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Small-scale Microgrid

Static Transfer Switch

GW500K-STC-PCS-G10

User Manual

GOODWE

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NOTICE

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

About This Manual

Overview

This document primarily introduces the product information, installation and wiring, configuration and commissioning, troubleshooting, and maintenance of the Grid-tie/Off-grid Switching Cabinet (hereinafter referred to as STS). Please read this manual carefully before installing and using this product to understand the product safety information and familiarize yourself with the product's functions and features. The document may be updated periodically. Please obtain the latest version of materials and more product information from the official website:

<https://www.goodwe.com>.

Applicable Model

This document is applicable to devices of the following models:

model	Rated Power	Nominal Voltage
GW500K-ST5-PCS-G10	500kW	220/380V, 230/400V, 3L/N/PE

Symbol Definition

DANGER

Indicates a situation with high potential DANGER that, if not avoided, will result in death or serious injury.

WARNING

Indicates a moderately hazardous situation which, if not avoided, could result in death or serious injury.

 CAUTION

Indicates a low-level potential hazard which, if not avoided, could result in moderate or minor injury to personnel.

NOTICE

Emphasizes or supplements content, may provide tips or tricks for optimizing product use, and can help you solve a problem or save time.

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1 Safety Precautions

The Safety Precautions information contained in this document must always be followed when operating the device.

WARNING

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

1.1 General Safety

NOTICE

- Due to product version upgrades or other reasons, the document content is updated periodically. Unless otherwise agreed, the document content cannot replace the safety precautions on the product labels. All descriptions in the document are for guidance only.
- Please read this document carefully before installing the equipment to understand the product and precautions.
- All operations on the equipment must be performed by professional, qualified electrical technicians who are familiar with the relevant standards and safety regulations at the project location.
- When operating the equipment, use insulated tools and wear personal protective equipment to ensure personal safety. When handling electronic components, wear anti-static gloves, anti-static wrist straps, anti-static clothing, etc., to protect the equipment from electrostatic damage.
- Unauthorized disassembly or modification may cause equipment damage, which is not covered under warranty.
- Equipment damage or personal injury resulting from installation, use, or configuration of the equipment not in accordance with the requirements of this document or the corresponding user manual is beyond the manufacturer's liability. For more product warranty information, please obtain it through the official website: <https://en.goodwe.com/warrantyrelated.html>.

1.2 personnel requirements

NOTICE

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

1. Qualified or authorized personnel include:

- Personnel who have mastered knowledge of equipment working principles, system architecture, associated risks and hazards, and have received professional operation training or possess extensive practical experience.
- Personnel who have received relevant technical and safety training, possess certain operational experience, are aware of potential dangers specific tasks may pose to themselves, and can take protective measures to minimize risks to themselves and others.
- Qualified electrical technicians meeting the regulatory requirements of the country/region where the work is performed.
- Personnel holding an electrical engineering degree/advanced diploma in electrical discipline or equivalent qualification/professional practice qualification in the electrical field, and possessing at least 2/3/4 years of experience in testing and regulatory work using electrical equipment safety standards.

2. Personnel involved in special tasks such as electrical work, work at heights, and operation of special equipment must hold valid qualification certificates required by the location where the equipment is installed.

3. Medium-voltage equipment operation must be performed by certified high-voltage electricians.

4. Equipment and component replacement is only permitted to be performed by authorized personnel.

1.3 EU Declaration of Conformity

1.3.1 Equipment with Wireless Communication Modules

Equipment with Wireless Communication Modules sold in the European market must comply with the following directives:

- Radio Equipment Directive 2014/53/EU (RED)
- Restrictions of Hazardous Substances Directive 2011/65/EU and (EU) 2015/863

(RoHS)

- Waste Electrical and Electronic Equipment 2012/19/EU
- Registration, Evaluation, Authorization and Restriction of Chemicals (EC) No 1907/2006 (REACH)

1.3.2 Devices without wireless communication functionality

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

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

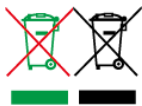
1.4 Safety Symbols and Certification Marks

DANGER

- After the equipment is installed, the labels and warning signs on the enclosure must remain clearly visible. Do not cover, alter, or damage them.
- The enclosure warning label descriptions provided below are for reference only. Please refer to the actual labels used on the equipment.

No.	Symbol	Description
1		Potential hazard exists during equipment operation. Take precautions when operating the equipment.
2		High voltage hazard. High voltage is present during equipment operation. Ensure the equipment is powered off before performing any operations.
3		High temperature on equipment surface. Do not touch during operation to avoid burns.

No.	Symbol	Description
4		Use the equipment properly. There is a risk of explosion under extreme conditions.
5		Battery contains flammable materials. Risk of fire.
6		The equipment contains corrosive electrolyte. Avoid contact with leaking electrolyte or vapor.
7		Delayed discharge. After powering off the equipment, wait for 5 minutes until it is completely discharged.
8		Keep the equipment away from open flames or ignition sources.
9		Keep the equipment out of reach of children.
10		Use the equipment properly. There is a risk of explosion under extreme conditions.
11		Battery contains flammable materials. Risk of fire.
12		Do not lift the equipment after the battery system is wired or while the battery system is operating.
13		Do not extinguish with water.
14		Read the product manual carefully before operating the equipment.
		

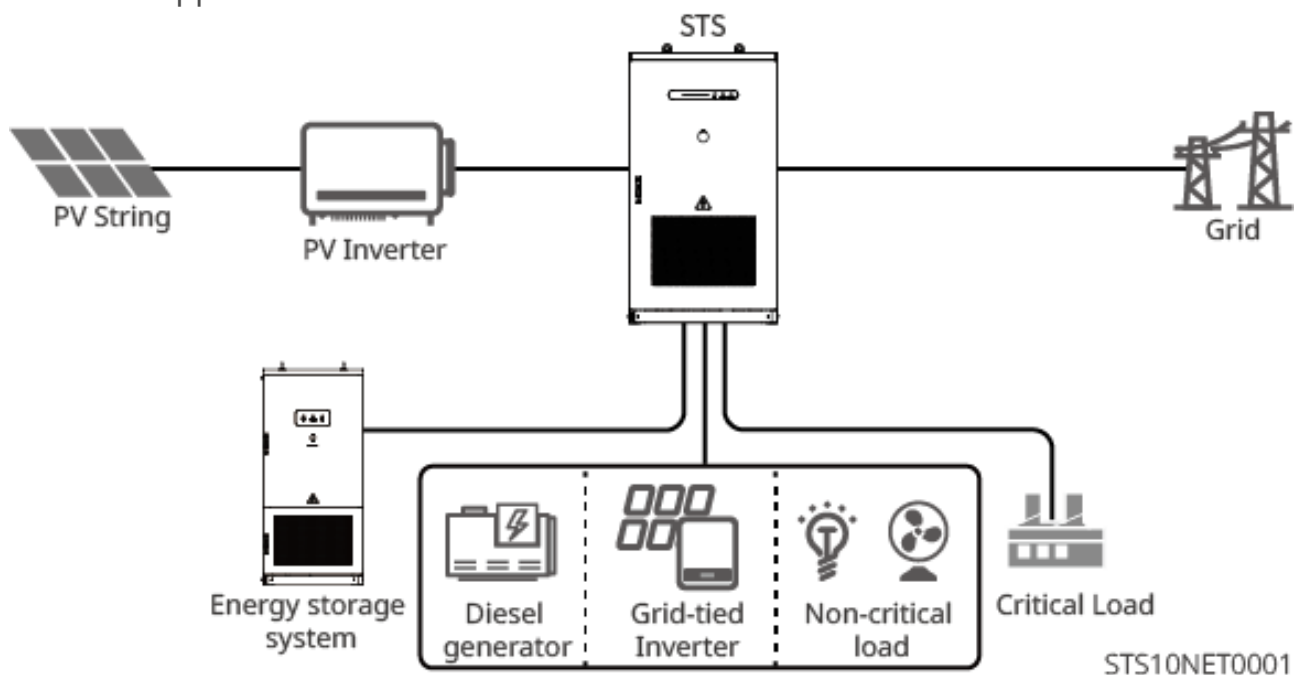
No.	Symbol	Description
15		Wear personal protective equipment during installation, operation, and maintenance.
16		Do not dispose of the equipment as household waste. Dispose of it according to local regulations or return it to the manufacturer.
17		Grounding point.
18		Recycling symbol. The equipment should be placed in the appropriate location and recycled in accordance with local environmental regulations.
19		CE marking.
20		RCM marking.

2 Product Introduction

2.1 Product Overview

STS supports the connection of photovoltaic inverters, energy storage system, Diesel Generator, loads, and the grid, assisting the entire system in achieving seamless grid-tied and off-grid switching to meet the power backup needs of areas with unstable power supply.

The main application scenarios are as follows:



port	Description
Inverter	Photovoltaic inverter connection port. Maximum port capacity 1MVA, supports 1 centralized (optional) and 5 string inverter inputs. • Centralized: Port capacity 500kVA, maximum input current 1250A. • String: Port capacity 500kVA, maximum input current 250A per input.

port	Description
ESS	Energy Storage System connection port. Maximum port capacity 550kVA, supports up to 5 ESS inputs, maximum input current 250A per input.
Smart-port	The Smart-port can connect to diesel generators, photovoltaics, or non-critical loads. Maximum port capacity 550kVA, maximum input current 1000A. The connection type can be configured on the SEC3000C WEB interface. The system executes corresponding control logic based on the setting: • When defined as a PV inverter input, the corresponding contactor is normally closed. • When defined as a diesel generator input, executes open/close commands based on the set SOC. • When defined as a load input, connects non-critical loads and executes open/close commands based on the set SOC, used for shedding non-critical loads. • When defined as no device connected, the system does not execute logic for this port.
Back-up	Load connection port. Port capacity 500kVA. Supports single-phase/three-phase loading, maximum phase current 835.6A.
Grid	Maximum configuration capacity 630kVA, maximum input current 1000A. For Supported Grid Types, please refer to 2.3.Supported Grid Types(Page 16) . Wiring method is 3L/N/PE.

NOTICE

1. When the Smart-port is connected to non-critical loads, the total load connection capacity for the Smart-port and Back-up port must not exceed 500kVA.
2. The load imbalance variation must not exceed $0.8S_n$, where S_n is the energy storage system capacity.

Microgrid System Off-grid Load Capacity

Off-grid Load Capacity	Technical Specifications	Remarks
Total Load	$\leq 0.8 * P_n$	1. Single-phase rated capacity = $(1/3) * P_n$ 2. Load per phase $\leq 0.8 * \text{Single-phase rated capacity}$, i.e., Load per phase $\leq (1/3) * 0.8 * P_n$ 3. The 0.8 coefficient reserves 20% dynamic adjustment margin, ensuring stable output during load fluctuations and when driving loads with 0.8 power factor.
Non-linear Load	Half-wave rectified load $\leq 0.4 * P_n$	The total harmonic content of the load current must meet specification or standard requirements.
Unbalanced Load	1. Two-phase loading: $\leq (2/3) * 0.8 * P_n$ 2. Single-phase loading: $\leq (1/3) * 0.8 * P_n$	1. Single-phase rated capacity = $(1/3) * P_n$ 2. Load per phase $\leq 0.8 * \text{Single-phase rated capacity}$, i.e., Load per phase $\leq (1/3) * 0.8 * P_n$

Off-grid Load Capacity	Technical Specifications	Remarks
Motor Load	1. Single motor load for direct-on-line starting, star-delta starting, or soft starter ramp-up: $\leq 0.1 \cdot P_n$ 2. Variable frequency drive motor load: $\leq 0.8 \cdot P_n$	1. If other base loads exist, the capacity for switching motor loads decreases proportionally. Motor starting inrush current $\leq 8 \cdot$ motor rated current; otherwise, adding a variable frequency drive for soft starting is recommended. 2. If the system contains motor loads and ordinary non-impact loads, configure the load capacity as: $A \cdot 10 + 1.25 \cdot B \leq P_n$, where: A: Capacity of simultaneously starting motor loads B: Other ordinary loads

Product Features

- Supports connection of grid-tied PV inverters, energy storage system, Diesel Generator, loads, and the grid, with flexible configuration
- Supports seamless grid-tied/off-grid switching within 20ms
- Seamless Diesel Generator switching
- Enables centralized energy and load management when paired with SEC3000C

Model Number Meaning

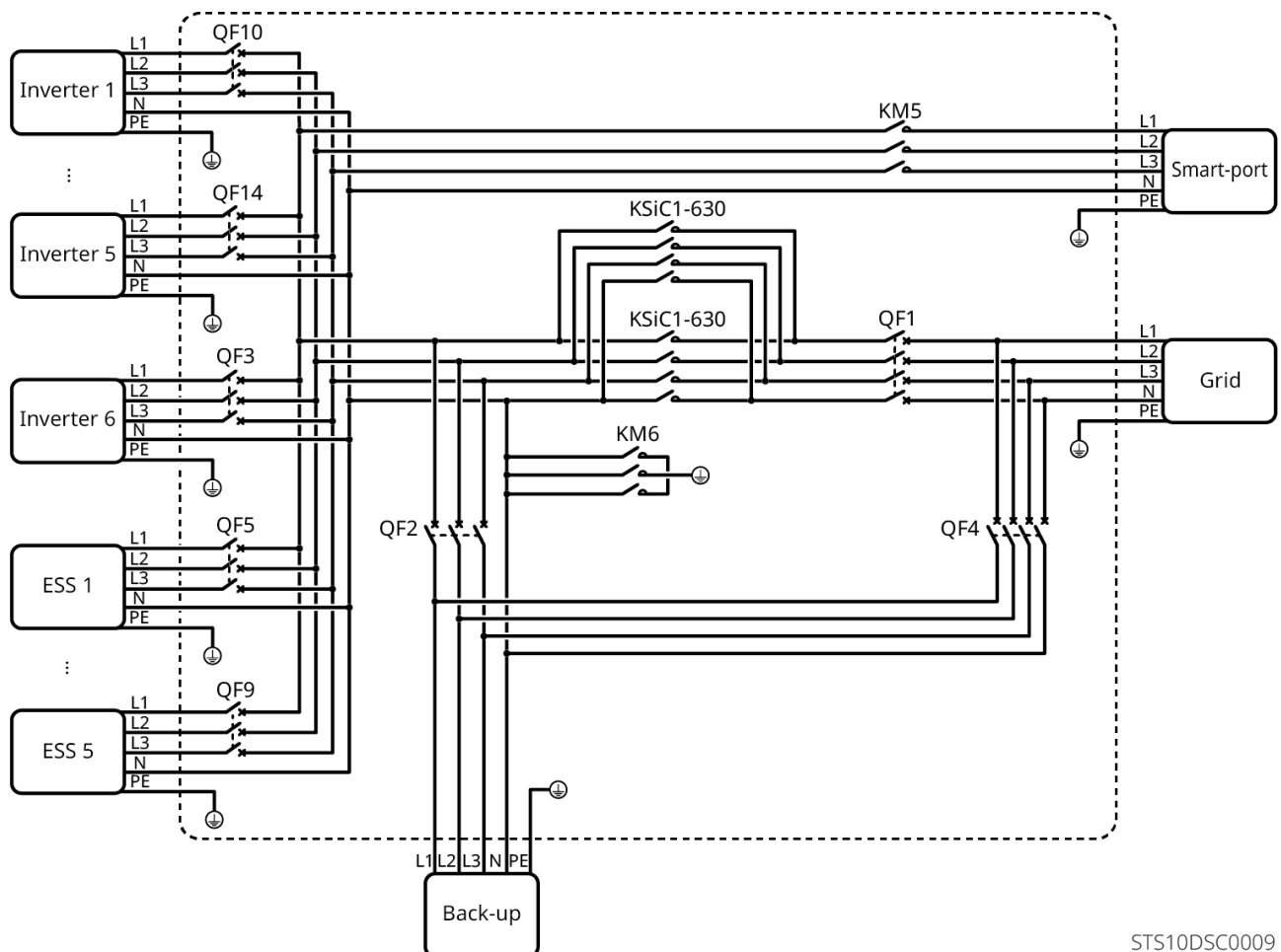
GW500K-STC-PCS-G10

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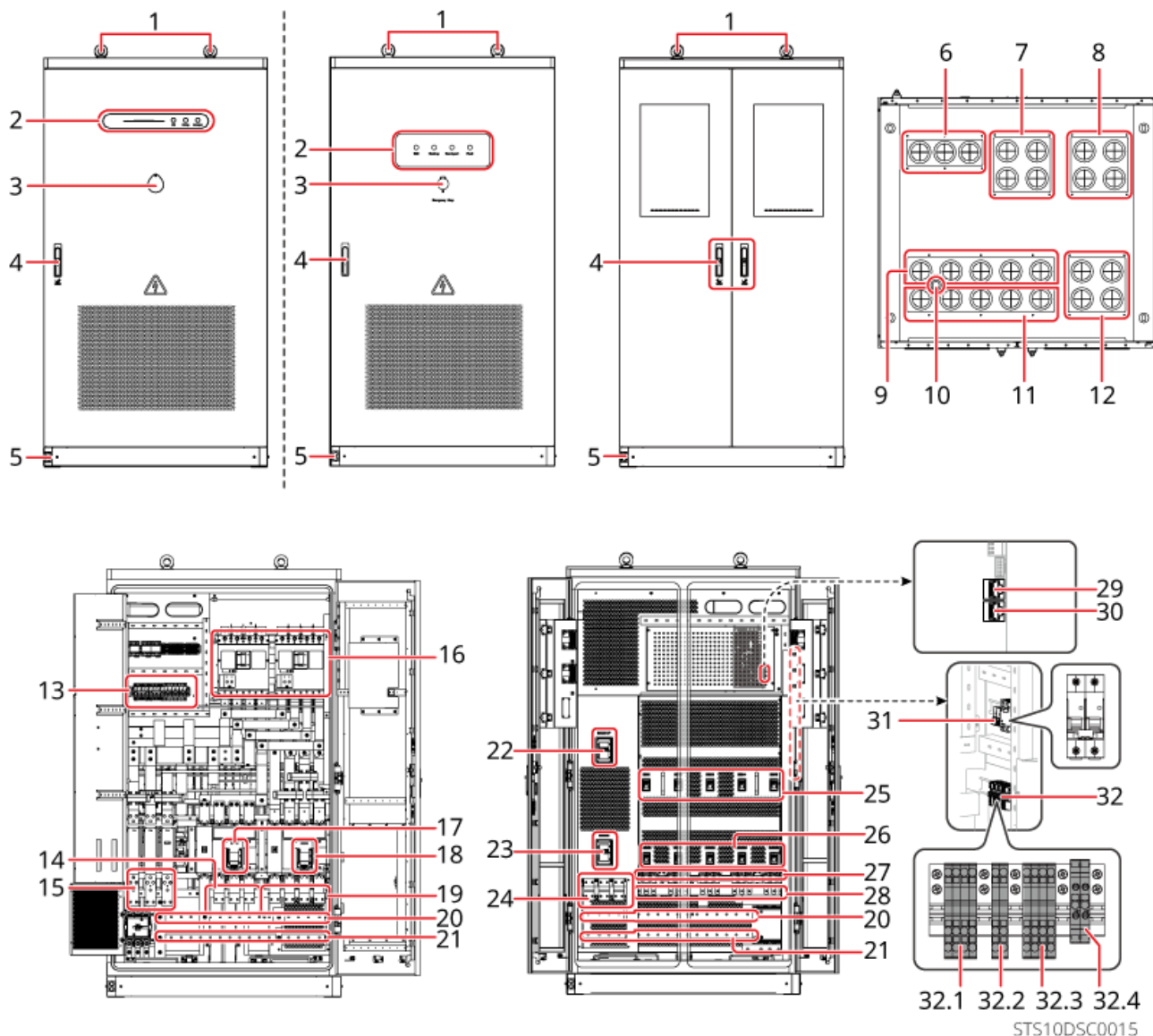
STS10DSC0008

No.	Meaning	Description
1	Brand code	GW: GoodWe
2	Rated Power	500K: Rated power is 500kW
3	Series code	STS: STS Series
4	Feature code	PCS: Only compatible with GoodWe PCS
5	Version code	G10: First generation product

2.2 Circuit Block Diagram



STS10DSC0009



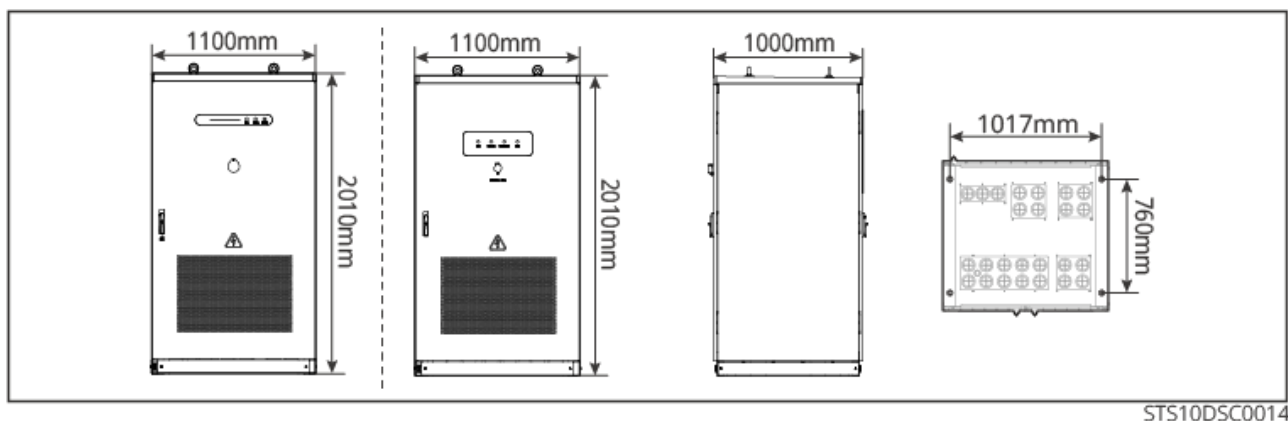
No.	Component	Description
1	Lifting Eye	For hoisting and handling
2	indicator	Indicates the operating status of the STS
3	Emergency Stop Button	In case of an emergency, use this button to stop the system.
4	Door Lock	Use the key to open the cabinet door lock. Close and lock the cabinet door when no internal operation is required.

No.	Component	Description
5	Protective Grounding Point	For connecting the protective ground wire
6	Smart-port Port	For connecting diesel generator, PV inverter, and non-critical loads
7	Back-up Port	For connecting loads
8	Grid Port	For connecting to the grid
9	ESS Port	For connecting to the energy storage system
10	COM Port	For connecting communication cables
11	Inverter Port	For connecting PV inverter (string type)
12	Inverter Port	For connecting PV inverter (centralized type)
13	Switches	Q1, Q2, Q3: Auxiliary power distribution supply switches Q4: Grid-side surge protector switch Q5: BUS-side surge protector switch
14	Back-up Port Terminal Block	For connecting load power cables
15	Smart-port Port Terminal Block	For connecting power cables of diesel generator/PV inverter/non-critical loads
16	Grid-connected/Off-grid Transfer Switch	For controlling the system's grid-connected/off-grid transfer

No.	Component	Description
17	Bypass Switch	The Bypass switch can control the load to be directly connected to the grid. • When the ESS/Inverter/Smart-port ports require maintenance, to ensure uninterrupted load operation, the Bypass switch can be closed and all other switches opened to safely maintain these ports. • Under normal conditions, the BYPASS switch must remain open and be locked by the customer using their own padlock. The padlock hole diameter is 18 mm.
18	Grid Input Breaker	For controlling grid input
19	Grid Port Terminal Block	For connecting grid-connected power cables
20	Neutral (N) Terminal Block	For connecting the neutral (N) wire
21	Protective Earth (PE) Terminal Block	For connecting the protective earth (PE) wire
22	Load Input Breaker	For controlling load input
23	(Optional) Centralized PV Inverter Input Breaker	For controlling centralized PV inverter input
24	(Optional) Inverter Port Terminal Block	For connecting power cables of the centralized PV inverter
25	Energy Storage System Breaker	For controlling energy storage system input
26	String PV Inverter Input Breaker	For controlling string PV inverter input

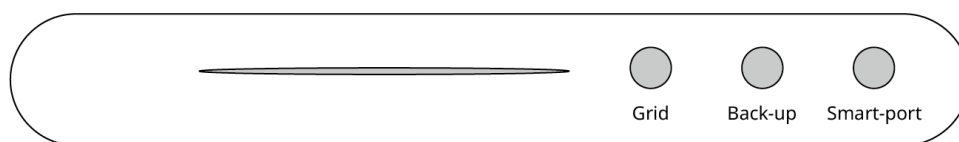
No.	Component	Description
27	Inverter Port Terminal Block	For connecting power cables of the string PV inverter
28	ESS Port Terminal Block	For connecting power cables of the energy storage system
29	LAN Port	For communicating with SEC3000C
30	PCS Port	For communicating with the energy storage system
31	Q6 Breaker	SEC3000C power supply switch for controlling SEC3000C power
32	Terminal Block	Terminal block
32.1	LOAD Load Control	(Reserved) 2-way DO ports for LOAD load control
32.2	RS485 Diesel Generator Controller Communication	(Reserved) RS485 port for communicating with the diesel generator
32.3	Diesel Generator Start/Stop Control Port	(Reserved) DO port for controlling diesel generator start/stop
32.4	Bypass DI Wire Connection Port	(Reserved) Bypass DI wire connection port

2.4.2 Product Dimensions



2.4.3 Indicator Light Instructions

Type I

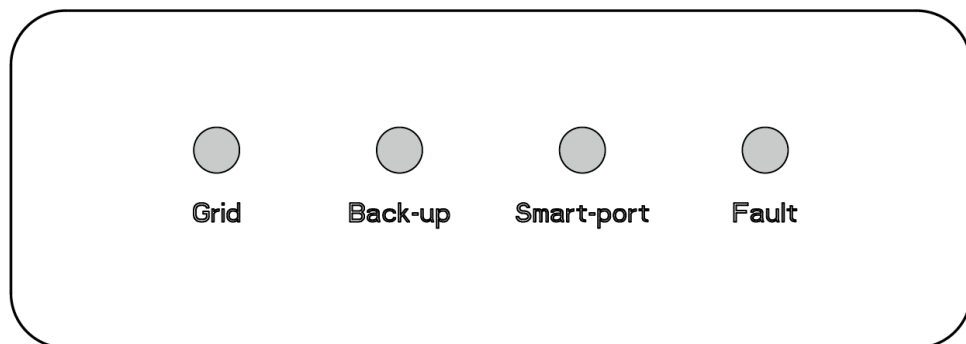


STS10DSC0011

Indicator	Status	Description
 Grid		Steady on: Grid voltage is normal and the Jinggui switch is closed.
		Flashing: Grid voltage is normal, but the Jinggui switch is not closed.
		Off: No grid voltage.
 Back-up		Steady on: Load circuit breaker is closed.
		Off: Load circuit breaker is open.
 Smart-port		Steady on: Smart-port voltage is normal and the Smart-port contactor is closed.
		Flashing: Smart-port voltage is normal, but the Smart-port contactor is open.
		Off: No voltage at the Smart-port.

Indicator	Status	Description
Fault Indicator		Red light on: An alarm or fault has occurred.
		Green light on: No faults or alarms.

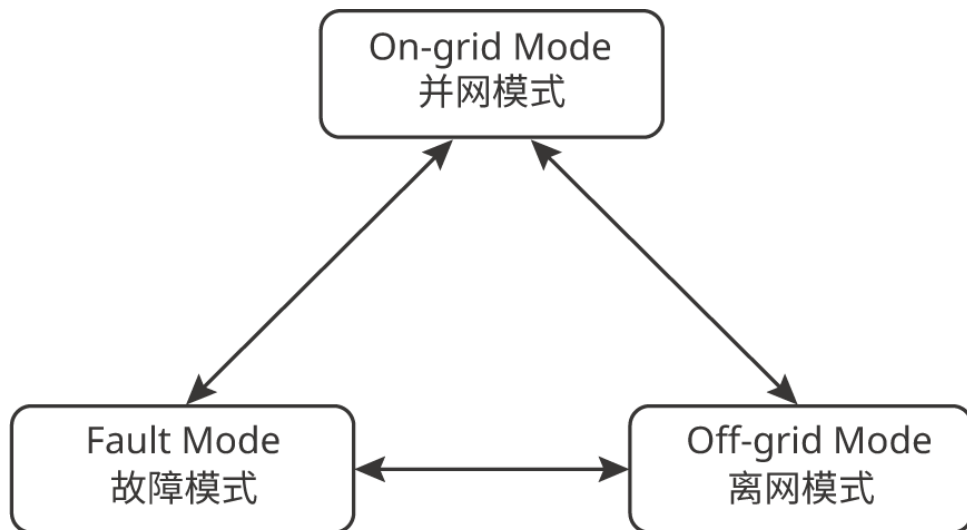
Type II



STS10DSC0016

Indicator	Status	Description
 Grid		Steady on: Grid voltage is normal and the grid-tie/islanding transfer switch is closed.
		Off: The grid-tie/islanding transfer switch is open.
 Back-up		Steady on: The load circuit breaker is closed.
		Off: The load circuit breaker is open.
 Smart-port		Steady on: Smart-port voltage is normal and the Smart-port contactor is closed.
		Off: No voltage at the Smart-port and the Smart-port contactor is open.
 Fault		Red light flashing with buzzer alarm: System fault occurred.
		Off: No fault.

2.5 Operating Mode



STS10DSC0012

No.	Mode	Description
1	on-grid	When the grid is normal, the STS transfer switch is closed, and the system is in the on-grid state.
2	off-grid	When the grid is powered off, the STS transfer switch is open, and the system is in the off-grid state.
3	fault	The fault indicator light is red, please handle it promptly.

3 Check and Storage

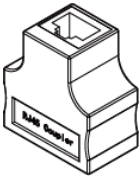
3.1 Check Before Receiving

Before receiving the product, please carefully check the following:

1. Check if the outer packaging is damaged, such as deformation, holes, cracks, or other signs that might cause damage to the equipment inside the packaging. If damaged, do not open the packaging and contact your dealer.
2. Check if the STS model is correct. If it does not match, do not open the packaging and contact your dealer.
3. Check if the type and quantity of the delivered items are correct, and if there is any damage to the appearance. If damaged, contact your dealer.

3.2 deliverables

Component	Description	Component	Description
	Grid-tie/Off-grid switching cabinet ×1		Expansion bolt ×4
 M8×25	M8 external hexagon combination bolt ×60	 M8×30	M8 external hexagon combination bolt ×60
	fireproofing mud ×50		PIN terminal ×12

Component	Description	Component	Description
	Terminal resistor ×1		Double-ended RJ45 connector ×4 Reserved for equipment maintenance
	User manual ×1		

3.3 Storage

If the device is not put into use immediately, please store it according to the following requirements:

1. Ensure that the outer packaging box is not removed, and the desiccant inside is not lost.
2. Ensure that the storage environment is clean, with appropriate temperature and humidity ranges, and no condensation.
3. Ensure that the stacking height and direction of the devices are arranged according to the instructions on the packaging box labels.
4. Ensure that there is no risk of tipping after the devices are stacked.
5. If the storage time of the device exceeds two years or the non-operational time after installation exceeds 6 months, it is recommended to have it inspected and tested by professionals before putting it into use.
6. To ensure the good electrical performance of the internal electronic components of the device, it is recommended to power it on every 6 months during storage. If it has not been powered on for more than 6 months, it is recommended to have it inspected and tested by professionals before putting it into use.

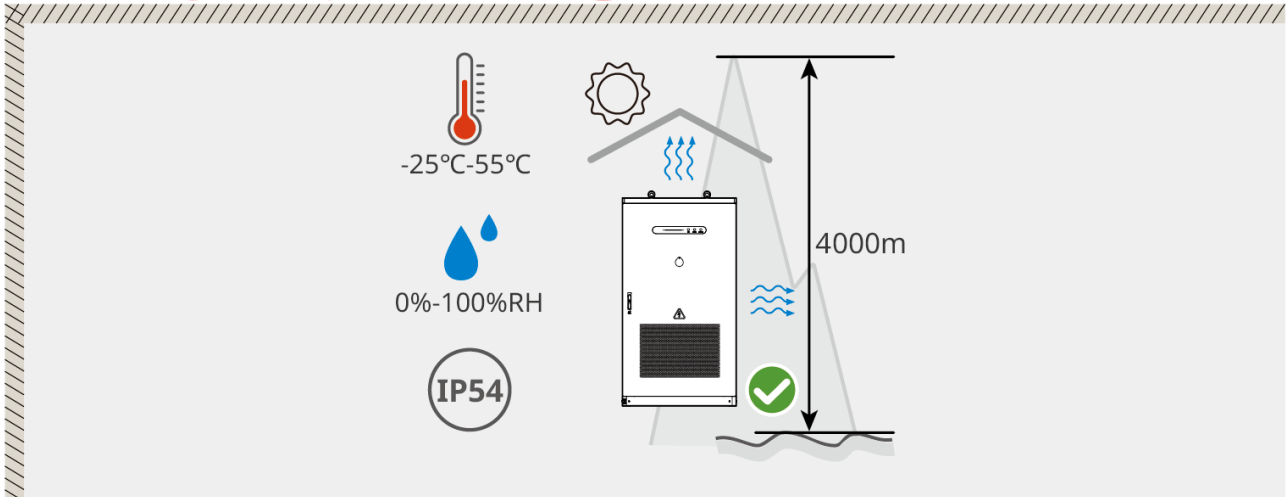
4 Installation

4.1 Installation Requirements

Installation Environment Requirements

1. The device must not be installed in flammable, explosive, corrosive, or similar environments.
2. The installation space must meet the device's ventilation, heat dissipation, and operational space requirements.
3. The device's protection rating must be suitable for outdoor installation, and the ambient temperature and humidity must be within the appropriate range.
4. Install the device away from direct sunlight, rain, snow accumulation, and similar conditions. It is recommended to install it in a sheltered location; a sunshade canopy can be erected if necessary.
5. The installation location must be out of reach of children and avoid easily accessible spots.
6. The device installation height should facilitate operation and maintenance, ensuring indicator lights and all labels are easily visible, and terminal blocks are easy to operate.
7. The device installation altitude must be below 4000m.
8. The device may corrode if installed in salt damage areas. Salt damage areas refer to regions within 500m of the coast or areas affected by sea breeze. Areas affected by sea breeze vary depending on weather conditions (e.g., typhoons, monsoon) or terrain (e.g., presence of embankments, hills).
9. If the device is installed in public areas other than work and living spaces (such as parking lots, stations, factory buildings, etc.), install a protective net around the device and erect safety warning signs to isolate it. Prevent unauthorized personnel from approaching to avoid personal injury or property damage caused by accidental contact by non-professionals or other reasons during device operation.
10. Keep away from strong magnetic field environments to avoid electromagnetic interference. If there are radio stations or wireless communication equipment operating below 30MHz near the installation site, install the device according to the following requirements:
 - Add a ferrite core with multiple windings at the device's AC line, or add a low-pass EMI filter.
 - Maintain a distance of over 30m between the device and the wireless

electromagnetic interference equipment.

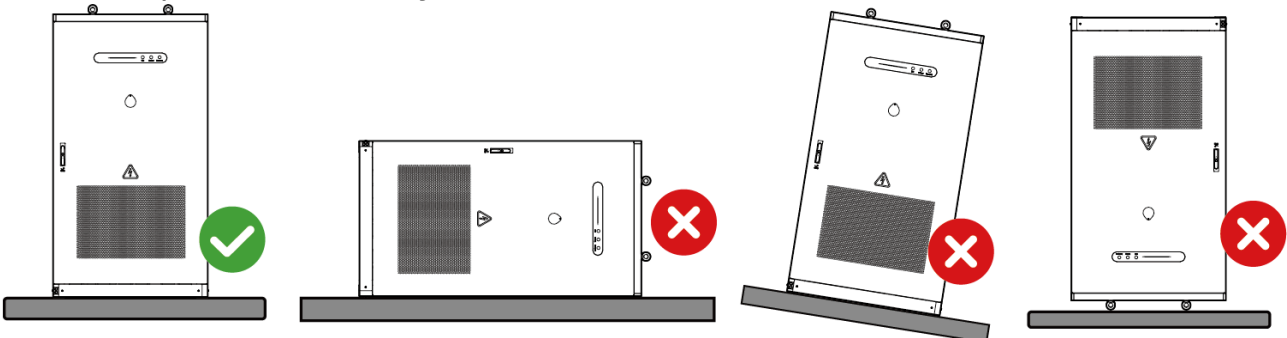


STS10INT0017

Installation Angle Requirements

The device must be installed vertically and stably on the foundation to ensure stability and proper heat dissipation.

Do not tilt, place on its side, or invert the device, as these may cause device damage, unstable operation, or safety hazards.

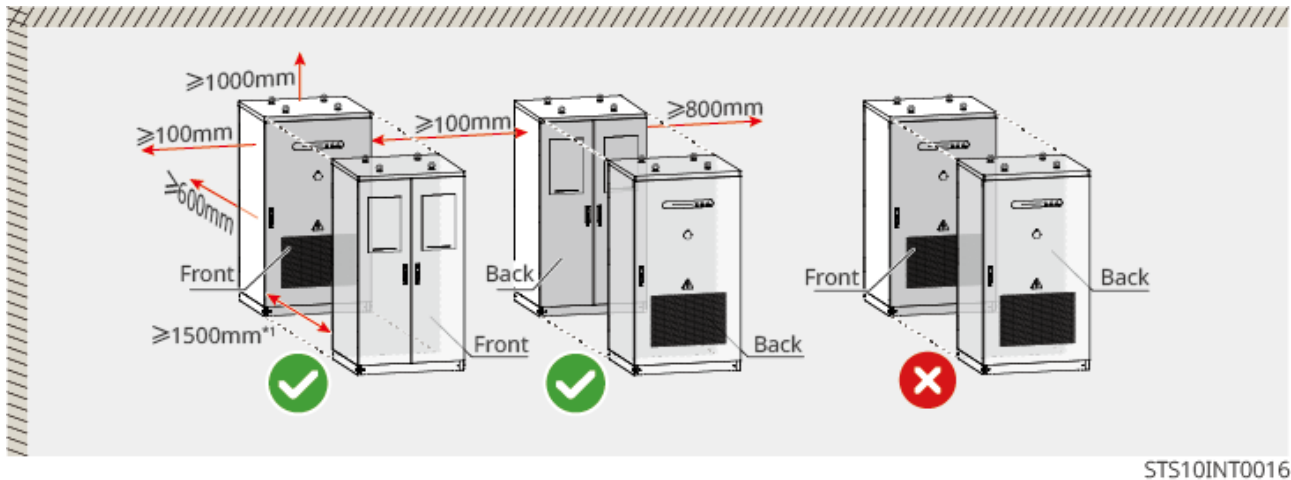


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Installation Space Requirements

NOTICE

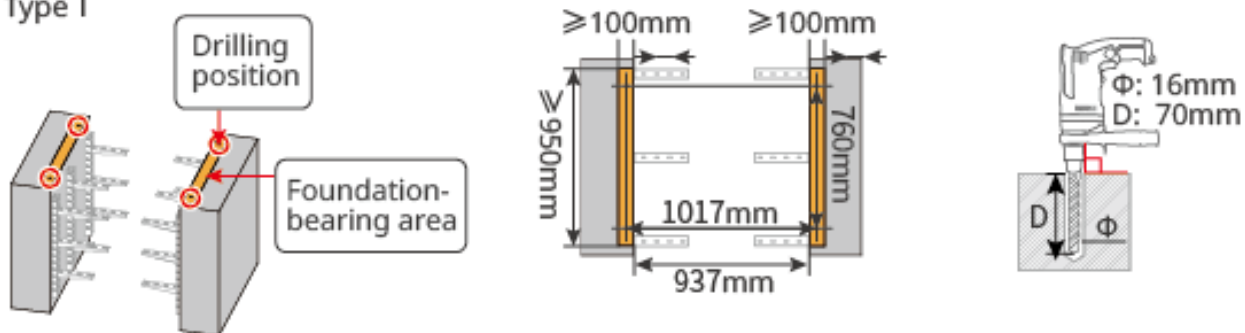
When using forklifts, the clearance in front of and behind the equipment must be greater than or equal to 2.5m.



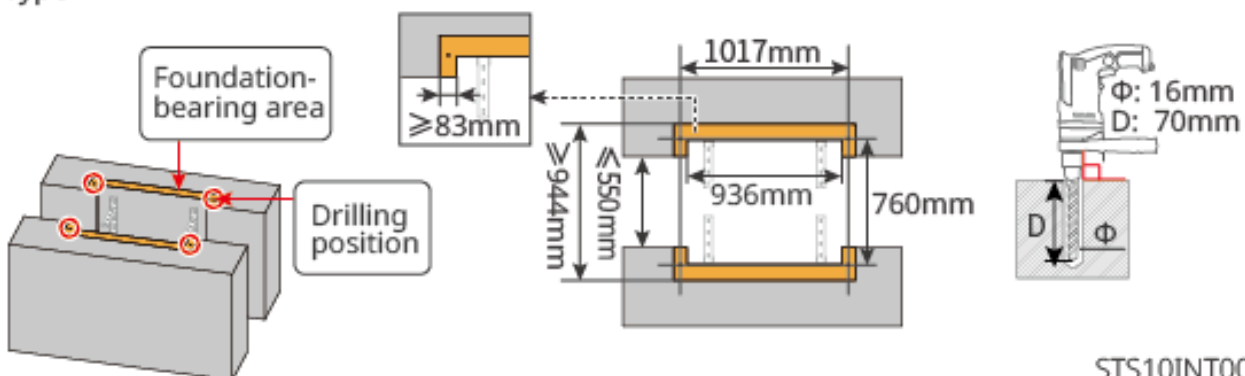
Installation Foundation Requirements

- The device installation foundation must be constructed using C35 concrete or other concrete with equivalent performance.
- Before installation, ensure the base is level, solid, flat, dry, and has sufficient load-bearing capacity. Avoid depressions or tilting.
- The base must have pre-embedded conduits or reserved cable outlet holes to facilitate device cabling.
- The device uses bottom cable entry. The foundation must have a dust and rodent prevention design to prevent foreign objects from entering.
- The foundation must have an anti-water accumulation and moisture-proof design to prevent cable aging and short circuits, which could affect normal device operation.
- Due to the thickness of the device cables, the pre-embedded conduit/reserved cable outlet must be designed with ample space for the cables to ensure smooth, unworn connections.

Type I



Type II



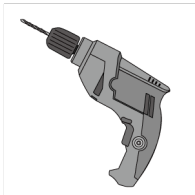
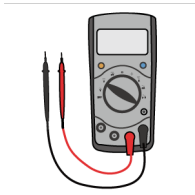
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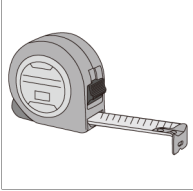
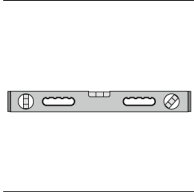
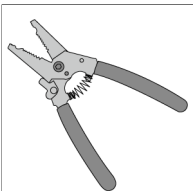
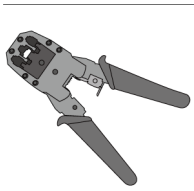
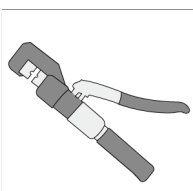
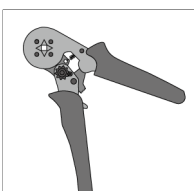
4.2 Tool Requirements

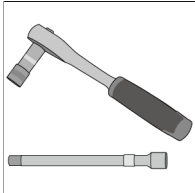
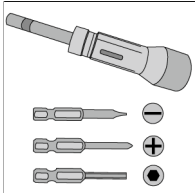
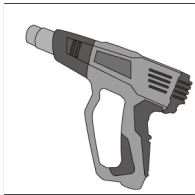
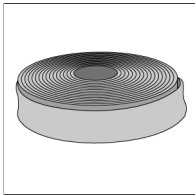
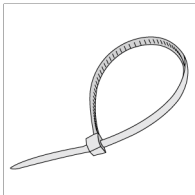
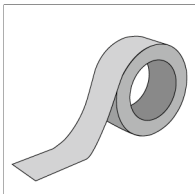
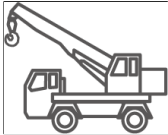
NOTICE

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

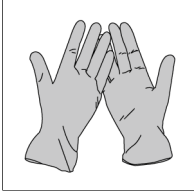
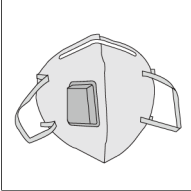
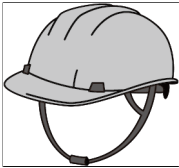
Installation Tools

Tool Type	Description	Tool Type	Description
	hammer drill (16mm bit)		multimeter

Tool Type	Description	Tool Type	Description
	Tape measure		Utility knife
	rubber hammer		Level
	Marker pen		diagonal plier
	wire stripper		RJ45 crimping tool
	hydraulic pliers		Tubular terminal crimping tool

Tool Type	Description	Tool Type	Description
	socket wrench		Torque screwdriver
	Heat gun		Heat shrink tubing
	Vacuum cleaner		cable tie
	open-end wrench		Insulation tape
	forklift		Crane

Personal Protective Equipment

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

4.3 Handling Requirements

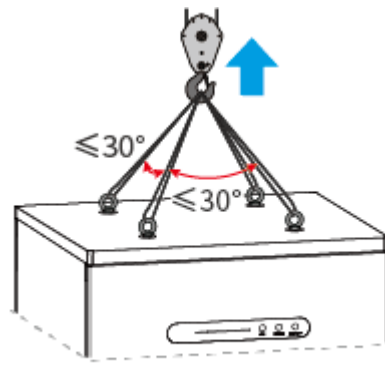
CAUTION

1. During operations such as transportation, turnover, and installation, the equipment must comply with the laws, regulations, and relevant standard requirements of the country or region where it is located.
2. To protect the equipment from damage during transportation, ensure that transport personnel are professionally trained. Record the operational steps during transportation and keep the equipment balanced to avoid falling.
3. Before installation, the energy storage system needs to be moved to the installation site. During the moving process, to avoid personal injury or equipment damage, please note the following:
 - Please allocate appropriate personnel and tools according to the equipment weight to prevent the equipment from exceeding the manual handling weight limit, which could cause injuries.
 - Please ensure that the equipment is kept balanced during moving to avoid falling.
 - During equipment moving, please ensure that the cabinet doors are securely locked.

NOTICE

- The equipment can be moved to the installation site by hoisting or forklift.
- When using hoisting to move the equipment, please use flexible slings or straps, with a single strap load-bearing capacity of $\geq 5t$.
- When using a forklift to move the equipment, the forklift's load-bearing capacity must be $\geq 5t$.
- The door panel surface sticker is a vulnerable area during installation and transportation; please handle with care.

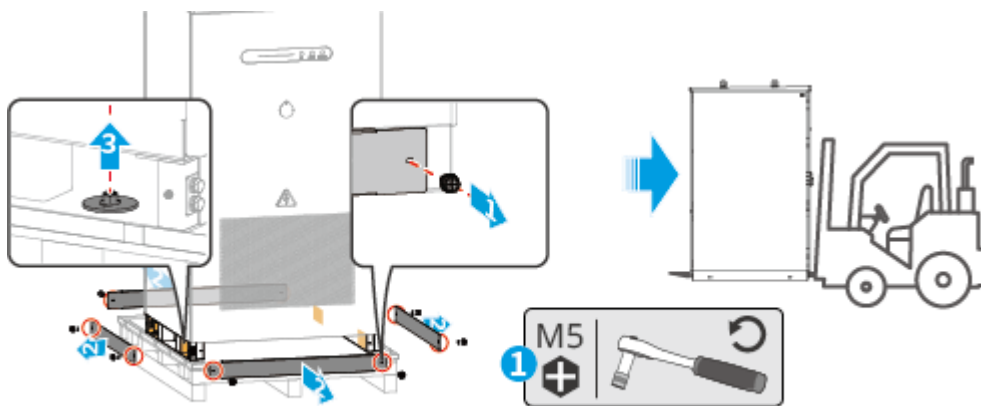
• Crane Handling



STS10INT0022

1. Use slings with hooks or U-hooks to perform lifting operations on the equipment.
2. Use lifting equipment to hoist and move the equipment.

• Forklift Handling



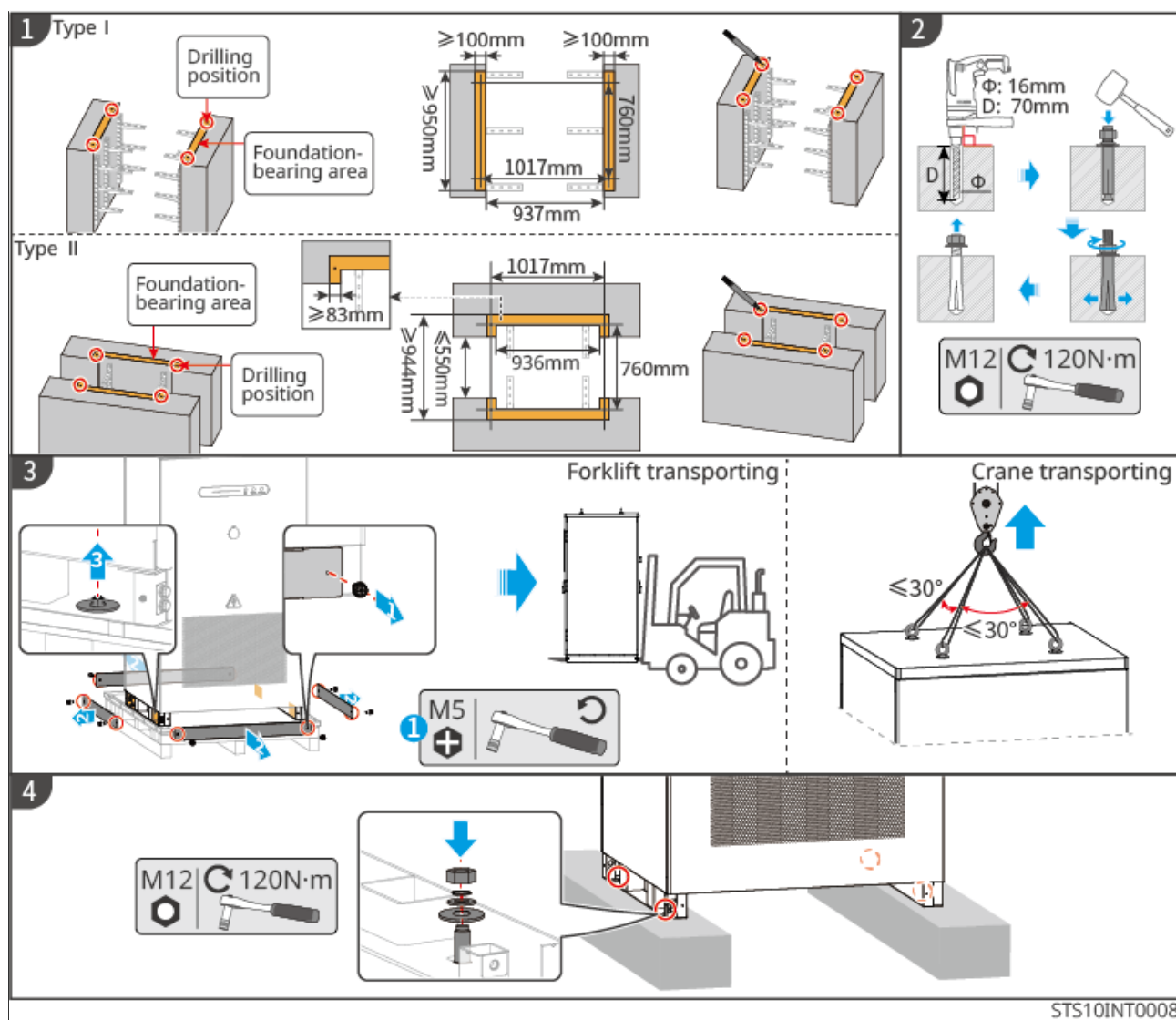
STS10INT0021

1. Remove the front and rear baffles of the equipment.
2. Use a forklift to move the equipment, ensuring the equipment's center of gravity is positioned at the center of the forklift forks.

4.4 Install and Off-Grid Switching Cabinet

1. Use a marker pen to mark the drilling positions on the foundation.
2. Use an impact drill to make holes in the ground and install expansion bolts.
3. Move the cabinet onto the foundation and remove the surrounding panels.

4. Secure the cabinet to the foundation.



5 Electrical Connection

DANGER

- All operations during electrical connection, as well as the specifications of cables and components used, must comply with local laws and regulations.
- Before connecting electrical cables, ensure all upstream switches of the equipment are disconnected.
- Before performing electrical connections, disconnect all switches of the equipment to ensure the equipment is powered off. Live operation is strictly prohibited, otherwise hazards such as electric shock may occur.
- Cables of the same type should be bundled together and routed separately from different types of cables. Intertwining or cross-routing is prohibited.
- If the cable is subjected to excessive tension, poor connections may result. When connecting, leave a certain length of slack in the cable before connecting it to the equipment's terminal port.
- When crimping terminals, ensure the conductor part of the cable makes full contact with the terminal. Do not crimp the cable insulation together with the terminal, as this may cause equipment malfunction, or after operation, lead to issues such as terminal block damage due to unreliable connections and overheating.
- Using cables in high-temperature environments may cause insulation aging and damage. Maintain a distance of at least 30mm between the cable and heat-generating components or the periphery of heat source areas.

NOTICE

- Before electrical connection, please wear personal protective equipment such as safety shoes, protective gloves, and insulating gloves as required.
- Only trained professionals are permitted to perform electrical connection and related operations.
- Please keep the cabinet door key properly.
- The cable colors shown in the graphics of this document are for reference only. The specific cable specifications must comply with local regulatory requirements.

5.1 Pre-Wiring Preparation

Preparing Cables

No.	Cable	Type	Recommended Specification	Note
1	PE cable	Hot-dip galvanized flat steel	Must comply with local AC electrical installation grounding design specifications	User-provided
2	power cable	Outdoor five-core copper/aluminum cable	For the power cables and terminal specifications suitable for each port, please refer to the 5.3.Connecting Power Cables(Page 42) section.	User-provided
3	DI signal cable	Copper-core outdoor twisted-pair cable meeting local standards	Conductor cross-sectional area: 0.32~0.5mm ²	User-provided
4	LAN communication cable	Standard shielded network cable, CAT 5E or above, with RJ45 connectors		User-provided

Note:

The cable specifications recommended in this table are for reference only. For actual cable selection, users need to comprehensively consider factors such as installation ambient temperature, laying method, number of parallel runs, voltage deviation, and thermal stability, and correct the current-carrying capacity using appropriate correction factors. The selected cable must meet the following requirement: Cable current-carrying capacity ≥ Rated current of the overcurrent protection device ≥ Maximum rated current.

Circuit Breaker Preparation

Recommended Overcurrent Protection Device for Smart-port External Connection	Recommended Specification	Acquisition Method
AC breaker	Rated Current: 1000A	Self-provided

UPS Preparation (Optional)

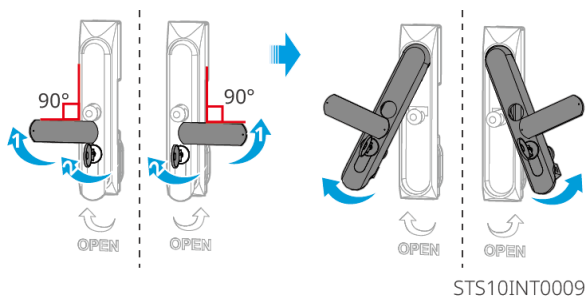
Brand		Schneider
model		SPM1K
Input/Output	Nominal Input Voltage	220 V
	Input Voltage Range	110~300 VAC
	Input Current Protection	10 A Protection
	Output Voltage	220 V (Default)/230 V/240 V
	Maximum Output Power	800 W
	Output Efficiency	88%
	Output Terminals	National Standard Socket*3
Battery	Battery Capacity	9 Ah*2
	Battery Voltage	24 V
	Charging Time	4 hours to charge to 90%
Other	Operating Temperature	0~+40°C
	Storage Temperature	-15~+60°C

	Altitude	1 km (Output capacity decreases by 1% for every 100 m increase)
	Dimensions	145*288*223 mm
	Net Weight	9.3 kg

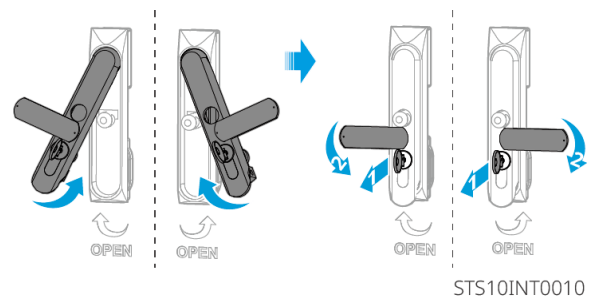
Cabinet Door and Cover Plate Operations

• Cabinet Door

Open the cabinet door

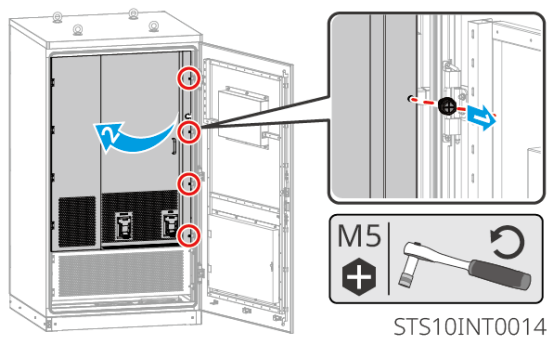


Close the cabinet door

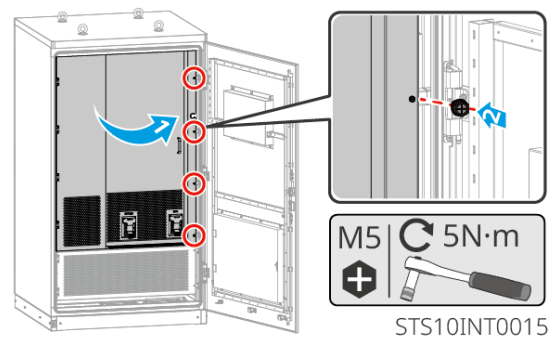


• Top Cover Plate

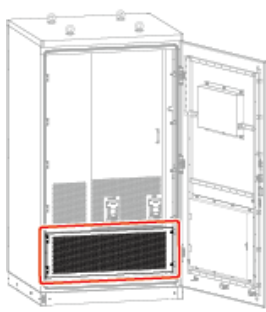
Open the upper cover plate



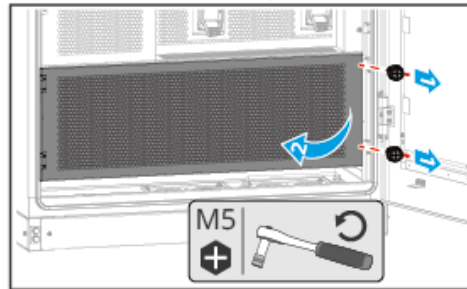
Close the upper cover plate



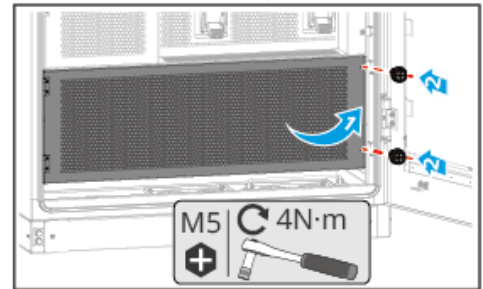
• Bottom Cover Plate



Open the lower cover plate

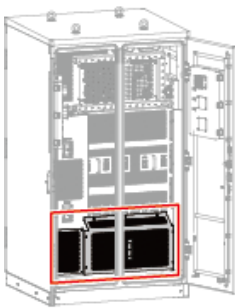


Close the lower cover plate

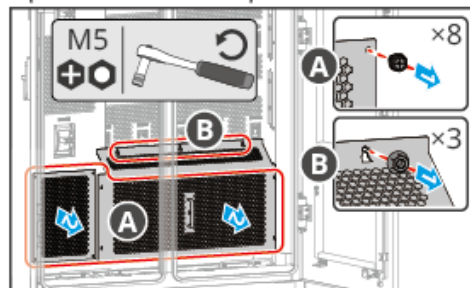


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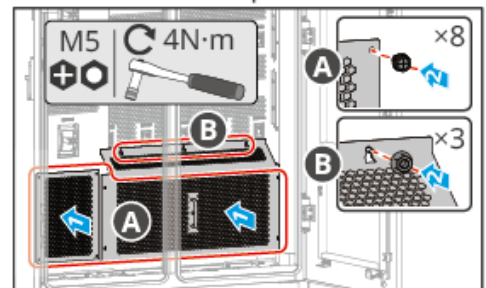
• Rear Cover Plate



Open the rear cover plate

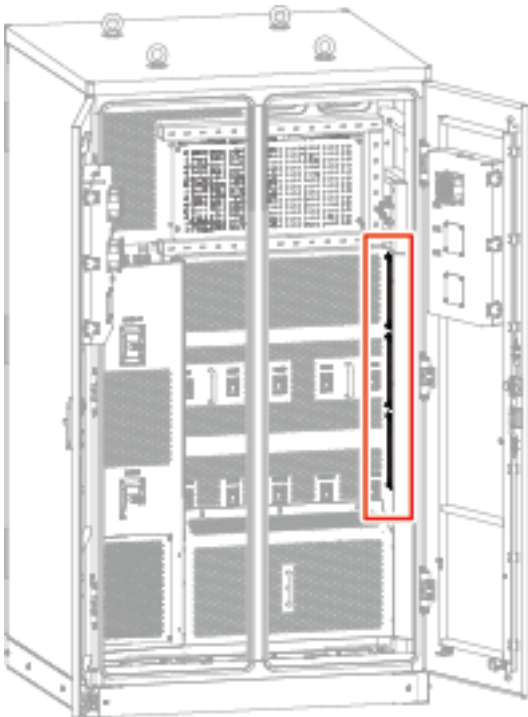


Close the rear cover plate

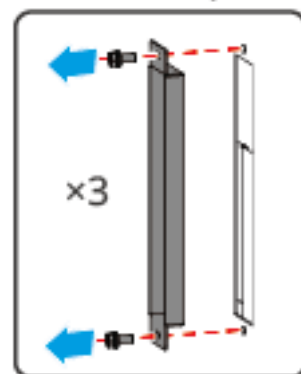


STS10INT0023

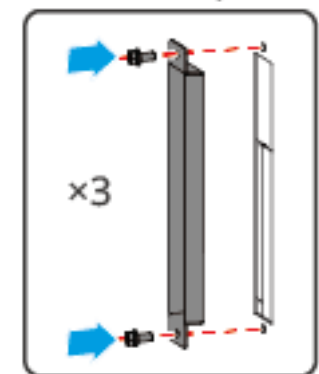
• Side Cover Plate



Remove the side cover plate

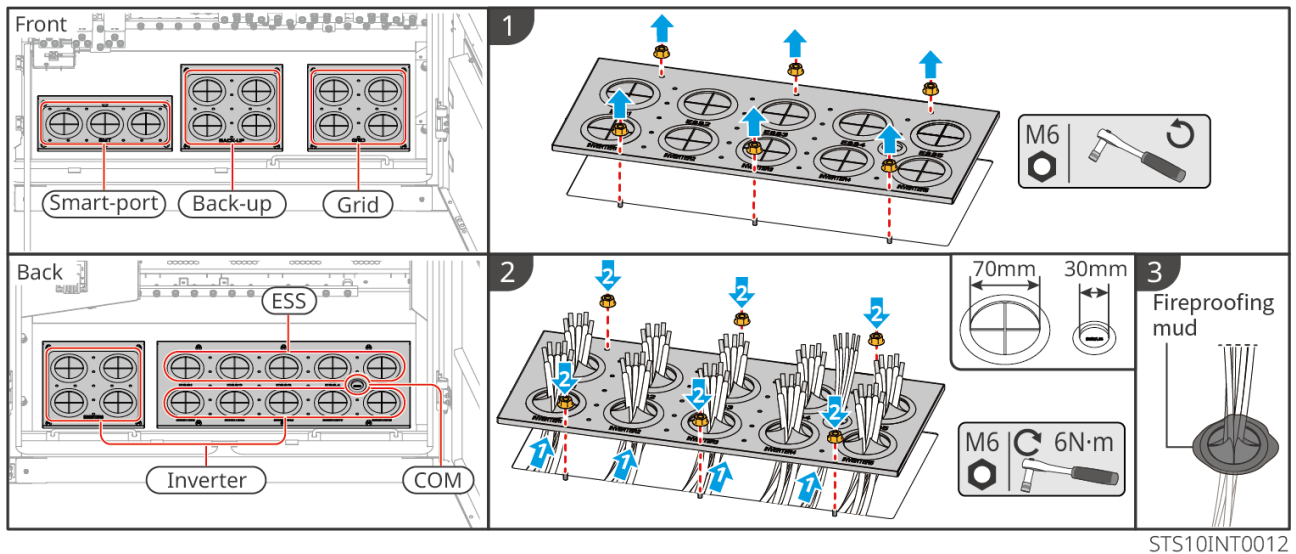


Install the side cover plate



STS10INT0013

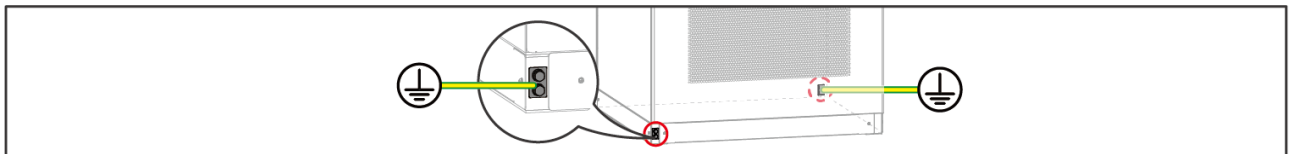
Wiring Port and Wire Protection Plate Operations



5.2 Connecting the PE cable

WARNING

- Before operating the device, ensure the system is reliably grounded and appropriate protective measures are taken, otherwise there is a risk of electric shock.
- To improve the corrosion resistance of the terminal, it is recommended to apply silicone sealant or paint over the external part of the grounding terminal for protection after the ground wire connection is completed.



STS10ELC0013

5.3 Connecting Power Cables

Smart-port & Back-up & Grid & ESS & Inverter

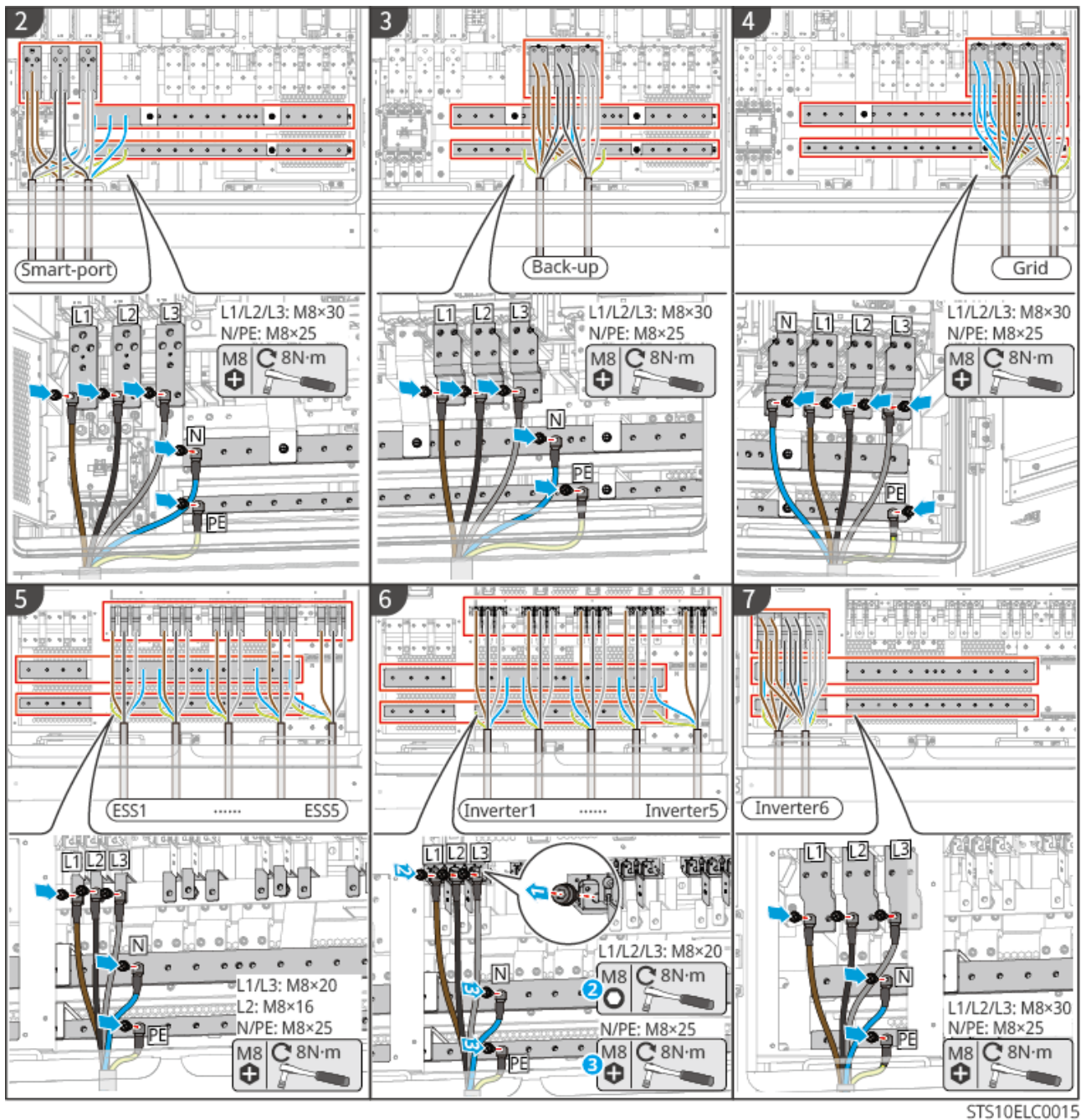
NOTICE

- The STS terminal block is a copper bar. If using aluminum wire, please prepare copper-aluminum transition terminals yourself.
- The Back-up, Grid, and Inverter (centralized) ports can use 95mm² or 120mm² copper core cables. If using 95mm² copper wire, 4 strands need to be connected; if using 120mm² copper wire, only 3 strands need to be connected.

1. Prepare the cables and terminals, and perform crimping.
2. Loosen the screws on the copper busbar, and secure the crimped cable to the busbar using the screws.

端口 Port	线缆材质 Cable Material	线缆类型 Cable Type	A (mm)	B (mm)	D (mm)	E (mm)	I (mm)	S (mm ²)	
Grid Back-up Inverter1-5	Cu	L1/L2/L3	8.5-10	17-19	13.7-15	57-63	$\Phi: \leq 70$	95-120	
		N		12.5-14.5	9.8-11.5	42.5-50		50-70	
		PE							
	Al	L1/L2/L3	12.5	23	15.2	120	$\Phi: \leq 70$	120	
		N						70	
		PE							
Smart-port	Cu	L1/L2/L3	10	19	15	63	$\Phi: \leq 70$	120	
		N							
		PE							
Inverter6 ESS	Cu	L1/L2/L3	8.5-10	14.5	11.5	48.5-50	$\Phi: \leq 70$	70	
		N		10.8	8.5	37-38		35	
		PE							
	Al	L1/L2/L3	12.5	21	13.5	109	$\Phi: \leq 70$	95	
		N						50	
		PE							

STS10ELC0014

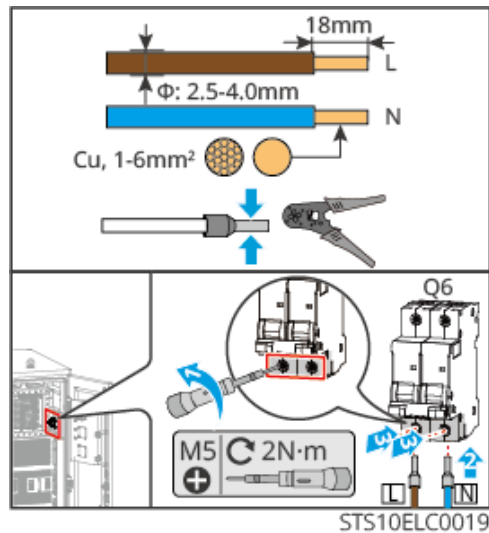


Q6 (Connect the SEC3000C Power Cable)

NOTICE

It is recommended to equip a UPS between the Q6 power supply port and the SEC3000C to ensure the stable operation of the SEC3000C. For the recommended UPS model, please refer to [5.1.Preparations Before Wiring\(Page 37\)](#).

1. Prepare the single-phase AC cable and terminals. For specific requirements, please refer to the [SEC3000C User Manual](#).
2. Crimp the terminals.
3. Loosen the screws at the bottom of the Q6 circuit breaker, insert the terminals, and then tighten the screws.

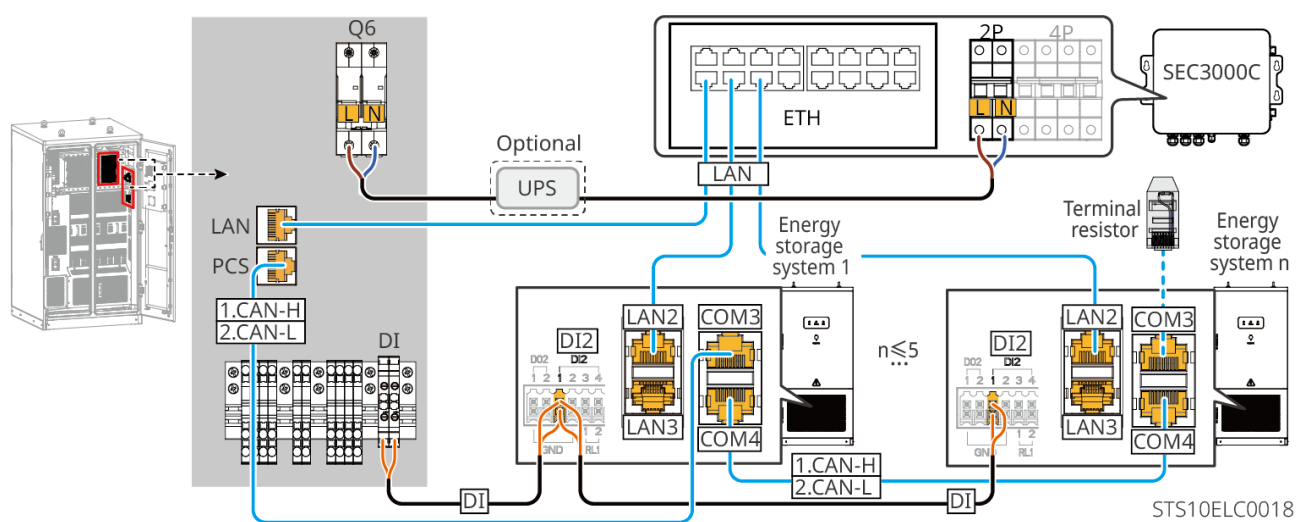


5.4 Connecting the Communication Cable

NOTICE

- Before connecting the communication cables, please open the side cover plate first.
- The length of the communication cable between the STS and the energy storage system closest to it should not exceed 45 m. The length of the communication cable between two adjacent energy storage systems should not exceed 5 m.
- When multiple energy storage systems are connected in parallel, please insert the terminal resistor into the COM port of the last energy storage system.
- When multiple energy storage systems are connected in parallel, if one system fails and requires a complete power-down, unplug the network cables connected to its COM3 and COM4 ports, and use a double-ended RJ45 connector to short-circuit these two cables. If the last energy storage system fails, unplug the network cable from its COM port and the network cable from the previous system's COM port, then remove the terminal resistor from the faulty system and insert it into the COM port of the previous system.
- It is recommended to install a UPS between the STS and the SEC3000C. After installing the UPS, the system can achieve remote black-start; without the UPS, remote black-start cannot be achieved.

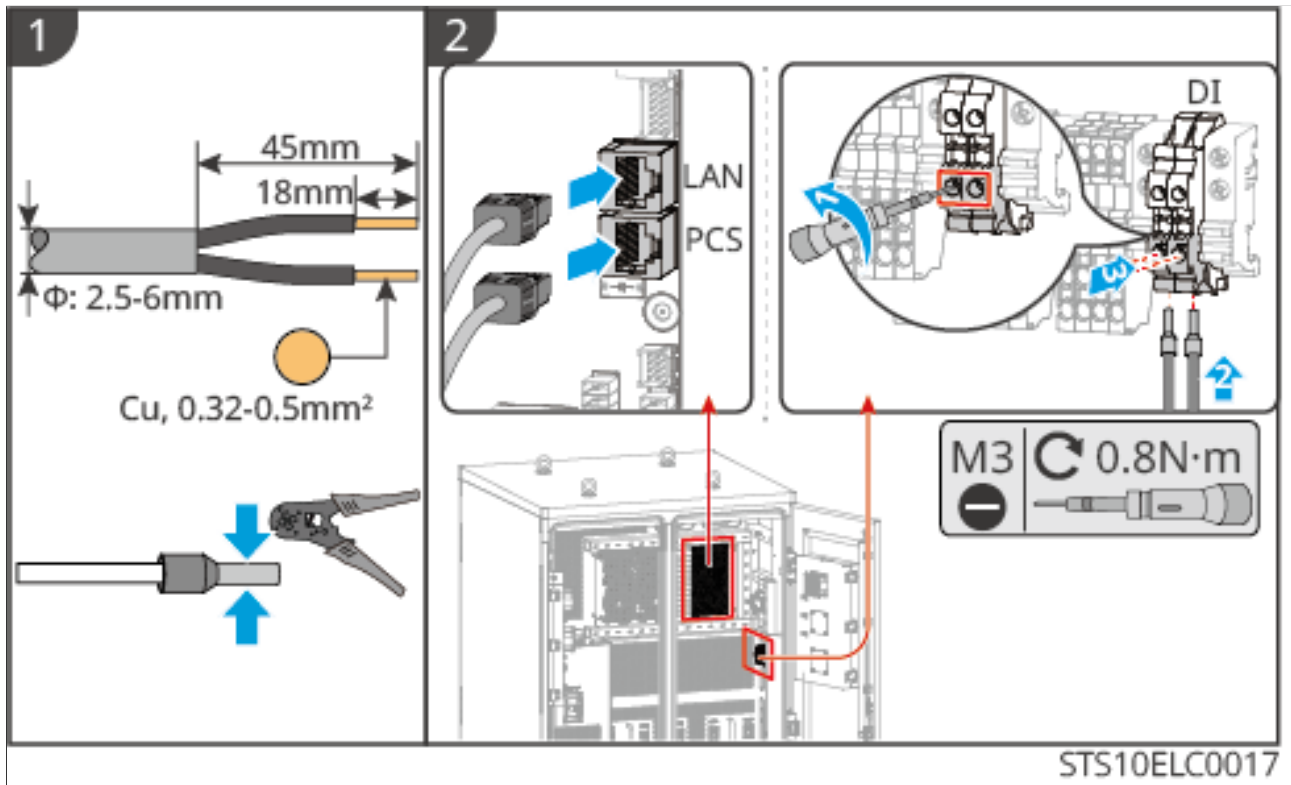
Wiring Overview



Procedure

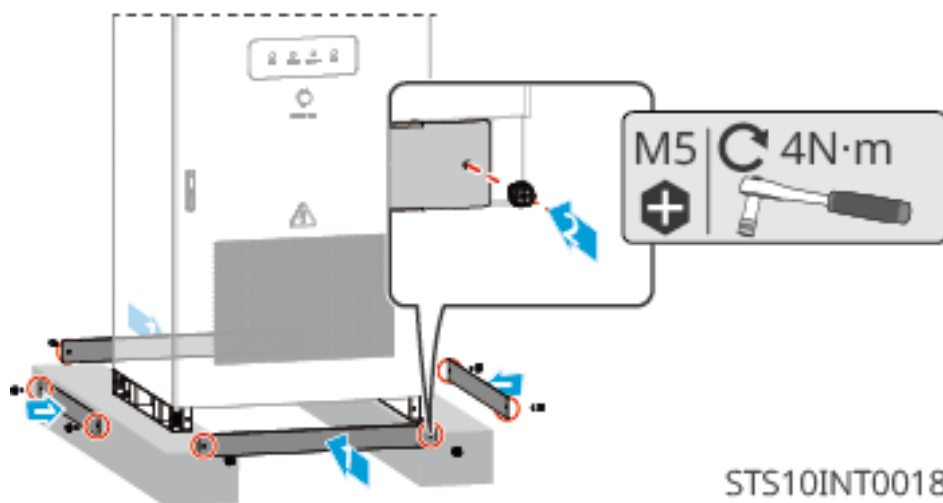
1. Prepare the communication cable and crimp the terminals.

2. Route the communication cable through the bottom COM port and insert it into the corresponding communication port.

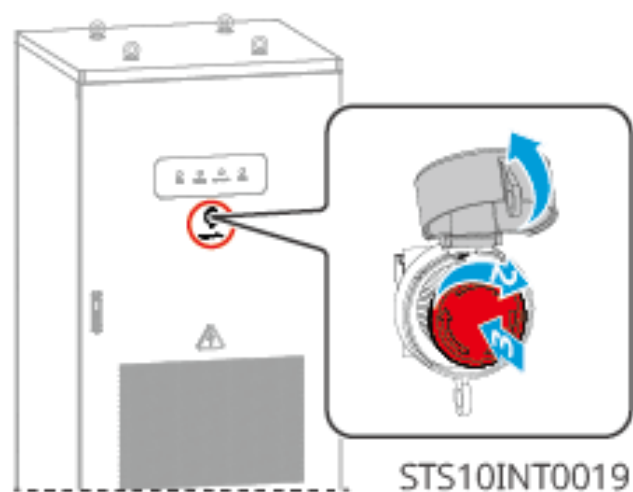


5.5 Post-Wiring Operations

1. Install the baffle.



2. Release the emergency stop switch.



6 Equipment Trial Run

6.1 Pre-power-on Inspection

No.	Inspection Item
1	The equipment is installed securely, the installation location facilitates operation and maintenance, the installation space allows for ventilation and heat dissipation, and the installation environment is clean and tidy.
2	PE cable, power cable, and communication cable are connected correctly and securely.
3	Cable bundling meets wiring requirements, distribution is reasonable, and there is no damage.
4	For unused cable holes and ports, please ensure to use the terminals provided with the accessories for reliable connection, and they have been sealed.
5	Ensure that the used cable holes have been sealed.
6	The voltage and frequency at the equipment's grid connection point comply with grid connection requirements.

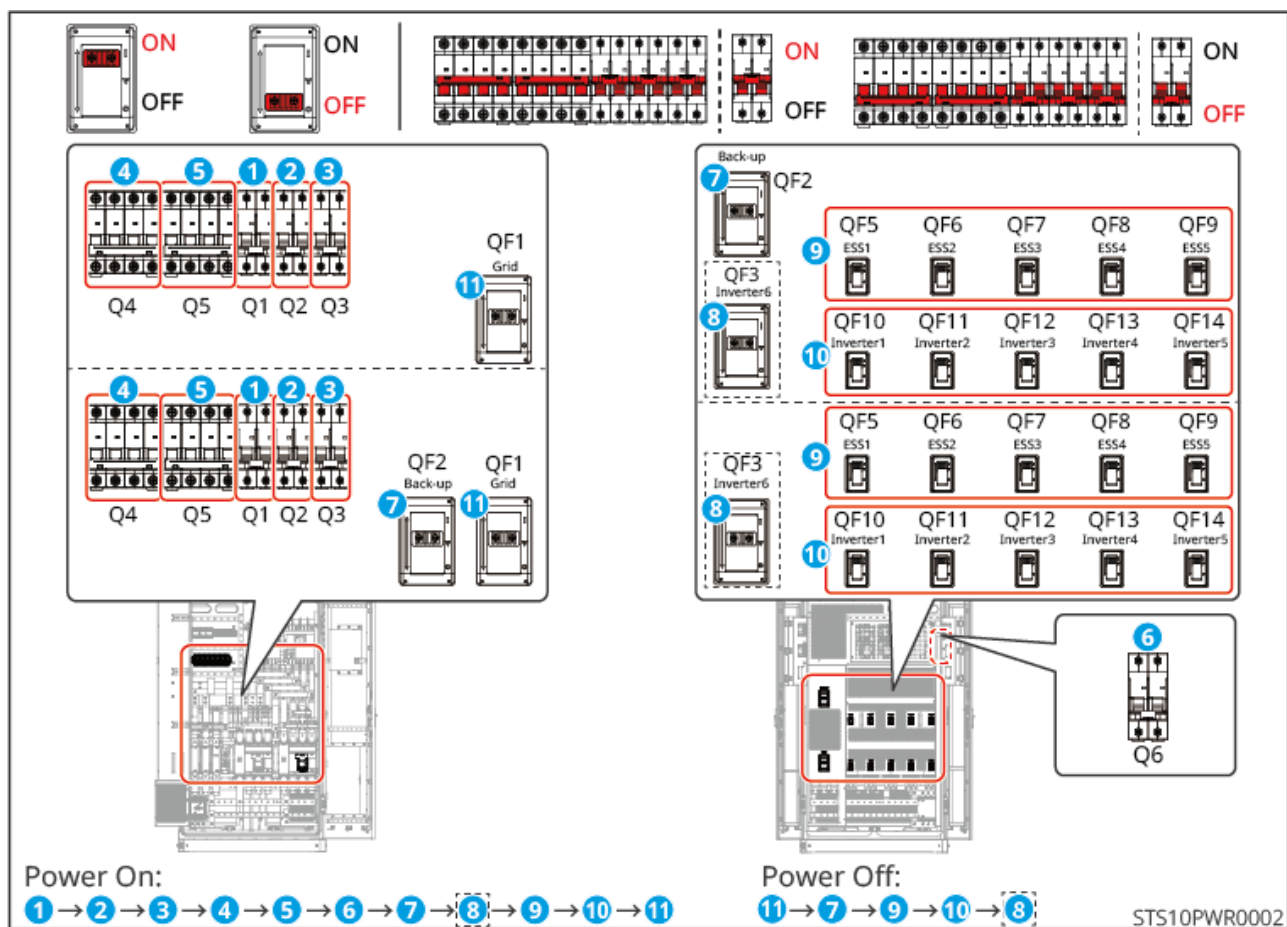
6.2 Device Power On

NOTICE

Before powering on, please open the upper cover plate.

1. Close the Q1 switch (GRID single-phase power circuit breaker).
2. Close the Q2 switch (BUS single-phase power circuit breaker).
3. Close the Q3 switch (Smart-port single-phase power circuit breaker).
4. Close the Q4 switch (Grid-tie SPD circuit breaker).
5. Close the Q5 switch (Off-grid SPD circuit breaker).

6. Close the Q6 switch (SEC3000C power supply switch).
7. Close the QF2 switch (Load switch).
8. (Optional) Close the QF3 switch (Centralized switch after PV inverter combiner).
9. Close the QF5~QF9 switches (Energy storage system switches).
10. Close the QF10~QF14 switches (PV inverter switches).
11. Close the QF1 switch (Main incoming line switch).



8 Power Plant Monitoring via SEMS+

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

- Manage organizational or user information, etc.
- Add and monitor power plant information, etc.
- Maintain devices.

For detailed functions, please refer to the "[SEMS+ User Manual](#)".

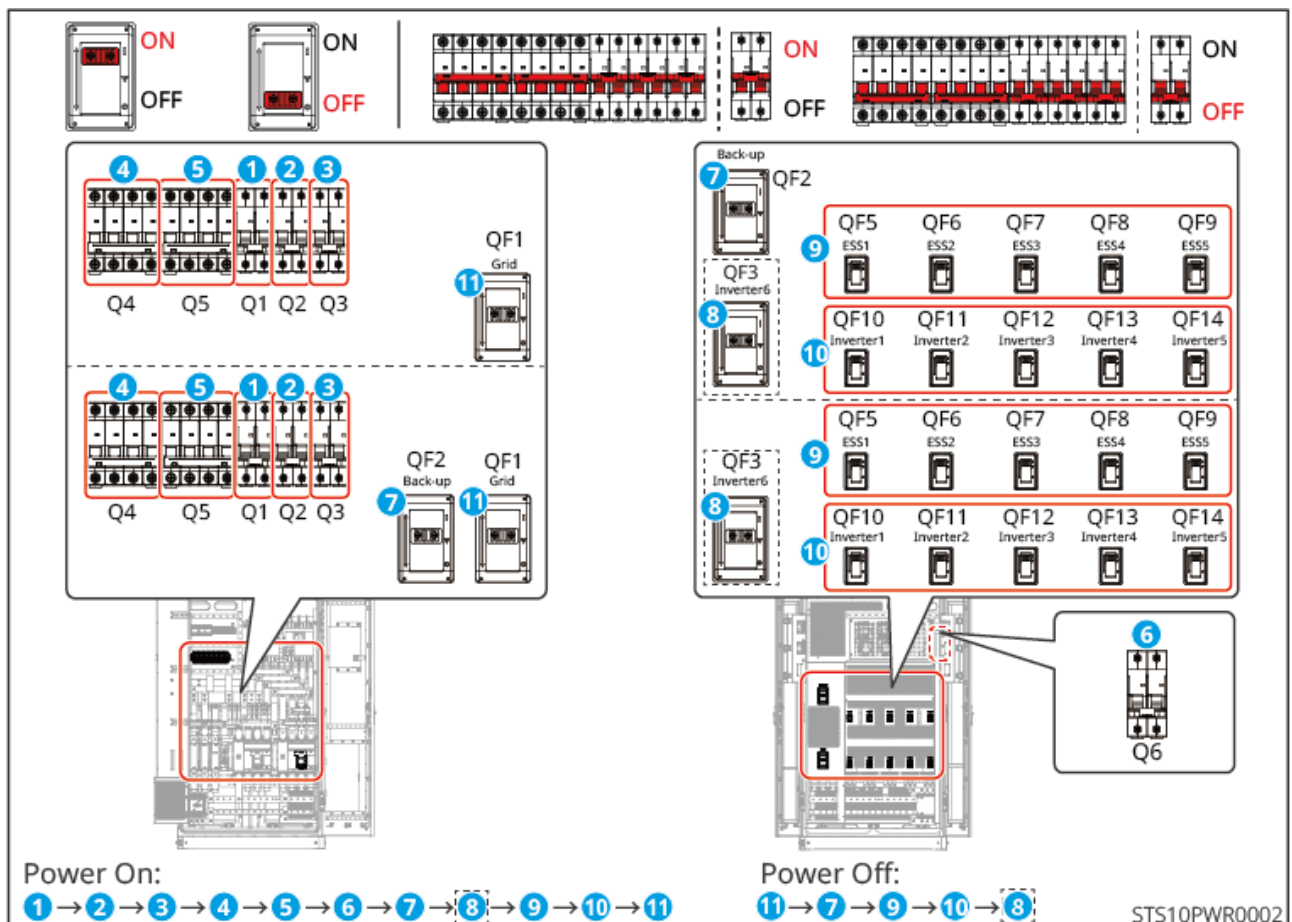
9 Maintenance

9.1 Device Power-off

NOTICE

After power-down is complete, please close the upper cover.

1. Turn off the QF1 switch (main incoming line switch).
2. Turn off the QF2 switch (load switch).
3. Turn off the QF5~QF9 switches (energy storage system switches).
4. Turn off the QF10~QF14 switches (PV inverter switches).
5. Turn off the QF3 switch (centralized switch after PV inverter confluence).



9.2 Troubleshooting

Please follow the methods below for troubleshooting. If the troubleshooting methods cannot help you, please contact the after-sales service center. When contacting the after-sales service center, please collect the following information to facilitate a quick resolution.

1. Device information, such as: serial number, software version, device installation time, fault occurrence time, fault occurrence frequency, etc.
2. Device installation environment, such as: weather conditions, installation location, etc. It is recommended to provide photos, videos, and other files to assist in problem analysis.
3. Power grid condition.

Fault Type	Fault Prompt	Troubleshooting
MC Control Board Fault	NTC Abnormal (Ambient Temperature)	Please contact the dealer/GoodWe After-sales Service Center
	Internal Fan Abnormal	Please contact the dealer/GoodWe After-sales Service Center
	DSP Communication Failure	1. After powering down, check if the PCS communication RJ45 port on the MC control board and the COM port RJ45 of the 261 integrated cabinet LC are connected or if there is any abnormality. 2. If the fault persists after eliminating abnormalities and powering up again, please contact the dealer/GoodWe After-sales Service Center.

Fault Type	Fault Prompt	Troubleshooting
	Contactor Communication Failure	1. After powering down, check if the CN20 control port on the MC control board and the Phoenix terminal of the Jinggui switch are connected or if there is any abnormality. 2. If the fault persists after eliminating abnormalities and powering up again, please contact the dealer/GoodWe After-sales Service Center.
	DG Communication Failure	1. After powering down, check if the RS485 port of the DG terminal block inside the cabinet and the communication terminal on the DG side are connected or if there is any abnormality. 2. If the fault persists after eliminating abnormalities and powering up again, please contact the dealer/GoodWe After-sales Service Center.
EPO	Fault Inside Cabinet	1. If the EPO button was pressed due to human error, rotate the EPO button to reset after confirming the STS is completely powered down and safe. 2. If the EPO was pressed urgently due to danger, please contact the dealer/GoodWe After-sales Service Center.
Contactor Failure 1	Latching Contactor False Trip Warning	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	Latching Contactor False Close Warning	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.

Fault Type	Fault Prompt	Troubleshooting
	Main Latching Contactor Close Failure	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	Main Latching Contactor Trip Failure	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	Relay Abnormal Open in Closed State	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	Relay Abnormal Close in Open State	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	Relay Close Failure	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	Relay Trip Failure	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	Phase A Current Trip Timeout	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.

Fault Type	Fault Prompt	Troubleshooting
	Phase B Current Trip Timeout	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	Phase C Current Trip Timeout	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	Input Three- Phase Power Loss	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	24V Power Supply Undervoltage	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	Latching Contactor Drive Undervoltage	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	Dual-Machine Mode Setting Error	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	Internal 485 Communicatio n Loss	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.

Fault Type	Fault Prompt	Troubleshooting
Contactor Failure 2	Parallel Slave Action Failure	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	N Phase Wiring Error	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	ABC Phase Sequence Error	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	Phase Loss Error	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	MCU Overtemperature Error	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	One Open One Close in Parallel Mode	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	Both Machines Closed in Interlock Mode	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.

Fault Type	Fault Prompt	Troubleshooting
	Control Contacts Triggered Simultaneously	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
	Excessively High Trip/Close Frequency	Power down the entire system, wait for 5 minutes, then power up again. If the fault persists, please contact the dealer/GoodWe After-sales Service Center.
Overload Protection 1	Overload Protection (GRID)	1. Power down the entire system, wait for 5 minutes, then power up again. If the fault disappears, it's fine. 2. If it occurs twice or more within one month, please contact the dealer/GoodWe After-sales Service Center.
Overload Protection 2	Overload Protection (Smart-port)	1. Power down the entire system, wait for 5 minutes, then power up again. If the fault disappears, it's fine. 2. If it occurs twice or more within one month, please contact the dealer/GoodWe After-sales Service Center.
Surge Protection Fault 1	Grid Side SPD1 Activated	Check if the surge protector SPD1 has activated. Please contact the dealer/GoodWe After-sales Service Center and report the activation status.
Surge Protection Fault 2	Off-grid Side SPD2 Activated	Check if the surge protector SPD1 has activated. Please contact the dealer/GoodWe After-sales Service Center and report the activation status.

9.3 Routine Maintenance

DANGER

Before maintenance, ensure the STS is completely powered off. Operating on live equipment may cause device damage or electric shock hazard.

Maintenance Item	Maintenance Method	Maintenance Cycle
System Cleaning	• Check if there is any foreign matter or dust on the heat sink and the air inlet/outlet vents. • Check if the fans and dust filters are clean and free of dust accumulation.	Once every six months
Fan	Check if the fan is operating normally, if there is any abnormal noise, and if its appearance is normal.	Once per year
Electrical Connections	Check if electrical connections are loose, if the cable appearance is damaged, and if there is any exposed copper.	Once every six months to once per year
Sealing	Check if the sealing of the equipment cable entry holes meets requirements. If gaps are too large or unsealed, reseal them.	Once per year

9.4 Removing the Equipment

CAUTION

- Before removing the STS, ensure the device is completely powered off.
- Wear personal protective equipment during operation.

1. Open the cabinet door.
2. Disconnect all electrical connections of the STS, including: power cable, Communication cable, and protective earth cable.

3. Unscrew the fixing screws on the STS base.
4. Use a hoist or forklift to move and remove the STS from the base.
5. Store the equipment properly. If it will be put into use again later, ensure the storage conditions meet the requirements.

9.5 Disposing of the Equipment

When the equipment can no longer be used and needs to be disposed of, please dispose of the equipment according to the electrical waste disposal requirements of the country/region where the equipment is located. Do not dispose of the equipment as general household waste.

10 Technical Data

Technical Data	GW250K-STC-PCS-G10	GW500K-STC-PCS-G10
Grid side		
Nominal Voltage (V)	220/380, 230/400, 240/415, 3L/N/PE	
Voltage Range (V)	340~440	340~440
Nominal Frequency (Hz)	50/60	50/60
Frequency Range (Hz)	47.5~52.5/57.5~62.5	47.5~52.5 /57.5~62.5
Rated. Current (A)	478.6	957.2
Max. Current (A)	550@10s	1000@10s
Rated Power (kW)	250	500
Max. Apparent Power (kVA)	315	630
Rated Conditional Short-circuit Current (kA)	20	20
Back-up side		
Nominal Voltage (V)	220/380, 230/400, 240/415, 3L/N/PE	
Voltage Range (V)	340~440	340~440
Nominal Frequency (Hz)	50/60	50/60
Frequency Range (Hz)	47.5~52.5/57.5~62.5	47.5~52.5 /57.5~62.5
Rated. Current (A)	417.8	835.6
Max. Current (A)	550@10s	1000@10s

Technical Data	GW250K-STC-PCS-G10	GW500K-STC-PCS-G10
Rated Power (kW)	250	500
Max. Apparent Power (kVA)	275	550
Rated Conditional Short-circuit Current (kA)	20	20
ESS side		
Nominal Voltage (V)	220/380, 230/400, 240/415, 3L/N/PE	
Voltage Range (V)	340~440	340~440
Nominal Frequency (Hz)	50/60	50/60
Frequency Range (Hz)	47.5~52.5/57.5~62.5	47.5~52.5 /57.5~62.5
Rated. Current (A)	417.8	835.6
Max. Current (A)	550@10s	1000@10s
Rated Power (kW)	250	500
Max. Apparent Power (kVA)	275	550
Rated Conditional Short-circuit Current (kA)	20	20
Smart Port side		
Nominal Voltage (V)	220/380, 230/400, 240/415, 3L/N/PE	
Voltage Range (V)	340~440	340~440
Nominal Frequency (Hz)	50/60	50/60

Technical Data	GW250K-ST5-PCS-G10	GW500K-ST5-PCS-G10
Frequency Range (Hz)	47.5~52.5/57.5~62.5	47.5~52.5 /57.5~62.5
Rated. Current (A)	417.8	835.6
Max. Current (A)	550@10s	1000@10s
Rated Power (kW)	250	500
Max. Apparent Power (kVA)	275	550
Rated Conditional Short-circuit Current (kA)	20	20
Inverter side		
Nominal Voltage (V)	220/380, 230/400, 240/415, 3L/N/PE	
Voltage Range (V)	340~440	340~440
Nominal Frequency (Hz)	50/60	50/60
Frequency Range (Hz)	47.5~52.5/57.5~62.5	47.5~52.5 /57.5~62.5
Rated. Current (A)	835.6	1519.4
Max. Current (A)	1100@10s	1800@10s
Rated Power (kW)	500	1000 (Centralized Access 500+Independent Access 500)
Max. Apparent Power (kVA)	550	1000 (Centralized Access 500+Independent Access 500)

Technical Data	GW250K-STC-PCS-G10	GW500K-STC-PCS-G10
Rated Conditional Short-circuit Current (kA)	20	20
General Data		
On/Off Grid Transfer Time (ms)	<20	<20
Operating Temperature Range (°C)	-25~+55	-25~+55
Storage Temperature (°C)	-40~+70	-40~+70
Relative Humidity	0~100%	0~100%
Pollution Degree	III	III
Max. Operating Altitude (m)	4000	4000
Cooling Method	Smart Fan Cooling	Smart Fan Cooling
Communication	LAN、CAN	LAN, CAN
Weight (kg)	450	750
Dimension (W×H×D mm)	850×1600×800	1100×2010×1000
Mounting Method	Grounded	Grounded
Noise Emission (dB)	<60	<60
Ingress Protection Rating	IP54	IP54
Overvoltage Category	III	III
Protective Class	I	I

Technical Data	GW250K-ST5-PCS-G10	GW500K-ST5-PCS-G10
Certification		
Safety Regulation	IEC 61439-1、IEC 61439-2 EN 61439-1、EN 61439-1 IEC 60730	IEC 61439-1、IEC 61439-2 EN 61439-1、EN 61439-1 IEC 60730

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