode setting error	Check whether the PV connection mode is set correctly (ABCD, AACC, AAAA), and reset the PV connection mode correctly. 1. Verify that the actual connected PV channels are correctly connected; 2. If PV is correctly connected, check the currently set "PV connection mode" via the APP or screen to see if it matches the actual connection mode; 3. If the currently set "PV connection mode" does not match the actual connection mode, set the "PV connection mode" to match the actual situation via the APP or screen. After setting, disconnect PV and AC power supply and restart; 4. If after setting, the current "PV connection mode" matches the actual connection mode but the fault still occurs, contact the dealer or after-sales service center.
F124	Battery 1 reverse polarity fault	Battery 1 positive and negative terminals reversed	Check whether the positive and negative terminals of the battery and the device connection match.

Fault Code	Fault Name	Cause	Recommended Action
F125	Battery 2 reverse polarity fault	Battery 2 positive and negative terminals reversed	Check whether the positive and negative terminals of the battery and the device connection match.
F126	Abnormal battery connection	Abnormal battery connection	Check if the battery is working properly.
F127	Battery heatsink temperature too high	Battery temperature too high, possible causes: 1. Inverter installation location lacks ventilation. 2. Ambient temperature too high. 3. Internal fan malfunction.	Turn off the AC output switch and DC input switch, wait 5 minutes, then turn them back on. If the fault persists, contact the dealer or after-sales service center.
F128	Reference voltage abnormal	Reference circuit fault	Turn off the AC output switch and DC input switch, wait 5 minutes, then turn them back on. If the fault persists, contact the dealer or after-sales service center.
F129	Chamber temperature too low	Chamber temperature too low, possible cause: ambient temperature too low.	Turn off the AC output switch and DC input switch, wait 5 minutes, then turn them back on. If the fault persists, contact the dealer or after-sales service center.
F130	AC side SPD fault	AC side surge protection device failure	Replace the AC side surge protection device.
F131	DC side SPD fault	DC side surge protection device failure	Replace the DC side surge protection device.

Fault Code	Fault Name	Cause	Recommended Action
F132	Internal fan abnormal	Internal fan abnormal, possible causes: 1. Fan power supply abnormal; 2. Mechanical failure (blocked rotor); 3. Fan aging and damaged.	Turn off the AC output switch and DC input switch, wait 5 minutes, then turn them back on. If the fault persists, contact the dealer or after-sales service center.
F133	External fan abnormal	External fan abnormal, possible causes: 1. Fan power supply abnormal; 2. Mechanical failure (blocked rotor); 3. Fan aging and damaged.	
F134	PID diagnosis abnormal	PID hardware fault or PV voltage too high causing PID suspension	The PID suspension warning caused by high PV voltage does not require action. For PID hardware fault, turn off the PID switch and turn it back on to clear the PID fault; replace the PID device.

Fault Code	Fault Name	Cause	Recommended Action
F135	Circuit breaker trip warning	Possible causes: Overcurrent or PV reverse polarity causing circuit breaker to trip;	Contact the dealer or after-sales service center; The reason for tripping: if PV short circuit or reverse polarity occurred, check for historical PV short circuit warning or historical PV reverse polarity warning. If present, a technician must inspect the corresponding PV condition. After inspection and confirmation of no fault, manually reset the circuit breaker and clear the warning via the APP interface by clearing historical faults.
F136	Historical PV IGBT short circuit warning	Possible causes: Overcurrent causing circuit breaker to trip;	Contact the dealer or after-sales service center; The technician must check the Boost hardware and external string corresponding to the historical PV short circuit warning subcode for faults. After inspection and confirmation of no fault, clear the warning via the APP interface by clearing historical faults.
F137, F138	Historical PV reverse polarity warning (string 1-n) (n: determined by the actual number of strings in the inverter)	Possible causes: PV reverse polarity causing circuit breaker to trip;	Contact the dealer or after-sales service center; The technician must check whether the corresponding string has reverse polarity based on the historical PV reverse polarity warning subcode, and check whether there is a voltage difference in the PV panel configuration. After inspection and confirmation of no fault, clear the warning via the APP interface by clearing historical faults.

Fault Code	Fault Name	Cause	Recommended Action
F139	Flash read/write error warning	Possible causes: 1. Flash content changed; 2. Flash lifespan exhausted.	1. Upgrade to the latest software version; 2. Contact the dealer or after-sales service center.
F140	Meter communication abnormal alarm	This warning may only occur when anti-reverse flow function is enabled. Possible causes: 1. Meter not connected; 2. Communication cable between meter and inverter incorrectly wired.	Check the meter wiring and connect the meter correctly. If the fault persists after inspection, contact the dealer or after-sales service center.
F141	PV panel type identification failed	PV panel identification hardware abnormal	Contact the dealer or after-sales service center.
F142	String mismatch	PV string mismatch: different open-circuit voltage configurations for two strings under the same MPPT	Check the open-circuit voltage of the two strings. Configure strings with the same open-circuit voltage under the same MPPT. Prolonged string mismatch may pose a safety risk.
F143	CT not connected	CT not connected	Check the CT wiring.
F144	CT reverse polarity	CT reverse polarity	Check the CT wiring.
F145	Ground wire missing warning	Ground wire not connected	Check the ground wire.

Fault Code	Fault Name	Cause	Recommended Action
F146	String terminal high temperature (string 1~8)	Register 37176 PV terminal temperature alarm subcode 1 set	-
F147	String terminal high temperature (string 9~16)	Register 37177 PV terminal temperature alarm subcode 2 set	-
F148	String terminal high temperature (string 17~20)	Register 37178 PV terminal temperature alarm subcode 3 set	-
F149	Historical PV reverse polarity warning (string 33~48)	Possible causes: PV reverse polarity causing circuit breaker to trip;	Contact the dealer or after-sales service center; The technician must check whether the corresponding string has reverse polarity based on the historical PV reverse polarity warning subcode, and check whether there is a voltage difference in the PV panel configuration. After inspection and confirmation of no fault, clear the warning via the APP interface by clearing historical faults.
F150	Battery 1 voltage low	Battery voltage below set value	-
F151	Battery 2 voltage low	Battery voltage below set value	-
F152	Battery power supply voltage low	Battery not in charging mode, voltage below shutdown voltage	-

Fault Code	Fault Name	Cause	Recommended Action
F153	Battery 1 voltage high	-	-
F154	Battery 2 voltage high	-	-
F155	Online insulation resistance low	1. PV string short circuit to protective earth. 2. The PV string installation environment is humid for a long time and the wiring has poor insulation to ground.	1. Check the impedance of the PV string to protective earth. If a short circuit is found, rectify the short circuit point. 2. Check if the inverter's protective earth wire is correctly connected. 3. If it is confirmed that the impedance is indeed lower than the default value in rainy weather, reset the "Insulation resistance protection point."
F156	Microgrid overload warning	Excessive input current at backup port	Occasional occurrence: no action required. If the alarm occurs frequently, contact the dealer or after-sales service center.
F157	Manual reset	-	-
F158	Generator phase sequence abnormal	-	-
F159	Multipurpose port configuration abnormal	Multipurpose (generator) port configured as microgrid or large load, but a generator is actually connected	Use the APP to change the multipurpose (generator) port configuration.

Fault Code	Fault Name	Cause	Recommended Action
F160	EMS forced off-grid	EMS issued a forced off-grid command but the off-grid function is not enabled	Enable the off-grid function.
F161	Passive islanding protection	-	-
F162	Grid type error	Actual grid type (two-phase or split-phase) does not match the set safety standard	Switch to the corresponding safety standard according to the actual grid type.
F163	Grid phase shift protection	Grid abnormality: grid voltage phase change rate does not meet local grid standards.	1. If it occurs occasionally, it may be a temporary grid anomaly. The inverter will resume normal operation after detecting that the grid is normal. No manual intervention is needed. 2. If it occurs frequently, check whether the grid frequency is within the allowable range. If not, contact the local power operator.

8.5.2.5 Fault Symptom Handling

Fault Name	Cause	Troubleshooting Suggestion
Generator Fault	1. This fault will be displayed continuously when no generator is connected. 2. When the generator is running, this fault is triggered if the generator fails to meet safety regulations.	1. Ignore this fault if no generator is connected. 2. This fault is normal when the generator itself has a fault; after the generator recovers, wait for a while and the fault will be cleared automatically. 3. This fault does not affect normal operation in off-grid mode. 4. If both the generator and the grid are connected and meet safety regulations, the grid will take priority for grid-tied operation.
BMS Status Bit Error	BMS module fault	Disconnect the AC output switch and DC input switch, then reconnect them after 5 minutes. If the fault persists, contact your dealer or after-sales service center.
Ambient Temperature Too High	1. Poor ventilation of the machine 2. Hot air flows back to the ambient temperature sampling point	Disconnect the AC output switch and DC input switch, then reconnect them after 5 minutes. If the fault persists, contact your dealer or after-sales service center.
PV Terminal Temperature Too High	PV terminal temperature too high. Possible causes: 1. The inverter is installed in a poorly ventilated location. 2. High ambient temperature. 3. Internal fan malfunction.	1. Check whether the inverter installation location has good ventilation and whether the ambient temperature exceeds the maximum allowed range. 2. If ventilation is poor or the ambient temperature is too high, improve the ventilation and heat dissipation. 3. If both ventilation and ambient temperature are normal, contact your dealer or after-sales service center.

Fault Name	Cause	Troubleshooting Suggestion
Bat Terminal Temperature Too High	Bat terminal temperature too high. Possible causes: 1. The inverter is installed in a poorly ventilated location. 2. High ambient temperature.	1. Check whether the inverter installation location has good ventilation and whether the ambient temperature exceeds the maximum allowed range. 2. If ventilation is poor or the ambient temperature is too high, improve the ventilation and heat dissipation. 3. If both ventilation and ambient temperature are normal, contact your dealer or after-sales service center.
AC Terminal Temperature High Warning	AC terminal temperature too high. Possible causes: 1. The inverter is installed in a poorly ventilated location. 2. High ambient temperature. 3. Internal fan malfunction.	
Bat Terminal Temperature High Warning	Bat terminal temperature too high. Possible causes: 1. The inverter is installed in a poorly ventilated location. 2. High ambient temperature.	1. Check whether the inverter installation location has good ventilation and whether the ambient temperature exceeds the maximum allowed range. 2. If ventilation is poor or the ambient temperature is too high, improve the ventilation and heat dissipation. 3. If both ventilation and ambient temperature are normal, contact your dealer or after-sales service center.
Unit Three-Phase Grid Connection Wiring Fault	Incorrect external wiring for the three-phase unit	Rewire.

Fault Name	Cause	Troubleshooting Suggestion
External STS Fault	Abnormal connection cable between inverter and STS	Check whether the wiring sequence of the harness between the inverter and the STS corresponds one-to-one in order.

Fault Name	Cause	Fault Handling Suggestion
Parallel Communication Timeout Shutdown	In parallel mode, if the slave does not communicate with the master for more than 400 seconds	Check whether the parallel communication harness is connected reliably, and check whether the slave addresses are duplicated.
Three-Phase Off-Grid Phase Loss Fault	Three-phase system phase loss	1. Check whether all inverters are powered on; 2. Check whether each phase of the three-phase system is connected to an inverter;
Emergency Stop	External hardware emergency stop button triggered or remote emergency stop command triggered	1. If it was actively triggered via remote shutdown, it can be ignored; 2. If not actively triggered, contact the dealer or after-sales service center.

Fault Name	Cause	Fault Handling Suggestion
High Combustible Gas Concentration	Automatically triggered when the gas detection device detects a concentration of 20% LEL or higher	1. After the fault occurs, the machine will automatically open the air damper to exhaust and reduce the concentration. It will automatically clear once the concentration drops below 5% LEL for 15 minutes. 2. If a cluster-level fire fault is triggered after the fault occurs, the air damper will automatically close. Confirm the damper status within 30 seconds to ensure cluster-level fire protection is executed in a sealed space. 3. Contact the dealer or after-sales service center.
Combustible Gas Device Open Damper Signal Mismatch	The control signal to open the damper does not match the feedback signal	1. Check that the harness signal connection is没有问题. 2. Contact the dealer or after-sales service center.
One-Key Shutdown	Check via the App whether the one-key shutdown function is enabled	Disable one-key shutdown.
Offline Shutdown	-	-
Remote Shutdown	-	-

Fault Name	Cause	Fault Handling Suggestion
Grid-Side Surge Protection Fault	-	1. Try restarting the machine and observe whether the fault clears; 2. If the fault does not clear after restart, contact the dealer or after-sales service center.
Off-Grid Side Surge Protection Fault	-	1. Try restarting the machine and observe whether the fault clears; 2. If the fault does not clear after restart, contact the dealer or after-sales service center.
Sub-Node Communication Fault	Internal communication anomaly	1. Try restarting the machine and observe whether the fault clears; 2. If the fault does not clear after restart, contact the dealer or after-sales service center.
Dehumidifier Communication Fault	Communication link anomaly between dehumidifier and LC control box	1. Check the communication harness and observe whether the fault clears; 2. Try restarting the machine and observe whether the fault clears; 3. If the fault does not clear after restart, contact the dealer or after-sales service center.

Fault Name	Cause	Fault Handling Suggestion
Combustible Gas Detection Device Communication Fault	1. The combustible gas device was not configured with 485 address 2 at the factory. 2. Communication link anomaly between the gas device and LC control box	1. Check the communication harness and observe whether the fault clears; 2. Try restarting the machine and observe whether the fault clears; 3. Use the method provided by the gas device manufacturer to check whether its address is 2; if not, modify it; 4. If the fault does not clear after restart, contact the dealer or after-sales service center.
Generator Communication Fault	Communication link anomaly between control board and generator	1. Check the communication harness and observe whether the fault clears; 2. Try restarting the machine and observe whether the fault clears; 3. If the fault does not clear after restart, contact the dealer or after-sales service center.
Battery Overvoltage Protection	1. Single cell voltage too high 2. Voltage sensing wire anomaly	Record the fault phenomenon, restart the battery, wait a few minutes, and confirm whether the fault disappears. If the problem persists after restart, contact the after-sales service center.
	1. Battery total voltage too high 2. Voltage sensing wire anomaly	
Battery Undervoltage Protection	1. Single cell voltage too low 2. Voltage sensing wire anomaly	

Fault Name	Cause	Fault Handling Suggestion
	1. Battery total voltage too low 2. Voltage sensing wire anomaly	
Battery Overcurrent Protection	1. Charging current too high, battery current limiting anomaly: temperature and voltage values change abruptly 2. Inverter response anomaly	
	Battery discharge current too high	
Battery Overtemperature Protection	1. Ambient temperature too high 2. Temperature sensor anomaly	
Battery Low Temperature Protection	1. Ambient temperature too low 2. Temperature sensor anomaly	
Battery Terminal Overtemperature Protection	Terminal temperature too high	

Fault Name	Cause	Fault Handling Suggestion
Battery Imbalance Protection	1. Large temperature difference: at different stages, the battery limits its power, i.e., restricts charging/discharging current. So this problem is generally rare. 2. Cell capacity degradation leads to high internal resistance, causing high temperature rise during overcurrent and thus large temperature difference. 3. Poor cell tab welding causes rapid temperature rise during overcurrent. 4. Temperature sampling issue; 5. Loose power wire connection.	

Fault Name	Cause	Fault Handling Suggestion
	1. Inconsistent cell aging levels 2. Slave board chip issues can also cause excessive cell voltage difference; 3. Slave board balancing issues can also cause excessive cell voltage difference; 4. Harness issues.	
Insulation Resistance Protection	Insulation resistance damaged	Check whether the ground wire is properly connected. Restart the battery. If the problem persists after restart, contact the after-sales service center.
Precharge Failure Fault	Precharge failure	Indicates that during precharging, the voltage across the precharge MOSFET always exceeds the specified threshold. After shutdown and restart, observe whether the fault persists. Check whether the wiring is correct and whether the precharge MOSFET is damaged.
Sensor Wire Fault	Battery sensor wire loose or disconnected	Check wiring, restart battery. If problem persists after restart, contact after-sales service center.
	Single cell voltage sensor wire loose or disconnected	Check wiring, restart battery. If problem persists after restart, contact after-sales service center.
	Single cell temperature sensor wire loose or disconnected	

Fault Name	Cause	Fault Handling Suggestion
	Dual-channel current comparison error too large, or current sensor loop anomaly	
	Dual-channel voltage comparison error too large, or MCU vs AFE voltage comparison error too large, or voltage sensor loop anomaly	
	Temperature sensor loop anomaly, loose or disconnected	
	Level 5 overvoltage or overtemp, blowing triple fuse	Triple fuse blown. Contact 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 exceeds the specified threshold. Shut down and let it rest for 2 hours for the temperature to recover.
Shunt Overtemperature	Shunt overtemperature	This fault indicates that the shunt temperature exceeds the specified threshold. Shut down and let it rest for 2 hours for the temperature to recover.
BMS1 Other Faults 1 (Residential Storage)	Relay or MOSFET Open Circuit	1. Update software, shut down and rest for 5 minutes, then restart and see if the fault persists; 2. If it persists, replace the battery pack.

Fault Name	Cause	Fault Handling Suggestion
	Relay or MOSFET Short Circuit	1. Update software, shut down and rest for 5 minutes, then restart and see if the fault persists; 2. If it persists, replace the battery pack.
	Communication anomaly between main and sub clusters, or inconsistent cells between clusters	1. Check the battery information and software version of the slave, and whether the communication line with the master is normal. 2. Update software.
	Battery system return loop harness anomaly, causing no loop for interlock signal	Check whether the terminating resistor is installed correctly.
	BMS and PCS communication anomaly	1. Confirm that the communication line interface definition between the inverter and the battery is correct; 2. Contact the after-sales service center to check background data and observe whether the inverter and battery software versions are compatible.
	BMS master and slave communication harness anomaly	1. Check wiring, restart battery; 2. Update battery software; if problem persists after restart, contact after-sales service center.
	Main negative chip communication lost	

Fault Name	Cause	Fault Handling Suggestion
	Circuit breaker or shunt trip anomaly	1. Shut down and rest for 5 minutes, then restart and see if the fault persists; 2. Check the blind-mate connectors at the bottom of PACK and PCU for loose or bent pins.
	MCU self-test failed	Update software, restart battery. If problem persists after restart, contact after-sales service center.
	1. Software version too low or BMS board damaged 2. Large number of inverters in parallel, causing excessive surge during battery precharge	1. Update software and observe if the fault persists. 2. If parallel setup, black-start the battery before starting the inverter.
	MCU internal fault	Update software, restart battery. Usually detects MCU or external component damage. If problem persists after restart, contact after-sales service center.
	Total control current exceeds specified threshold	1. Shut down and rest for 5 minutes, then restart and see if the fault persists; 2. Check whether the inverter power setting is too high, causing the total bus load to be exceeded;
	Inconsistent cells in parallel clusters	Confirm that the cells in parallel clusters are consistent.
	Parallel cluster battery positive/negative reversed	Check whether the positive and negative terminals of the parallel cluster battery are reversed.

Fault Name	Cause	Fault Handling Suggestion
	Severe overtemp/overvoltage triggering fire protection system	Contact after-sales service center.
System Air Conditioner Faults	Air conditioner abnormal failure	Try restarting the system. If the fault does not clear, contact after-sales service center.
	Cabinet door not closed	Check if the cabinet door is properly closed.
	Supply voltage too high	Confirm that the supply voltage meets the air conditioner input voltage requirements. After confirmation, power on again.
	Supply voltage too low	
	No voltage input	
	Supply voltage unstable	
	Compressor voltage unstable	Try restarting the system. If the fault does not clear, contact after-sales service center.
	Sensor loose or damaged	
	Air conditioner fan anomaly	
BMS1 Other Faults 2 (Residential Storage)	DCDC internal voltage or current anomaly	Refer to specific DC fault details.
	DCDC overload or heatsink temperature too high, etc.	

Fault Name	Cause	Fault Handling Suggestion
	Cell sensing anomaly or inconsistent aging	Contact after-sales service center.
	Fan action not executed normally	Contact after-sales service center.
	Output port screw loose or poor contact	1. Shut down battery, check wiring and output port screws. 2. After confirmation, restart battery and observe if fault persists. If it does, contact after-sales service center.
	Battery used for too long or cell severely damaged	Contact after-sales service center to replace the pack.
	1. Software version too low or BMS board damaged 2. Large number of inverters in parallel, causing excessive surge during battery precharge	1. Update software and observe if the fault persists. 2. If parallel setup, black-start the battery before starting the inverter.
	Heating film damaged	Contact after-sales service center.
	Heating film triple fuse blown, heating function unavailable	Contact after-sales service center.
	Software model, cell type, hardware model mismatch	Check if software model, SN number, cell type, and hardware model are consistent. If not, contact after-sales service center.
	Thermal management board communication lost	

Fault Name	Cause	Fault Handling Suggestion
	Pack fan fault signal triggered	1. Shut down and rest for 5 minutes, then restart and see if the fault persists; 2. If the fault does not clear, contact after-sales to replace the pack.
DCDC Faults	Output port voltage too high	Check output port voltage. If output port voltage is normal and the fault does not clear after restarting the battery, contact after-sales service center.
	DCDC module detects battery voltage exceeding maximum charging voltage	Stop charging, discharge to SOC below 90% or let it rest for 2 hours. If invalid and fault persists after restart, contact after-sales service center.
	Heatsink temperature too high	Let battery rest for 1 hour for heatsink temperature to drop. If invalid and fault persists after restart, contact after-sales service center.
	Battery discharge current too high	Check if load exceeds battery discharge capability. Turn off load or stop PCS for 60 seconds. If invalid and fault persists after restart, contact after-sales service center.
	Output port power harness positive/negative reversed with parallel cluster battery or PCS	Turn off battery manual switch, check output port wiring, then restart battery.
	Output power relay cannot close	Check if output port wiring is correct and if there is a short circuit. If invalid and fault persists after restart, contact after-sales service center.

Fault Name	Cause	Fault Handling Suggestion
	Power device temperature too high	Let battery rest for 1 hour for internal power device temperature to drop. If invalid and fault persists after restart, contact after-sales service center.
	Relay sticking	If fault persists after restart, contact after-sales service center.
Inter-Cluster Circulating Current Fault	1. Cell imbalance 2. First power-on not calibrated with full charge	Record the fault phenomenon, restart the battery, wait a few minutes, and confirm whether the fault disappears. If the problem persists after restart, contact the after-sales service center.
BMS1 Other Faults 3 (Large Storage)	Communication anomaly with Linux module	1. Check if the communication line is connected properly. 2. Update software, restart battery and observe if the fault persists. If it does, contact after-sales service center.
	Cell temperature rise too fast	Cell anomaly, contact after-sales to replace pack.
	SOC below 10%	Charge the battery.
	SN write does not comply with rules	Check if the SN number length is normal. If abnormal, contact after-sales service center.
	1. Daisy chain communication anomaly within battery cluster 2. Inconsistent cell aging between battery clusters	1. Check the contact status of packs in a single cluster. 2. Confirm the usage of each cluster battery, such as cumulative charge/discharge capacity, cycle count, etc. 3. Contact after-sales service center.
	High humidity inside pack	-
	Fuse blown	Contact after-sales to replace pack.

Fault Name	Cause	Fault Handling Suggestion
	Battery low charge	Charge the battery.
BMS1 Other Faults 4 (Large Storage)	Circuit breaker anomaly	Contact after-sales to replace pack.
	External device anomaly	Contact after-sales to replace pack.
Contactor Fault 1	-	-
Contactor Fault 2	-	-
Overload Protection (Jinggui)	Continuous overload (over 690 KVA) for 10s	Contact after-sales service center.
Overload Protection (Smart Port)	Continuous overload (over 690 KVA) for 10s	Contact after-sales service center.
Overcurrent Protection (Jinggui)	-	-
Overcurrent Protection (Smart Port)	-	-
Master AC Power-On and Meter Communication Anomaly	1. The meter may not be connected to the master. 2. The meter communication line may be loose.	1. Check if the meter is connected to the master. 2. Check if the meter communication line is loose.

Fault Name	Cause	Fault Handling Suggestion
Slave with Meter Anomaly in Parallel System	Meter connected to slave.	Set the machine with the meter as the master.
Slave AC Power-On >10 Minutes and Master Communication Timeout Anomaly	1. Slave address set incorrectly. 2. Slave communication line loose.	1. Check if slave addresses are duplicated. 2. Check if the parallel communication line is loose.

8.5.3 Battery Fault

- **BAT Series 35.8-56.3kWh High Voltage Battery**

No.	Fault Name	Possible Cause	Fault Handling
1	Charging Overvoltage2	• Cell voltage/Total voltage too high • Abnormal voltage sampling wire	1. Shut down and let it rest for 5 minutes, then restart to see if the fault persists; 2. If the fault is not resolved, please contact the after-sales service center.
2	Charging Overvoltage3	• Cell voltage/Total voltage too high • Abnormal voltage sampling wire	1. Shut down and let it rest for 5 minutes, then restart to see if the fault persists; 2. If the fault is not resolved, please contact the after-sales service center.

No.	Fault Name	Possible Cause	Fault Handling
3	Discharge Undervoltage3	• Cell voltage/Total voltage too low • Abnormal voltage sampling wire	1. Shut down and let it rest for 5 minutes, then restart to see if the fault persists; 2. Determine if the inverter is operating properly, whether it fails to charge the battery due to working mode or other issues. 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.
4	Discharge Undervoltage2	• Cell voltage/Total voltage too low • Abnormal voltage sampling wire	1. Shut down and let it rest for 5 minutes, then restart to see if the fault persists; 2. Determine if the inverter is operating properly, whether it fails to charge the battery due to working mode or other issues. 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.

No.	Fault Name	Possible Cause	Fault Handling
5	Cell Overvoltage2	• Cell voltage/Total voltage too high • Abnormal voltage sampling wire	1. Shut down and let it rest for 5 minutes, then restart to see if the fault persists; If the fault is not resolved, please contact the after-sales service center.
6	Cell Undervoltage2	Cell undervoltage	1. Shut down and let it rest for 5 minutes, then restart to see if the fault persists; 2. Determine if the inverter is operating properly, whether it fails to charge the battery due to working mode or other issues. 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.
7	Large Cell Voltage Difference 2	Large cell voltage difference	1. Restart the battery and wait 12 hours. 2. If the fault is not resolved, please contact the after-sales service center.

No.	Fault Name	Possible Cause	Fault Handling
8	Charging Overcurrent2	• Charging current too high, abnormal battery current limiting: sudden change in temperature and voltage • Abnormal inverter response	1. Shut down and let it rest for 5 minutes, then restart to see if the fault persists; 2. Check if the inverter is set to too much power, causing the battery rated operating current to be exceeded; 3. If the fault is not resolved, please contact the after-sales service center.
9	Discharge Overcurrent2	• Discharge current too high, abnormal battery current limiting: sudden change in temperature and SOC value • Abnormal inverter response	
10	Cell High Temperature2	• Cell temperature too high • Abnormal temperature sensor	1. Shut down and let it rest for 30 minutes, then restart to see if the fault persists; 2. If the fault is not resolved, please contact the after-sales service center.
11	Cell Low Temperature2	• Ambient temperature too low • Abnormal temperature sensor	1. Shut down and let it rest for 30 minutes, then restart to see if the fault persists; 2. If the fault is not resolved, please contact the after-sales service center.

No.	Fault Name	Possible Cause	Fault Handling
12	Charging Overtemperature2	• Cell temperature too high • Abnormal temperature sensor	1. Shut down and let it rest for 30 minutes; restart to see if the fault persists; 2. If the fault is not resolved, please contact the after-sales service center.
13	Charging Low Temperature2	• Ambient temperature too low • Abnormal temperature sensor	1. Shut down and let it rest for 30 minutes; restart to see if the fault persists; 2. If the fault is not resolved, please contact the after-sales service center.
14	Discharge Overtemperature2	• Cell temperature too high • Abnormal temperature sensor	1. Shut down and let it rest for 30 minutes; restart to see if the fault persists; 2. If the fault is not resolved, please contact the after-sales service center.
15	Discharge Low Temperature2	• Ambient temperature too low • Abnormal temperature sensor	1. Shut down and let it rest for 30 minutes; restart to see if the fault persists; 2. If the fault is not resolved, please contact the after-sales service center.

No.	Fault Name	Possible Cause	Fault Handling
16	Large Cell Temperature Difference 2	Large cell temperature difference	1. Shut down and let it rest for 30 minutes; restart to see if the fault persists; 2. If the fault is not resolved, please contact the after-sales service center.
17	Precharge Failure	Precharge mos failed to close	1. Shut down and let it rest for 5 minutes, then restart to see if the fault persists; 2. If the fault is not resolved, please contact the after-sales service center.
18	Battery Trip	Battery circuit breaker trip	1. Let it rest for 10min, then re-close to restore; 2. If the fault is not resolved, please contact the after-sales service center.
19	Battery and Inverter Communication Failure	Battery and inverter communication failure	1. Verify that the communication cable pinout and DC cables are correct and continuity is normal. 2. Restart the inverter and battery. 3. If the fault is not resolved, please contact the after-sales service center.
20	Specific Fault	Specific battery fault	Please contact the after-sales service center.

No.	Fault Name	Possible Cause	Fault Handling
21	Parallel Cluster Fault	Slave cluster lost Parallel cluster failed	Check the reliability of the master-slave communication harness connection. Please contact the after-sales service center.
22	Application Software Fault	Software self-test failed	Please contact the after-sales service center.
23	Microelectronics Fault	Electronic component fault	Please contact the after-sales service center.
24	Main Control Overload	Exceeds power cable capacity	Stop charging, if not automatically restored, please contact a professional technician to restart the system.
25	SN Abnormal	Batteries with duplicate SN exist	Please contact the after-sales service center.
26	Abnormal Circuit Breaker	Moulded case circuit breaker abnormally tripped	Replace the moulded case circuit breaker.

- **BAT Series 92.1-112.6kWh Commercial and Industrial Battery System**

No.	Fault Name	Possible Cause	Troubleshooting
1	Charging Overvoltage 2	• Cell voltage/total voltage too high • Voltage sampling wire anomaly	1. Turn off and let it rest for 5 minutes, restart and check if the fault persists; 2. If the fault is not resolved, contact the after-sales service center.

No.	Fault Name	Possible Cause	Troubleshooting
2	Charging Overvoltage 3	• Cell voltage/total voltage too high • Voltage sampling wire anomaly	1. Turn off and let it rest for 5 minutes, restart and check if the fault persists; 2. If the fault is not resolved, contact the after-sales service center.
3	Discharge Undervoltage3	• Cell voltage/total voltage too low • Voltage sampling wire anomaly	1. Turn off and let it rest for 5 minutes, restart and check if the fault persists; 2. Check the inverter working status, determine if it is not charging the battery due to working mode or other issues, try charging the battery through the inverter, and observe if the fault recovers. 3. If the fault is not resolved, contact the after-sales service center.
4	Discharge Undervoltage2	• Cell voltage/total voltage too low • Voltage sampling wire anomaly	1. Turn off and let it rest for 5 minutes, restart and check if the fault persists; 2. Check the inverter working status, determine if it is not charging the battery due to working mode or other issues, try charging the battery through the inverter, and observe if the fault recovers. 3. If the fault is not resolved, contact the after-sales service center.

No.	Fault Name	Possible Cause	Troubleshooting
5	Cell Overvoltage 2	• Cell voltage/total voltage too high • Voltage sampling wire anomaly	1. Turn off and let it rest for 5 minutes, restart and check if the fault persists; If the fault is not resolved, contact the after-sales service center.
6	Cell Undervoltage2	Cell undervoltage	1. Turn off and let it rest for 5 minutes, restart and check if the fault persists; 2. Check the inverter working status, determine if it is not charging the battery due to working mode or other issues, try charging the battery through the inverter, and observe if the fault recovers. 3. If the fault is not resolved, contact the after-sales service center.
7	Large Cell Voltage Difference2	Large cell voltage difference	1. Restart the battery and wait for 12 hours. 2. If the fault is not resolved, contact the after-sales service center.
8	Charging Overcurrent 2	• Charging current too high, battery current limiting anomaly: sudden temperature and voltage value changes • Inverter response anomaly	1. Turn off and let it rest for 5 minutes, restart and check if the fault persists; 2. Check if the inverter power setting is too high, causing it to exceed the battery's rated operating current; 3. If the fault is not resolved, contact the after-sales service center.

No.	Fault Name	Possible Cause	Troubleshooting
9	Discharge Overcurrent 2	• Discharge current too high, battery current limiting anomaly: sudden temperature and SOC value changes • Inverter response anomaly	
10	Cell High Temperature2	• Cell temperature too high • Temperature sensor anomaly	1. Turn off and let it rest for 30 minutes, restart and check if the fault persists; 2. If the fault is not resolved, contact the after-sales service center.
11	Cell Low Temperature2	• Ambient temperature too low • Temperature sensor anomaly	1. Turn off and let it rest for 30 minutes, restart and check if the fault persists; 2. If the fault is not resolved, contact the after-sales service center.
12	Charging Overtemperature2	• Cell temperature too high • Temperature sensor anomaly	1. Turn off and let it rest for 30 minutes; restart and check if the fault persists; 2. If the fault is not resolved, contact the after-sales service center.
13	Charging Low Temperature2	• Ambient temperature too low • Temperature sensor anomaly	1. Turn off and let it rest for 30 minutes; restart and check if the fault persists; 2. If the fault is not resolved, contact the after-sales service center.

No.	Fault Name	Possible Cause	Troubleshooting
14	Discharge Overtemperature2	• Cell temperature too high • Temperature sensor anomaly	1. Turn off and let it rest for 30 minutes; restart and check if the fault persists; 2. If the fault is not resolved, contact the after-sales service center.
15	Discharge Low Temperature2	• Ambient temperature too low • Temperature sensor anomaly	1. Turn off and let it rest for 30 minutes; restart and check if the fault persists; 2. If the fault is not resolved, contact the after-sales service center.
16	Large Cell Temperature Difference2	Large cell temperature difference	1. Turn off and let it rest for 30 minutes; restart and check if the fault persists; 2. If the fault is not resolved, contact the after-sales service center.
17	Precharge Failure	Precharge mos closing failure	1. Turn off and let it rest for 5 minutes, restart and check if the fault persists; 2. If the fault is not resolved, contact the after-sales service center.
18	Battery Trip	Battery circuit breaker tripped	1. Let it rest for 10min, then close and recover; 2. If the fault is not resolved, contact the after-sales service center.

No.	Fault Name	Possible Cause	Troubleshooting
19	Battery and Inverter Communication Failure	Battery and inverter communication failure	1. Check whether the communication cable pinout and DC cable are correct, and whether the continuity is normal. 2. Restart the inverter and battery. 3. If the fault is not resolved, contact the after-sales service center.
20	Specific Fault	Battery specific fault	Contact the after-sales service center.
21	Parallel Cluster Fault	Slave cluster lost connection Parallel cluster failure	Check the reliability of the master-slave wiring harness communication Contact the after-sales service center.
22	Application Software Fault	Software self-test failure	Contact the after-sales service center
23	Microelectronic Fault	Electronic component failure	Contact the after-sales service center
24	Master Controller Overload	Exceeds the capacity range of the power cable	Stop charging, if it does not recover automatically, contact a professional technician to restart the system.
25	SN Anomaly	There are batteries with the same SN	Contact the after-sales service center
26	Circuit Breaker Anomaly	Molded case circuit breaker abnormally opens	Replace the molded case circuit breaker
27	Circuit Breaker Sticking Fault	Molded case circuit breaker fault or auxiliary circuit breaker fault	Replace the molded case circuit breaker or replace the auxiliary circuit breaker

No.	Fault Name	Possible Cause	Troubleshooting
28	Fire System Triggered	System internal thermal runaway or fire system false trigger	Contact the after-sales service center
29	Air Conditioner Fault	An abnormal fault occurs in the air conditioning system	Contact the after-sales service center
30	Access Control Fault	Door abnormally opened or access control sensor damaged	Close the door or replace the access control sensor
31	Emergency Stop Triggered	Emergency stop pressed or emergency stop button damaged	Replace the emergency stop button
32	PACK Fan Fault	PACK fan does not rotate or cannot work	Replace the corresponding PACK fan

- **BAT-C Series 208.9-261.2kWh Commercial and Industrial Battery System**

No.	Fault Name	Possible Cause	Troubleshooting
1	Overvoltage Protection	1. Single cell or total voltage too high 2. Voltage sampling harness abnormal	1. Power off and let stand for 5 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center
2	Undervoltage Protection	1. Single cell or total voltage too low 2. Voltage sampling harness abnormal	1. Power off and let stand for 5 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center

No.	Fault Name	Possible Cause	Troubleshooting
3	Overcurrent Protection	Current limiting abnormal, charging current too high	1. Power off and let stand for 5 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center
4	Overtemperature Protection	1. Single cell temperature too high 2. Temperature sensor abnormal	1. Power off and let stand for 30 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center
5	Low Temperature Protection	1. Single cell temperature too low 2. Temperature sensor abnormal	1. Power off and let stand for 30 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center

No.	Fault Name	Possible Cause	Troubleshooting
6	Imbalance Protection	Temperature difference: 1. Battery capacity degradation, leading to excessive internal resistance and large temperature rise during overcurrent 2. Battery tab welding issues 3. Temperature sampling issues 4. Power cable connection loose Voltage difference: 1. Inconsistent battery aging levels 2. Harness issues	1. Power off and let stand for 30 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center
7	Insulation Protection	Insulation resistance damaged/failed	1. Power off and let stand for 30 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center
8	Precharge Failure	Precharge relay closure failure	1. Power off and let stand for 5 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center

No.	Fault Name	Possible Cause	Troubleshooting
9	Harness Abnormality	Sampling wire disconnected	1. Power off and let stand for 5 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center
10	Relay Open Circuit	Relay damaged	1. Power off and let stand for 5 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center
11	Relay Welding	Relay damaged	1. Power off and let stand for 5 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center
12	Parallel Cluster Fault	1. Sub-cluster communication lost 2. Sub-cluster registration failed	1. Replace the communication cable, check if the fault is resolved 2. If the fault is not resolved, please contact the after-sales service center
13	PCS Communication Lost	Communication cable disconnected	1. Replace the communication cable, check if the fault is resolved 2. If the fault is not resolved, please contact the after-sales service center

No.	Fault Name	Possible Cause	Troubleshooting
14	BMU Communication Lost	AFE internal communication lost	1. Power off and let stand for 5 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center
15	MCU Communication Lost	Communication lost between battery and DCDC	1. Power off and let stand for 5 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center
16	Circuit Breaker Welding	Circuit breaker, shunt trip abnormal	1. Power off and let stand for 5 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center
17	Precharge Failure	Precharge relay closure failure	1. Power off and let stand for 5 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center
18	Reverse Connection Fault	P+P- port voltage < -500V	1. Check if the power cables between batteries are reversely connected 2. If the fault is not resolved, please contact the after-sales service center

No.	Fault Name	Possible Cause	Troubleshooting
19	Software Fault	Software cannot operate normally	1. Power off and let stand for 5 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center
20	Hardware Overcurrent	Large current exists when the system is not working	1. Power off and let stand for 5 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center
21	Microelectronic Fault	Electronic component fault	1. Power off and let stand for 5 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center
22	General Alarm	Single cluster has a fault and is bypassed	View the single cluster fault information and handle it according to the corresponding fault handling solution
23	Main Controller Overload	Output current exceeds system capacity	1. Power off and let stand for 5 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center

No.	Fault Name	Possible Cause	Troubleshooting
24	Circuit Breaker Abnormality	Molded case circuit breaker open/tripped	1. Close the molded case circuit breaker, check if the fault is resolved 2. If the fault is not resolved, please contact the after-sales service center
25	Fire Protection Fault	Fire protection actually triggered or false triggered	1. Power off and let stand for 5 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center
26	Emergency Stop Fault	Emergency stop button pressed	1. Reset the emergency stop button, check if the fault is resolved 2. If the fault is not resolved, please contact the after-sales service center
27	Access Control Fault	1. Access control open 2. Access control switch damaged	1. Close the access control, check if the fault is resolved 2. If the fault is not resolved, please contact the after-sales service center
28	Connector Overtemperature	Power connector temperature too high	1. Power off and let stand for 5 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center

No.	Fault Name	Possible Cause	Troubleshooting
29	Water Immersion Fault	Water immersion inside the cabinet	1. After draining the water, restart to check if it is resolved 2. If the issue persists after restart, please contact the after-sales service center
30	DCDC Fault	DCDC internal fault	1. Power off and let stand for 5 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center
31	PACK Fault	PACK internal fault	1. Power off and let stand for 5 minutes, restart to check if resolved 2. If the issue persists after restart, please contact the after-sales service center

9 Technical Specifications

9.3 The Parameter of Batteries

9.4 The Parameter of the Smart Meter

Technical parameters			**GM330**
Input	Grid		Three-phase
	Voltage	Nominal Voltage-Line to N (Vac)	220/230
		Nominal Voltage-Line to Line (Vac)	380/400
		Voltage Range	0.88Un-1.1Un
		Nominal AC Grid Frequency (Hz)	50/60
	Current	Current Transformer Ratio	nA: 50A
Communication			RS485
Communication Distance (m)			1000
User interface			4 LED, Reset button
Accuracy	Voltage/Current		Class 0.5
	Active Energy		Class 0.5
	Reactive Energy		Class 1
Power Consumption(W)			<5

Technical parameters		GM330
Mechanical	Dimensions (W×H×D mm)	72*85*72
	Weight (g)	240
	Mounting	Din rail
Environment	Ingress Protection Rating	IP20
	Operating Temperature Range (℃)	-30~70
	Storage Temperature Range(℃)	-30~70
	Relative Humidity (non-condensing)	0~95%
	Max. Operating Altitude (m)	3000

10 Appendix

10.1 FAQ

10.1.1 How to Perform Meter/CT Assisted Test?

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

- Method 1:

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

- Method 2:

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

10.1.2 How to Upgrade Device Version

Via firmware information, you can view or upgrade the inverter's DSP version, ARM version, BMS version, and communication module software version. Some communication modules do not support upgrading software version via the SEMS+ App. Please refer to the actual situation.

- **Upgrade Prompt:**

When the user opens the App, an upgrade prompt appears on the home page. The user can choose whether to upgrade. If you choose to upgrade, follow the on-screen instructions to complete the upgrade.

- **Regular Upgrade:**

Go to **[Home]** > **[Settings]** > **[Firmware Information]** to enter the firmware information view.
Click Check for Update. If a new version is available, follow the on-screen instructions

to complete the upgrade.

- **Forced Upgrade:**

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

10.2 Abbreviations

Abbreviation	English Description	Chinese Description
Ubatt	Battery Voltage Range	Battery Voltage Range
Ubatt,r	Nominal Battery Voltage	Rated Battery Voltage
Ibatt,max (C/D)	Max. Charging Current Max. Discharging Current	Max. Charging/Discharging Current
EC,R	Rated Energy	Rated Energy
UDCmax	Max.Input Voltage	Max. Input Voltage
UMPP	MPPT Operating Voltage Range	MPPT Voltage Range
IDC,max	Max. Input Current per MPPT	Max. Input Current per MPPT
ISC PV	Max. Short Circuit Current per MPPT	Max. Short Circuit Current per MPPT
PAC,r	Nominal Output Power	Nominal Output Power
Sr (to grid)	Nominal Apparent Power Output to Utility Grid	Nominal Apparent Power Output to Utility Grid
Smax (to grid)	Max. Apparent Power Output to Utility Grid	Max. Apparent Power Output to Utility Grid
Sr (from grid)	Nominal Apparent Power from Utility Grid	Nominal Apparent Power from Utility Grid
Smax (from grid)	Max. Apparent Power from Utility Grid	Max. Apparent Power from Utility Grid
UAC,r	Nominal Output Voltage	Nominal Output Voltage
fAC,r	Nominal AC Grid Frequency	Output Voltage Frequency
IAC,max(to grid)	Max. AC Current Output to Utility Grid	Max. AC Current Output to Utility Grid
IAC,max(from grid)	Max. AC Current From Utility Grid	Max. AC Current from Utility Grid
P.F.	Power Factor	Power Factor

Abbreviation	English Description	Chinese Description
Sr	Back-up Nominal apparent power	Off-grid Nominal Apparent Power
Smax	Max. Output Apparent Power (VA) Max. Output Apparent Power without Grid	Max. Output Apparent Power
IAC,max	Max. Output Current	Max. Output Current
UAC,r	Nominal Output Voltage	Max. Output Voltage
fAC,r	Nominal Output Freqency	Nominal Output Voltage Frequency
Toperating	Operating Temperature Range	Operating Temperature Range
IDC,max	Max. Input Current	Max. Input Current
UDC	Input Voltage	Input Voltage
UDC,r	DC Power Supply	DC Input
UAC	Power Supply/AC Power Supply	Input Voltage Range / AC Input
UAC,r	Power Supply/Input Voltage Range	Input Voltage Range / AC Input
Toperating	Operating Temperature Range	Operating Temperature Range
Pmax	Max Output Power	Max. Power
PRF	TX Power	TX Power
PD	Power Consumption	Power Consumption
PAC,r	Power Consumption	Power Consumption
F (Hz)	Frequency	Frequency
ISC PV	Max. Input Short Circuit Current	Max. Input Short Circuit Current
Udcmin-Udcmax	Range of input Operating Voltage	Operating Voltage Range
UAC,rang(L-N)	Power Supply Input Voltage	Adapter Input Voltage Range
Usys,max	Max System Voltage	Max. System Voltage
Haltitude,max	Max. Operating Altitude	Max. Operating Altitude
PF	Power Factor	Power Factor
THDi	Total Harmonic Distortion of Current	Current Harmonic Distortion

Abbreviation	English Description	Chinese Description
THDv	Total Harmonic Distortion of Voltage	Voltage Harmonic Distortion
C&I	Commercial & Industrial	Commercial & Industrial
SEMS	Smart Energy Management System	Smart Energy Management System
MPPT	Maximum Power Point Tracking	Maximum Power Point Tracking
PID	Potential-Induced Degradation	Potential-Induced Degradation
Voc	Open-Circuit Voltage	Open-Circuit Voltage
Anti PID	Anti-PID	Anti-PID
PID Recovery	PID Recovery	PID Recovery
PLC	Power-line Commucation	Power Line Carrier Communication
Modbus TCP/IP	Modbus Transmission Control / Internet Protocol	Modbus over TCP/IP
Modbus RTU	Modbus Remote Terminal Unit	Modbus over Serial Link
SCR	Short-Circuit Ratio	Short-Circuit Ratio
UPS	Uninterruptable Power Supply	Uninterruptible Power Supply
ECO mode	Economical Mode	Economical Mode
TOU	Time of Use	Time of Use
ESS	Energy Stroage System	Energy Storage System
PCS	Power Conversion System	Power Conversion System
RSD	Rapid shutdown	Rapid Shutdown
EPO	Emergency Power Off	Emergency Power Off
SPD	Surge Protection Device	Surge Protection
ARC	zero injection/zero export Power Limit / Export Power Limit	Anti-backflow
DRED	Demand Response Enabling Device	Demand Response Enabling Device
RCR	Ripple Control Receiver	-
AFCI	AFCI	AFCI DC Arc Protection
GFCI	Ground Fault Circuit Interrupter	Ground Fault Circuit Interrupter

Abbreviation	English Description	Chinese Description
RCMU	Residual Current Monitioring Unit	Residual Current Monitoring Unit
FRT	Fault Ride Through	Fault Ride Through
HVRT	High Voltage Ride Through	High Voltage Ride Through
LVRT	Low Voltage Ride Through	Low Voltage Ride Through
EMS	Energy Management System	Energy Management System
BMS	Battery Management System	Battery Management System
BMU	Battery Measure Unit	Battery Measurement Unit
BCU	Battery Control Unit	Battery Control Unit
SOC	State of Charge	State of Charge
SOH	State of Health	State of Health
SOE	State Of Energy	State of Energy
SOP	State Of Power	State of Power
SOF	State Of Function	State of Function
SOS	State Of Safety	State of Safety
DOD	Depth of discharge	Depth of Discharge

10.3 Glossary of Terms

- **Explanation of Overvoltage Categories**
  - **Overvoltage Category I**: Equipment connected to circuits with measures to limit transient overvoltages to a relatively low level.
  - **Overvoltage Category II**: Energy-consuming equipment supplied from fixed power distribution installations. This category includes appliances, portable tools, and other household and similar loads. If special requirements for reliability and suitability apply to such equipment, Overvoltage Category III is used.
  - **Overvoltage Category III**: Equipment in fixed power distribution installations, where the reliability and suitability of the equipment must meet special requirements. Includes switchgear in fixed power distribution installations and industrial equipment permanently connected to fixed power distribution installations.
  - **Overvoltage Category IV**: Equipment used at the supply of the power distribution installation, including measuring instruments and primary overcurrent protection devices.
- **Explanation 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%

- **Explanation of Ambient Temperature Categories:**
  - **Outdoor inverter**: Ambient air temperature range -25~+60°C, suitable for pollution degree 3 environment.
  - **Indoor Type II inverter**: Ambient air temperature range -25~+40°C, suitable for pollution degree 3 environment.
  - **Indoor Type I inverter**: Ambient air temperature range 0~+40°C, suitable for pollution degree 2 environment.
- **Explanation of Pollution Degree Categories**
  - **Pollution Degree 1**: No pollution or only dry, non-conductive pollution.
  - **Pollution Degree 2**: Only non-conductive pollution normally occurs, but occasional temporary conductivity caused by condensation must be taken into account.
  - **Pollution Degree 3**: Conductive pollution occurs, or dry non-conductive pollution becomes conductive due to condensation.
  - **Pollution Degree 4**: Persistent conductive pollution, e.g., from conductive dust or rain/snow.

10.4 Meaning of Battery SN Code



LXD10DSC0002

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

- Digits 11 and 12 represent the last two digits of the production year, for example,

2023 is represented as 23;

- Digit 13 represents the production month, for example, August is represented as 8; Details are as follows:

Month	Jan~Sep	Oct	Nov	Dec
Month Code	1~9	A	B	C

- Digit 14 represents the production day, for example, the 8th is represented as 8; Numbers are used preferentially, for example, 1~9 represent the 1st to 9th day, A represents the 10th day, and so on. The letters I and O are not used to avoid confusion. Details are as follows:

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

Production Date	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15	Day 16	Day 17	Day 18	Day 19	Day 20
Code	A	B	C	D	E	F	G	H	J	K	L

Production Day	21st	22nd	23rd	24th	25th	26th	27th	28th	29th	30th	31st
Code	M	N	P	Q	R	S	T	U	V	W	X

11 Contact Information

GoodWe Technologies Co., Ltd.
No. 90 Zijing Road, Suzhou New District, Suzhou, China
400-998-1212
www.goodwe.com
service@goodwe.com