AC Switching Cabinet

X3-PCAB-750kW-A
X3-PCAB-750kW-B

User Manual

Version 1.0

www.solaxpower.com

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About This Manual

Scope of Validity

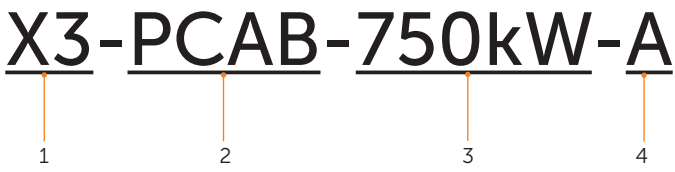
This manual is an integral part of the AC Switching Cabinet Series (Hereinafter referred to as switching cabinet or more). It describes the transportation, storage, installation, electrical connection, commissioning, maintenance and troubleshooting of the product. Please read it carefully before operating.

This manual is valid for the following system models:

- X3-PCAB-750kW-A
- X3-PCAB-750kW-B

Model description

X3-PCAB-750kW-A is used for example.



No.	Definition	Description
1	Grid type	X3: Applicable to three-phase system
2	Product series	PCAB: Parallel cabinet
3	Maximum power	750kW: Maximum power that the cabinet is applicable
4	Product version	A: Advanced version with combiner breaker B: Basic version without combiner breaker

Target Group

The installation, maintenance and grid-related setting can only be performed by qualified personnel who:

- Are licensed and/or satisfy state and local regulations.
- Have good knowledge of this manual and other related documents.
- A medium-voltage operator is required to obtain any Certifications for High-voltage Electrician.

Conventions

The symbols that may be found in this manual are defined as follows.

Symbol	Description
DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION!	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE!	Provides tips for the optimal operation of the product.

Change History

Version 1.0 (2025-03-03)

Changed the product name from "Parallel Cabinet" to "AC Switching Cabinet"

Modified the packing list of both models, and added description for the usage of the Dacromet screws.

Version 0.0 (2025-02-27)

Initial release

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1 Safety

1.1 General Safety

Before transporting, storing, installing, operating, using and/or maintaining the device, please carefully read and understand the document, and strictly follow the instructions and safety precautions given herein, as well as symbols affixed on the device. The safety instructions herein are only supplements to local laws and regulations.

The operator should not only abide by all safety precautions provided in the document, including but not limited to the “Danger” sign, "Warning" sign, "Caution" sign, and "Notice" sign, but also comply with relevant international, national and local laws, regulations, standards, guidelines and industry rules in the process of transportation, storage, installation, operation, and maintenance. SolaX will not assume any responsibilities for the loss caused by improper operation, or violation of safety standards for design, production and equipment suitability.

SolaX will not be liable for maintenance for possible device failure, device malfunction, or parts damage, nor will the company assume any liability to pay compensation for the possible physical and property damage resulting from the installation environment that does not meet the design requirements.

The device is well designed and tested to meet all applicable state and international safety standards. However, like all electrical and electronic equipment, safety precautions must be observed and followed during the installation of the device to reduce the risk of personal injury and to ensure a safe installation.

SolaX will not assume any responsibilities if any of the following circumstances occur, including but not limited to:

- Device damage due to force majeure, such as earthquake, flooding, thunderstorm, lighting, fire hazard, volcanic eruption, war, typhoon, tornado, etc.
- Device damage due to human cause.
- Device used or operated against local policy or regulations.
- Failure to follow the operation instructions and safety precautions on the product and in this document.
- Installation and use under improper environment or electrical condition.
- Unauthorized modifications to the product or software.
- Device damage caused during transportation by the customer or the third party.
- Storage conditions that do not meet the requirements specified in this document
- Use of incompatible inverters or devices.
- Installation and commissioning operated by unauthorized personnel who are not licensed and /or satisfy state and local jurisdiction regulations.

1.2 Device Safety

To prevent personal injury or property damage from improper operation, please carefully read the following installation precautions before installation.

DANGER!

- According to the local laws and regulations related to high-altitude work, operators must wear PPE, e.g., a helmet, safety belt, or waist harness, when they work at heights, while the other end of the harness must connect to a secure structure to prevent fall incidents.

WARNING!

- Please prepare tools that meet the requirements before installation, and check the number of tools after installation, to avoid leaving them inside the equipment.
- Please ensure that the cabinet has been thoroughly secured before operating it. Otherwise, it may cause personal injury or equipment damage due to tilting or collapsing the cabinet.
- Please ensure that the cabinet's vents and cooling system are working properly when it is running. If the vents are blocked, it will lead to overheating, and even equipment damage or fire hazard.
- Please ensure that the cabinet's vents and cooling system are kept away from heat sources.
- Do not drill holes in the device to avoid equipment failure.
- If the circumstances that may cause personal injury or equipment failure occur, such as, fluid flowing into the equipment, stop operation and power off immediately. Otherwise, it may cause a short circuit or damage.
- Do not open the cabinet doors on a rainy or high humid day (≥80% humidity). If the doors have to be opened on such days, please take proper protective measures.

WARNING!

- When the system is operating off-grid, do not close the QF-GRID breaker without permission.

CAUTION!

- Do not use a straight ladder. When electrical work is involved, a wooden ladder or an insulated ladder shall be used.
- The equipment shall not be used to provide a backup power source in the following circumstances:
  a. Equipment related to life;
  b. Sensitive precision instruments;
  c. Home appliances will be faulty in the case of a power failure during operation.

NOTICE!

- The signs and messages on the labels and nameplates attached to the device need to be visible and clear.

1.3 Electrical Safety

DANGER!

- Please make sure that the unit is free from any damage before the electrical connection.
- Do not modify, change, or dismantle the device, do not change the power-on and power-off sequences and the installation procedure written in the document, and please properly and correctly operate it.
- Do not power on the device during installation. Otherwise, it may cause a fire, personal injury, or device damage.
- Must remove earrings, rings, bracelets, watches, and any other metal jewelry before operation, to avoid electrical shock, burns, or even death.
- During operation, special insulated tools must be used to avoid electric shock or short circuit failure. The insulated tools' voltage ratings must exceed the system voltage ratings. Please refer to "12 Technical Data" for system information.

WARNING!

EMC

- This is a class A device. Operating this device in a residential area may cause radio interference, and the user might need to take appropriate measures in such cases.

WARNING!

- Please wear PPE, such as, protective clothing, insulating shoes, goggles, safety helmets, insulating gloves, etc., when conducting electrical wiring.
- Do not touch the power supply equipment directly, or through conductors or damp objects.
- Do not touch the parts of the equipment of which warning signs are attached, to avoid personal injury or device damage.

CAUTION!

- Do not power on the device until it has been installed and confirmed by professionals.
- In the event of a fire, evacuate immediately and call the local fire services.

NOTICE!

- Please operate according to the safety code for power station.
- Before installation, it is necessary to set up temporary safety fences or warning lines and hang warning signs in the operation area, to prohibit non-staff from entering here.
- Please make sure that the equipment and its associated switches are off before connecting and disconnecting power cables.

- Please check whether the protective housing and insulating sleeve for an electrical component have been installed correctly after finishing installation, to avoid electric shock.
- Must turn off the output switch of the power supply equipment when maintaining its electrical terminal device and power distribution device.
- If the device is required to be powered off during troubleshooting and diagnosis, please do as the following procedure: power off > electricity testing > connecting grounding cable > hanging warning signs and setting up guardrails.
- Must hang up "Do Not Switch On" warning signs on the relevant switches or circuit breakers before completing maintenance, to prevent power connection. Do not switch on before the fault is solved.
- Do not use water, alcohol, oil, or other solvents when cleaning electrical components inside and outside the device.

NOTICE!

Grounding Requirements:

- The device's grounding impedance shall meet the requirements of local electrical safety standards.
- The equipment shall be permanently connected to a grounding wire within the building's electrical system. Please check whether the device is reliably grounded before operation. The grounding cable should be removed last while dismantling and maintaining the device.
- Do not start the device if it is not fitted with a grounding conductor.
- All acts against the grounding conductor are prohibited.
- If the device is equipped with a three-pronged socket, make sure that the ground prong is reliably grounded.
- For the device that may generate large contact currents, please make sure that the grounding terminal on the housing has been grounded before powering on, to avoid electric shock.

NOTICE!

Cable Requirements:

- When deciding the wire diameter, and connecting or wiring cables, follow the local laws, regulations, and codes to ensure safety.
- When external conditions (e.g., placement method, ambient temperature, etc.) change, the cable type must be verified according to IEC-60364-5-52 or local laws, regulations and standards. For instance, whether the cable's current-carrying capacity meets the requirements.
- Before connecting power cables, please make sure that the cable labels are correctly labelled and the cable terminals are well insulated.
- Do not loop and twist cables while conducting electrical wiring. If the length of the power cable is not enough, please replace it instead of joining or welding. Ensure that all the cables of the correct type and size are fully connected and well insulated, and the edges of cable slots and crossing holes are smooth.

- It is recommended to bundle similar cables with cable ties, to ensure that the inside of the device is neat and tidy and to avoid cable jacket damage.
- Please use fireproof mud to seal the threading openings immediately after finishing wiring, to avoid the entry of water vapour or small animals.
- Cables should be kept away from heaters or other heat sources, because a high temperature environment may result in aging and damage to cable insulation.

2 Product Overview

2.1 Product Introduction

X3-PCAB-750kW cabinet series is designed to work with AELIO and TRENE energy storage systems for on-gird and off-grid switch. It features accurate detection and rapid response to changes in grid voltage status, and supports seamless switch to operation in island mode within 200 ms. The cabinet can also be connected to external devices such as PV inverters and diesel generator to establish micro-grid systems.

X3-PCAB-750kW-A is embedded with a combiner breaker and can be directly connected to PCS, while X3-PCAB-750kW-B does not have a combiner breaker, and should be connected to isolation transformer or ESS. The two models only differ in terminals for PCS/ESS connection at the rear.

2.1.1 Functions and Features

Functions

- X3-PCAB-750kW integrates grid breaker, control board, EMS PRO and other components that form an advanced system to automatically and rapidly switch between on-gird and off-grid operation modes. Besides, it can control the energy storage and release within the system based on EMS commands to satisfy multiple scenarios.

Features

- **Diverse Applications:** Besides mere on-grid and off-grid application, it can be connected to multiple devices to form diverse scenarios such as solar energy storage, and solar energy storage with diesel generator.
- **Rapid Switching:** It takes no more than 200 ms to complete switching between the on/off-gird mode. Such rapid and smooth switch can ensure that the entire system maintains long-term stable operation.
- **Intelligent Management:** The embedded EMS PRO can adjust the system to suit different scenarios, thus maximizing the efficiency of the energy storage system.
- **Durable Quality:** Rated IP55, the cabinet can be installed outdoors, and sustains severe installation conditions.

2.1.2 Dimensions

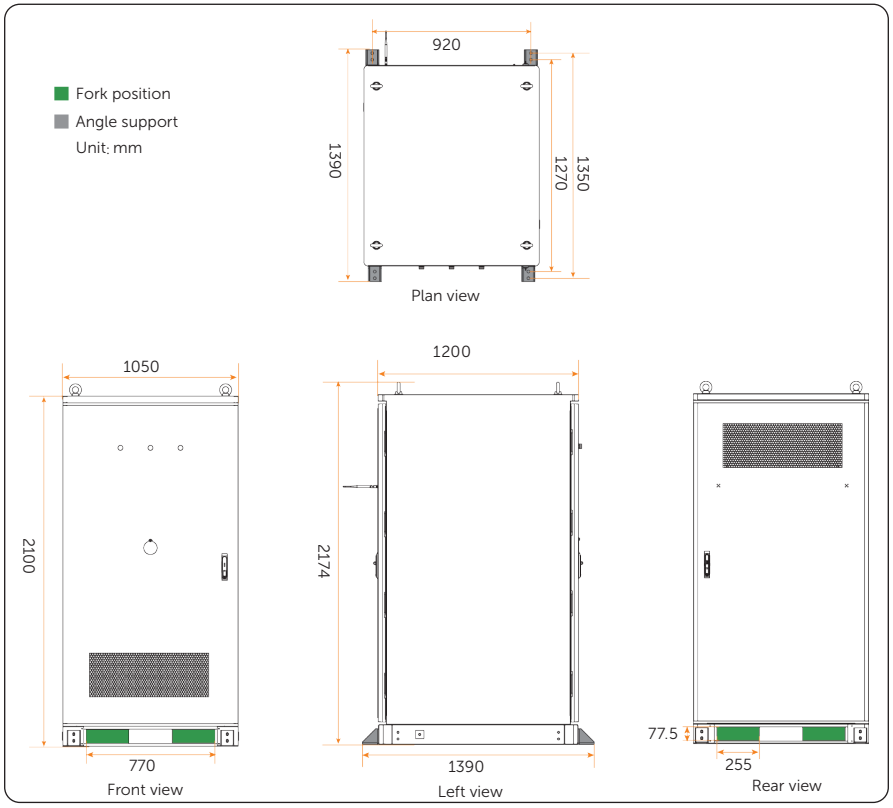


Figure 2-1 Appearance and dimension

2.1.3 Appearance

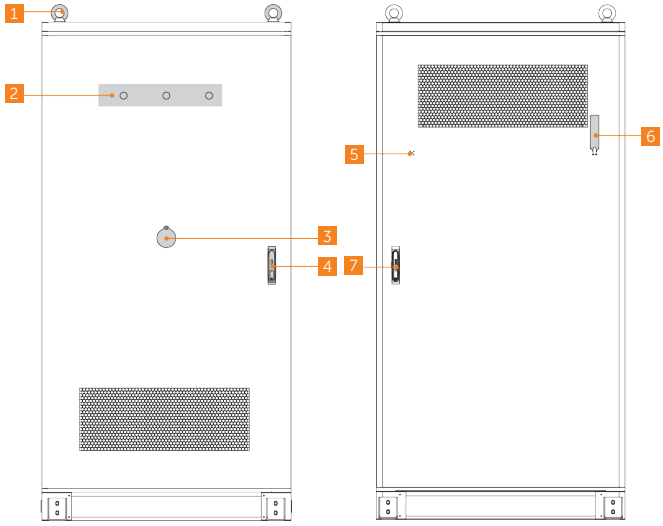


Figure 2-2 Exterior parts (cabinet door closed)

Table 2-1 Parts description (1)

No.	Item	Description
1	Eye bolt	To hoist the cabinet
2	Indicator	To display the operation status of the system
3	Emergency stop button	To shut down the system in emergency circumstances
4	Front door lock	/
5	Reserved antenna port	To connect to the wireless meter.
6	Antenna	4G antenna for expanding data transmission
7	Rear door lock	/

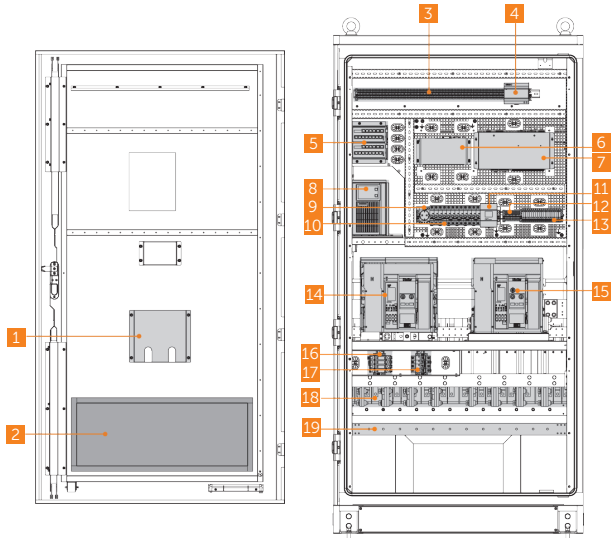


Figure 2-3 Interior parts in the front view (cabinet door open)

Table 2-2 Parts description (2)

No.	Item	Description
1	File pocket	To store documents
2	Mesh filter	/
3	Terminal block	For wiring of internal components
4	DIN rail power supply	Converts 230 a.c V power into 24 d.c V power
5	Switch	Connects to EMS PRO and EMS1000 for data exchange
6	EMS	To manage the energy flow and operation of the system
7	Control board	To collect system operation data
8	UPS	To supply backup power for the system
9	220V power supply port	/
10	Circuit breakers	Supplies power and protection for parts in the cabinet
11	Meter	To measure and monitor the energy flow of the system

No.	Item	Description
12	Terminal block	For wiring of internal components
13	Fuse	To offer overload protection
14	Grid breaker	To control the connection to the grid
15	Load breaker	To control the connection of the load
16	SPD	To offer surge protection
17	SPD breaker	To control the connection of the SPD
18	Busbar	To connect to the grid
19	PE bar	To connect to PE cables for grounding protection

NOTICE!

- The cabinet rear of X3-PCAB-750kW-A and X3-PCAB-750kW-B are different.

- X3-PCAB-750kW-A

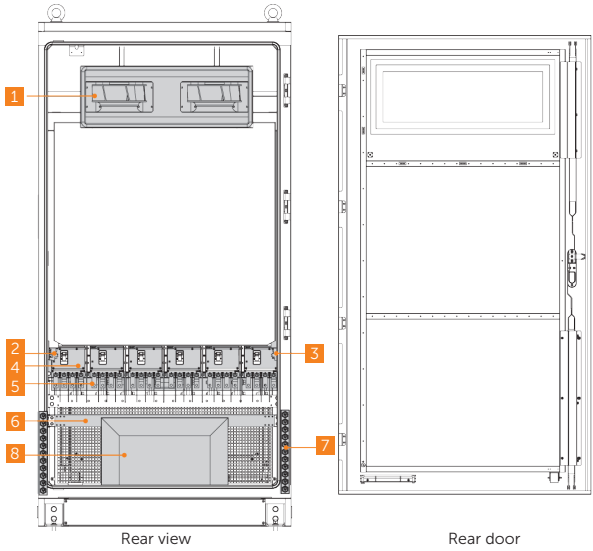


Figure 2-4 Interior parts in the rear view (cabinet door open) (1)

Table 2-3 Parts description (3)

No.	Item	Description
1	Fan	To improve air circulation in the cabinet and dissipate heat
2	XT6 terminal block	EMS adapter terminal block
3	XT7 terminal block	Control board adapter terminal block
4	PCS breaker	To control the connection of PCS
5	Busbar	To connect to the PCS
6	PE bar	To connect to the PE wires for grounding protection
7	Ethernet port	To connect the system to network
8	Accessory kit	/

- X3-PCAB-750kW-B

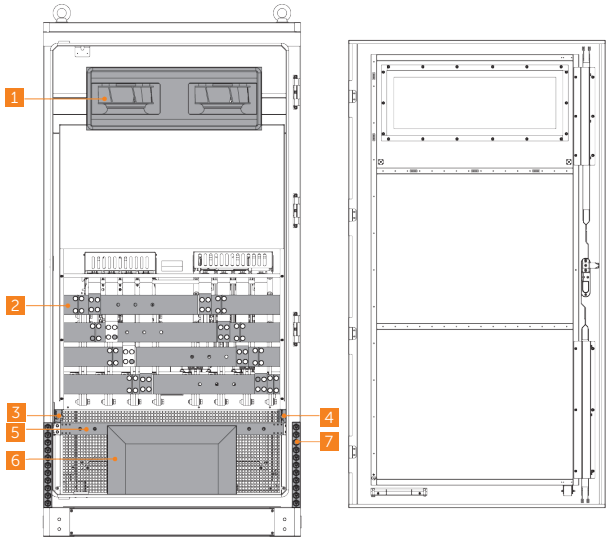


Figure 2-5 Interior parts in the rear view (cabinet door open) (2)

Table 2-4 Parts description (4)

No.	Item	Description
1	Fan	To improve air circulation in the cabinet and dissipate heat
2	Busbar	To connect to ESS
3	XT6 terminal block	EMS adapter terminal block
4	XT7 terminal block	Control board adapter terminal block
5	PE bar	To connect to the PE wires for grounding protection
6	Ethernet port	To connect the system to network
7	Accessory kit	/

2.1.4 Parts Description

Only some parts of the system are introduced.

2.1.4.1 Grid Breaker & Load Breaker

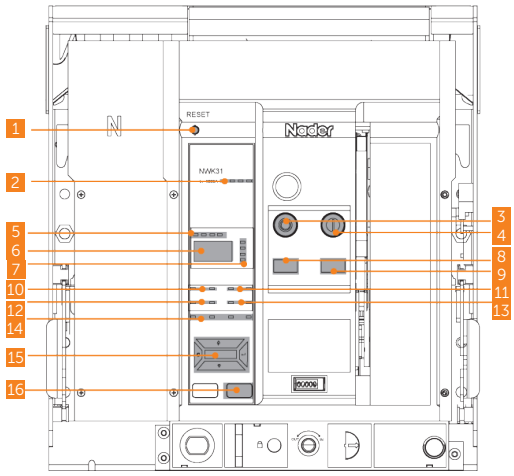


Figure 2-6 Grid and load breaker appearance

Table 2-5 Grid description (3)

No.	Item	Description
1	Reset button	To reset the breaker
2	Operation status indicator	Communication transmission, reception, fault, and alarm indicators
3	Disconnection button	/
4	Connection button	/
5	Voltage indicator	N, L1, L2 and L3 phase voltage indicator
6	Display screen	Displays the current of the three phases
7	Parameter indicator	Unbalance rate, current, time, and I2t (inverse time option) indicator
8	Disconnection indicator	Lights up when the grid breaker is in disconnection status
9	Connection indicator	Lights up when the grid breaker is in connection status
10	Load monitoring indicator	Lights up when load monitoring signal 1 and 2 are working
11	Unbalance and ground current protection indicator	Lights up when unbalance and ground current protection are enabled
12	Long delay and short delay protection indicator	Lights up when long delay and short delay protection are enabled
13	Instantaneous or N-phase current, or self-diagnosis indicator	Lights up when it detects the instantaneous or N-phase current, or performs self-diagnosis
14	Function buttons	To move up and down, exit, select, and go to the function menu
15	Test button	To perform device test

2.1.4.2 Control Board

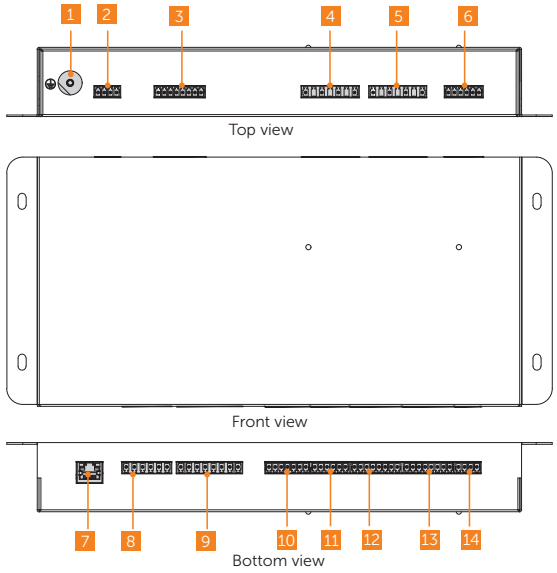


Figure 2-7 Control board appearance

Table 2-6 Terminal definition of control board

No.	Item	Description
1	Grounding port	Connected to the ground for protection
2	AELIO	To differentiate the control program of AELIO system
3	CT terminal	Connect to CT for data collection
4	Inverter terminal	For PCS/inverter voltage data collection
5	Grid input terminal	For grid voltage data collection
6	24V power supply port	To supply power supply for the control board
7	Ethernet port	To connect to EMS Pro for communication
8	DO terminal	Reserved
9		To control the QF-GRID breaker to open or close the circuit

No.	Item	Description
10	DI terminal	To receive the signal on the open and closed status of the breaker
11		Reserved
12	RS485 terminal	Communication terminals for AELIO system and meter in the switching cabinet
13	Parallel connection terminal	Communication terminal for TRENE system
14	CAN terminal	Reserved

2.1.4.3 EMS1000 PRO

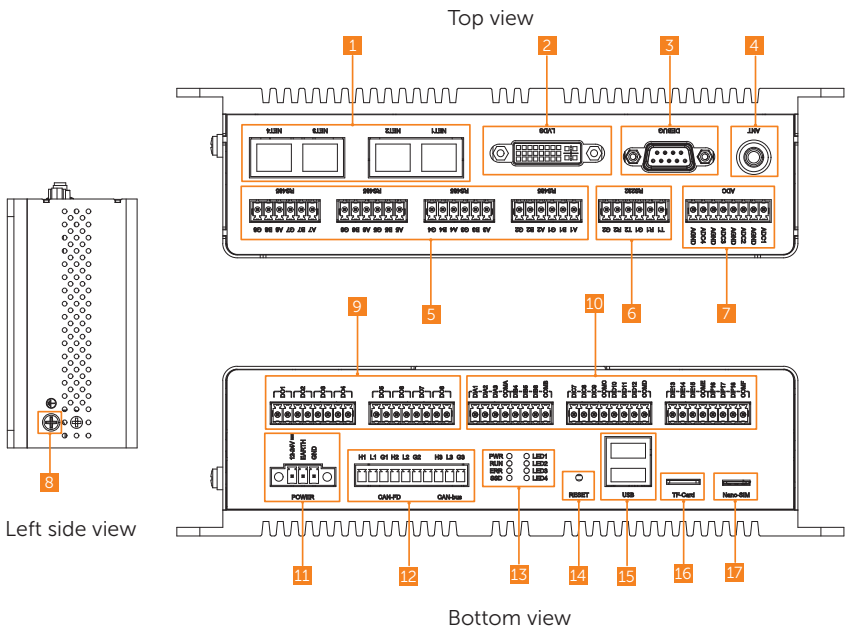


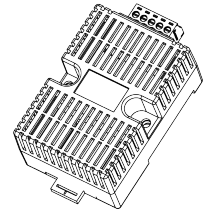
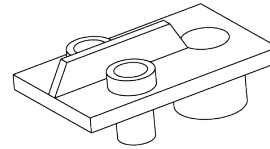
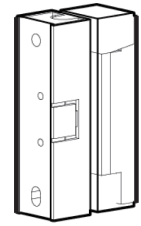
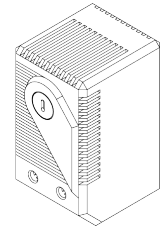
Figure 2-8 EMS1000 PRO appearance

Table 2-7 Terminal description of EMS1000 PRO

Position	Area	Item	QTY	Description
Top	1	Ethernet terminal (NET)	4	• NET1: Connected to sub devices such as EMS1000 and AC switching cabinet • NET2: Connected to master EMS1000 PRO NET3: Reserved • NET4: Connected to the router for network
	2	LVDS terminal	1	Reserved
	3	Debug terminal (DEBUG)	1	Reserved
	4	Antenna socket (ANT)	1	For expanding signal transmission
	5	RS485 terminal	8	• 1-5: Reserved • 6: Connected to other grid-connected inverter • 7: Reserved • 8: Only connected to the meter
	6	RS232 terminal	2	Reserved
	7	ADC terminal	4	Reserved
Left side	8	Earthing terminal	1	For device earthing
Bottom	9	DO terminal	8	Reserved
	10	DI terminal	18	DIA1-DIA3 and COMA, DIB4 and COMB: Dry contact DIB5-COMF: Reserved
	11	Power supply (POWER)	1	12 Vdc-24 Vdc
	12	CAN terminal	3	2 × CAN-FD, and 1 × CAN-bus
	13	Indicators	8	• Power status (PWR) • Running status (RUN) • Error (ERR) • SSD status (SSD) • LED 1-LED4: Reserved
	14	Reset button (RESET)	1	For device resetting
	15	USB socket (USB)	2	For device update
	16	TF card socket (TF Card)	1	For firmware programming
	17	Nano-SIM card socket (Nano-SIM)	1	For 4G communication

2.1.4.4 Environmental Monitoring System

The parts for environment monitoring are embedded in the cabinet.

No.	Item	Description	Figure
1	Temperature and humidity sensor	To monitor the temperature and humidity in the cabinet	
2	Water sensor	To detect the presence of water in the cabinet	
3	Door sensor	To monitor the door status	
4	Temperature control switch	To automatically adjust the temperature in the cabinet	

2.1.5 LED Indicator

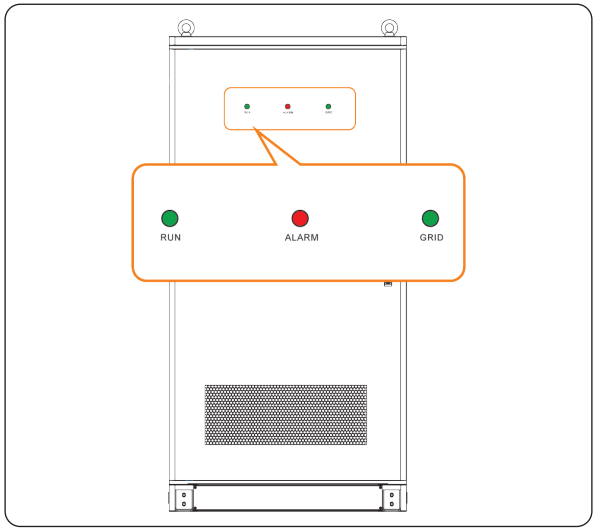


Figure 2-9 Cabinet indicators

Table 2-8 Indicator description

Indicator	Status		Description
Run	Solid green		Normal running
Alarm	Solid red		System exception
Grid	Solid green		On-gird running
	Off		Off-grid running

2.1.6 Symbols

Table 2-9 Symbol description

Symbol	Description
	CE mark of conformity
	TUV certification
	Protective grounding point
	Grounding point
	Caution, hot surface. The enclosure temperature may be high while running. Therefore, do not contact to avoid scalding.
	Danger, electric shock. Do not touch the device after it is powered on. Otherwise, an electric shock may occur.
	Danger. Due to possible risks, do not touch the device after it is powered on.
	Observe enclosed documentation.
	The device cannot be disposed together with the household waste.

2.2 System Overview

2.2.1 Electrical Schematic Diagram

The Electrical Schematic Diagram label is pasted on the middle of the front cabinet door.

X3-PCAB-750kW-A

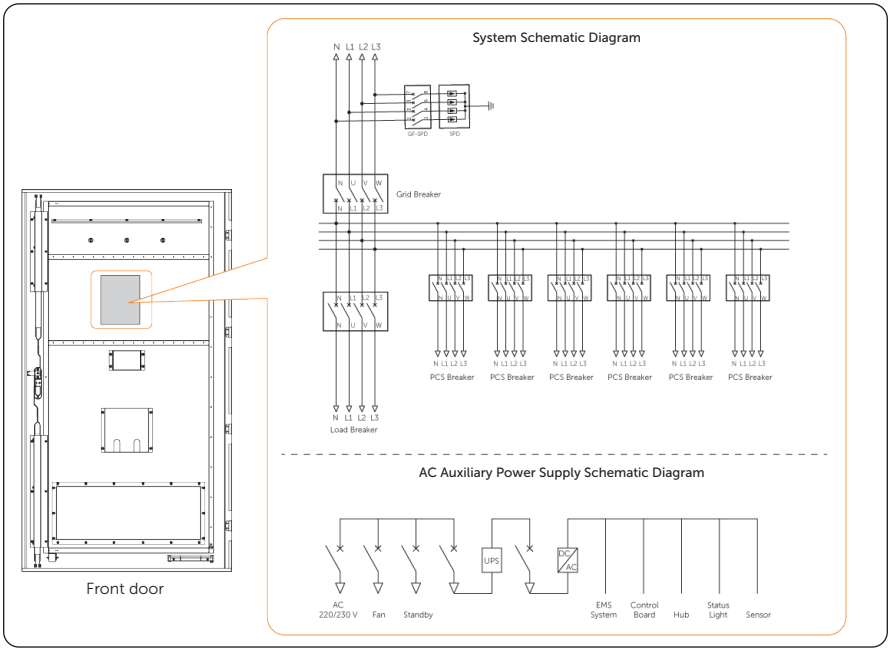


Figure 2-10 Position and content of the label (1)

X3-PCAB-750kW-B

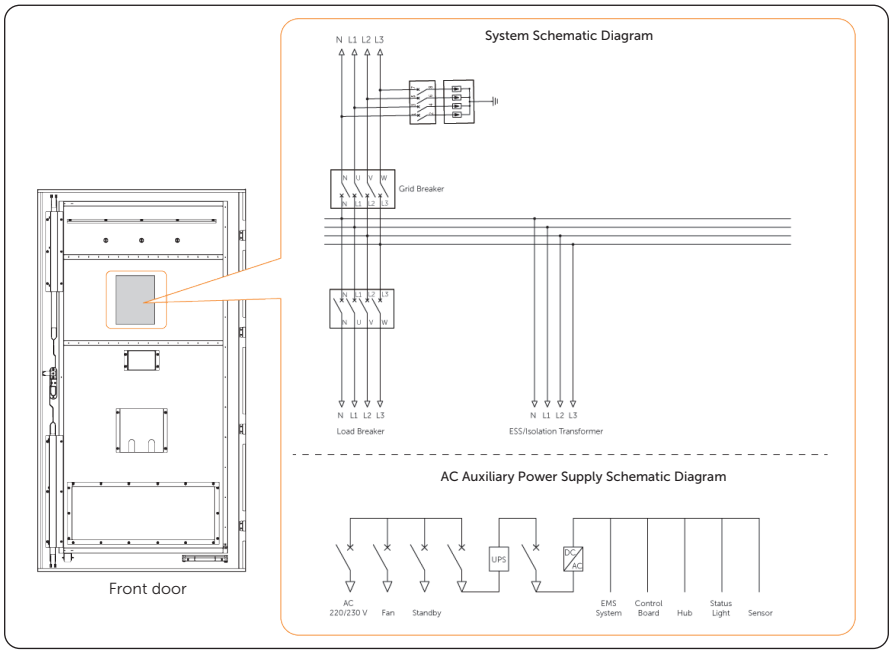


Figure 2-11 Position and content of the label (2)

NOTICE!

Requirements for load:

- The rated capacity of the load should not exceed 2/3 of the PCS rated capacity.
- The peak inrush current during load switching should not exceed 1.1 times the PCS rated current.
- For motor loads with direct-on-line or star-delta starting methods, it is recommended that the load should not exceed 1/6 of the PCS rated power.
- For three-phase imbalance scenarios, or when the inrush current during load switching is large (such as motor-type loads), X3-PCAB-750kW-B is recommended. In this case, connect the PCS to an isolation transformer. The rated power of the isolation transformer should be selected based on the parallel capacity, with a rated voltage of 400/400. The recommended connection method is Dyn11.

2.2.2 Working Mode

The switching cabinet can link the energy storage system to automatically or manually switch between on-grid and off-grid working modes.

Figure 2-12 Working mode

Status	Description
Automatic on/off-grid switch	• While working in on-grid mode, the cabinet will continuously monitor the gird voltage status. Once it detects the grid voltage abnormal, it disconnects the on/off-grid switch, and sends commands to PCS for it to work off-gird. In this case, the entire system works in the island mode. • While working in off-grid mode, once it detects the grid voltage back to normal, it connects the on/off-grid switch, and sends commands to PCS for it to work on-gird.
Manual on/off-grid switch	• While working in on-grid mode, once the cabinet receives commands from EMS to work off-gird, it disconnects the on/off-grid switch, and sends commands to PCS for it to work off-gird. In this case, the entire system works in the island mode. • While working in off-grid mode, once the cabinet receives commands from EMS to work on-gird, it connects the on/off-grid switch, and send commands to PCS for it to work on-gird.

2.2.3 Typical Application Scenarios

X3-PCAB-750kW-A

Table 2-10 Maximum number of energy storage cabinets for parallel connection

No.	Model	Max. Number of cabinets
1	TRENE system series	6
2	AELIO system series	10
3	TRENE-P100B215I	4

X3-PCAB-750kW-B

Table 2-11 Maximum number of energy storage cabinets for parallel connection

No.	Model	Max. Number of cabinets
1	TRENE system series	100kW PCS: 7 125kW PCS: 6
2	AELIO system series	10
3	TRENE-P100B215I	4

X3-PCAB-750kW-A

- TRENE system

NOTICE!

- TRENE system series except for TRENE-P100B215I is used for illustration for the system overview diagram.

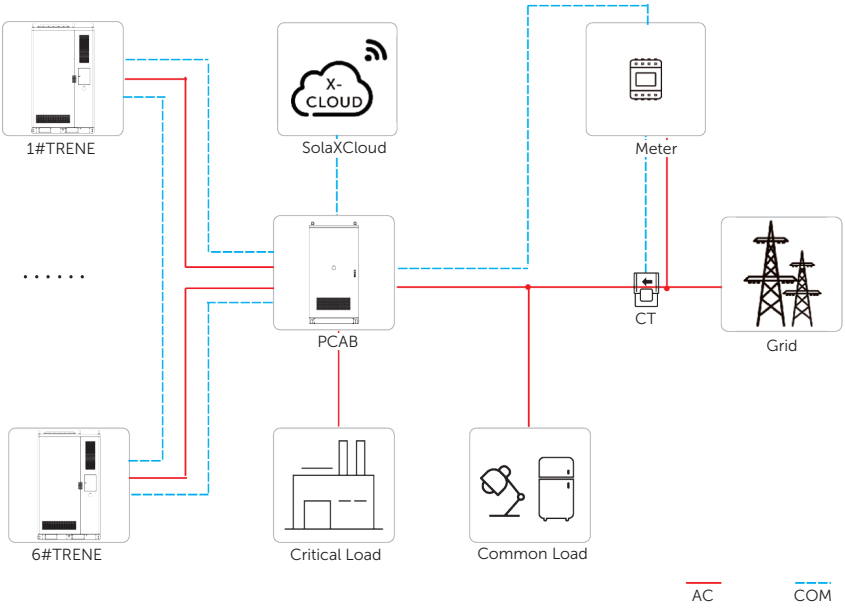


Figure 2-13 TRENE system overview diagram (1)

- AELIO system

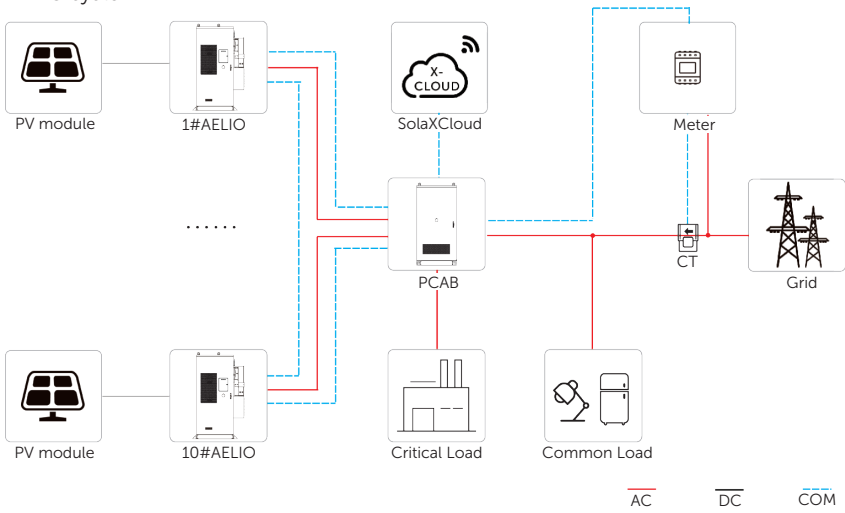


Figure 2-14 AELIO system overview diagram (1)

X3-PCAB-750kW-B

- TRENE system

NOTICE!
• TRENE system series except for TRENE-P100B215I is used for illustration for the system overview diagram.

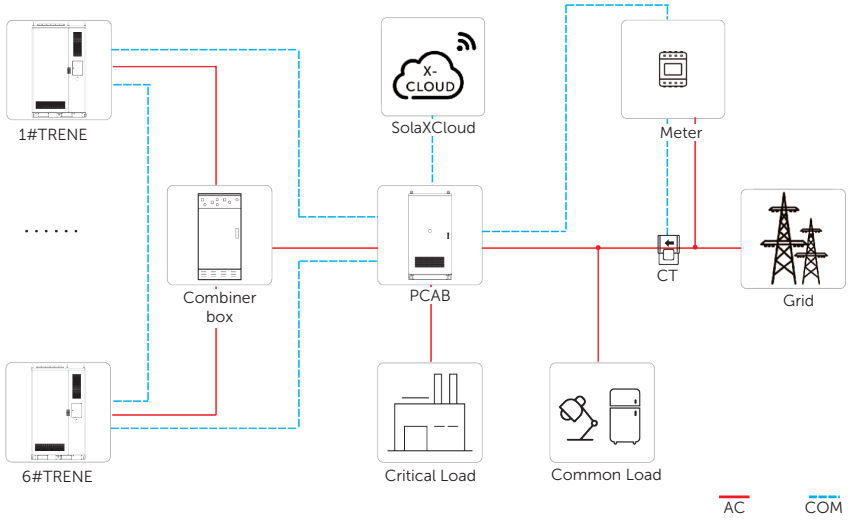


Figure 2-15 TRENE system overview diagram (2)

- AELIO system

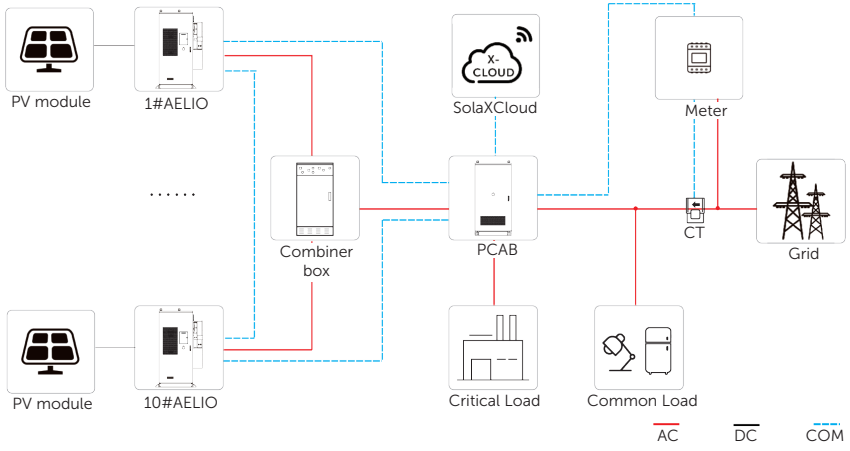


Figure 2-16 AELIO system overview diagram (2)

Table 2-12 System item description

Item	Description
PV modules (AELIO system only)	PV modules work in MPPT mode. The maximum number of PV MPP tracker is five for 50 kW inverter and six for 60 kW inverter.
TRENE/AELIO system	Energy storage system, which includes PCS, battery, power distribution box, EMS and other parts.
PCAB	The PCAB monitors the grid voltage status in real time, and controls the energy storage systems to work on-grid or off-gird accordingly.
Combiner box (X3-PCAB-750kW-B only)	The combiner box gathers and combines the output currents from multiple power sources or circuits into a single output.
Meter/CT	The meter/CT is used for import / export or consumption readings, and manages the battery charge / discharge accordingly for smart energy management applications.
Grid	400 V / 230 V grid is supported.
SolaXCloud	SolaXCloud is an intelligent, multifunctional monitoring platform that can be accessed either remotely or through a hard wired connection. With the SolaXCloud, the operators and installers can always view key and up-to-date data. Commercial platform can be connected through EMS1000 PRO connection (EMS1000 PRO is integrated into the cabinet).

3 Transportation and Storage

3.1 Transportation Requirements

DANGER!

- Please be careful to avoid physical collisions during transportation. Do not place the equipment upside down, be exposed to water, etc., which may result in equipment damage, or even a fire or an explosion.

NOTICE!

- Please strictly comply with the transportation requirements of the warning signs on the packaging and equipment.
- The tilt angle of the cabinet should be ≤10° while transporting and moving it.
- To reduce product damage caused by shocking, tilting or impacting during transportation, it is recommended to consider sea or road (with better conditions) transport instead of rail and air transports.
- Relevant qualifications for the transport of dangerous goods must be obtained by the forwarding agent engaged in such businesses, and they must strictly abide by the local regulations for the transport of dangerous goods. Please check the battery before transportation. If a battery leaks, smells, or is damaged, do refuse to transport it.

3.1.1 Forklift

- Please confirm that the forklift's load-bearing capacity shall be ≥ 1 t before using it.
- The forklift should meet the following requirements: length of fork blade > 1.2 m, width of fork blade between 26 cm and 42 cm, and thickness of fork blade between 25 cm and 70 cm.

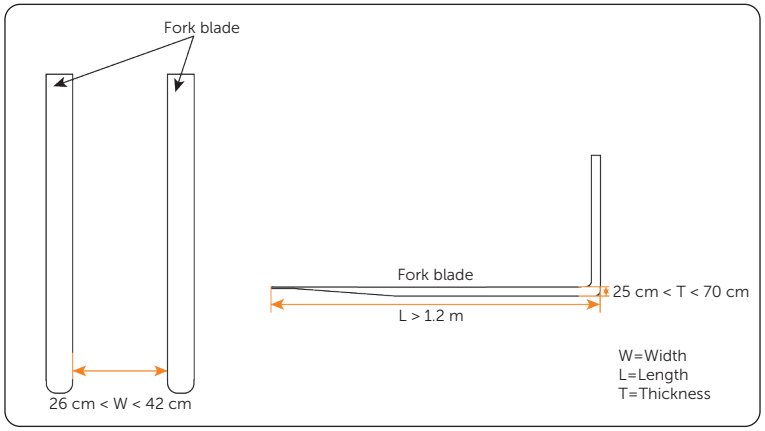


Figure 3-1 Forklift requirements

- Before moving the device, please pay attention to the center of gravity position of the load, and fully secure the load on the forklift by securing measures, such as ropes or bindings. In addition, please designate a person to supervise for safety concerns during transportation.
- Before unpacking, please accurately insert the fork blade into the fork holes on the pallet.
- The equipment can only be transported by forklift before unpacking.

3.1.2 Hoisting

- A hoist operator with good operational skills and safety awareness, who must be trained and certified, shall be operated according to the local laws and regulations.
- After unpacking, the following requirements must be met when working with cranes and lifting ropes: crane hoisting capacity ≥ 1 t, hoisting operating radius ≥ 2 m.
- Before hoisting, please check:
  - » Lifting tools are complete, tested and fully secured.
  - » The device door is closed and locked to avoid accidental opening.
  - » The lifting rope's quality must meet standards, and it shall be fully secured, to avoid falling and fraying.
- Do not hoist outdoors in rain, snow, wind and other bad weather.
- It is recommended to hoist devices in sequence and to ensure that the hoist moves in the same direction.

3.2 Storage Requirements

- For long-term storage, do not remove the original packaging and check the packaging regularly.
- Please strictly comply with the storage requirements of the warning signs and other information on the packaging to avoid device damage.
- Storage temperature: -20°C ~+ 60°C.
- Relative humidity for device storage: 5% ~ 95%.

4 Preparation before Installation

4.1 Installation Site Selection

The installation site is critical to the safety, service life, and performance of the device, and it should be convenient for electrical connections, operation, and maintenance. Therefore, the installation site should be selected according to the *NFPA 855 Standard for the Installation of Stationary Energy Storage Systems* and the local laws and regulations.

The installation site shall meet the following requirements:

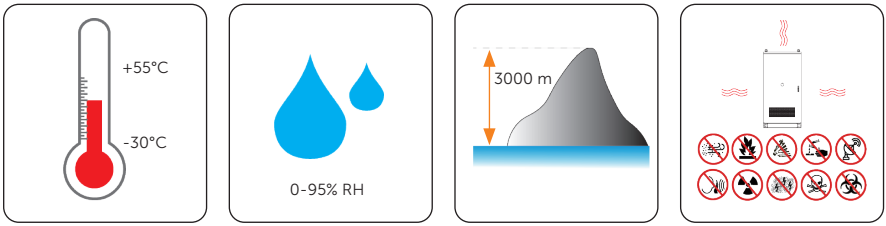
- **Laws, regulations and industry standards**: The selection of installation sites must strictly comply with local laws, regulations, and related industry standards.
- **Fire safety**: Fire extinguishers must be configured at the installation site according to the local fire codes, and a port for the water fire extinguishing system shall be reserved.
- **Outdoor installation**: It is recommended to install the device outdoors.
- **Safety spacing**:
  - » The installation distance between the device and residential areas, population centers, or production buildings should meet the requirements of the local fire codes and standards.
  - » If the safety spacing cannot be met, a firewall that meets the requirements of the local fire codes must be built between the device and adjacent buildings. During the planning phase, it is crucial to consider the space for transportation, installation and maintenance of the device.
- **Flood and waterlogging prevention**:
  - » Avoid low-lying and flood-prone areas. The installation site that the device is to be located must be at least 300 mm higher than the highest water level in history.
  - » Since winds and wind-driven waves from rivers, lakes, and seas can affect the device, the foundation must be built at least 0.6 m higher than the maximum wave height in history.
  - » If a large amount of water flows in or through the energy storage power station, drainage facilities should be set up.
  - » If the installation site is prone to water accumulation, take waterproof measures, including but not limited to installing water baffles, configuring a drainage system, or raising the height of the foundation to prevent device damage.
- **Avoid liquid intrusion**: The installation area should be far away from the area where liquid is likely to be generated or leaked to avoid device failure.

- **Good transportation**: Good transportation for the installation site.
- **Reserve space**: During the planning phase, please consider the space for capacity expansion or connection in parallel in the future.
- **Avoiding bad soil**: Do not install devices on the undesirable soil that are prone to deformation and settlement.
- **Keeping away from salt-damaged and polluted areas**: Since the salt-damaged and polluted areas may corrode the device, the installation site must meet the following requirements:

Table 4-1 Installation spacing requirements

	Safety Distance
Distance from coastal areas	> 2000 m
Distance from heavy pollution sources, such as smelters, coal mines, thermal power plants	> 1500 m
Distance from moderate pollution sources, such as chemical plants, rubber plants, and electroplate factory	> 1000 m
Distance from light pollution sources, such as food processing plants, leather processing plants, heating boiler factory, slaughter houses, dumping sites, and sewage treatment stations	> 500 m

- **Additional fence**: For security reasons, the installation area should be surrounded by locking fences or walls accessible to qualified persons only.
- **Installation environment requirements**:
  - » Temperature: -30°C ~ +50°C.
  - » Relative humidity: 0 ~ 95% RH.
  - » Altitude: Below 3000 meters.
  - » Good ventilation.
  - » Keep away from sandy and dusty environments.
  - » Keep away from high temperature environment such as heat source and fire source, etc.
  - » Keep away from flammable and explosive materials and areas with dust.
  - » Keep away from corrosive substances.
  - » Keep away from strong electromagnetic fields and antenna.
  - » Keep away from strong vibration and noise sources.
  - » Keep away from areas with radiation.
  - » Keep away from areas with metal conductive and magnetic dust.
  - » Keep away from areas that produce or have toxic and harmful gases.
  - » Keep away from environments that are prone to microbial growth.



4.1.1 Installation Foundation Requirements

The requirements for foundation are shown as follows:

- Type of foundation material: 1. Non-combustible materials such as solid bricks or concrete; 2. Steel.
- The bottom of the foundation pit must be strengthened and filled. The surface of the foundation shall be solid, flat and level (horizontal error ≤ 3mm, tilt angle ≤ 5°). Sunken or tilted foundation is not acceptable.
- The foundation's bearing capacity shall exceed 1 t. Otherwise, a retest is required.

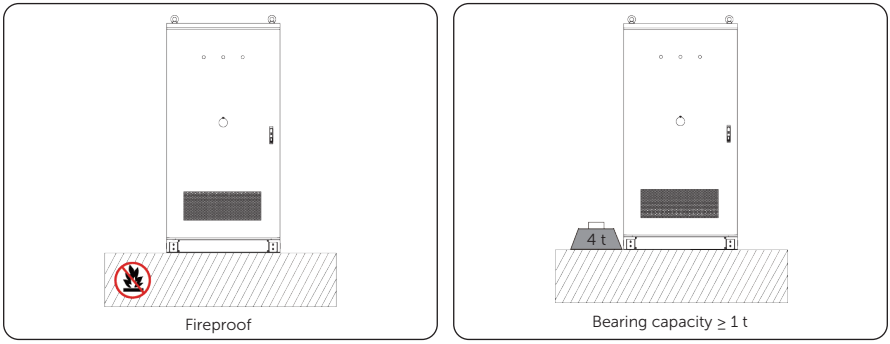


Figure 4-2 Foundation requirement

- A qualified drainage facility, of which the drainage capacity meets the requirements of the heaviest rain records in local history,shall be established according to the local geological conditions and municipal drainage standards.
- Reserve a trench or cable entry hole during the design phase.
- Avoid cables buried underground when constructing the foundation.
- The foundation drawing is only for reference. Operators shall recheck and revise it according to the environment, geological conditions, seismic requirements, etc. of the installation site.

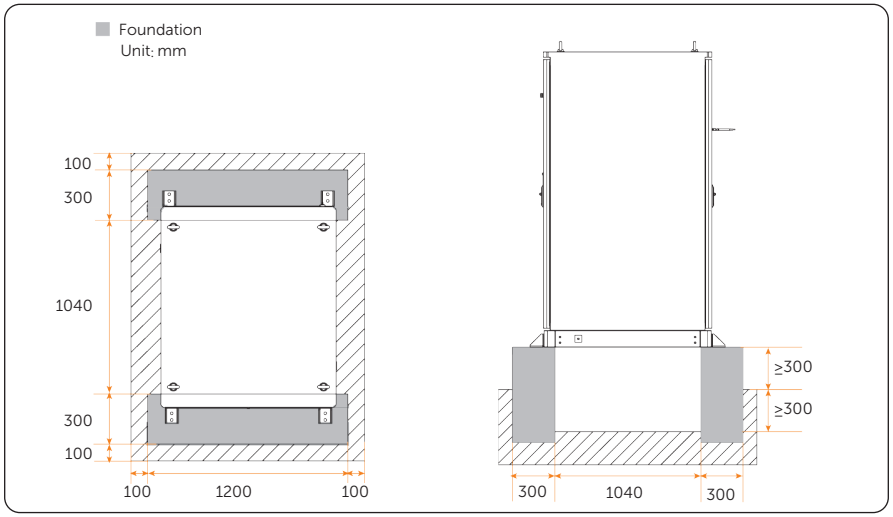


Figure 4-3 Foundation requirements

4.1.2 Clearance Requirement

The installation clearance for a single and multiple cabinets should meet the following requirements:

- Reserve a minimal space of 50 mm (when placed side by side with SolaX cabinets) or 400 mm (when placed side by side with other objects) at the left and right side of the cabinet.
- Reserve a minimal space of 1200 mm at the left and right side of the cabinet.
- Reserve a minimal space of 1500 mm from the ceiling.

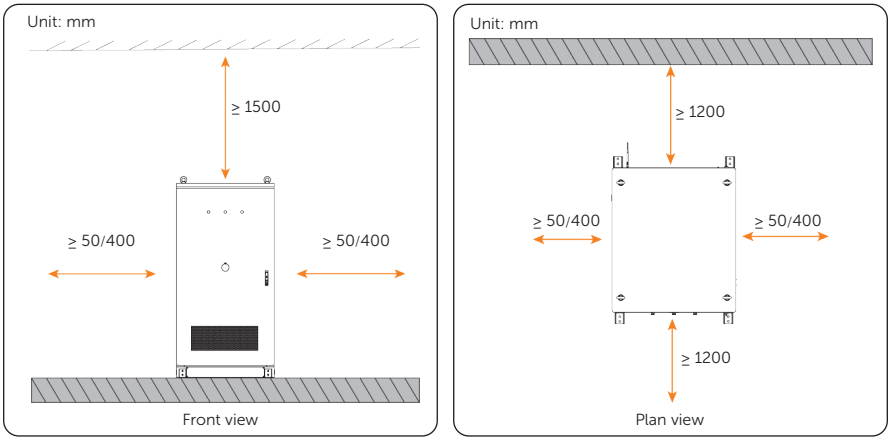


Figure 4-4 Clearance requirements for a single cabinet

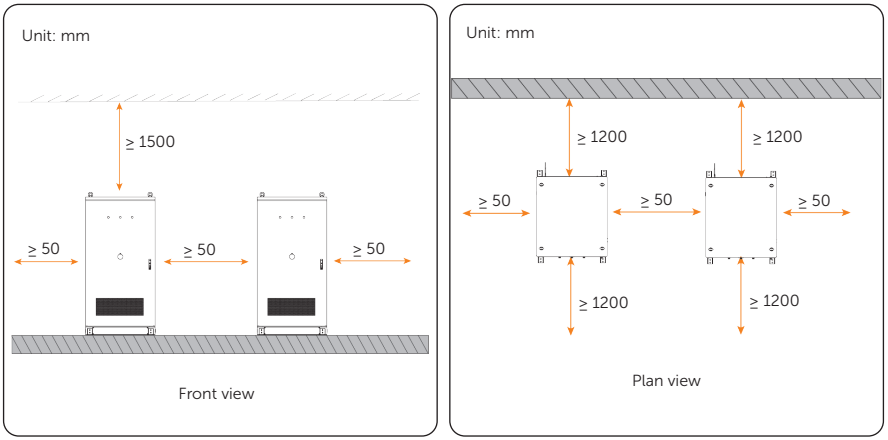
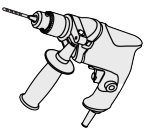
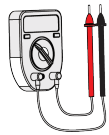


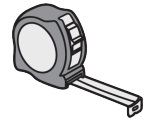
Figure 4-5 Clearance requirements for multiple cabinets

4.2 Tools Requirement

The tools used include but are not limited to the recommended tools below. Please use other auxiliary tools according to the site requirements. Please note that the tools used must comply with local regulations.

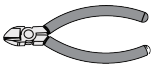

Hammer drill (Ø18 mm)

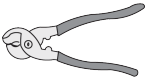

Multimeter


Measuring tape


Utility knife


Marker

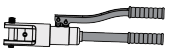

Diagonal pliers

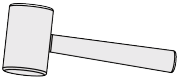

Wire cutter

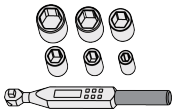

Vacuum cleaner

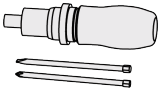

Wire stripper

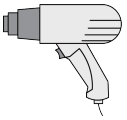

Crimping tool for RJ45

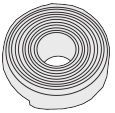

Hydraulic wire crimper


Rubber mallet


Torque wrench (M4~M12)


Torque screwdriver
(Flat-head: M3)
(Phillips head: M4, M5)


Heat gun


Heat shrink tubing
(Ø15~35 mm)


Crane
(Load capacity:≥ 1t)


Steel wire rope
(Length:≥2000mm × 2)


Electric forklift
Load capacity:≥ 1t


Insulated ladder
(Height:≥2 m)


Safety helmet


Safety belt


Safety vest


Safety shoes

4.3 Additionally Required Materials

The material quantity is for reference only. Please prepare enough cables and terminals based on the on-site conditions.

X3-PCAB-750kW-A

Table 4-2 Cable requirements (1)

No.	Required material		Cable Type	Conductor Cross-section	Quantity
1	Grid cable		4-core copper cable	≥240 mm^2	3 groups
2	Load cable		4-core copper cable	≥240 mm^2	3 groups
3	PCS cable		4-core copper cable	≥35 mm^2 (for AELIO system)	10 groups
				≥70 mm^2 (for TRENE system)	6 groups
4	PE wire		Conventional yellow and green cable	≥120 mm^2 (for load and cabinet grounding)	/
5	Network cable		Network cable CAT5E	/	/
6	COM cable		Shielded twisted-pair cable	0.5 mm^2	/

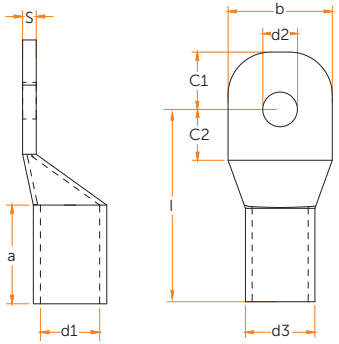
NOTICE!

When used with AELIO system, the total communication distance through network cables among the cabinets shall be within 70 meters to ensure stable data transmission. When used with TRENE system, the total communication distance through network cables among the cabinets shall be within 50 meters to ensure stable data transmission.

Table 4-3 Ring terminal requirements (1)

No.	Required material	Type (Recommended)	Quantity	Description
7	Ring terminal 	TLK240-12	24	For connecting the power cables of the grid and load
8		TLK120-12	2	For cabinet grounding
9		TLK120-8	6	For load grounding
10		TLK35-8	24	For PCS connection (35 mm2 power cable in AELIO system)
11		TLK70-8	24	For PCS connection (70 mm^2 power cable in TRENE system)

Figure 4-6 Ring terminal dimensions requirements (1)



Ring terminal dimensions requirements

Terminal type	Dimensions (mm)								
	S	a	b	C1	C2	d1	d2	d3	l
TLK 240-12	4.8	35.0	39.0	21.5	19.0	21.0	13.0	26.0	72.0
TLK 120-12	4.3	26.0	28.0	14.0	14.0	15.0	13.0	19.5	51.0
TLK 120-8	4.3	26.0	28.0	14.0	14.0	15.0	8.4	19.5	51.0
TLK 35-8	3.2	17.0	17.0	10.0	10.0	8.5	8.4	12.0	34.0
TLK 70-8	4.2	21.0	23.0	10.0	10.0	12.0	8.4	16.5	34.0

X3-PCAB-750kW-B

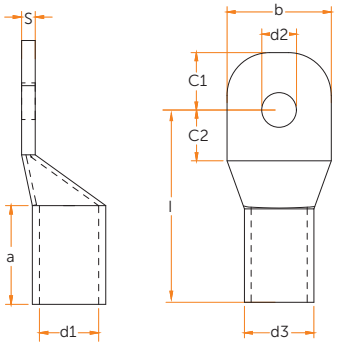
Table 4-5 Cable requirements (2)

No.	Required material	Cable Type	Conductor Cross-section	Quantity
1	Grid cable 	4-core copper cable	≥240 mm^2	3 groups
2	Load cable 	4-core copper cable	≥240 mm^2	3 groups
3	ESS cable 	4-core copper cable	≥240 mm^2	3 groups
4	PE wire 	conventional yellow and green cable	≥120 mm^2 (for load and cabinet grounding)	/
5	Network cable 	Network cable CAT5E	/	/
6	Com cable 	Shielded twisted-pair cable	0.5 mm^2	/

Table 4-6 Ring terminal requirements (2)

No.	Required material	Type (Recommended)	Quantity	Description
7	Ring terminal 	TLK240-12	45	For connecting the power cables of load and ESS
8		TLK120-12	2	For cabinet grounding
9		TLK120-8	10	For grid and load grounding

Figure 4-7 Ring terminal dimensions requirements (2)



Ring terminal dimensions requirements

Terminal type	Dimensions (mm)								
	S	a	b	C1	C2	d1	d2	d3	l
TLK 240-12	4.8	35.0	39.0	21.5	19.0	21.0	13.0	26.0	72.0
TLK 120-12	4.3	26.0	28.0	14.0	14.0	15.0	13.0	19.5	51.0
TLK 120-8	4.3	26.0	28.0	14.0	14.0	15.0	8.4	19.5	51.0

5 Unpacking and Inspection

5.1 Unpacking

- The equipment undergoes 100% testing and inspection before shipping from the manufacturing facility. However, transport damage may still occur. Before unpacking the rechargeable battery, please verify that the model and outer packing materials for damage, such as holes and cracks.
- Due to the cabinet height, please take necessary precautions for working at heights when removing the outer packaging.

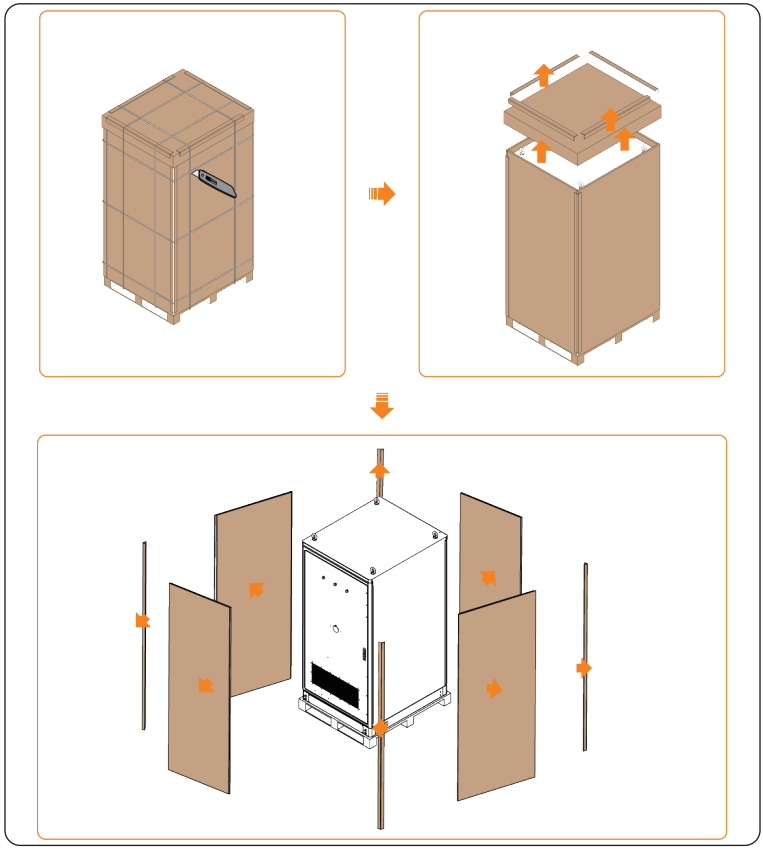


Figure 5-8 Unpacking

- When unpacking, please handle all packaging materials properly for future storage or relocation of this equipment.
- After unpacking, please check if the equipment is intact and if all accessories are complete. If there is any damage or missing accessories, please contact your dealer immediately for assistance.

5.2 Packing List

Procedure to Take Out the Accessory Kit (At the Rear Door)

The accessory kit is placed under the sheet metal enclosure at the rear of the cabinet. Follow the steps below to take them out.

Step 1: Use an Allen key and a door key to open the rear door.

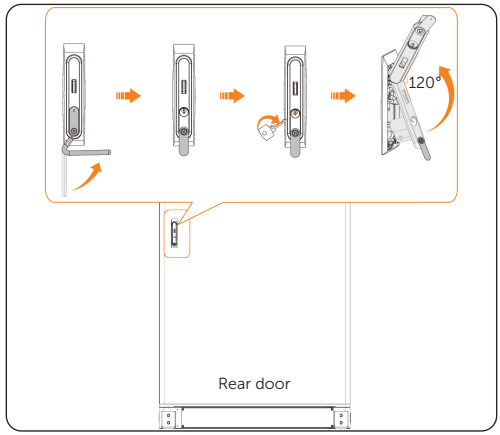


Figure 5-9 Opening the rear door

Step 2: Insert the limiting rod into the limiting holes of the cabinet to protect the cabinet coating against damages.

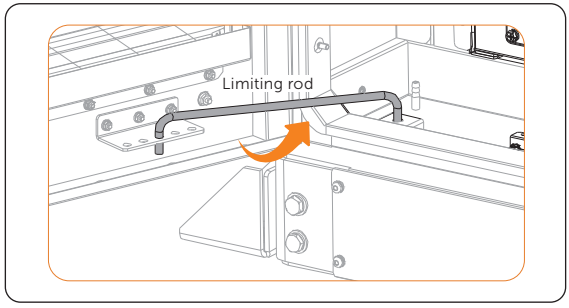
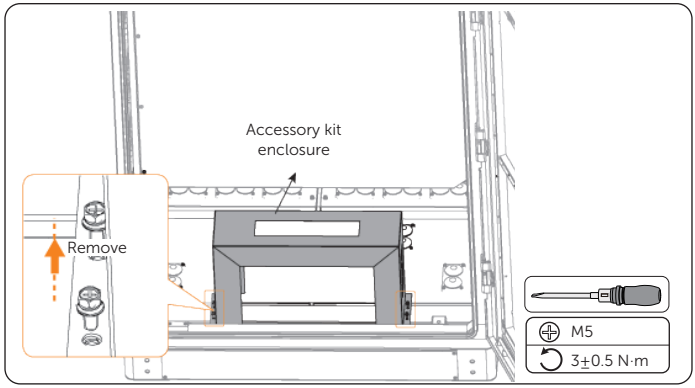


Figure 5-10 Placing the limiting rod

Step 3: Unscrew the M5 screws, remove the accessory kit enclosure, and then take out the accessory kit.

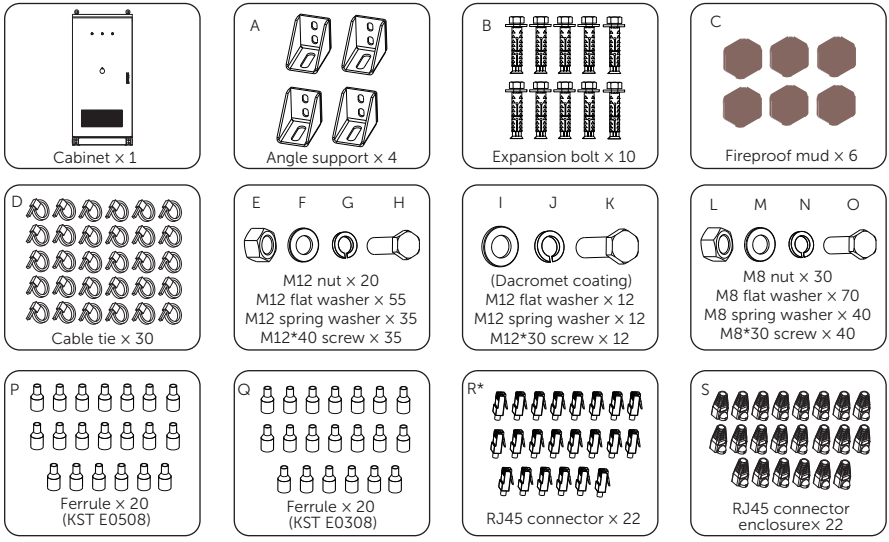


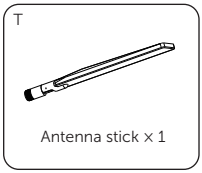
NOTICE!

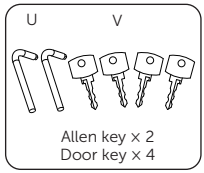
- The *Installation Manual* is placed in the file pocket on the front door of the cabinet.
- The enclosure is for securing the accessory kit only, and is not needed after you take out the accessory kit. Do not reinstall it back.

Scope of Delivery

- X3-PCAB-750kW-A







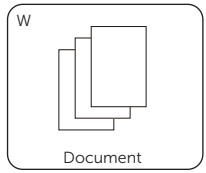


Table 5-1 Packing list (1)

No.	Items	Quantity (PCS)	Description
/	Cabinet	1	/
A	Angle support	4	For securing the cabinet
B	Expansion bolt	10	For connecting the angle support and foundation
C	Fireproof mud	6	For sealing off the grid cable inlet
D	Cable tie	30	To organize cables
E	M12 nut	20	For grid and load connection, and cabinet grounding
F	M12 flat washer	55	
G	M12 spring washer	35	
H	M12*40 screw	35	
I	Dacromet M12 flat washer	12	For securing the angle supports to the cabinet, and for cabinet grounding connection
J	Dacromet M12 spring washer	12	
K	Dacromet M12*30 screw	12	
L	M8 nut	30	For PCS connection, and load grounding
M	M8 flat washer	70	
N	M8 spring washer	40	
O	M8*30 screw	40	
P	Ferrule (KST E0508)	20	For EMS connection
Q	Ferrule (KST E0308)	20	For control board connection
R	RJ45 connector	22	For communication connection

No.	Items	Quantity (PCS)	Description
S	RJ45 connector enclosure	22	For protecting the RJ45 connectors
T	Antenna stick	1	For expanding data transmission
U*	Door key	2	For unlocking the cabinet doors
V*	Allen key	4	
W	Document	/	/

NOTICE!

- U* and V* are collected in a bunch, and are inserted into the door lock upon delivery.

- X3-PCAB-750kW-B

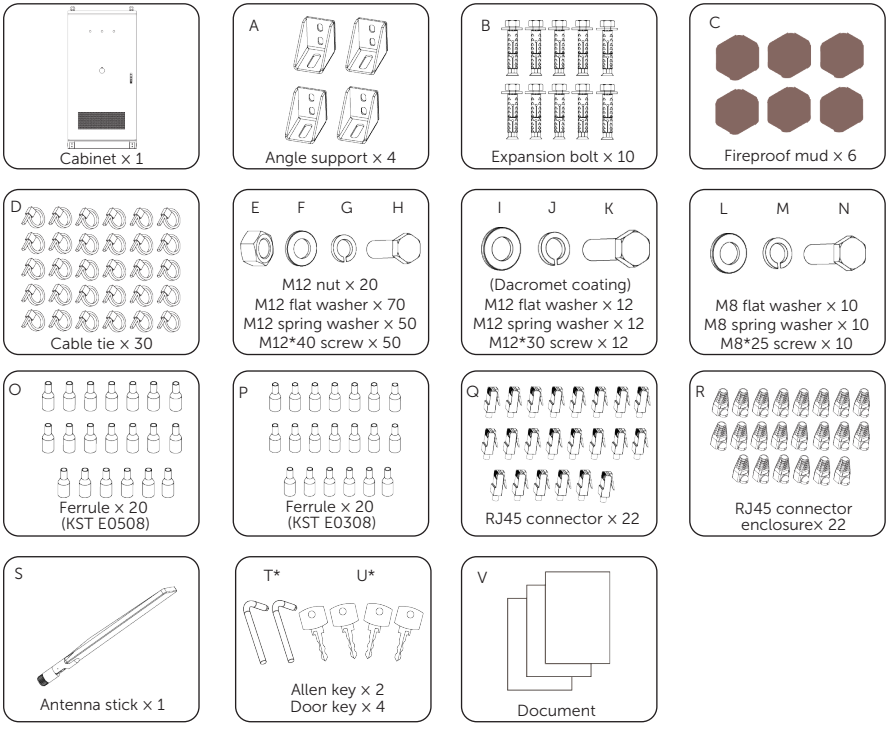


Table 5-2 Packing list (2)

No.	Items	Quantity (PCS)	Description
/	Cabinet	1	/
A	Angle support	4	For securing the cabinet
B	Expansion bolt	10	For connecting the angle support and foundation
C	Fireproof mud	6	For sealing off the grid cable inlet
D	Cable tie	30	To organize cables
E	M12 nut	20	For grid and load connection, and cabinet grounding
F	M12 flat washer	70	
G	M12 spring washer	50	
H	M12*40 screw	50	
I	Dacromet M12 flat washer	12	For securing the angle supports to the cabinet, and for cabinet grounding connection
J	Dacromet M12 spring washer	12	
K	Dacromet M12*30 screw	12	
L	M8 flat washer	10	For load grounding
M	M8 spring washer	10	
N	M8*30 screw	10	
O	Ferrule (KST E0508)	20	For EMS connection
P	Ferrule (KST E0308)	20	For control board connection
Q*	RJ45 connector	22	For communication connection
R	RJ45 connector enclosure	22	For protecting the RJ45 connectors

No.	Items	Quantity (PCS)	Description
S	Antenna stick	1	For expanding data transmission
T	Door key	2	For unlocking the cabinet doors
U	Allen key	2	
V	Document	/	/

6 Mechanical Installation

After determining the installation site, please take out the required underground cables.

WARNING!

- Avoid installing, operating and maintaining the device or cables outdoors under severe weather conditions such as lightning, rain or snow.
- The device must be installed by professionals in accordance with local regulations and standards.
- Before drilling, please check and ensure that the area is free of pipes, light switches, sockets, and wires, and safe to drill into.
- Please wear PPE, and take steps to cover the device to prevent debris from entering it while drilling holes.
- After drilling, clean up the site in time.

6.1 Cabinet Handling

NOTICE!

- There are two ways to move a cabinet: using a crane or a forklift. Please refer to "3.1 Transportation" for related handling precautions.

6.1.1 Removal of Wooden Pallet

Step 1: Unscrew the M5 screws on the front and rear covers, and then remove the front and rear covers.

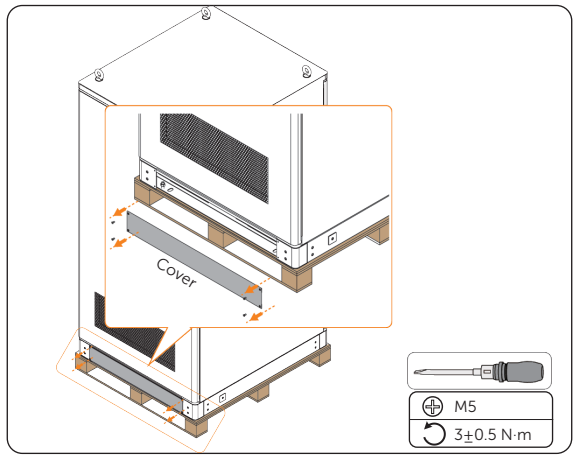


Figure 6-11 Unscrewing the screws for the cover

Step 2: Unscrew the M12 screws used to secure the wooden pallet to the cabinet.

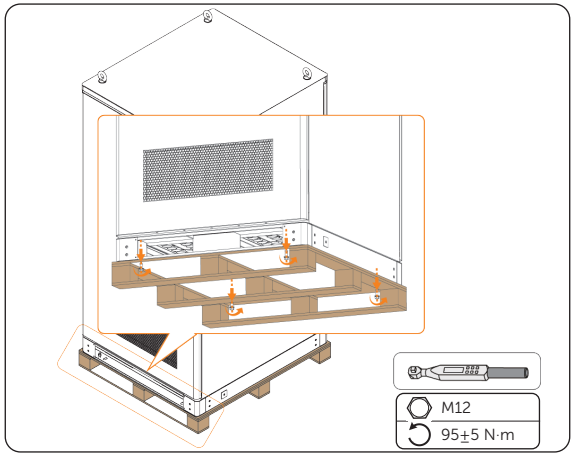


Figure 6-12 Unscrewing the screws for securing pallet

Step 3: Separate the wooden pallet and cabinet.

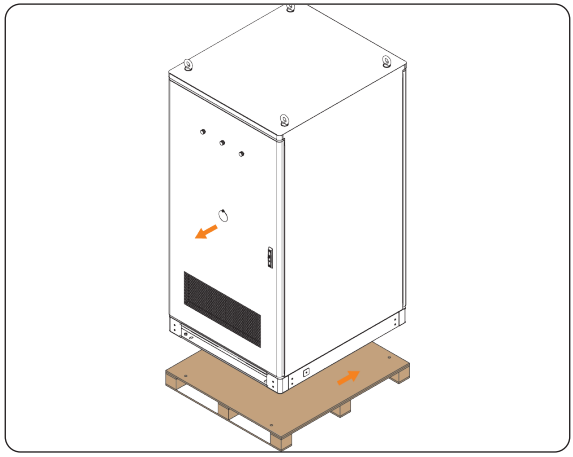


Figure 6-13 Unscrewing the screws for securing pallet

6.1.2 Crane Hoisting

NOTICE!

When hoisting:

- Temporary warning signs or fences should be set up in the hoisting area, and only the qualified persons can access it.
- Never stand and walk under or near the device being lifted or lowered.
- For safety reasons, avoid long-distance hoisting operations.
- Please be careful when hoisting and placing the device, and do not remove the ropes before it is seated on the foundation. Please make sure that the boom lift moves level and the cabinet's tile angle is ≤ 5° during hoisting.
- The angle in both the diagonal ropes shall be ≤60°.
- Do not lift the next one before the previous cabinet has been installed on the foundation.

Insert the steel wire ropes into the eye bolts on the top of the cabinet, and then tie knots.

NOTICE!

- Ensure that the steel wire ropes make full contact with the eye bolts.
- The rope length is for reference only. Adjust the length based on the angle requirements and on-site conditions while making sure that the cabinet is horizontal and level.

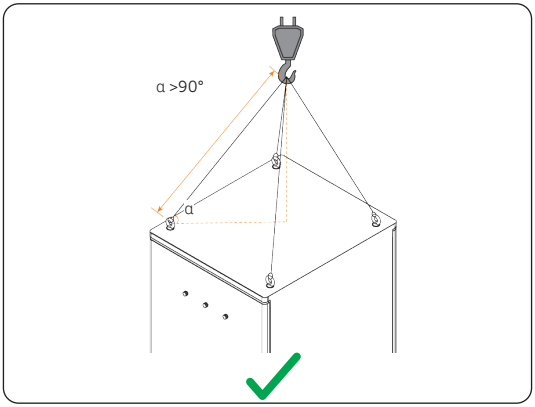


Figure 6-14 Proper way of hoisting

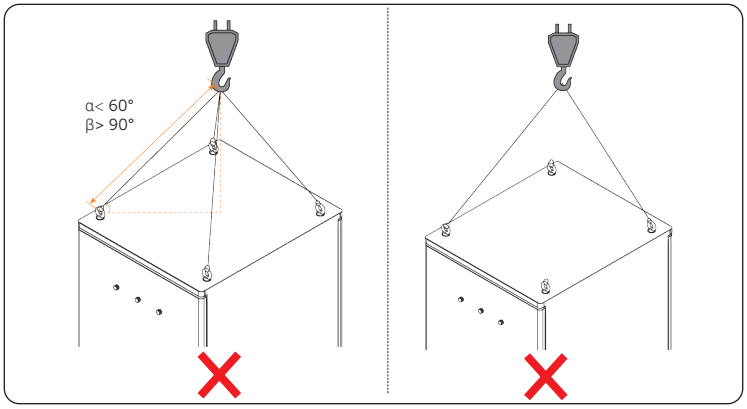


Figure 6-15 Improper way of hoisting

6.1.3 Forklift Handling

NOTICE!

- Before relocating the cabinet through a forklift truck, make sure you have secured the cabinet properly without any risks of tipping over.

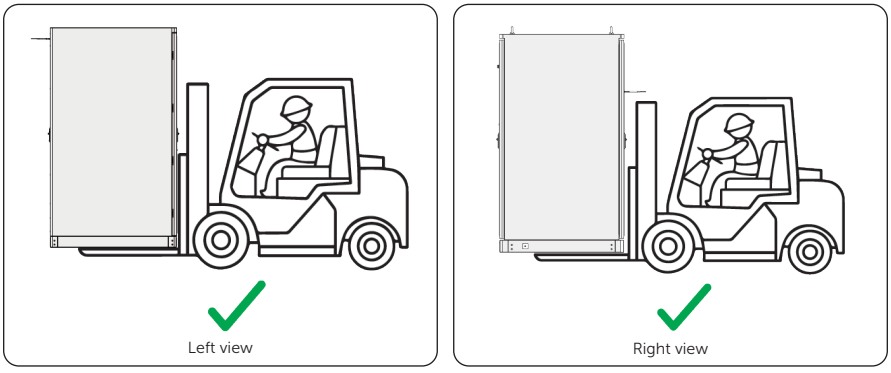


Figure 6-16 Proper way of handling

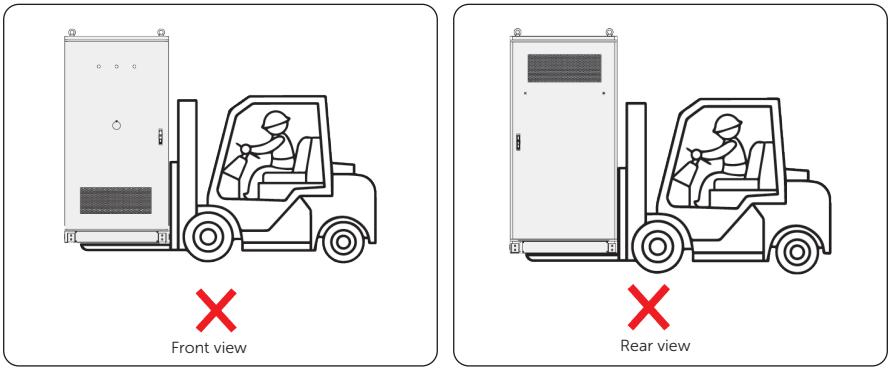


Figure 6-17 Improper way of handling

NOTICE!

- After unloading the cabinet from the forklift truck, check if there is any paint peeling or chipping. If there is, follow the instructions on "15.2 How to Repaint the Cabinet" to repair.

6.2 Angle Support Installation

Install the angle supports to secure the cabinet to the foundation.

NOTICE!

- The installation procedure of all four angle supports are the same. The following use only one of them for example.

Step 1: Align the installation holes of the angle support (part A) to those of the cabinet.

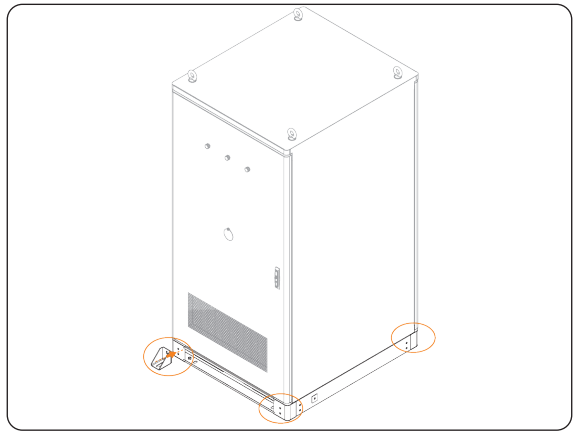


Figure 6-18 Aligning and drawing circles

Step 2: Draw circles on the foundation surface.

The distance between two holes must be no less than 40 mm.

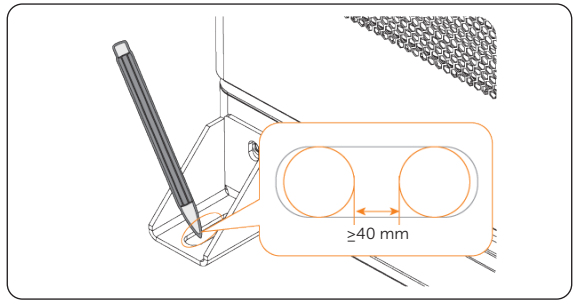


Figure 6-19 Drawing holes

Step 3: Drill holes through the marks, and then clean the site.

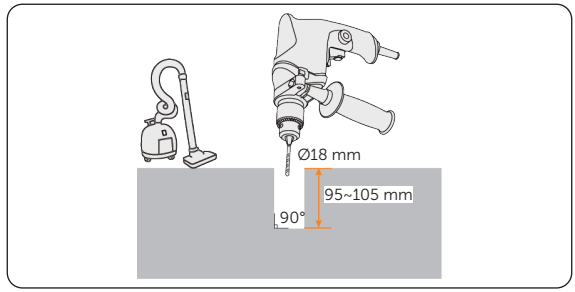


Figure 6-20 Drilling holes

Step 4: Assemble the Dacromet M12*30 screw, Dacromet M12 spring washer, and Dacromet M12 flat washer , hammer in the combination screw into the installation holes, and then secure it with M12 nut.

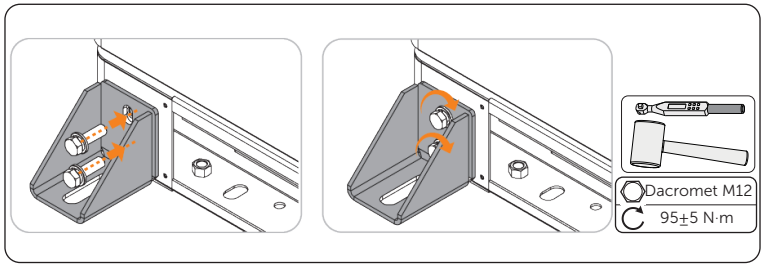


Figure 6-21 Securing the cabinet

Step 5: Hammer in the M12 expansion screws into the installation holes, and then secure them.

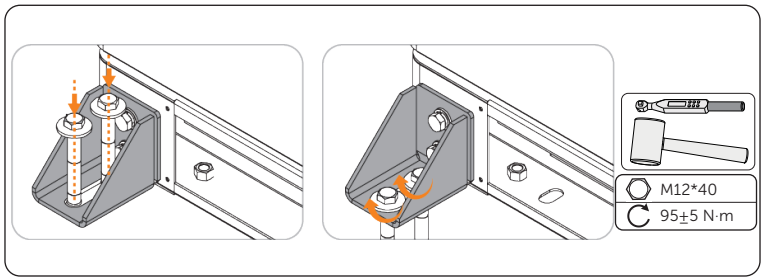


Figure 6-22 Securing the angle supports

Step 6: Use the M5 screws to reattach the front and rear covers back to the cabinet.

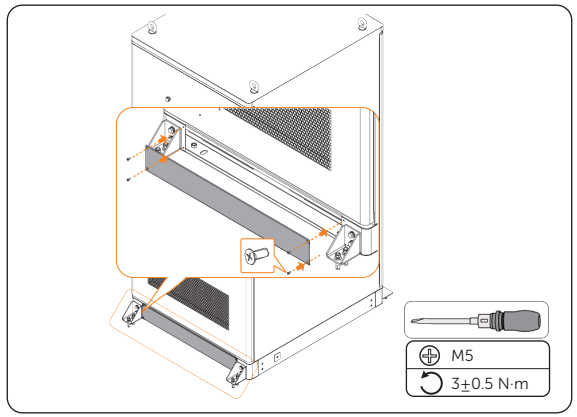


Figure 6-23 Reattaching the covers

6.3 Antenna Installation

The cabinet offers two antenna ports. The right one is for connecting the 4G antenna stick delivered with the cabinet, and the left one is reserved.

NOTICE!
• Keep the sealing caps on if the antenna terminals are not used.

Step 1: Remove the silicone cap.

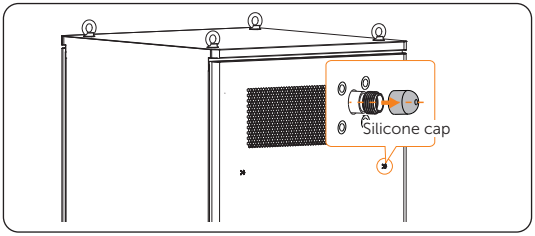


Figure 6-24 Removing silicone cap

Step 2: Insert and swirl the antenna stick clockwise to fix it on the cabinet port.

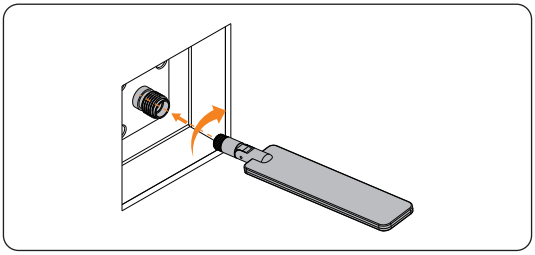


Figure 6-25 Installing antenna stick

Step 3: Fold the antenna up 90°.

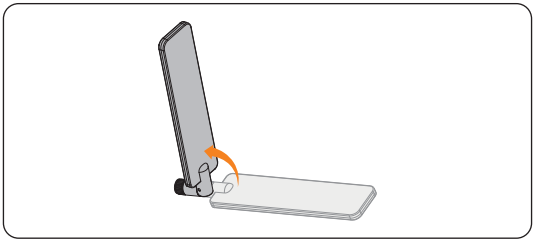


Figure 6-26 Folding up antenna stick

7 Electrical Connection

The system offers abundant terminals that can be connected to the grid for power supply and on/off-frid control, and connected to load, PCS or ESS, and other devices that are suitable for different scearios.

Here are the positions of the wired parts.

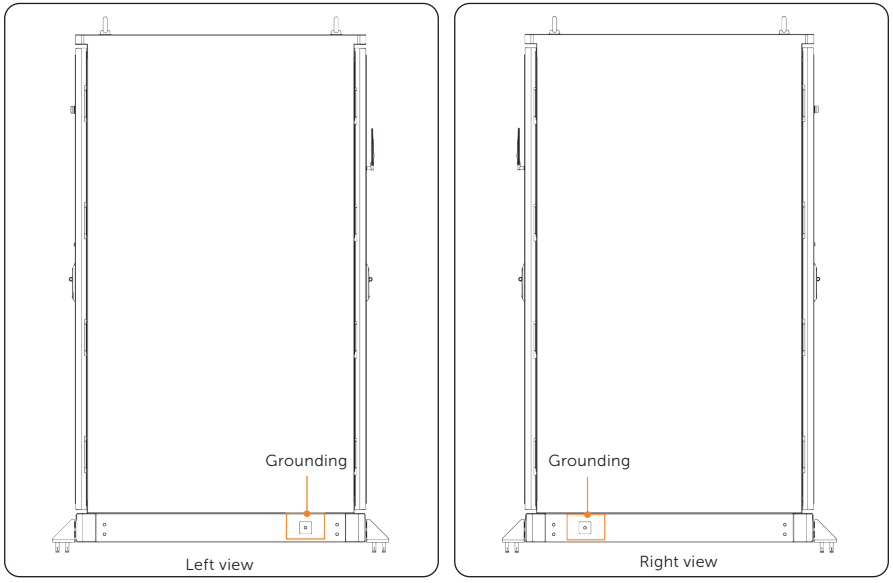


Figure 7-1 Position of the cabinet grounding terminals

- Front side of X3-PCAB-750kW-A and X3-PCAB-750kW-B

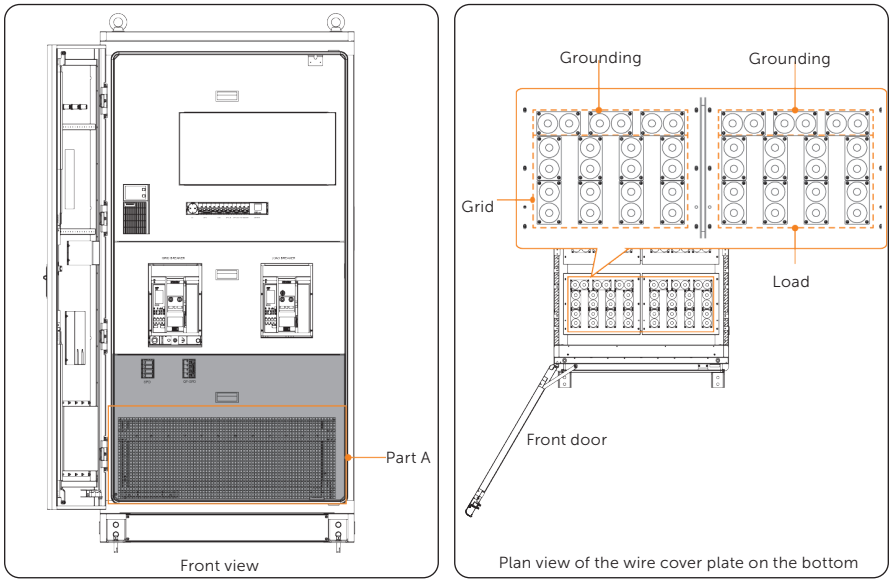


Figure 7-2 Position of grid and load connection terminals

- Rear side of X3-PCAB-750kW-A

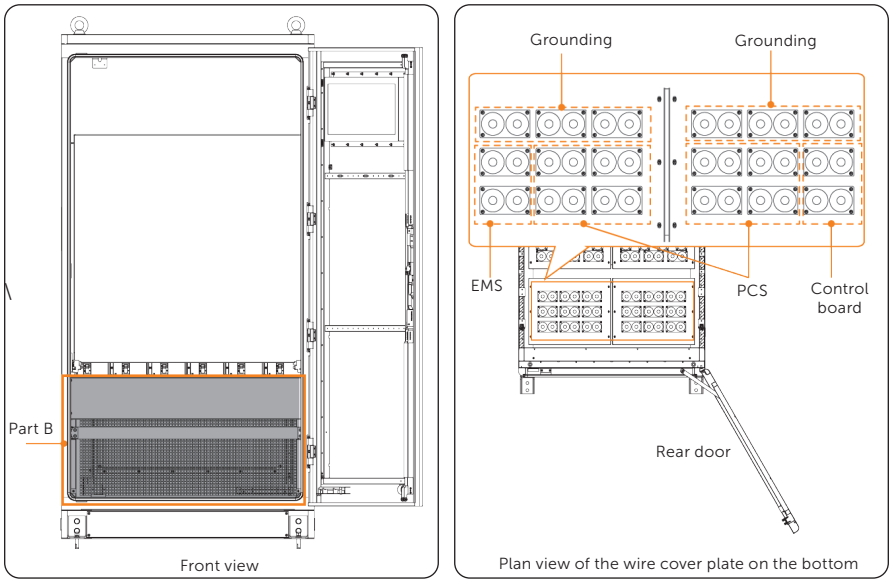


Figure 7-3 Position of PCS connection terminals

- Rear side of X3-PCAB-750kW-B

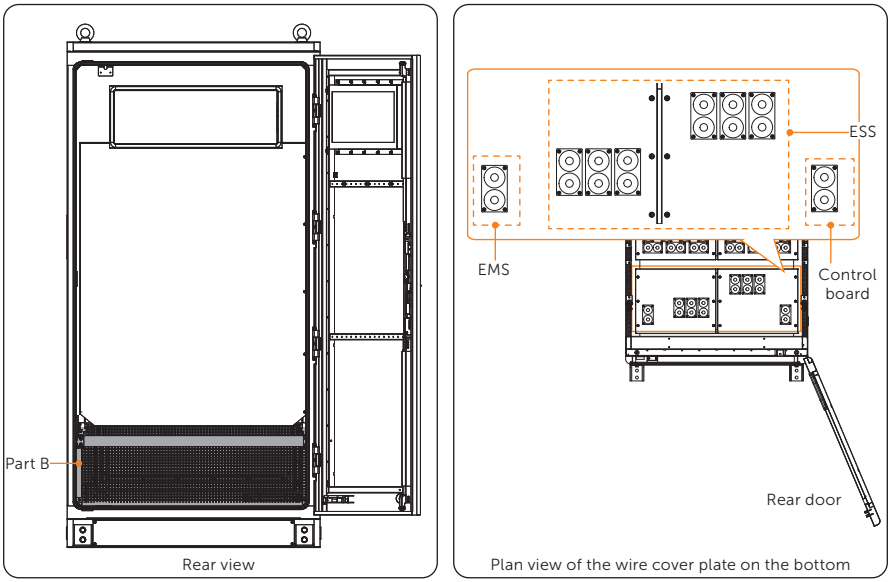


Figure 7-4 Position of ESS connection terminals

NOTICE!

- X3-PCAB-750kW-A and X3-PCAB-750kW-B share the same cabinet grounding, grid and load connection procedure, and only differs in PCS/ESS connection.

Table 7-1 Position of wired parts in the cabinet

Area	Position	Connection Type	Remarks
Part A	Next to the front door	Grid connection	PE bar and cable threading holes are reserved for both grid and load connection.
		Load connection	
Part B	Next to the rear door	PCS/ESS	PE bar and cable threading holes are reserved for PCS/ESS connection.
		EMS	/
		Control Board	
		Ethernet	

7.1 Preparing Cables

We recommend making all cables in advance before performing electric connection. For cable requirements, see "4.3 Additionally Required Materials".

7.1.1 Preparing PE cables

PE cables are required for cabinet and load grounding protection. The cable making procedure is the same for these two connection.

See the table below for requirements on details such as heat shrink tubing specification, jacket strip length and more.

Table 7-2 Requirements for making PE cables

Connection Type	Cable Specification	Jacket Stripe Length	Specification of Heat Shrink Tubing	Terminal Type (Recommended)
Cabinet	120 mm^2	30 mm	Diameter: Ø20-25 mm Length: 70-80 mm	TLK120-12
Load				TLK120-8

Step 1: Strip the outer jacket off the PE cable to an appropriate length.

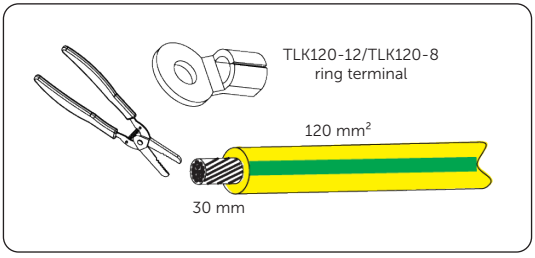


Figure 7-5 Striping cable jacket

Step 2: Cut a section of heat shrink tubing, thread it through the stripped cable, and then attach the ring terminal.

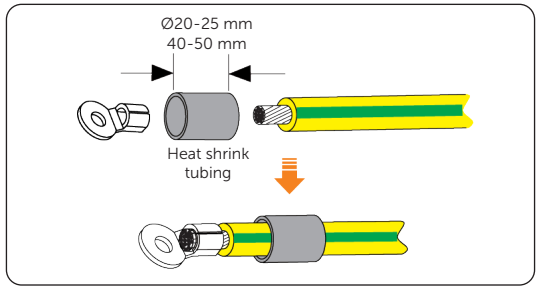


Figure 7-6 Attaching tubing and ring terminal

Step 3: Crimp the terminal, pull the heat shrink tubing to the crimped area, and then heat them with a heat gun.

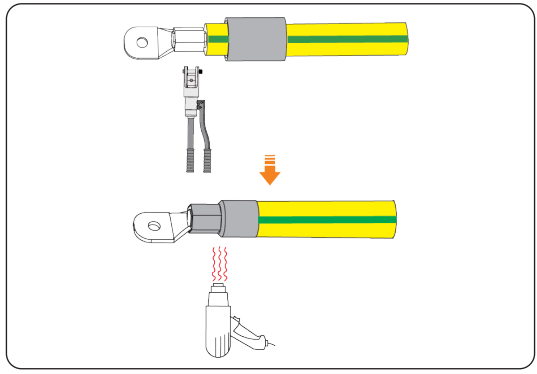


Figure 7-7 Crimping and heating

7.1.2 Preparing Power Cables

Prepare cables for connecting to the grid, load and PCS or ESS. The cable making procedure of these connections is the same. See the table below for details such as heat shrink tubing specification, jacket strip length and insulation strip length.

X3-PCAB-750kW-A

Table 7-3 Requirements for making power cables (1)

Connection Type	Ring Terminal Type (Recommended)	Jacket Stripe Length	Insulation Stripe Length	Specification of Heat Shrink Tubing
Grid	TLK240-12	700-800 mm	40 mm	Diameter: Ø30-35 mm Length: 80-90 mm
Load				
PCS (TRENE)	TLK70-8	500-600 mm	25 mm	Diameter: Ø20-25 mm Length: 60-70 mm
PCS (AELIO)	TLK35-8		20 mm	Diameter: Ø15-20 mm Length: 50-60 mm

X3-PCAB-750kW-B

Table 7-4 Requirements for making power cables (2)

Connection Type	Ring Terminal Type (Recommended)	Jacket Stripe Length	Insulation Stripe Length	Specification of Heat Shrink Tube
Grid	TLK240-12	700-800 mm	40 mm	Diameter: Ø30-35 mm Length: 80-90 mm
Load				
ESS				

NOTICE!

- We recommend conducting a health check for the grid cable before stripping it.
- Use controlled motion to strip the jacket and insulation layer to prevent damages on the wires.
- Make sure that the insulation layer has been stripped to a sufficient length so that the conductor is fully exposed without any damage or nicks. In addition, make sure that no extra insulation remains beyond the connector once it's crimped on.

Step 1: Stripe the outer jacket and insulation layer off the grid cable to an appropriate length.

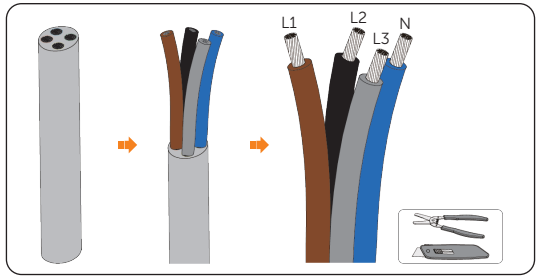


Figure 7-8 Striping wires

Step 2: Cut sections of heat shrink tubing, thread them through the stripped wires, and then attach the ring terminals.

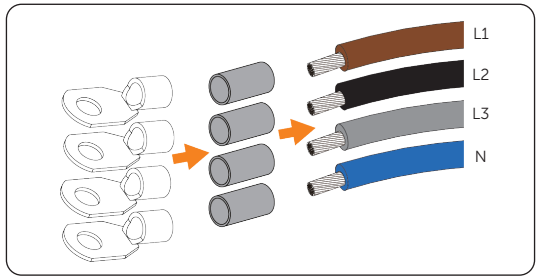


Figure 7-9 Attaching tubings and ring terminals

Step 3: Crimp the ring terminals with a hydraulic wire crimper.

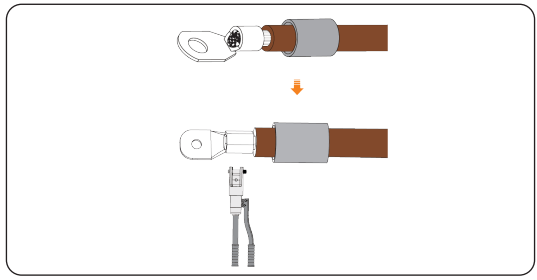


Figure 7-10 Crimping the wires and terminal

Step 4: Pull the heat shrink tubings to the crimped area, and then heat them with a heat gun.

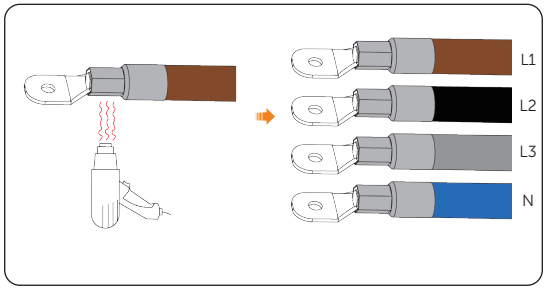


Figure 7-11 Heating the terminals

7.2 Grounding Connection

Ground the cabinet through the PE cable.

NOTICE!

- The cabinet offers 2 grounding terminals on the left and right side. Select either terminal to perform grounding.

Assemble the Dacromet M12*30 screw, Dacromet M12 spring washer, and Dacromet M12 flat washer, hammer in the combination screw into the terminal, and then secure it.

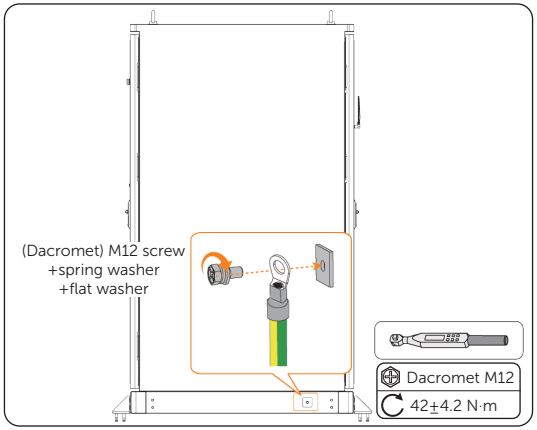


Figure 7-12 Cabinet grounding

7.3 Grid Connection

Connect the system to the grid for power supply and on/off grid control.

Step 1: Use an Allen key and a door key to open the rear door.

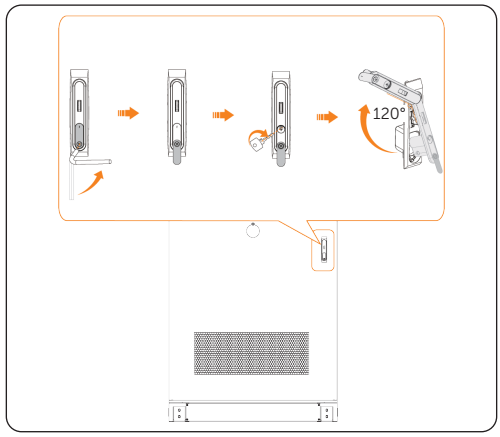


Figure 7-13 Opening the front door

Step 2: Insert the limiting rod into the limiting holes of the cabinet.

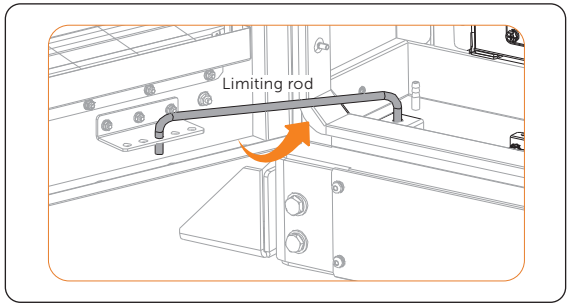


Figure 7-14 Placing the limiting rod

Step 3: Unscrew the M5 screws, and then remove the front cable cover.

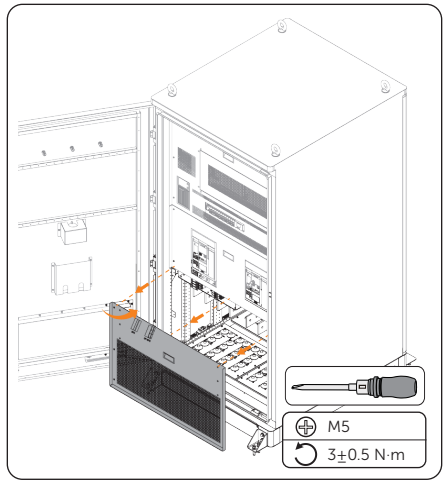


Figure 7-15 Removing the front cable cover

Step 4: Unscrew the M6 screws on the sides of the wire cover plate for grid connection, and then cut through the rubber seals.

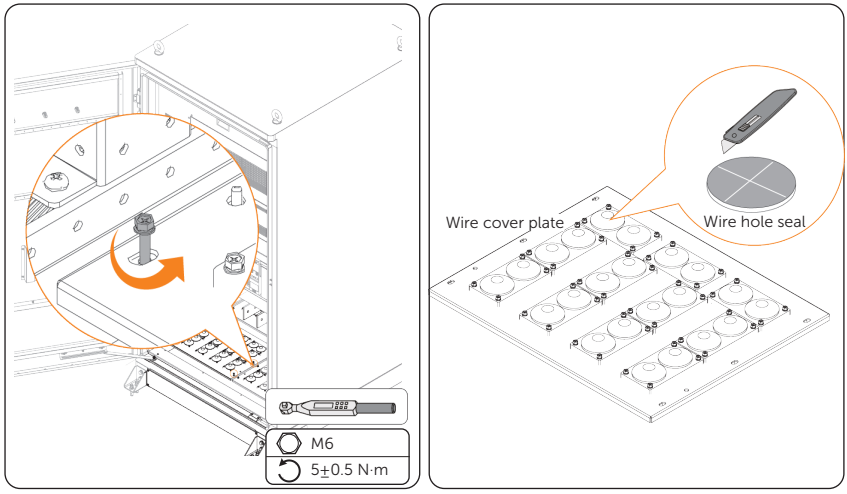


Figure 7-16 Cutting through wire hole seals

Step 5: Lift up the wire cover plate, thread the power wires through the plate holes.

Step 6: Assemble M12 screw, M12 spring washer and M12 flat washer, and then use the assembled screw to secure the power wire onto the terminal block.

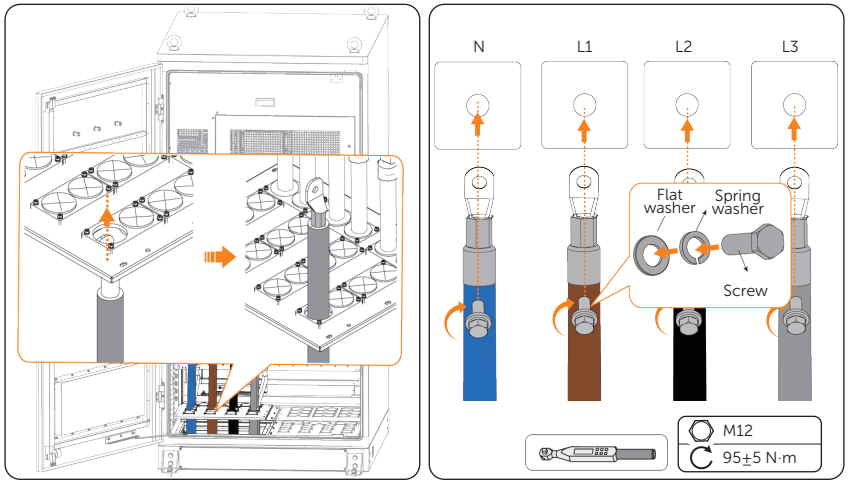


Figure 7-17 Threading and securing cables

Step 7: Pull down the wire cover plate to cabinet rack, and then use the original M6 screws to secure the plate onto the cabinet.

Step 8: Attach fireproof mud to seal the cable threading holes on the plate.

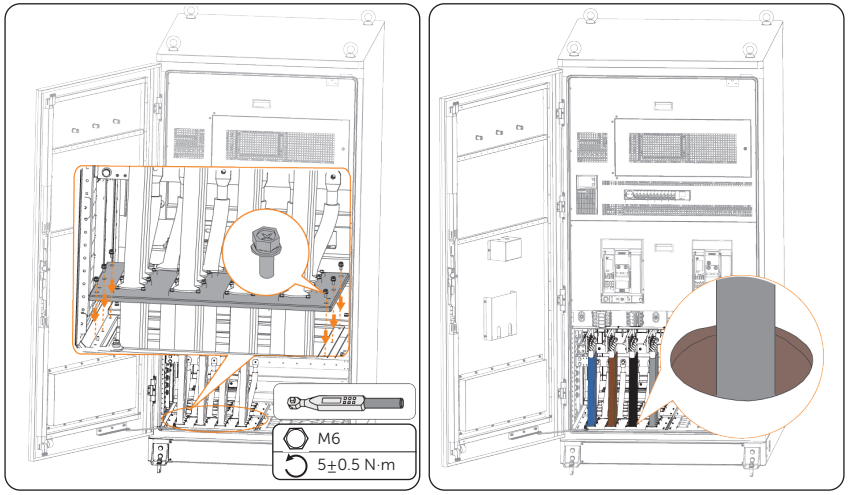


Figure 7-18 Securing plate and attaching fireproof mud

7.4 Load Connection

Step 1: Unscrew the M6 screws on the sides of the wire cover plate for load connection, and then cut through the rubber seals.

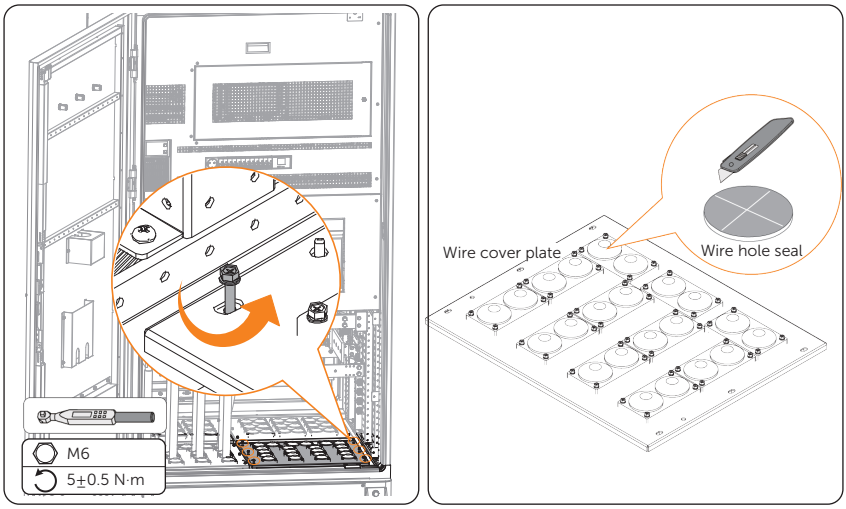


Figure 7-19 Cutting through wire hole seals

Step 2: Lift up the wire cover plate, and then thread the PE cables and power cables for load in sequence.

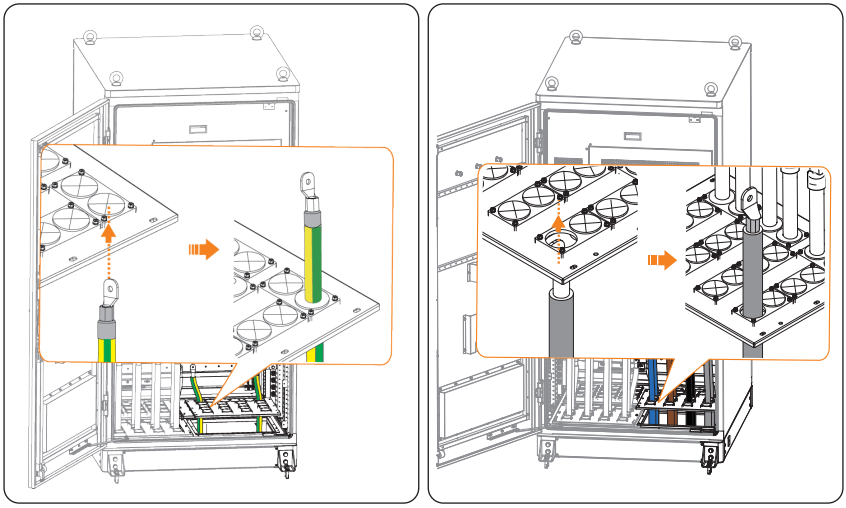


Figure 7-20 Threading through cables

Step 3: Assemble the M8 flat washer, M8 spring washer and M8 screw, and then use the assembled screw to secure the PE cable onto the PE bar.

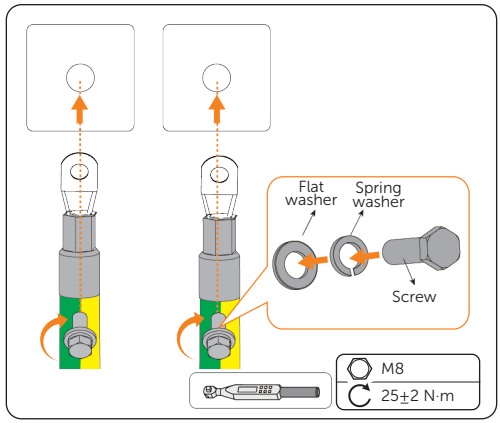


Figure 7-21 Securing the PE cable for load

Step 4: Assemble the M12 flat washer, M12 spring washer and M12 screw into a combination screw, assemble the M12 flat washer and M12 nut into a combination nut, and then use the assembled screw to secure the power wire onto the terminal block.

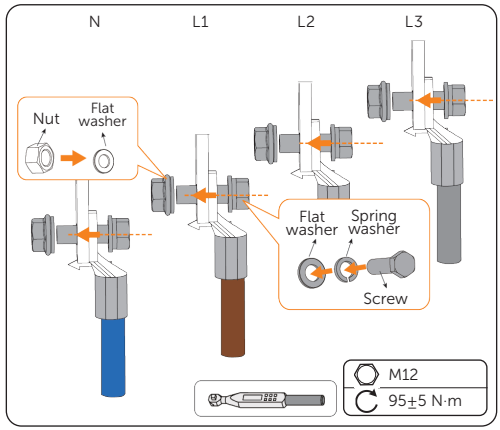


Figure 7-22 Securing the power cables for load

Step 5: Pull down the wire cover plate to cabinet rack, and then use the original M6 screws to secure the plate onto the cabinet.

Step 6: Attach fireproof mud to seal the cable threading holes on the plate.

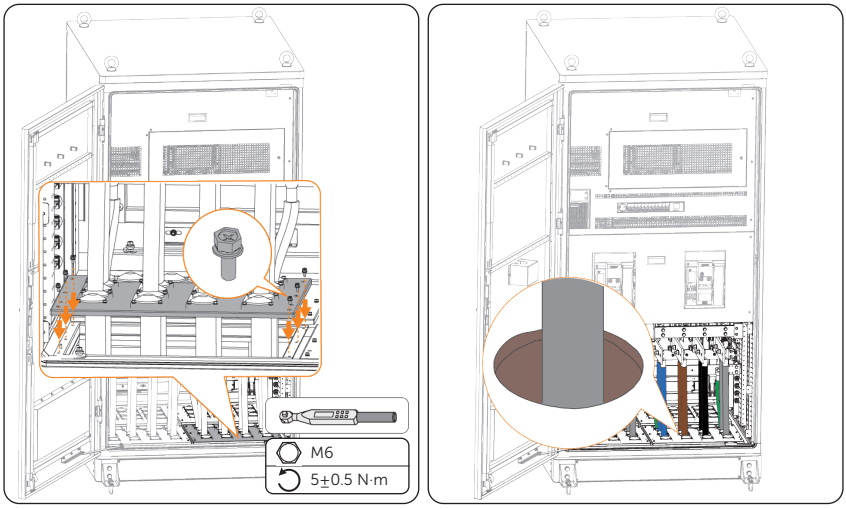


Figure 7-23 Securing plate and attaching fireproof mud

7.5 PCS Connection (X3-PCAB-750kW-A)

The system is compatible with both AELIO and TRENE energy storage systems. Connect the PCSs in the two systems to the switching cabinet for on/off-grid control.

NOTICE!

- This manual only introduces the connection between the switching cabinet and PCS of the energy storage system. For parallel connection among PCSs of the energy storage systems, see the *User Manual* of the corresponding system.

NOTICE!

- For AELIO system, the cable for PCS connection is 35mm^2; for TRENE system, the cable for PCS connection is 70mm^2.
- The wiring steps of the two types of cables only differ in the number of wires connected to each terminal. The identical wiring steps use 50mm^2 power cables for example.
- Users can decide how do they distribute the connection terminal and wires.

Table 7-5 PCS power and cable specification

No.	Rated Power of PCS	Cable Specification Required	Quantity
1	≤60 kW	35 mm^2 cooper wire	Up to 10 groups
2	60–125 kW	70 mm^2 cooper wire	Up to 6 groups

Step 1: Use an Allen key and a door key to open the rear door.

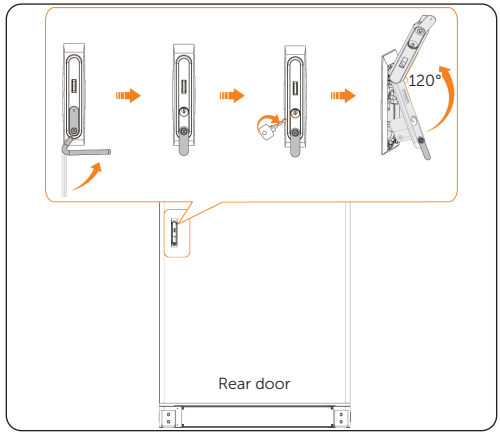


Figure 7-24 Opening the rear door

Step 2: Insert the limiting rod into the limiting holes of the cabinet.

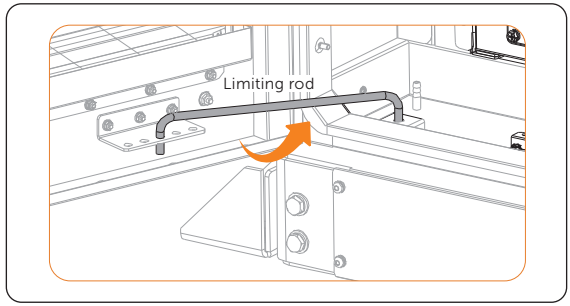


Figure 7-25 Placing the limiting rod

Step 3: Unscrew the M5 screws on the rear cable cover, and then remove the cover.

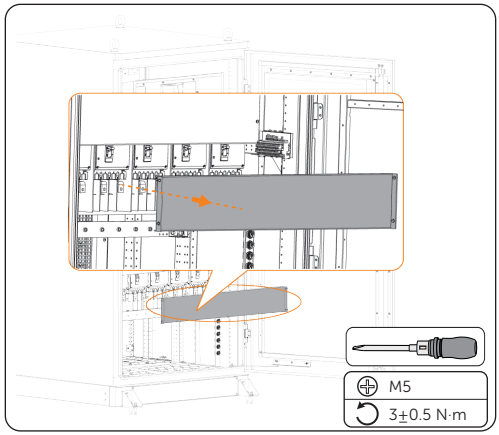


Figure 7-26 Removing the rear cover

Step 4: Unscrew the M6 screws on the sides of the wire cover plate for PCS connection, and then cut through the rubber seals.

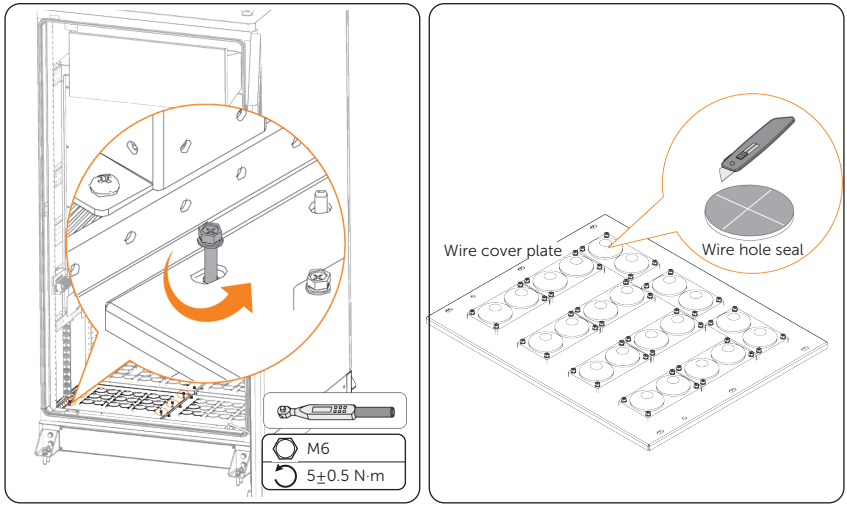


Figure 7-27 Cutting through wire hole seals

Step 5: Lift up the wire cover plate, and then thread the power cables through the holes.

NOTICE!

- For AELIO system, several wires might share a cable threading hole. Please properly distribute the cable threading holes according to on-site conditions.

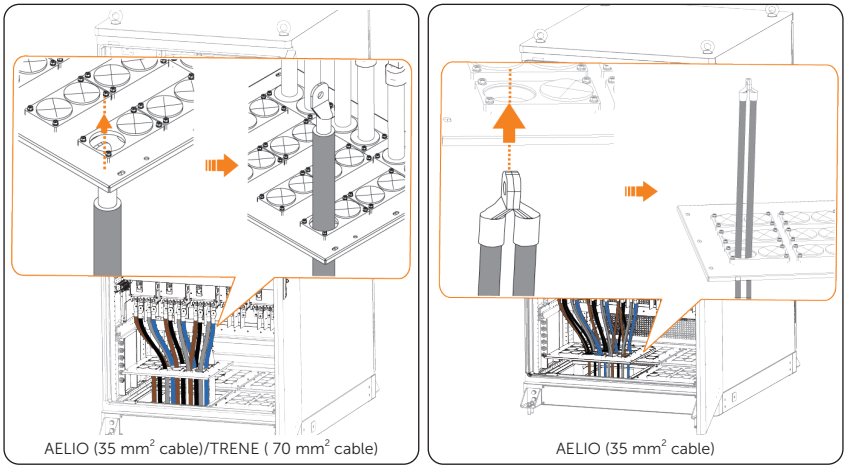


Figure 7-28 Threading through cables

Step 6: Assemble the M8 screw, spring washer and flat washer into a combination screw, and assemble the M8 flat washer and nut into a combination nut, and then use them to secure the wire onto the terminal block.

» For AELIO system, if more than 6 cabinets are connected, some terminal blocks might be connected to two wires at one time.

» For TRENE system, one terminal block will only be connected to one wire.

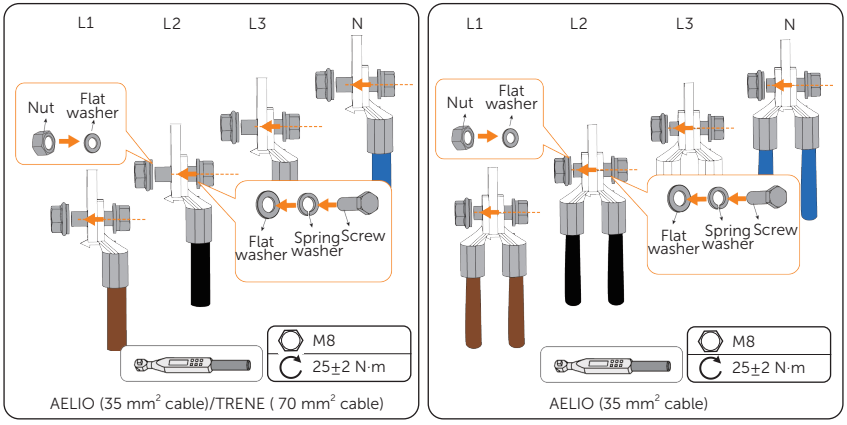


Figure 7-29 Securing cables

Step 7: Pull down the wire cover plate to cabinet rack, and then use the original M6 screws to secure the plate onto the cabinet.

Step 8: Attach fireproof mud to seal the cable threading holes on the plate.

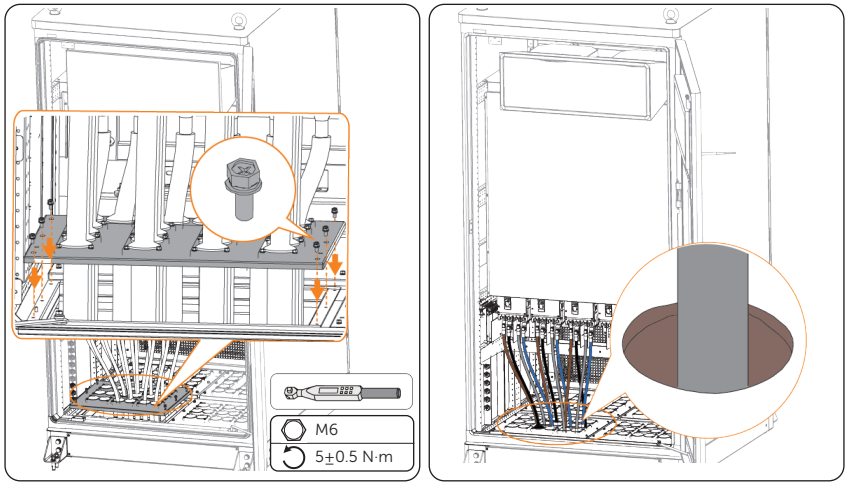


Figure 7-30 Securing plate and attaching fireproof mud

Step 9: Repeat Step 3 to Step 7 to connect the power cables for PCSs at the right side.

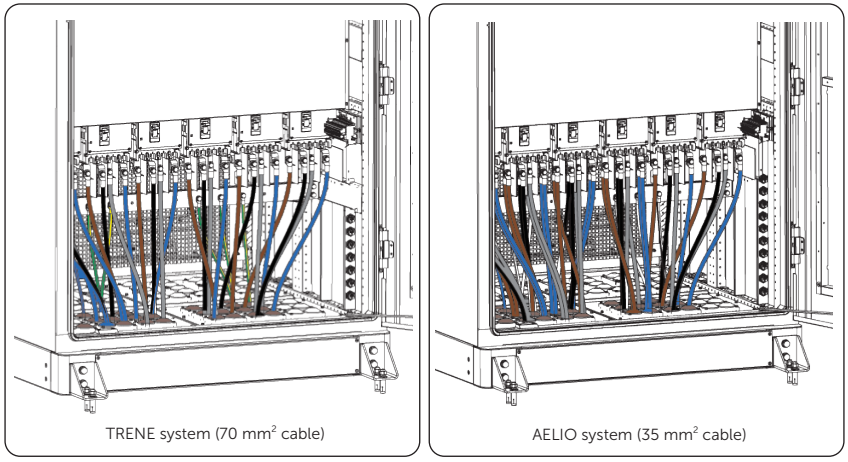


Figure 7-31 PCS connection completed

7.6 ESS Connection (X3-PCAB-750kW-B)

Connect the cabinet to ESS for power flow and on/off-grid mode switching.

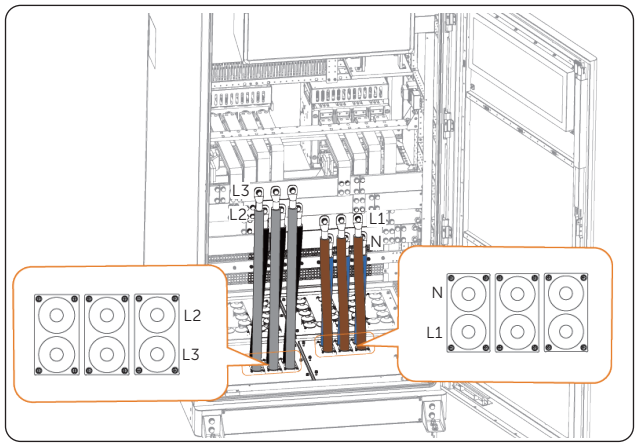


Figure 7-32 Terminal bar distribution for ESS connection

NOTICE!

- The sequence of the terminal bar for ESS connection is N, L1, L2 and L3 from the inside out.

Step 1: Use an Allen key and a door key to open the rear door.

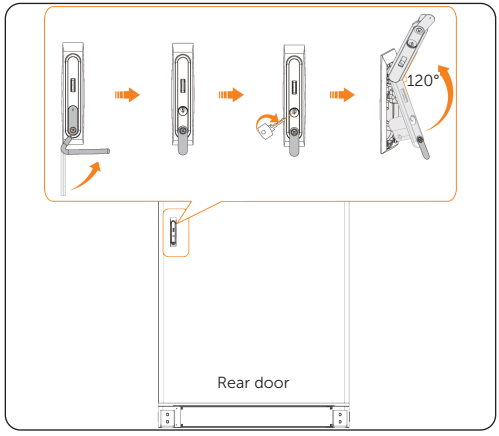


Figure 7-33 Opening the rear door

Step 2: Insert the limiting rod into the limiting holes of the cabinet.

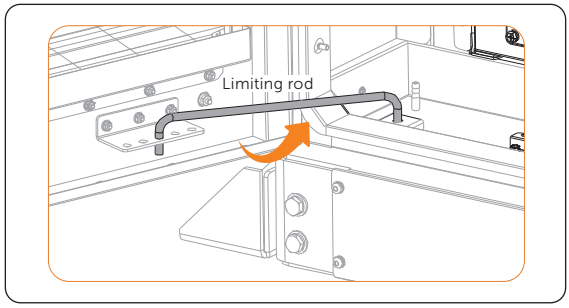


Figure 7-34 Placing the limiting rod

Step 3: Unscrew the M5 screws on the rear cable cover, and then remove the cover.

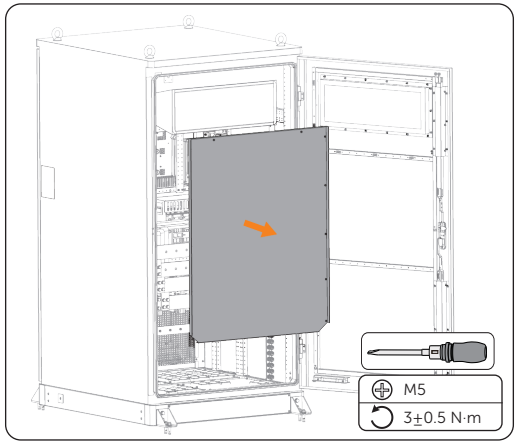


Figure 7-35 Removing the rear cover

Step 4: Unscrew the M6 screws on the left side of the wire cover plate for L2 and L3 connection, and then cut through the rubber seals.

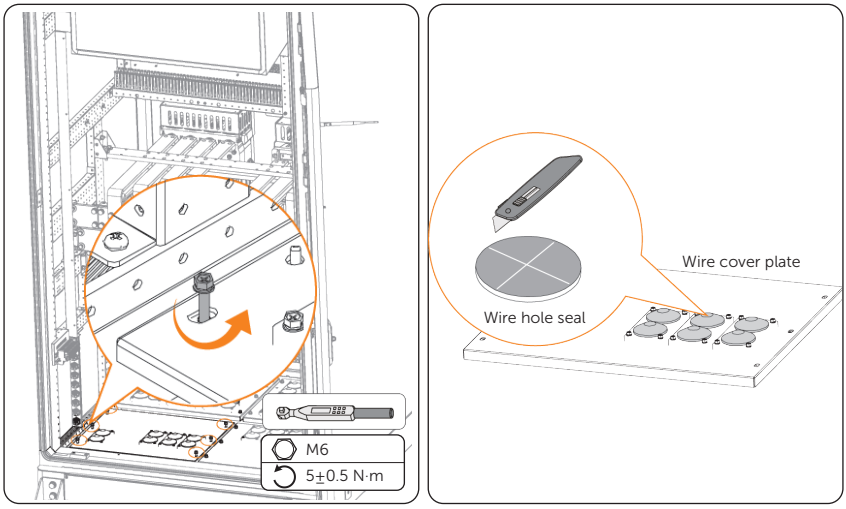


Figure 7-36 Cutting through wire hole seals

Step 5: Lift up the wire cover plate, and then thread the L2 and L3 through the holes.

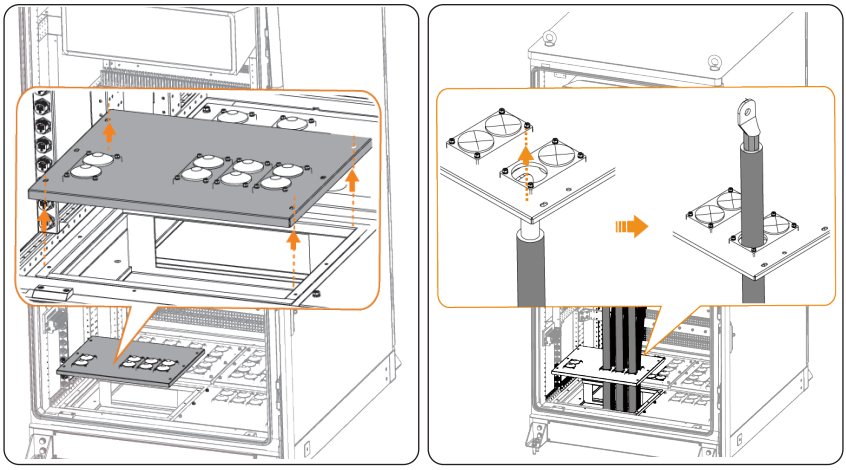


Figure 7-37 Threading through L2 and L3 cables

Step 6: Assemble M12 screw, M12 spring washer and M12 flat washer, and then use the assembled screws to secure L2 and L3 onto the terminal block.

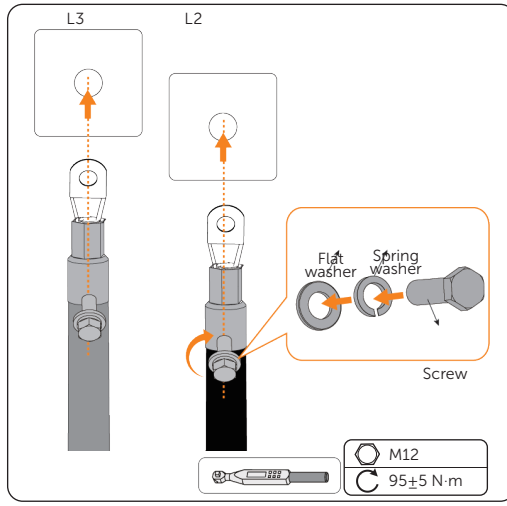


Figure 7-38 Securing L2 and L3

Step 7: Pull down the wire cover plate to cabinet rack, and then use the original M6 screws to secure the plate onto the cabinet.

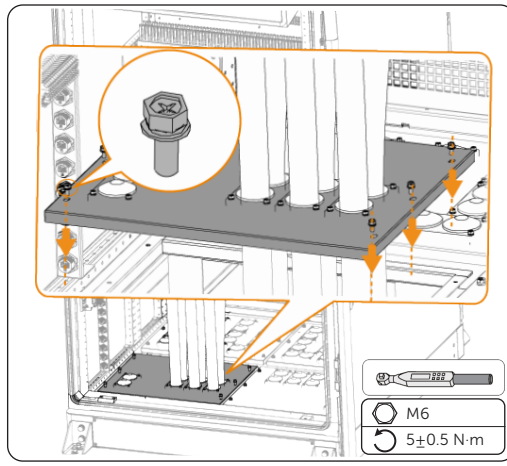


Figure 7-39 Securing plate

Step 8: Unscrew the M6 screws on the right side of the wire cover plate for N and L1 connection, and then cut through the rubber seals.

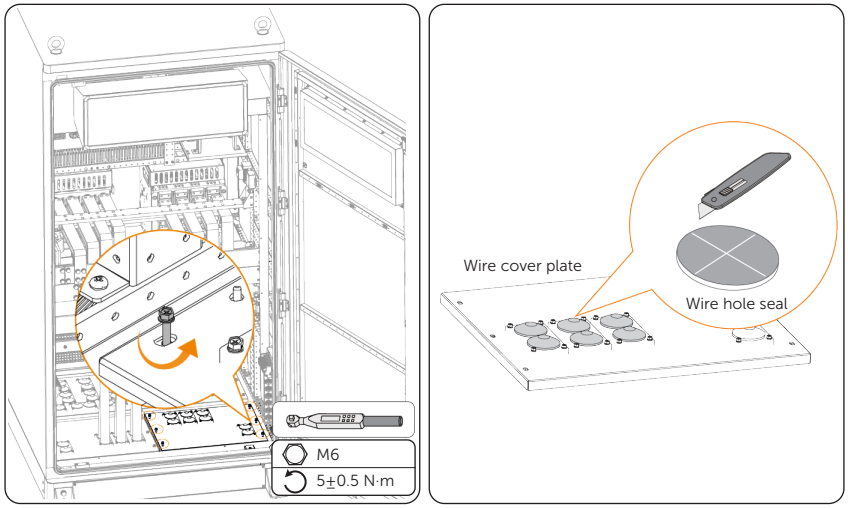


Figure 7-40 Cutting through wire hole seals

Step 9: Lift up the wire cover plate, and then thread the N and L1 through the holes.

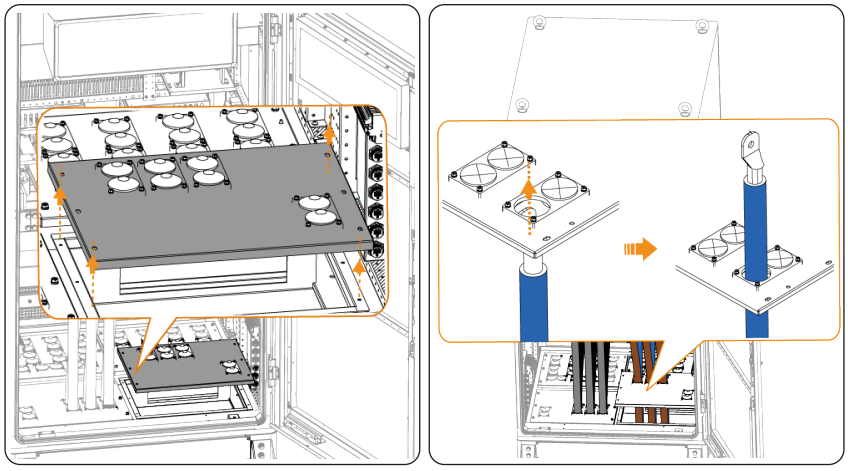


Figure 7-41 Threading through N and L1 cable

Step 10: Assemble M12 screw, M12 spring washer and M12 flat washer, and then use the assembled screws to secure N and L1 onto the terminal block.

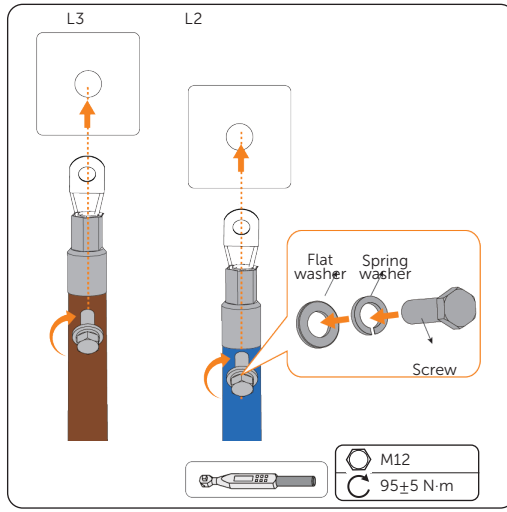


Figure 7-42 Securing L2 and L3

Step 11: Pull down the wire cover plate to cabinet rack, and then use the original M6 screws to secure the plate onto the cabinet.

Step 12: Attach fireproof mud to seal the cable threading holes on the plate.

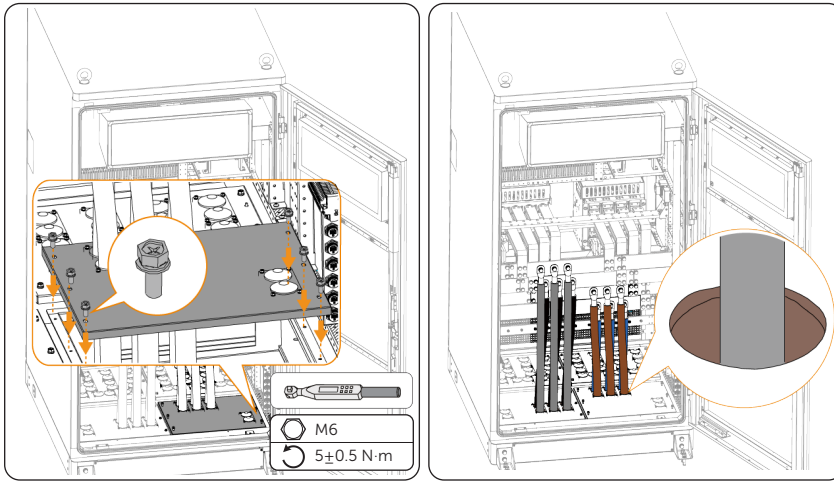


Figure 7-43 Securing plate and attaching fireproof mud

7.7 Communication Connection

Connect the PCS of the energy storage system to the control board of the switching cabinet for data acquisition, to EMS for data transmission and system management, and to the Ethernet port for network connection.

7.7.1 Grid-connected Meter Connection

Connect the grid-connected meter to EMS adapter terminal block (XT6) for energy flow control of the entire system.

Table 7-6 XT6 pin definition

No.	Marking	Description	No.	Marking	Description
1	EMS: A1	Connected to SolaX MEGA and Forth PV inverters	10	EMS: A6	Reserved
2	EMS: B1		11	EMS: B6	
3	EMS: G1		12	EMS: G6	
4	EMS: A4	Connected to diesel generator through communication mode	13	EMS: A8	Connected to grid-connected meter
5	EMS: B4		14	EMS: B8	
6	EMS: G4		15	EMS: G8	
7	EMS: A5	Connected to third-party PV inverters	16	EMS: DO8+	Connected to diesel generator through dry contact
8	EMS: B5		17	EMS: DO8-	
9	EMS: G5		18	EMS: DI6	
			19	EMS: DI COM	

NOTICE!

- DTSU666 is used for wiring procedure illustration.
- This meter model includes a communication cable upon delivery.

Table 7-7 Corresponding terminals of AC Switching Cabinet and DTSU666

XT6 terminal of EMS1000		RS485 terminal of DTSU666	
Marking	Pin assignment	Marking	Pin assignment
EMS: A8	RS485A	24	RS485A
EMS: B8	RS485B	25	RS485B

Step 1: Strip the communication cable to an appropriate length at both ends.

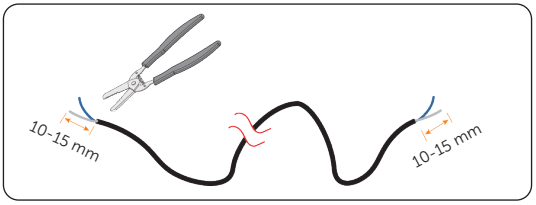


Figure 7-44 Stripping the communication cable

Step 2: Insert one end of the cable into the KST E0508 ferrules, and then use a crimping tool for ferrule to crimp them.

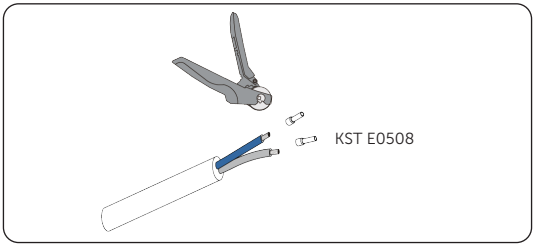


Figure 7-45 Attaching the ferrules

Step 3: Insert the ferrules respectively into 13 and 14 terminals of XT6 in sequence.

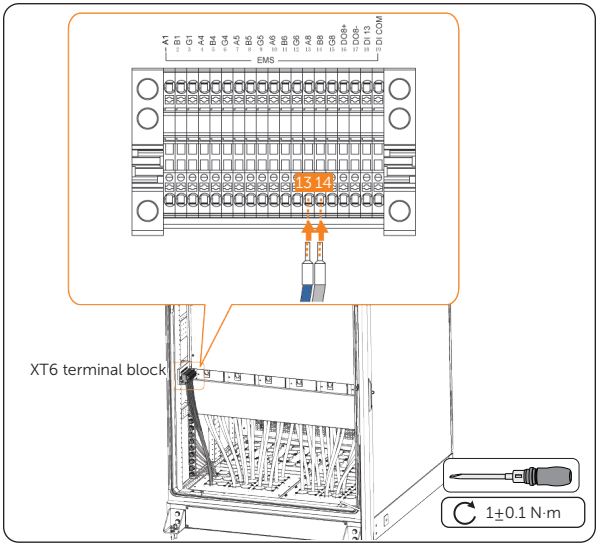


Figure 7-46 Connecting the switching cabinet

Step 4: Insert the other end of the conductors respectively into port 24 and 25 of the meter.

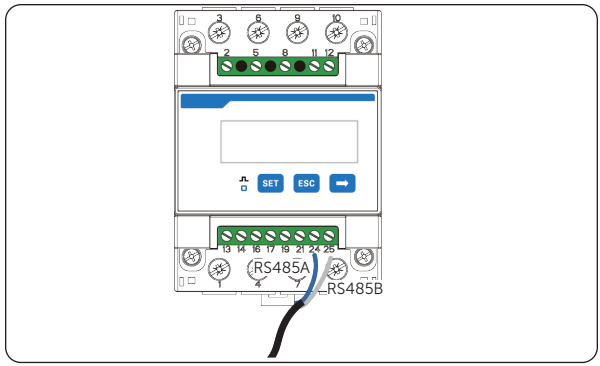


Figure 7-47 Connecting the meter

7.7.2 Control Board Connection

Connect the energy storage cabinets to the control board adapter terminal block (XT7) for management.

Table 7-8 XT7 pin definition

No.	Marking	Description	No.	Marking	Description
1	GND_SELV	For parallel connection with TRENE systems (excluding TRENE-P100B215I)	11	DO_1	Reserved
2	ARM_PARA_A		12	DO_2	
3	ARM_PARA_B		13	PCS_DO_1	
4	PARA_CANH		14	PCS_DO_2	
5	PARA_CANL		15	R1+	For resistor connection when connected to AELIO systems
6	PARA_50HZ		16	R2+	
7	PARA_SYNC		17	R1-	
8	GND_SELV		18	R2-	
9	PCS_485A	For parallel connection with AELIO systems and TRENE-P100B215I			
10	PCS_485B				

Terminals for control board connection are different for TRENE and AELIO systems.

Table 7-9 Corresponding terminals for control board connection

Energy Storage System			AC Switching Cabinet		/
Model	PCS Terminal No./Type		Control Board Terminal No./ Type		Cable Type
TRENE system	Parallel COM-1	RJ45	XT7:1-8	KST E0308	Network cable
AELIO system	COM1-PARALLEL 2 (PIN1&PIN2)		XT7: 9/10		Network cable
TRENE-P100B215I	PARALLEL COM (485A1&485B1)		XT7: 9/10		COM cable

Connection to TRENE System

Step 1: Strip the outer jacket off the network cable to an appropriate length at both ends.

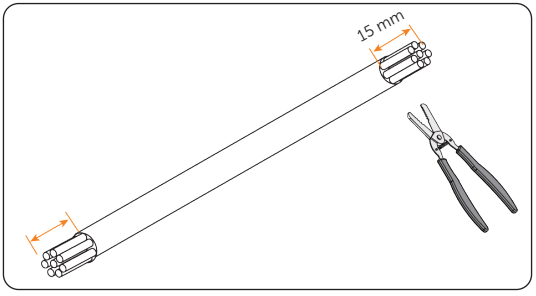
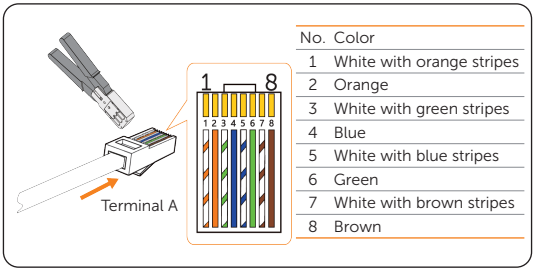


Figure 7-48 Stripping cable

Step 2: Insert the wires of one cable end (terminal A) into the pin contacts of the RJ45 connector in sequence, and then use a crimping tool to securely crimp the wires into the connector.



No.	Color
1	White with orange stripes
2	Orange
3	White with green stripes
4	Blue
5	White with blue stripes
6	Green
7	White with brown stripes
8	Brown

Figure 7-49 Crimping RJ45

Step 3: Insert the wires of the other cable end (Terminal B) into the KST E0308 ferrules , and then use a crimping tool for ferrule to crimp them.

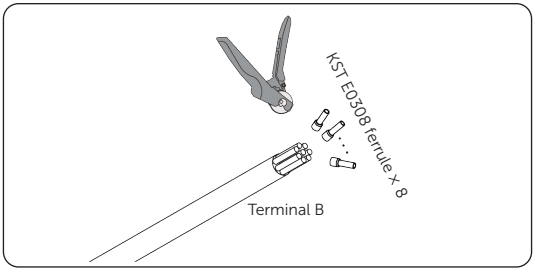


Figure 7-50 Crimping ferrules

Step 4: Insert terminal A with an RJ45 connector into PARALLEL COM-1 of TRENE energy storage system, and then thread the cable out of the cabinet through the cable threading hole.

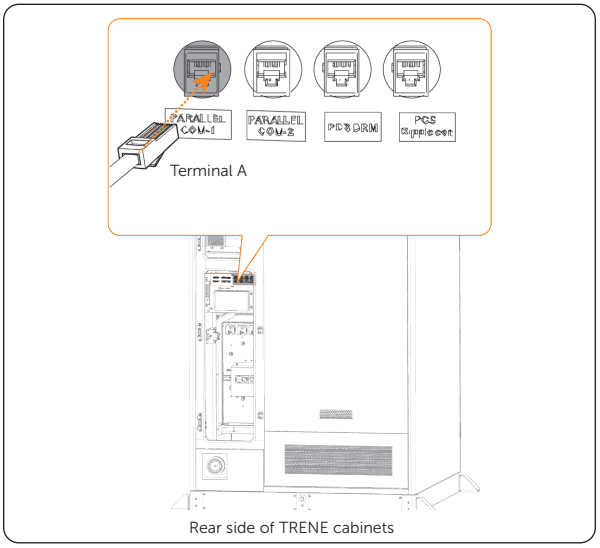


Figure 7-51 Connection to TRENE system

Step 5: Thread the cable into the switching cabinet through the wiring cover plate, and then insert terminal B with KST E0308 ferrules into 1 to 8 terminals of XT7 terminal block in sequence.

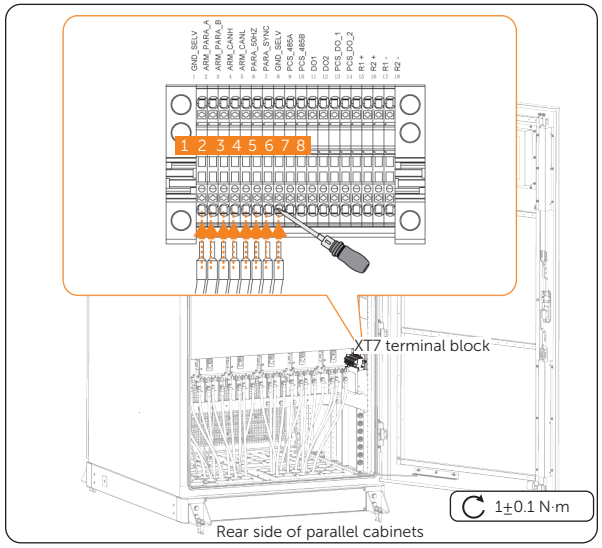


Figure 7-52 Connection to the switching cabinet

Connection to AELIO System

Step 1: Strip the outer jacket and insulation layer off the network cable to an appropriate length at both ends.

NOTICE!
• Only PIN1 and PIN2 will be connected. Please perform insulation treatment for unconnected wires.

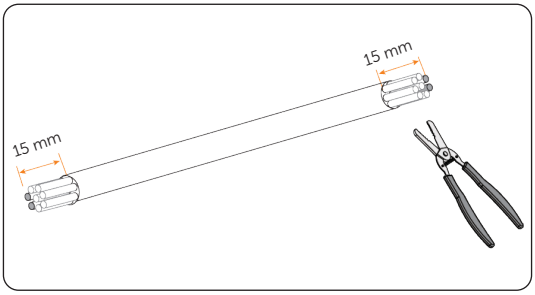


Figure 7-53 Stripping cable

Step 2: Insert the two wires of one cable end (terminal A) into the pin contacts of the

RJ45 connector in sequence, and then use a crimping tool to securely crimp the wires into the connector.

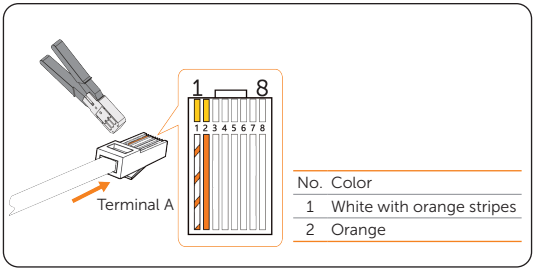


Figure 7-54 Crimping RJ45

Step 3: Insert the two wires of the other cable end (Terminal B) into the KST E0308 ferrules, and then use a crimping tool for ferrule to crimp them.

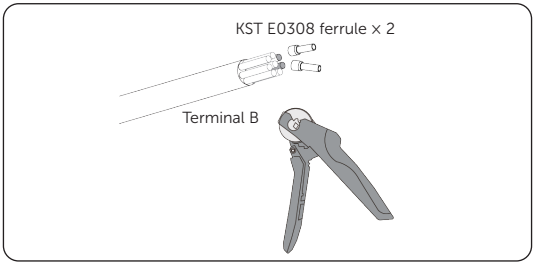


Figure 7-55 Crimping ferrules

Step 4: Insert terminal A with an RJ45 connector into COM1-PARALLEL 2 of AELIO energy storage system, and then thread the cable out of the cabinet through the cable threading hole.

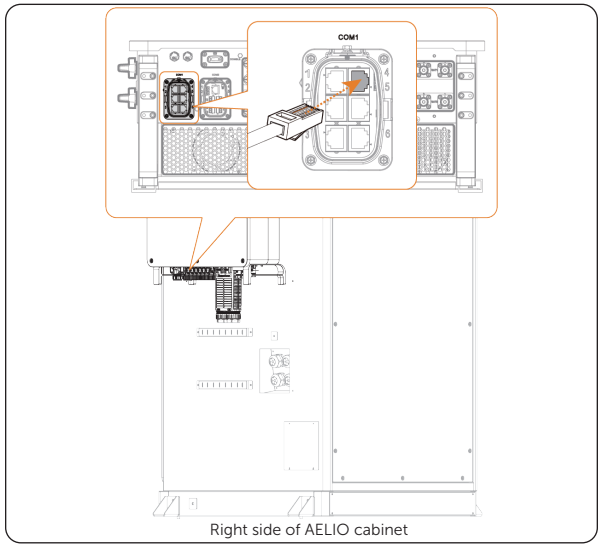


Figure 7-56 Connection to AELIO system

Step 5: Thread the cable into the switching cabinet through the wiring cover plate, and then insert terminal B with KST E0308 ferrules into 9 and 10 terminals of XT7 terminal block in sequence.

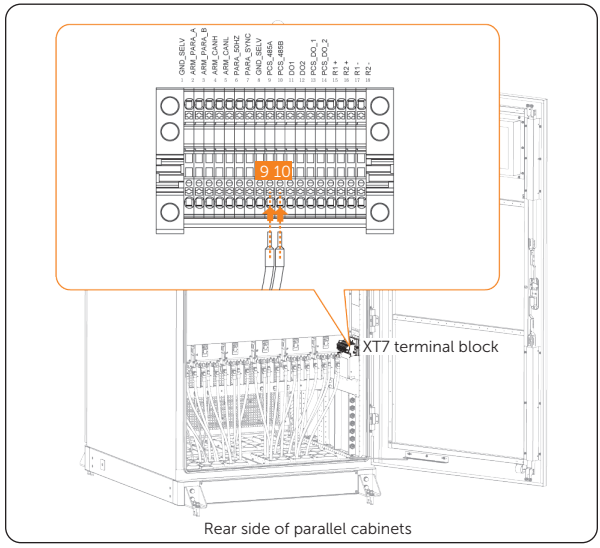


Figure 7-57 Connection to the switching cabinet

Connection to TRENE-P100B215I System

Step 1: Strip the outer jacket and insulation layer off the communication cable to an appropriate length at both ends.

NOTICE!

- If multi-core cable is used, please perform insulation treatment for unconnected wires.

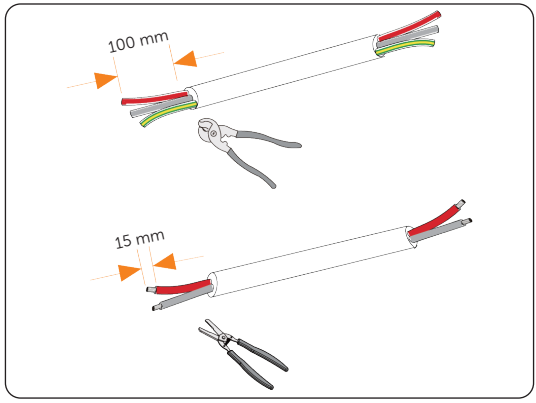


Figure 7-58 Stripping cable

Step 2: Insert the two wires at each end into the KST E0308 ferrules, and then use a crimping tool for ferrule to crimp them.

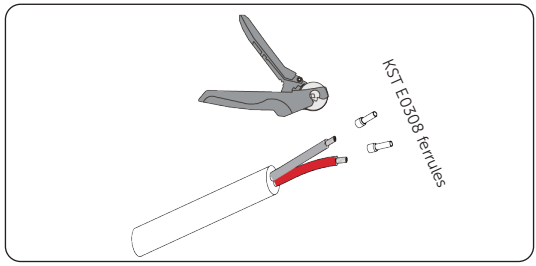


Figure 7-59 Crimping ferrules

Step 3: Insert the wires at one end of the cable into PARALLEL COM A1 and B1 port of TRENE-P100B215I, and then thread the cable out of the cabinet through the cable threading hole.

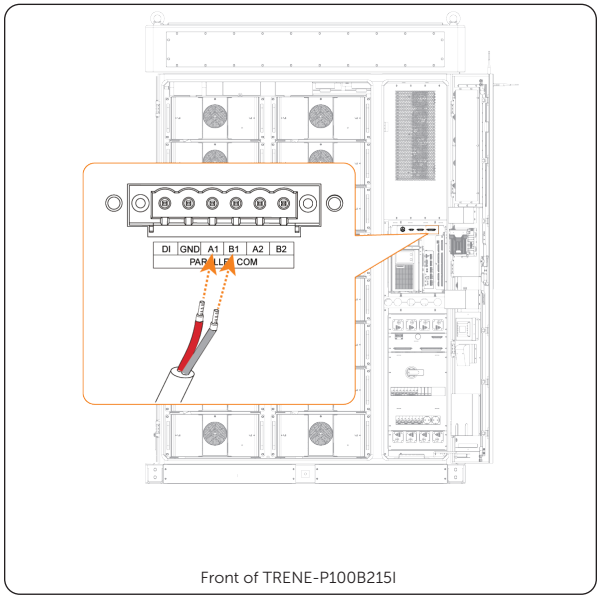


Figure 7-60 Connection to TRENE-P100B215I

Step 4: Thread the cable into the switching cabinet through the wiring cover plate, and then insert the wires at the other end of the cable into 9 and 10 terminals of XT7 terminal block.

NOTICE!
• The wire sequence of 485A and 485B must be consistent in two cabinets.

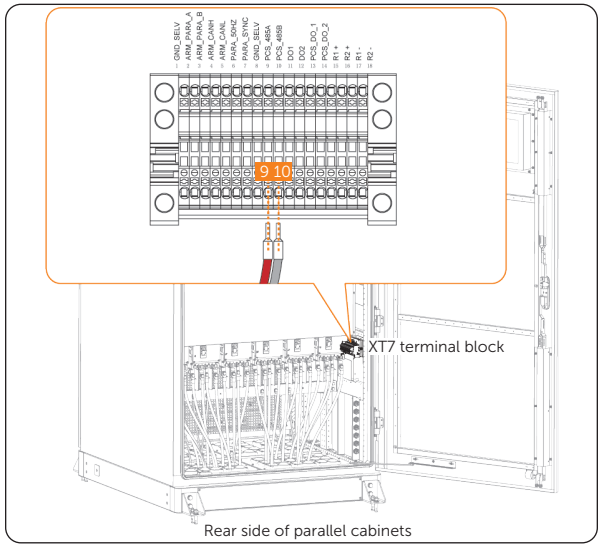


Figure 7-61 Connection to the switching cabinet

7.7.3 Power Control Hub Connection

The switching cabinet offers 11 terminals (Hereinafter referred to as "HUB 1") for pwoer control of the energy storage systems on the left side of the cabinet rear.

Energy Storage System			AC Switching Cabinet		/
Model	EMS Port No.	Terminal Type	HUB No.		Cable Type
TRENE AELIO TRENE-P100B215I	NET2	RJ45	HUB 1 (Port 1-11)	RJ45	Network cable

NOTICE!

- The connection procedure for the above 3 energy storage systems are the same.

Step 1: Prepare enough network cables based on on-site conditions.

a. Strip the outer jacket off the network cable to an appropriate length at both ends.

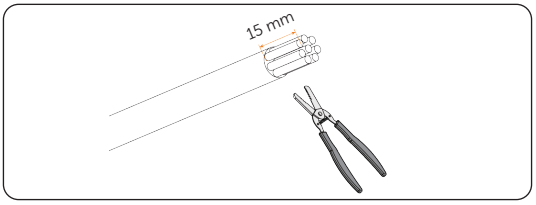
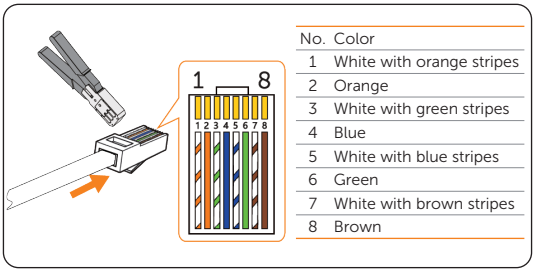


Figure 7-62 Stripping cable jacket

b. Insert the wires into the pin contacts of the RJ45 connector in sequence, and then use a crimping tool to securely crimp the wires into the connector.



No.	Color
1	White with orange stripes
2	Orange
3	White with green stripes
4	Blue
5	White with blue stripes
6	Green
7	White with brown stripes
8	Brown

Figure 7-63 Crimping RJ45

Step 2: Insert the RJ45 connector at one end of the network cable into NET2 of EMS in the energy storage cabinet, and then thread the cable out of the cabinet through the cable threading hole.

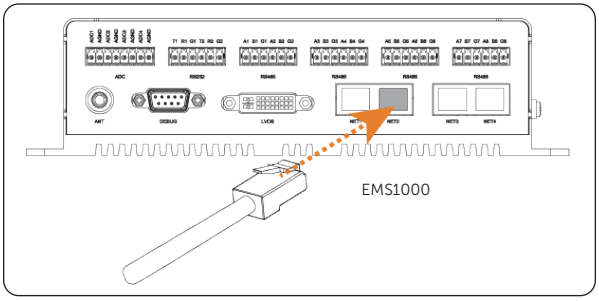


Figure 7-64 Connection to EMS1000

Step 3: Thread the RJ45 connector at the other end of the network cable into HUB 1 of the switching cabinet through the wiring cover plate.

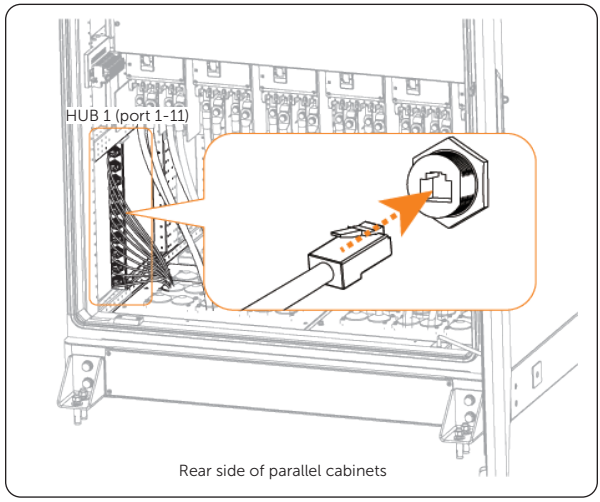


Figure 7-65 Connection to the switching cabinet

7.7.4 Data Exchange Hub Connection

The switching cabinet offers 11 terminals (Hereinafter referred to as "HUB 2") for data exchange with the energy storage systems on the right side of the cabinet rear.

Table 7-10 Corresponding terminals for LAN connection

Energy Storage System			AC Switching Cabinet		/
Model	EMS Port No.	Terminal Type	HUB No.		Cable Type
TRENE system AELIO system TRENE-P100B215I	NET4	RJ45	HUB 2 (Port 1-11)	RJ45	Network cable

NOTICE!

- The connection procedure for the above 3 energy storage systems are the same.

Step 1: Prepare enough network cables based on on-site conditions.

a. Strip the outer jacket off the network cable to an appropriate length at both ends.

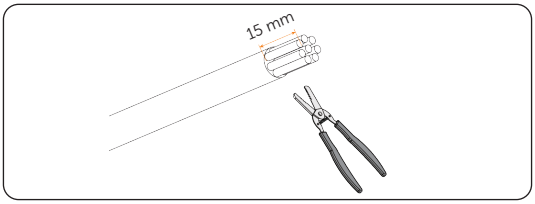
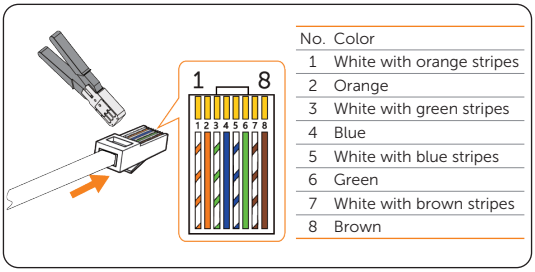


Figure 7-66 Stripping cable jacket

b. Insert the wires into the pin contacts of the RJ45 connector in sequence, and then use a crimping tool to securely crimp the wires into the connector.



No.	Color
1	White with orange stripes
2	Orange
3	White with green stripes
4	Blue
5	White with blue stripes
6	Green
7	White with brown stripes
8	Brown

Figure 7-67 Crimping RJ45

Step 2: Insert the RJ45 connector at one end of the network cable into NET4 of EMS in the energy storage cabinet, and then thread the cable out of the cabinet through the cable threading hole.

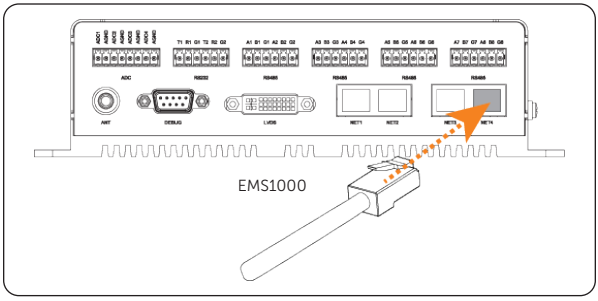


Figure 7-68 Connection to EMS1000

Step 3: Thread the RJ45 connector at the other end of the network cable into HUB 2 of the switching cabinet through the wiring cover plate.

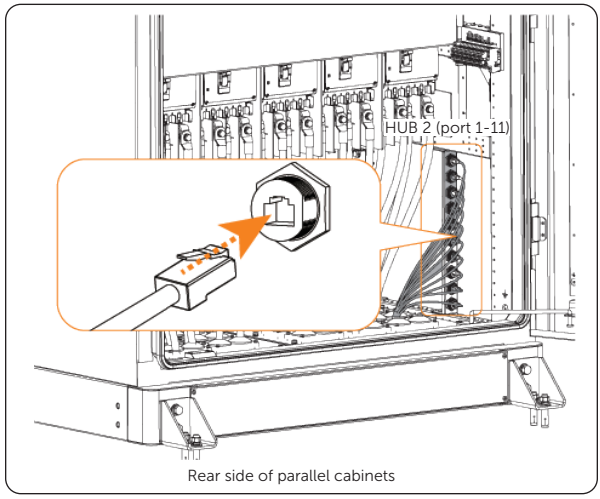


Figure 7-69 Connection to the switching cabinet

8 System Commissioning

8.1 Checking before Power-on

Ensure that all the cables are properly connected, and that all the electric components are switched off.

Table 8-1 Checklist

No.	Item	Description
1	Cabinet appearance	• Check whether the equipment is in good condition, with a clean, non-peeling paint, and rust-free surface. • Ensure that the labels on the equipment are clear and easy to read. If it is damaged, the label shall be replaced at once.
2	Cable appearance	• Check whether the cable jacket is in good condition. • Check whether the protective pipes are in good condition.
3	Cable connection	• Check whether the cable connection position is consistent with the design principles. • Ensure that the procedure for crimping terminals strictly observe the requirements, and the terminals are securely fastened. • Check whether the lables on the both sides of cables are clear, and the direction of both labels is the same.
4	Connection reliability	Make sure all screws are tightened and meet the torque requirements.
5	Idle terminals	Make sure all unused terminals are properly insulated and do not pose any risk of electric shock.

8.2 Powering on the System

The position of components for powering on the system are as follows.

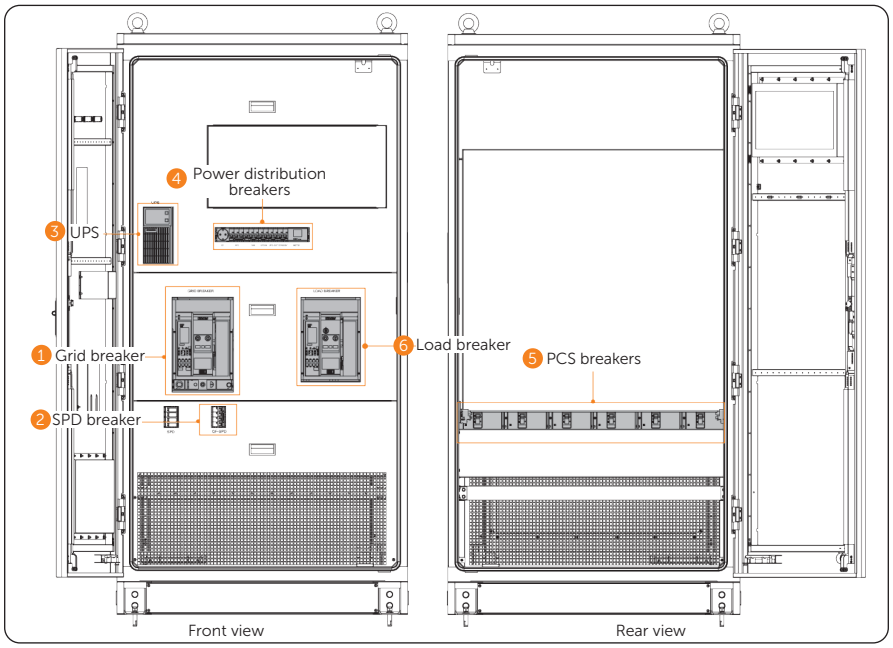


Figure 8-1 Position of modules for powering on system

Step 1: Press the ON button to turn on the grid breaker.

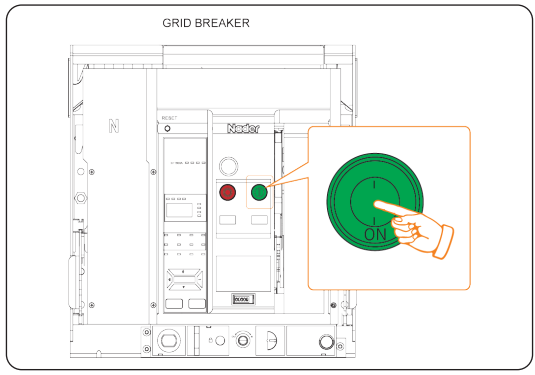


Figure 8-2 Starting the grid breaker

Step 2: Flip up the SPD breaker.

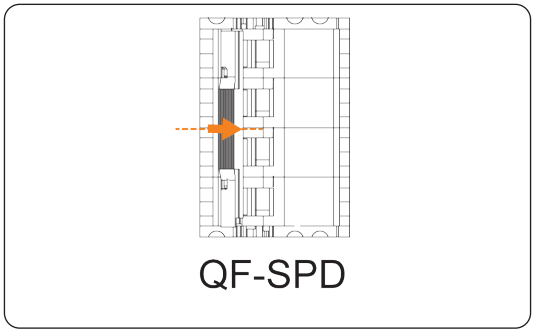


Figure 8-3 Flipping up SPD breaker

Step 3: Press and hold the power button of the UPS for 3 seconds to turn on it.

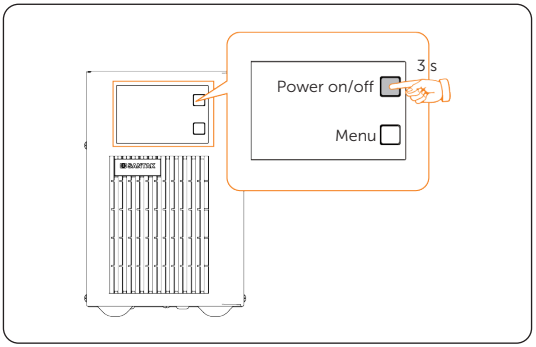


Figure 8-4 Turning on the UPS

Step 4: Flip up the power distribution breakers.

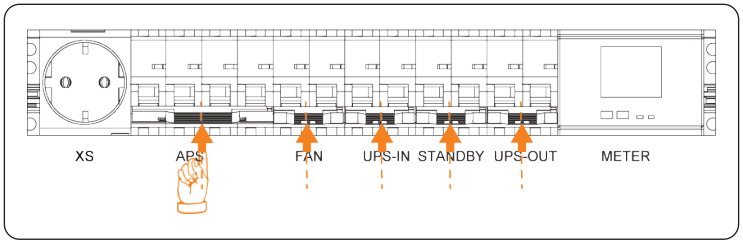


Figure 8-5 Flipping up power distribution breakers

Step 5: Flip up the PCS breakers.

NOTICE!

- X3-PCAB-750kW-B does not have PCS breakers. This step only applies to X3-PCAB-750kW-A.

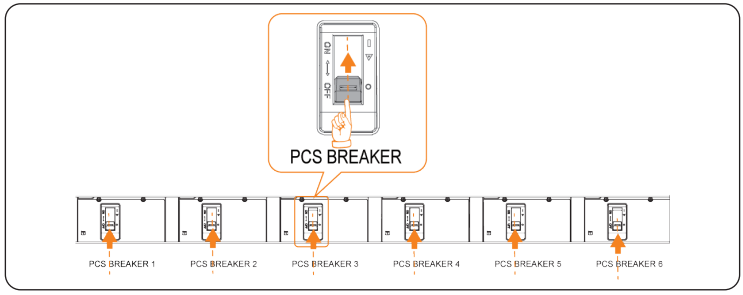


Figure 8-6 Flipping up PCS breakers

Step 7: Press the ON button to turn on the load breaker.

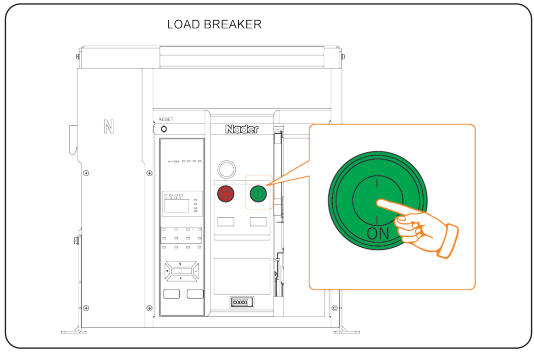


Figure 8-7 Starting the load breaker

Step 8: Lock the front and rear doors.

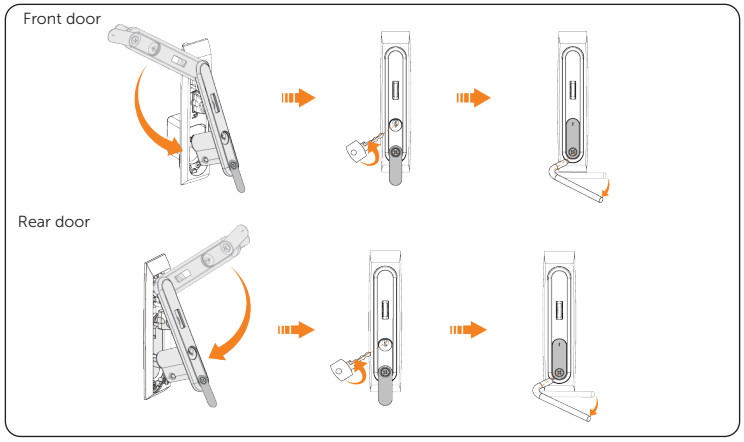


Figure 8-8 Locking doors

9 Operation on EMS and SolaXCloud

Log in to EMS webpage to set parameters for automatic on/off-grid mode switch, or manually switch the operation mode of the system.

9.1 Operation on EMS Webpage

NOTICE!

- IE browser is not supported currently, and we recommend logging in to the webpage through Chrome.
- For detailed operations on EMS, see *EMS1000 PRO User Manual*.

Step 1: Connect the computer to NET3 of EMS PRO with a network cable, or connect the computer to EMS PRO hotspot named WiFi_SN, and then go to the defined IP address based on the connection mode.

» For wired connection: 192.168.14.10

» For hotspot connection: 192.168.10.10

Step 2: On the login page, select the language, enter the username and password, and then click **Login**.

Figure 9-1 EMS login information

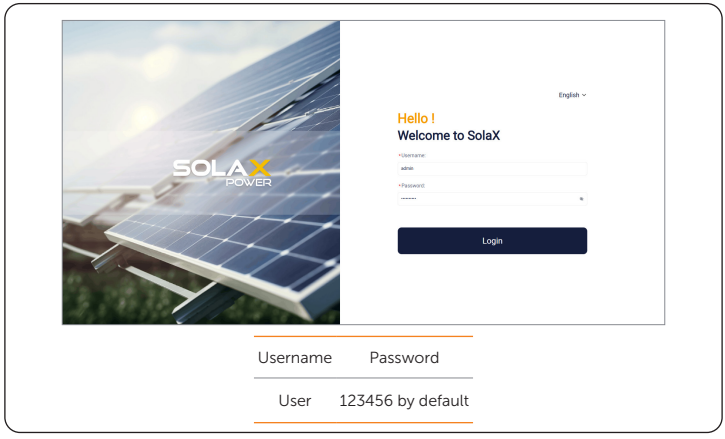


Figure 9-1 Logging in to EMS webpage

Step 3: On the home page, click **System settings** > **Micro gird setting**, set **Recovery Method** to **Auto** or **Manual**, and then set corresponding parameters.

» For auto switching mode, set **Grid voltage** and **Grid frequency**.

» For manual switch, click **Confirm** to perform switch.

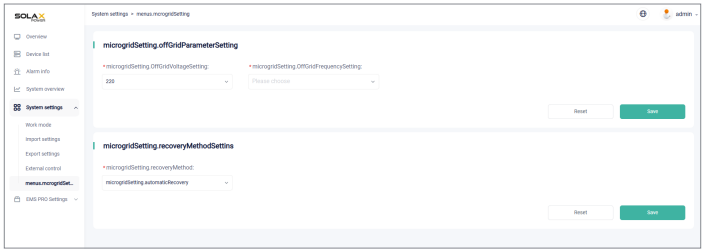


Figure 9-1 Setting switch parameters

9.2 SolaXCloud APP Login

Step 1: Downloading and installing App.

Select and scan the QR code below to download SolaxCloud APP. You can also find the QR codes at the button right of the login page of www.solaxcloud.com. In addition, you can search with the key word SolaxCloud in Apple Store or app store to download it.

Figure 9-2 QR code

Step 2: On the login page, enter your username and password. Select the checkbox to agree to the privacy policy and terms of use. Click on **Log in** to complete the app login. You can directly contact the SolaX to obtain your login credentials.

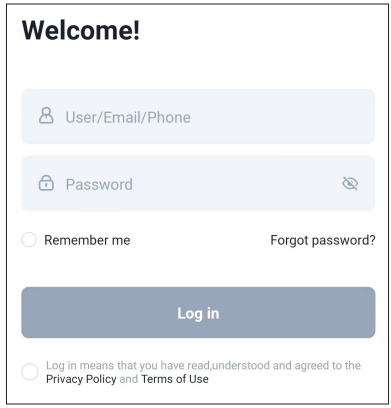


Figure 9-3 Login page

10 Troubleshooting and Maintenance

10.1 Powering off the System

There are two methods to power off the system: normal power-off and emergency power-off. The latter is used only in emergencies.

Normal Power Off

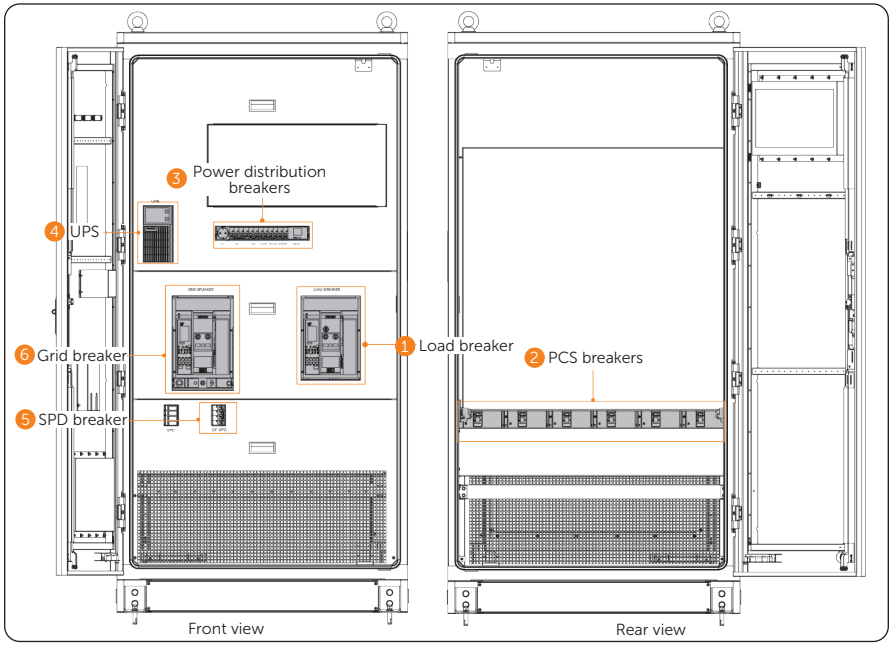


Figure 10-1 Position of modules for normally powering off the system

Step 1: Open the front and rear doors.

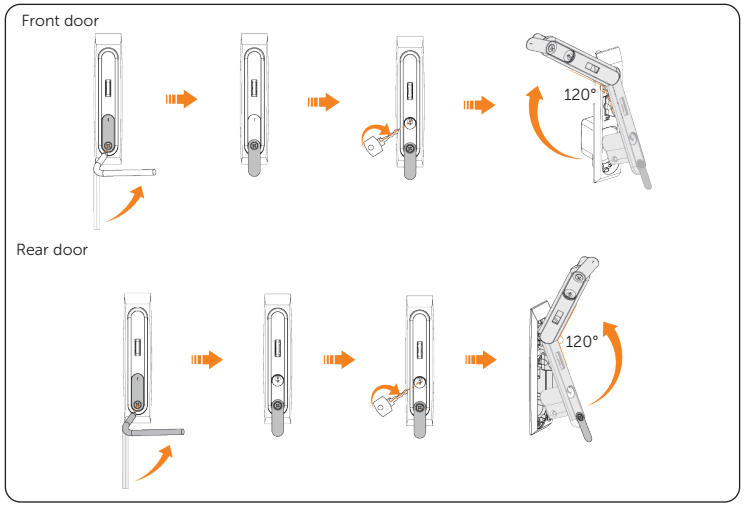


Figure 10-2 Opening the front and rear doors

Step 2: Press the OFF button to turn off the load breaker.

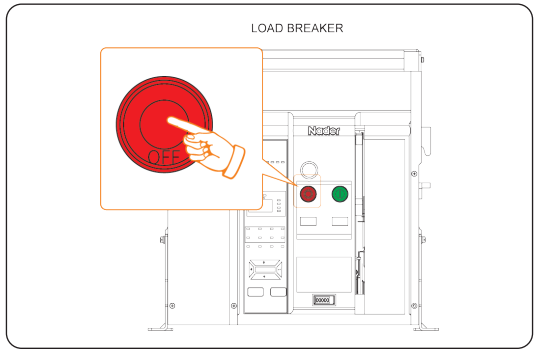


Figure 10-3 Turning off the load breaker

Step 3: Flip down the PCS breakers.

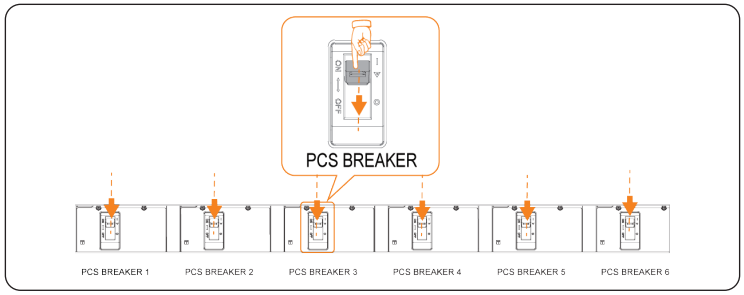


Figure 10-4 Flipping down PCS breakers

Step 4: Flip down the power distribution breakers.

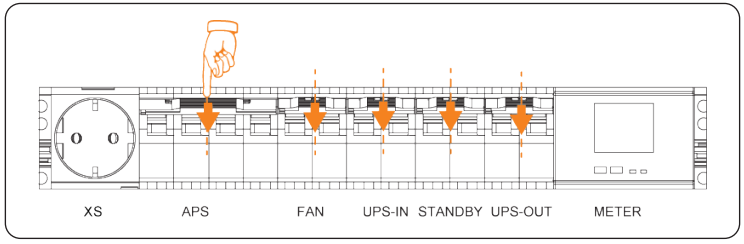


Figure 10-5 Flipping down power distribution breakers

Step 5: Press and hold the power button of the UPS for 3 seconds to turn off it.

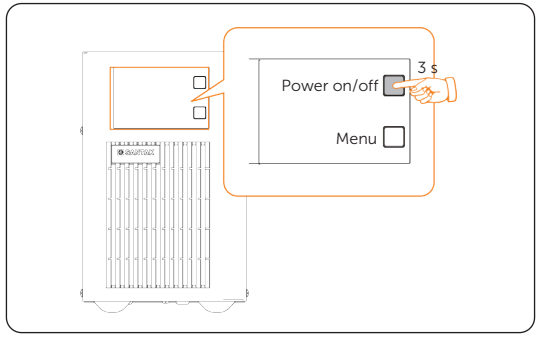


Figure 10-6 Turning off the UPS

Step 6: Flip down the SPD breaker.

NOTICE!

- X3-PCAB-750kW-B does not have PCS breakers. This step only applies to X3-PCAB-750kW-A.

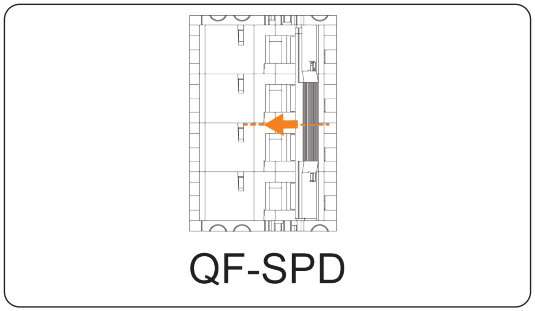


Figure 10-7 Flipping down SPD breaker

Step 1: Press the OFF button to turn off the grid breaker.

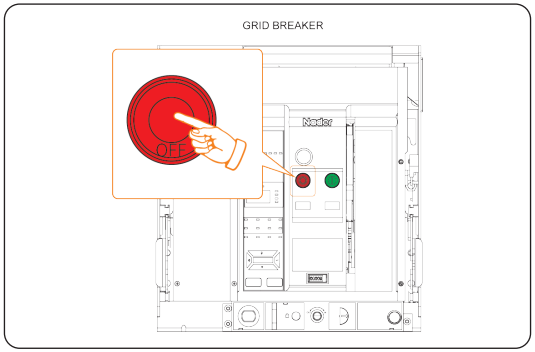


Figure 10-8 Turning off the gird breaker

Emergency Power Off

WARNING!

- Do not press the emergency stop button unless in an emergency.
- Some modules inside the cabinet may still have power after pressing the emergency stop button, therefore, non-professionals are not allowed to operate them.

Step 1: Flip up the cover.

Step 2: Press the emergency stop button.

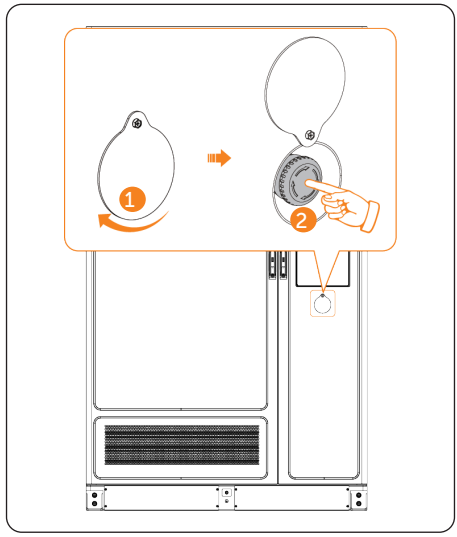


Figure 10-9 Pressing emergency stop button

NOTICE!

If it has been pressed, the emergency stop button must be reset before starting the equipment. The reset steps are shown as follows:

a. Rotate the cover;
b. Rotate the button according to the arrow direction shown on the button. Then the button will spring back to its original position.

10.2 Troubleshooting

This section lists the possible problems with the equipment, and provides information and procedures for identifying and resolving them. For further assistance, contact SolaX Customer Service. Please provide the model and SN of the cabinet, and be prepared to describe the system installation details.

Table 10-1 Troubleshooting list

No.	Fault code	Fault Description	Soltuion
1	PCS_ABC_ Phase_wrong	Incorrect wiring sequence of the 3 phases	Check for the wiring of each phase.
2	Grid_control_ alarm	Grid breaker abnormality	1. Check for the wiring. 2. Contact SolaX staff.
3	Microgrid_ EEPROM_alarm	EEPROM Fault of the control board	Contact SolaX staff
4	Microgrid_ FLASH_alarm	FLASH Fault of the control board	Contact SolaX staff
5	Microgrid_door_ alarm	Cabinet door opens	1. After closing the cabinet again, check the device status through EMS or the cloud platform to see if it is normal. 2. Reinstall the access control and ensure the distance between the access control sensors is less than 20mm.
6	Microgrid_water_ alarm	Water infiltration	1. Arrange for personnel to go on-site to check if a water ingress event has occurred in the cabinet. If so, ensure proper drainage; 2. Check the device status through EMS or the cloud platform to see if it is normal.
7	Microgrid_ emergency_Stop	Emergency stop alarm	1. Manually check for system anomalies, release the emergency stop, and close QF-GRID. 2. Check the device status through EMS or the cloud platform to see if it is normal.

No.	Fault code	Fault Description	Soltuion
8	Microgrid_SPD_ alarm	SPD alarm	1. Disconnect the grid power input and reclose QF-SPD to the closed position, and then check the device status through EMS or the cloud platform to see if it is normal. 2. Replace the SPD module. After replacing the SPD module, disconnect the grid power input, switch the AC circuit breaker to the OFF position, reconnect the SPD, and check the device status through EMS or the cloud platform to see if it is normal.
9	Temperature_ humidity_ communication_ alarm	Failed to communicate with the temperature and humidity sensor.	Contact SolaX staff.
10	PV_ communication_ alarm	EMS PRO failed to communicate with the PV.	1. Check for the wiring. 2. Contact SolaX staff.
11	Temperature_ Alarm	EMS PRO failed to communicate with the diesel generator.	1. Check for the wiring. 2. Contact SolaX staff.
12	Pro_Master_ communication_ alarm	EMS PRO failed to communicate with master EMS of the parallel energy storage systems.	1. Check for the wiring. 2. Contact SolaX staff.
13	Energy_storage_ battery_alarm	Battery fault of a single energy storage system	Contact SolaX staff.
14	Energy_storage_ inverter_alarm	PCS/inverter fault of a single energy storage system	Contact SolaX staff.
15	Energy_storage_ heat_alarm	Heat management fault of a single energy storage system	Contact SolaX staff.
16	Energy_system_ fire_alarm	Fire alarm of the energy storage system	Contact SolaX staff.

No.	Fault code	Fault Description	Soltuion
17	Grid_ communication_ alarm	Control board failed to communicate with the meter	Contact SolaX staff.
18	Pcab_ communication_ alarm	Control board communication failed	1. Check for the wiring. 2. Contact SolaX staff.
19	Grid_voltage_ sampling_alarm	Failed to collect grid voltage data	Contact SolaX staff.
20	PCS_voltage_ sampling_alarm	Failed to collect PCS voltage data	Contact SolaX staff.
21	Frequency_ sampling_alarm	Failed to collect frequency data	Contact SolaX staff.
22	Controlboard_ PCS_ communication_ alarm	Communication fault between the control board and the PCS	1. Check for the wiring. 2. Contact SolaX staff.

10.3 Maintenance

Regular maintenance is required for the device. The table below lists the operational maintenance for expressing the optimum device performance. More frequent maintenance service is needed in the worse work environment. Please make records of the maintenance.

Table 10-2 Maintenance routine

Item	Check notes	Maintenance interval
Fan	Check if the fan is making unusual noise or covered with dust. Clean the fan with a soft cloth or brush, and replace the fan if necessary.	Every 12 months
Mesh filter	Check and clean the mesh filter on the front door with water or air gun.	Every 3 months

Item	Check notes	Maintenance interval
Electrical Connections	• Check if all wiring connections are secure. • Check the condition of the cables to ensure that there are no scratches on the parts where the connectors contact the metal surfaces. • Check if the cables are in good condition without damage or shedding of the insulation layer. Replace them if necessary. • Check if the sealing on idle ports is loose or detached.	Every 12 months
Grounding Reliability	• Check if the grounding terminals and grounding wires are securely connected. • Use a grounding resistance tester to check if the grounding copper bar inside the cabinet and the grounding point meet the required resistance standards, and verify if the actual grounding resistance of the cabinet shell to the ground meets the requirements.	Every 12 months

11 Technical Data

Model	X3-PCAB-750kW-A	X3-PCAB-750kW-B
Rated AC power	750	750
Rated AC voltage	3 / N / PE, 230 / 400 V	3 / N / PE, 230 / 400 V
Rated AC frequency	50 Hz / 60 Hz	50 Hz / 60 Hz
Rated AC current	1087 a.c A	1087 a.c A
Max. AC power	825	825
Max. AC current	1195.7 a.c A	1195.7 a.c A
Transfer between on/off grid	200 ms	200 ms
Power limit(grid)	Yes	Yes
Grid breaker	1600 A	1600 A
PCS breaker	250 A × 6	-
Load breaker	1600 A	1600 A
Ingress protection	IP55	IP55
SPD	Type II	Type II
Operating temperature	-30 °C to +55 °C	-30 °C to +55 °C
Altitude	3000	3000
Dimension (W × H × D)	1050 × 2100 × 1200 mm	1050 × 2100 × 1200 mm
Weight [kg]	≤ 800 kg	≤ 800 kg
Rated short circuit current	40	40
Certificates and approvals	IEC61439-1, IEC61439-2, IEC 61000, IEC 60730	IEC61439-1, IEC61439-2, IEC 61000, IEC 60730

12 Appendix

12.1 Application of PV System

12.1.1 Introduction to PV System Application

Besides the mere on/off-grid switching application, the system can also be connected to PV inverters for additional energy source. In this system, the energy storage system is AC coupled with the PV system, and PCAB controls the coupled system to work on-grid or off-grid. When operating off-grid, the PV system and energy storage system collaboratively provide power for the load, and the surplus energy charges the battery.

This is primarily suitable for industrial and commercial parks with insufficient grid capacity, where expanding the grid is difficult, or where there are power restrictions during peak usage times.

12.1.2 System Wiring Diagram

NOTICE!

- The recommended configuration ratio for PV: Storage: Load is 2:2:1 (for power only). In this case, there is enough PV power to support the full load power consumption, while still providing energy to charge the energy storage system. For example, with a common 0.5P energy storage cabinet configuration, it can be fully charged within 4 hours.

X3-PCAB-750kW-A

- TRENE

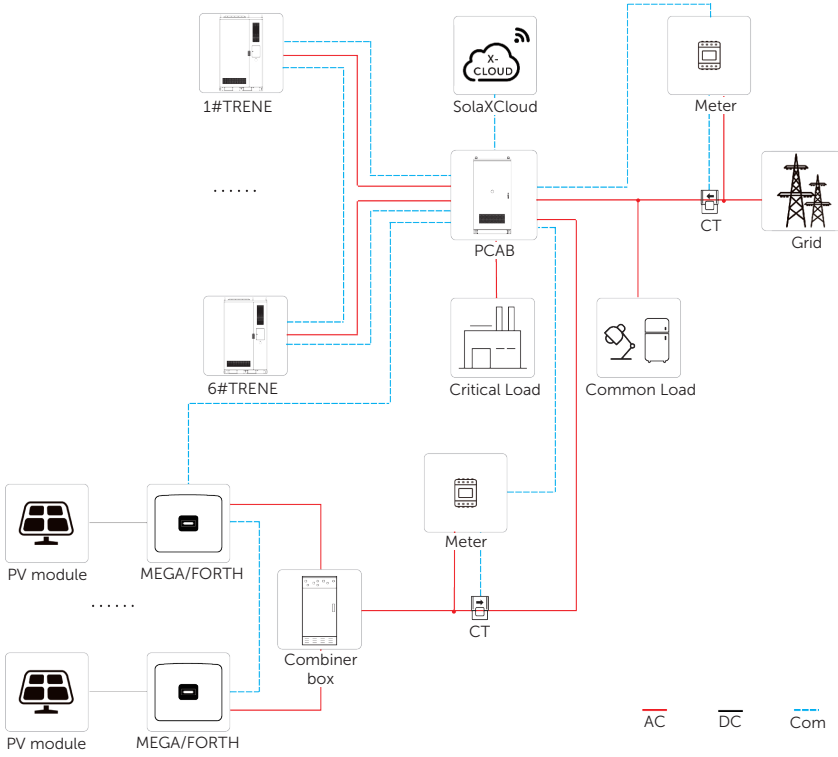


Figure 12-1 PV and TRENE energy storage system overview diagram (1)

- AELIO

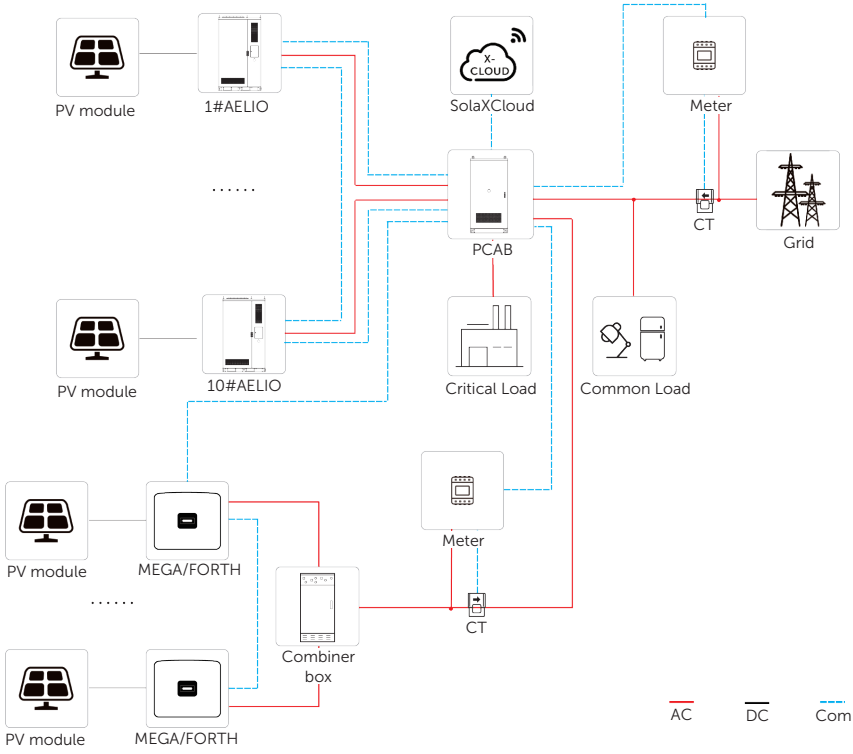


Figure 12-2 PV and AELIO energy storage system overview diagram (1)

X3-PCAB-750kW-B

- TRENE

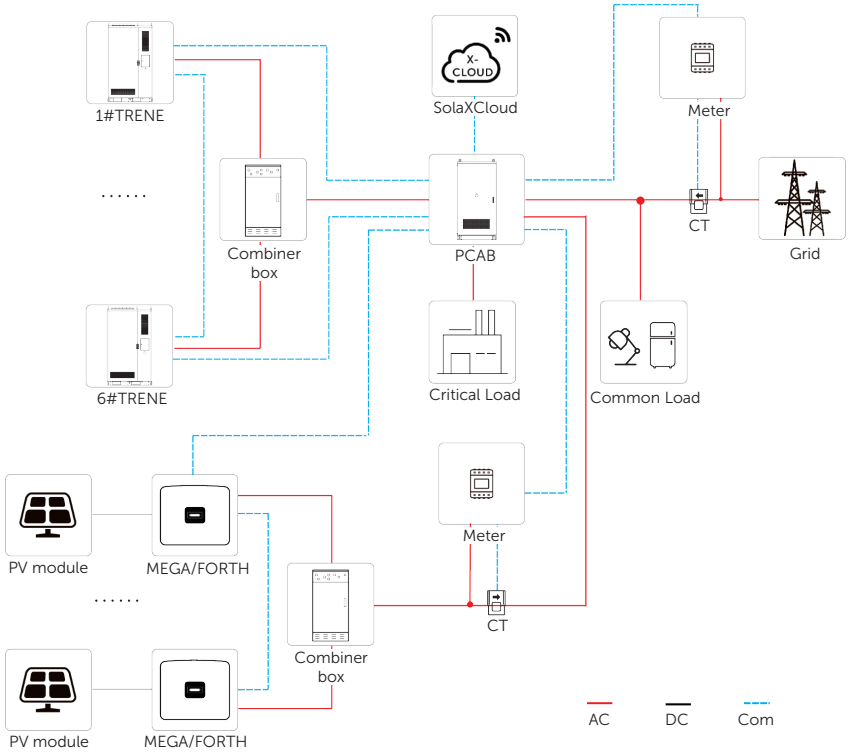


Figure 12-3 PV and TRENE energy storage system overview diagram (2)

- AELIO

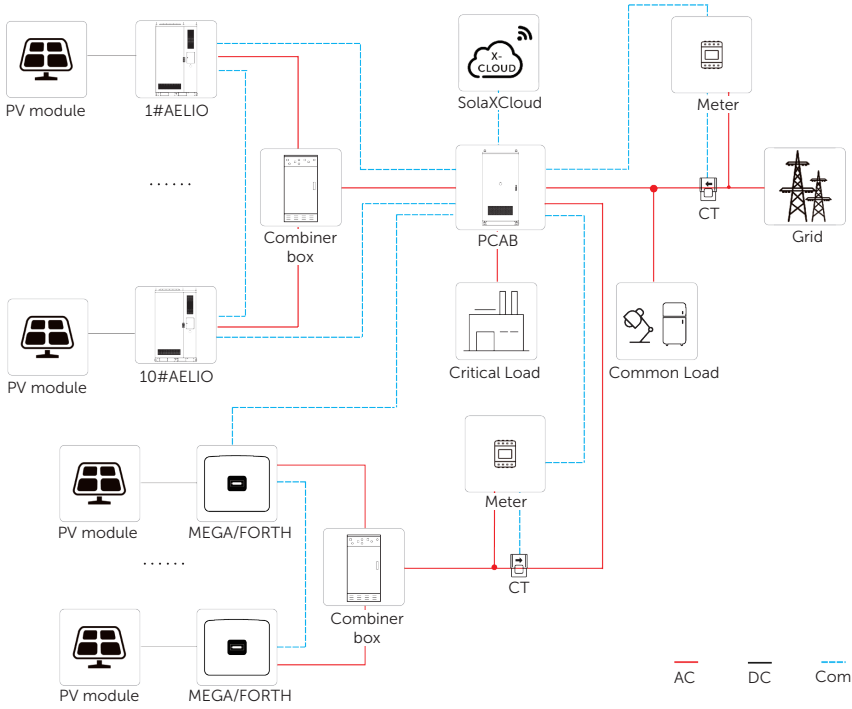


Figure 12-4 PV and AELIO energy storage system overview diagram (2)

12.1.3 Electrical Connection with PV Inverter

NOTICE!

- The terminal and wiring procedure of X3-PCAB-750kW-A and X3-PCAB-750kW-B are the same. X3-PCAB-750kW-A is used for example.

Table 12-1 Corresponding terminals for connection

PV Inverter				AC Switching Cabinet			/
Model	Terminal	Pin No.	Pin Definition	Terminal No.		Pin Definition	Cable Type
• FORTH • MEGA	RS485-1	4	RS485A OUT+	XT6	1	RS485A	Com cable
		5	RS485B OUT		2	RS485B	
		6	Reserved		3	Grounding	

Step 1: Strip the outer jacket and insulation layer off the communication cable to an appropriate length at both ends.

Step 2: Insert the two wires at each end into the KST E0508 ferrules, and then use a crimping tool for ferrule to crimp them.

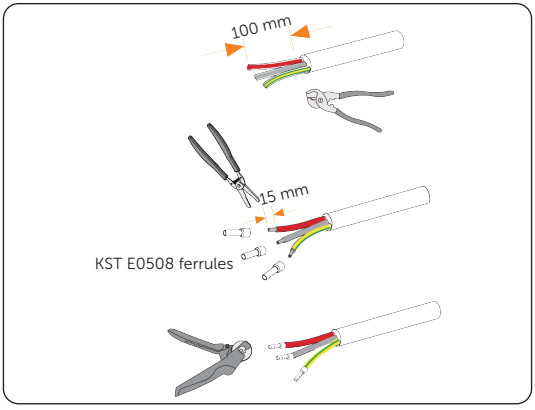


Figure 12-5 Preparing communication cable

Step 3: Insert the ferrules at one end of the cable respectively into pin 4, 5 and 6 of the inverter COM port, and then secure them.

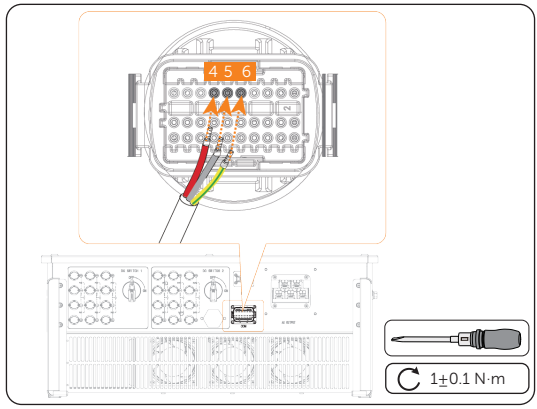


Figure 12-6 Connecting the PV inverter

Step 4: Insert the ferrules at the other end of the cable respectively into 1, 2 and 3 terminals of XT6 terminal block in sequence.

The wire sequence should be corresponding at two terminals.

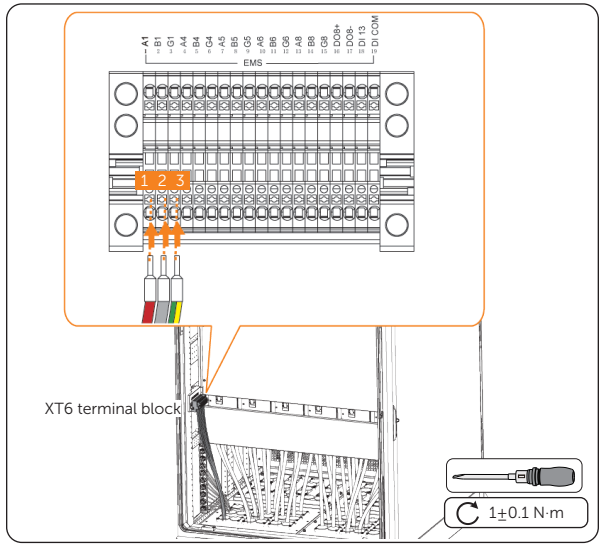


Figure 12-7 Connecting the switching cabinet

12.2 Application of Diesel Generator

12.2.1 Introduction to Diesel Generator Application

Generator can be added to the PV energy storage system for backup power supply. When operating off-grid, the energy storage system serves as the main power source for grid formation, and the PV system supplies power to the loads. When the solar-storage system cannot meet the load demand, the system switches to diesel generation through the ATS (Automatic Transfer Switch) to provide continuous power supply.

NOTICE!

- The recommended configuration ratio for PV: Storage: Diesel: Load is 2:2:1.5:1 (for power only). In this case, there is enough PV power to support the full load power consumption, while still providing energy to charge the energy storage system. For example, with a common 0.5P energy storage cabinet configuration, it can be fully charged within 4 hours.
- It is recommended that the maximum load power should not exceed 80% of the diesel generator's rated power, in order to mitigate the impact of frequency fluctuations on the entire microgrid during load fluctuations.

12.2.2 System Wiring Diagram

NOTICE!

- The diesel generator can also be used only with the energy storage systems without external PV systems. The components in the dashed box of the wiring diagrams are optional.

X3-PCAB-750kW-A

- TRENE

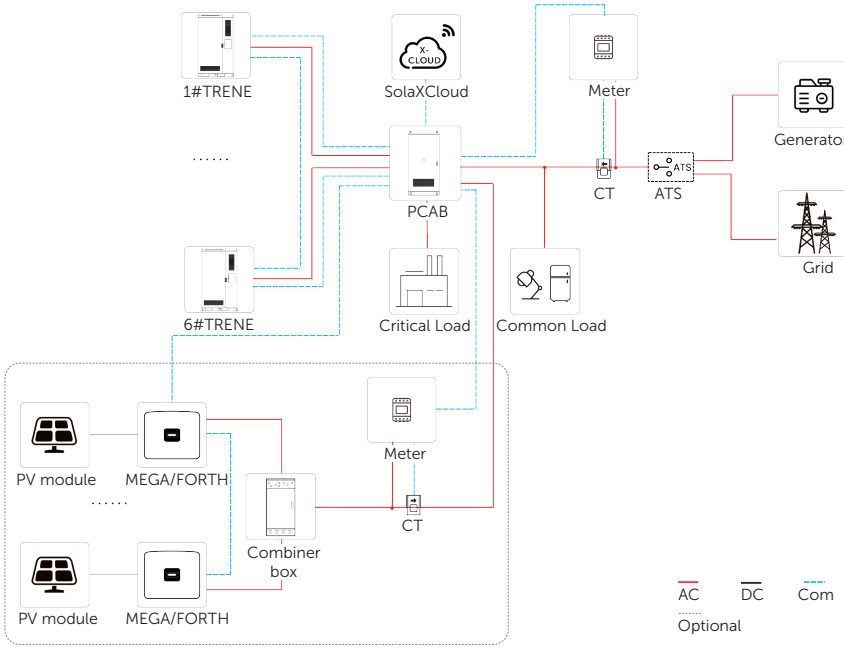


Figure 12-8 PV, DG and TRENE energy storage system overview diagram (1)

- AELIO

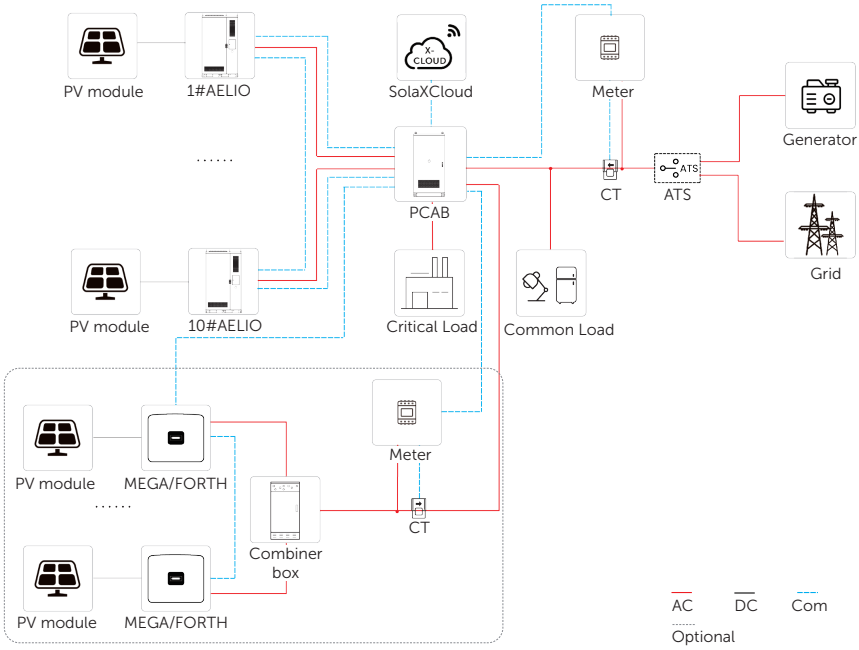


Figure 12-9 PV, DG and AELIO energy storage system overview diagram (1)

X3-PCAB-750kW-B

- TRENE

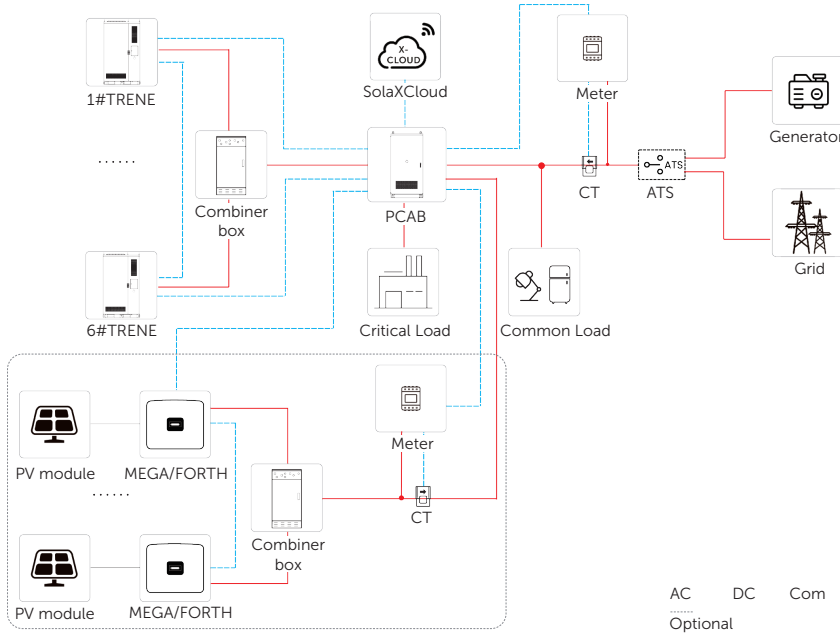


Figure 12-10 PV, DG and TRENE energy storage system overview diagram (2)

- AELIO

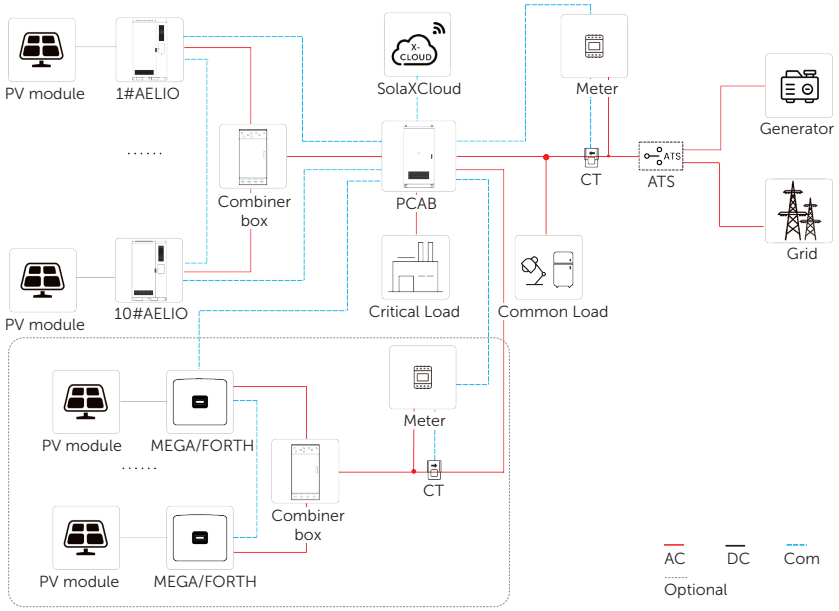


Figure 12-11 PV, DG and AELIO energy storage system overview diagram (2)

12.2.3 Electrical Connection with Generator

Select either communication mode or dry contact mode to connect the generator and switching cabinet. Under communication mode, EMS communicates with the generator controller for starting up the generator; while under dry contact mode, EMS directly controls the startup of the generator.

NOTICE!

- The terminal and wiring procedure of X3-PCAB-750kW-A and X3-PCAB-750kW-B are the same. X3-PCAB-750kW-A is used for example.

Table 12-1 Corresponding terminals for connection

Control Mode	Terminal No.	Definition	Description
Communication control mode	4	RS485A	For communication with the generator
	5	RS485B	
	6	Grounding	

Control Mode	Terminal No.	Definition	Description
Dry contact control mode	16	DO8+	For dry contact control of the generator
	17	DO8-	
	18	DI13	
	19	DI COM	

Communication Control Mode Connection

Step 1: Strip the outer jacket and insulation layer off the communication cable to an appropriate length at both ends.

Step 2: Insert the two wires at each end into the KST E0508 ferrules, and then use a crimping tool for ferrule to crimp them.

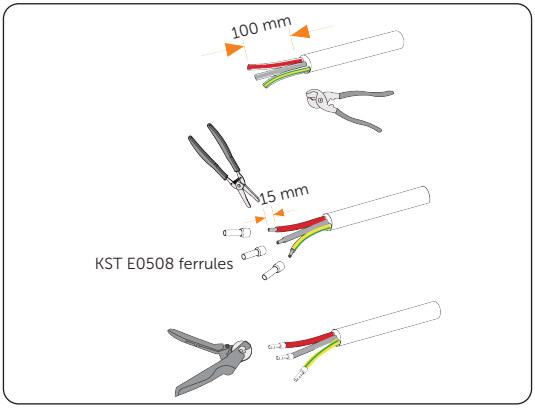


Figure 12-12 Preparing communication cable

Step 3: Insert the ferrules at one end of the cable respectively into 4, 5 and 6 terminals of XT6 terminal block in sequence.

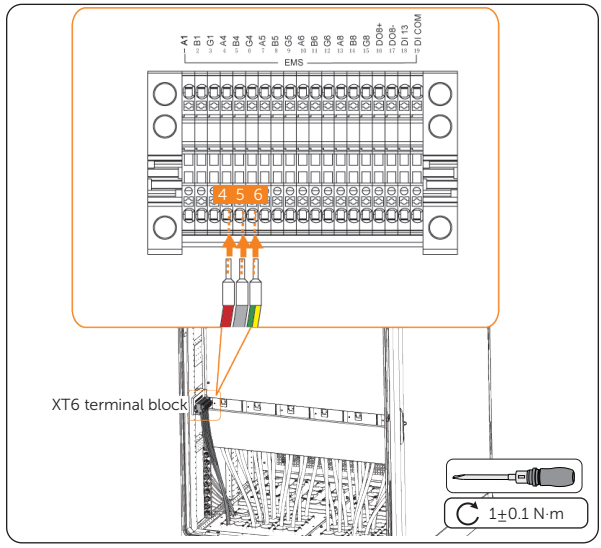


Figure 12-13 Connecting the switching cabinet

Step 4: Thread the wires out of the switching cabinet, and then connect the wires to the corresponding terminals of the generator.

Dry Contact Control Mode Connection

Step 1: Strip the outer jacket and insulation layer off the communication cables to an appropriate length at both ends.

Step 2: Insert the two wires at each end into the KST E0508 ferrules, and then use a crimping tool for ferrule to crimp them.

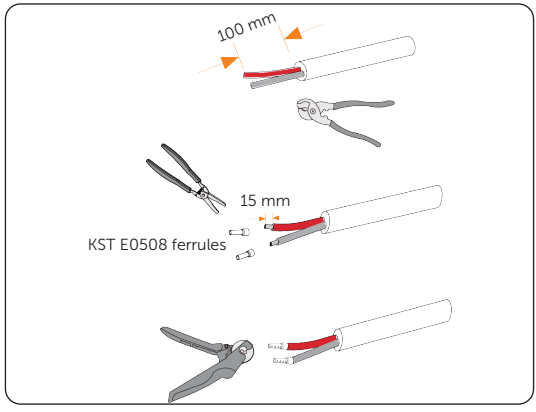


Figure 12-14 Preparing communication cables

Step 3: Insert the ferrules at one end of the cables respectively into 16 and 17, and 18 and 19 terminals of XT6 terminal block in sequence.

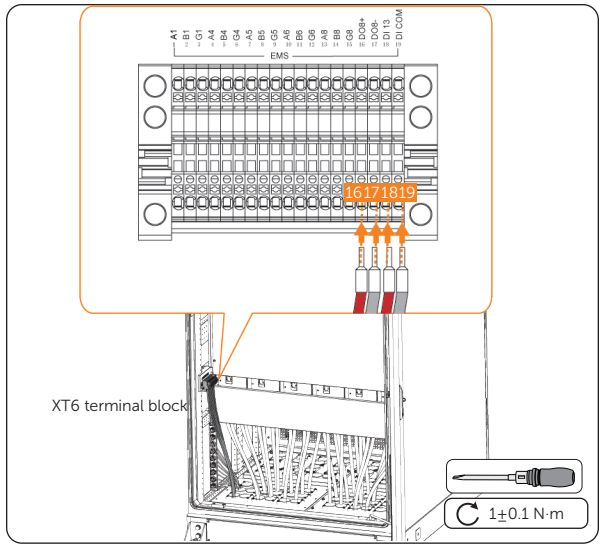


Figure 12-15 Connecting the switching cabinet

Step 4: Thread the wires out of the switching cabinet, and then connect the wires to the corresponding terminals of the generator.

12.3 Requirements for OT/DT/TO Terminal

For different types of cables, select proper terminals and additional components for connection.

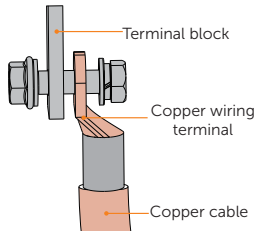
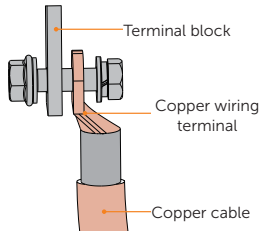
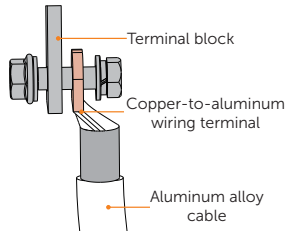
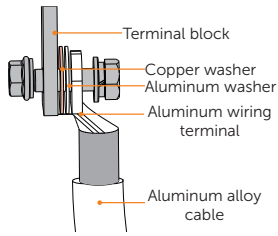
CAUTION!

- Do not connect the aluminum wiring terminal directly to the terminal block or copper bar in case of electrochemical corrosion, which might affect the reliability of cable connection.
- While using an aluminum wiring terminal, copper washer, and aluminum washer, pay special attention to the position of the two washers. The copper washer shall make contact with the terminal block, and the aluminum washer shall make contact with the aluminum wiring terminal.

NOTICE!

- The copper-to-aluminum wiring terminal used in scenario 3, and aluminum wiring terminal, copper washer, and aluminum washer used in scenario 4 must comply with the requirements in IEC61238-1.

Table 12-1 Terminal requirements for different types of cables

Scenario	Cable Type	Wiring Terminal Type	Figure Illustration
1	Cooper cable	Copper wiring terminal	
2	Copper-clad aluminum cable	Copper wiring terminal	
3	Aluminum alloy cable	Copper-to-aluminum wiring terminal	
4	Aluminum alloy cable	• Aluminum wiring terminal • Copper washer • Aluminum washer	

12.4 How to Repaint the Cabinet

Check the paint damage on the surface of the cabinet, with details as below:

- For light scratches or small areas of stubborn stains, please see "12.4.1 Light Scratches & Small Areas of Stubborn Stains" to treat them.
- If the deep scratches or large areas of stubborn stains can be treated by users, please refer to "12.4.2 Deep Scratches and Large Areas of Stubborn Stains".
- If the damaged area is too large and cannot be treated, please contact the after-sale personnel for assistance.

WARNING!

- If the cabinet is installed outdoors without shield, do not repaint it in rainy, snowy, windy, or stormy days.

NOTICE!

- Use paint of pantone11-4202TPG color.
- For light scratches and small areas of stubborn stains, spray paint and hairbrush are recommended.
- For deep scratches or large areas of stubborn stains, oil paint and paint sprayer are recommended.

12.4.1 Light Scratches & Small Areas of Stubborn Stains

This solution applies to light scratches without reaching the steel substrate and stubborn stains on the surface.

Tools and Materials Required

Prepare tools and enough materials according to actual conditions.

Table 12-2 Tools and materials

No.	Tool/Material	No.	Tool/Material
1	Spray/oil paint	2	Fine sandpaper
3	Anhydrous ethanol	4	Cotton cloth
5	Hairbrush (for small scratched area)	6	Spray paint (if there is a large area of light scratch, paint sprayer is recommended.)

Repainting Procedure

Step 1: Gently sand the scratched area with a fine sandpaper to remove rust and stains on the surface.

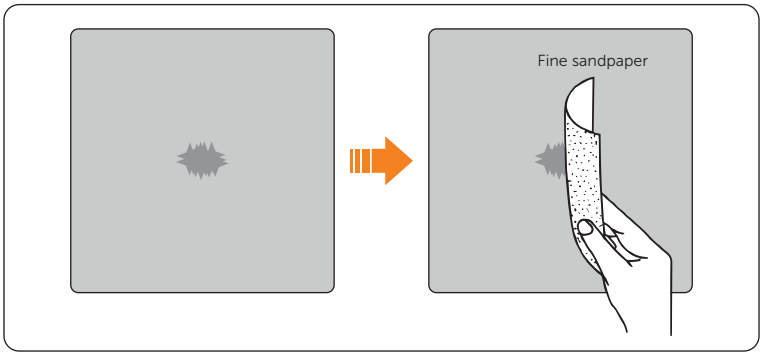


Figure 12-16 Sanding the scratched area

Step 2: Moisten a cotton cloth with anhydrous ethanol, wipe the scratched area with it to remove dust and dirt, and then use a dry cotton cloth to wipe the area dry.

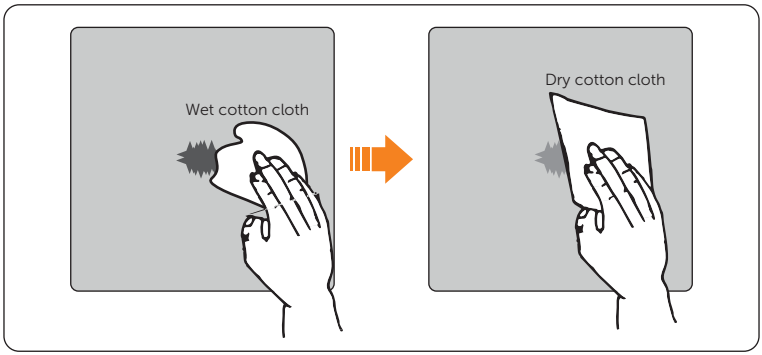


Figure 12-17 Cleaning the scratched area

Step 3: Use hairbrush or spray paint to apply paint to the surface of the scratched area until it is fully and evenly covered.

NOTICE!

- While applying paint, make sure the newly applied paint is thin and even, so that the scratched area can appear consistent and smooth on the surface.
- If there is color difference between the scratched area and the surroundings, cover the surrounding area with tape or paper in case of color contamination.

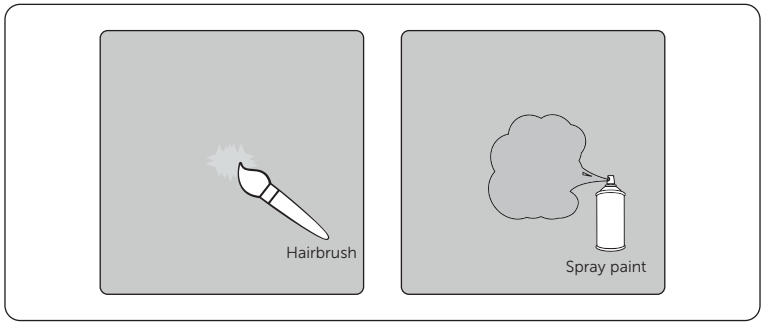


Figure 12-18 Applying paint

Step 4: After completing applying the paint, wait for around 30 minutes for the paint to get dry, and then check whether the repaired area meets the requirements.

NOTICE!

- The color of the repaired area shall be consistent with the surrounding area.
  - » Use a colorimeter to measure the color difference, of which Delta E shall be ≤ 3.
  - » If the color cannot be measured by a colorimeter, make sure that there is no obvious color difference at the edges between the repaired area and the surrounding area, as well as no bumps, scratches, flakings, or breaks.
- For spray painting, we recommend painting for at least 3 times before pausing to check the effect, and then repeat spray painting and observing until it meets the requirements.

12.4.2 Deep Scratches and Large Areas of Stubborn Stains

This solution applies to deep scratches where the primer has been damaged and reach the steel substrate.

Tools and Materials Required

Prepare tools and enough materials according to actual conditions.

Table 12-3 Tools and materials

No.	Tool/Material	No.	Tool/Material
1	Spray/oil paint	2	Zinc-rich primer
3	Fine sandpaper	4	Anhydrous ethanol

No.	Tool/Material	No.	Tool/Material
5	Cotton cloth	6	Hairbrush (for small areas of deep scratches and stubborn stains)
7	Paint sprayer (for large areas of deep scratches and stubborn stains)		

Repainting Procedure

Step 1: Gently sand the scratched area with a fine sandpaper to remove rust and stains on the surface.

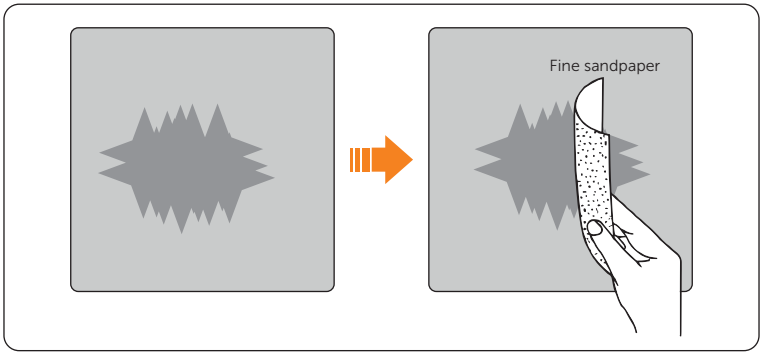


Figure 12-19 Sanding the scratched area

Step 2: Moisten a cotton cloth with anhydrous ethanol, wipe the scratched area with it to remove dust and dirt, and then use a dry cotton cloth to wipe the area dry.

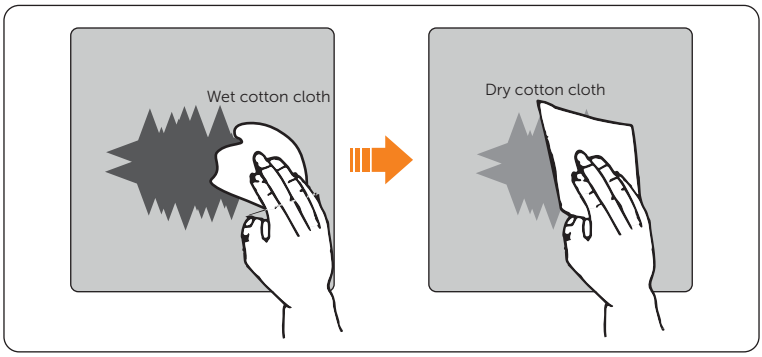


Figure 12-20 Cleaning the scratched area

Step 3: Use a paint spray to apply the zinc-rich primer to the scratched area.

NOTICE!

- If the steel substrate is visible on the scratched area, the zinc-rich primer must be applied first to entirely cover the substrate.
- Wait for the primer to get dry before applying the top coat to the scratched area.

Step 4: Use a paint spray to apply paint to the surface of the scratched area until it is fully and evenly covered.

NOTICE!

- While applying paint, make sure the newly applied paint is thin and even, so that the scratched can appear consistent and smooth on the surface.
- If there is color different between the scratched area and the surroundings, cover the surrounding area with tape or paper in case of color contamination.

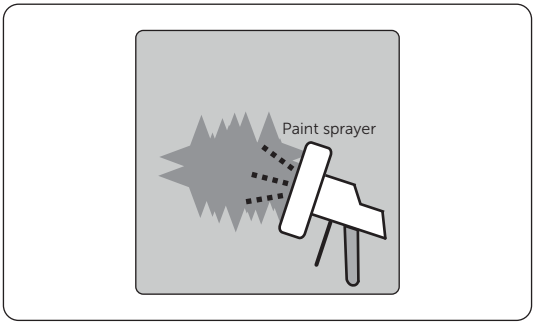


Figure 12-21 Applying paint

Step 5: After completing applying the paint, wait for around 30 minutes for the paint to get dry, and then check whether the repaired area meets the requirements.

NOTICE!

- The color of the repaired area shall be consistent with the surrounding area.
  - » Use a colorimeter to measure the color difference, of which Delta E shall be ≤ 3.
  - » If the color cannot be measured by a colorimeter, make sure that there is no obvious color difference at the edges between the repaired area and the surrounding area, as well as no bumps, scratches, flakings, or breaks.
- For spray painting, we recommend painting for at least 3 times before pausing to check the effect, and then repeat spray painting and observing until it meets the requirements.

12.4.3 Logo & Pattern damaged, Dents or Dings

In this case, we recommend contacting a local spray painting company for customized treatment based on the actual conditions.

Table 12-4 Damage extent and recommended solution

No.	Damaged Area	Recommended Solution
1	• Size < 100 mm^2 • Depth < 3 mm	Use a poly-putty base to fix the dents and dings first, and then deal with them according to "Repainting Procedure" for Deep Scratches.
2	• Size > 100 mm^2 • Depth > 3 mm	Contact local supplier to make a plan for repair.

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