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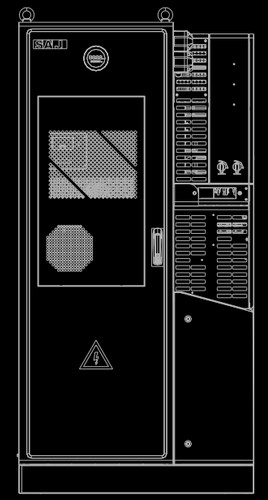
V1.1



CHS2 Series

C&I ENERGY STORAGE SYSTEM

Preface

Thank you for choosing SAJ products. We are pleased to provide you first-class products and exceptional service.

This manual includes information for installation, operation, maintenance, trouble shooting and safety. Please follow the instructions of this manual so that we can ensure delivery of our professional guidance and wholehearted service.

Customer-orientation is our forever commitment. We hope this document proves to be of great assistance in your journey for a cleaner and greener world.

Please check for the latest version at https://www.saj-electric.com/.

Guangzhou Sanjing Electric Co., Ltd.

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1.

SAFETY PRECAUTIONS

1.1. Scope of Application

This User Manual describes instructions and detailed procedures for installing, operating, maintaining, and troubleshooting of the following CHS2 Energy Storage Systems (ESS):

- CHS2-29.9K-T4-X
- CHS2-50K-T6-X

1.2. Safety Instructions

DANGER
· DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING
·WARNING indicates a hazardous situation which, if not avoided, can result in death or serious injury or moderate injury.

CAUTION
· CAUTION indicates a hazardous condition which, if not avoided, can result in minor or moderate injury.

NOTICE
· NOTICE indicates a situation that can result in potential damage, if not avoided.

1.3. Target Group

Only qualified electricians who have read and fully understood all safety regulations in this manual can perform installation and maintenance. Operators must be aware of the high-voltage device.

2.

PREPARATION

2.1. Safety Instructions

For safety, be sure to read all the safety instructions carefully prior to any operations, and follow the appropriate rules and regulations of the country or region where you install the energy storage system.

DANGER

- Possible danger to life due to electrical shock and high voltage.
- Do not touch the operating component of the inverter; it might result in burning or death.
- To prevent risk of electric shock during installation and maintenance, make sure all AC and DC terminals are plugged out.
- Do not touch the surface of the equipment while the housing is wet. Otherwise, it can cause electrical shock.
- Do not stay close to the equipment while there are severe weather conditions including storm, lighting, etc.
- Before opening the housing, the SAJ inverter must be disconnected from the grid and PV generator; you must wait for at least five minutes to let the energy storage capacitors completely discharged after disconnecting from power source.
- Keep the power off prior to any operations.
- Do not use the battery or the battery control unit if it is defective, broken, or damaged.
- Do not expose the battery to temperature higher than 50°C.
- Do not apply any strong force to the battery.
- Do not place the battery near a heat source, such as direct sunlight or a fireplace.
- Keep inflammable and explosive dangerous items or flames away from the battery.
- Do not soak the battery in water or expose it to moisture or liquids.
- Do not use the battery in vehicles.
- Do not use the battery in spaces where the ammonia level exceeds 20 ppm.

WARNING

- The installation, service, recycling and disposal of the inverters must be performed by qualified personnel only in compliance with national and local standards and regulations.
- Any unauthorized actions including modification of product functionality of any form may cause lethal hazard to the operator, third parties, the units or their property. SAJ is not responsible for the loss and these warranty claims.
- Be sure that the PV generator and inverter are well grounded to protect the properties and persons.
- For personal and property safety, do not short-circuit the positive (+) and negative (-) electrode terminals.

CAUTION
· The inverter becomes hot during operation. Do not touch the heat sink or peripheral surface during or shortly after operation. · Risk of product damage due to improper modifications. · Use professional tools when operating on the product.

NOTICE
· During installation of the battery system, the circuit breaker must be disconnected from the battery pack wiring.

2.2. Explanations of Symbols

Symbol	Description
	**Danger of electrical voltage** This device is directly connected to public grid. All operations to the battery shall only be carried out by qualified personnel.
	**Danger to life due to high electrical voltage** There might be residual currents in inverter because of large capacitors. Wait at least 5 minutes before you remove the front lid.
	**No open flames** Do not place or install near flammable or explosive materials.
	**Danger of hot surface** The components inside the inverter will release a lot of heat during operation. Do not touch the metal plate housing during operating.
	**Attention** Keep the product out of reach of children.
	**An error has occurred** See the Troubleshooting section to remedy the error.
	**This device shall NOT be disposed of in residential waste.**

	**This battery module shall NOT be disposed of in residential waste.**
	**CE Mark** Equipment with the CE mark fulfills the requirements of the Low Voltage Directive and Electro Magnetic Compatibility.
	**Recyclable**

2.3. Battery Handling

Operate and use the battery properly according to the user manual. Any attempt to modify the battery without the permission from SAJ will void the limit warranty for the battery.

- The battery must be installed at a suitable location with sufficient ventilation.
- Do not use the battery if it is defective, damaged or broken.
- Only use the battery with the compatible inverter.
- Do not use the battery with other types of battery.
- Make sure the battery is grounded prior to use.
- Do not pull out any cables or open the battery enclosure when the battery is powered on.
- Only use the battery as intended and designed.

2.4. Potential Hazard and Preventions

The damaged battery can have the following types of potential hazard:

- **Chemical hazard**: Battery rupture may result in battery electrolyte leakage which is corrosive and flammable.

To prevent the chemical hazard:

1) Do not open the damaged battery.
2) Do not move the damaged battery to avoid further damage.
3) Keep the damaged battery away from water.
4) Do not expose the damaged battery to the sunlight to prevent battery internal heating.

- **Electrical hazard**: Battery explosion can result in fire and explosion accidents.

To prevent battery explosion:

1) Avoid short circuit of the battery.

Short circuit will generate high heat inside the battery, resulting in partial electrolyte gasification, which will stretch the battery shell. The temperature reaching ignition point of internal material will lead to explosive combustion.

2) Avoid battery overcharge.
3) Battery overcharge may precipitate lithium metal. If the shell is broken, it will come into direct contact with the air and causes combustion. The electrolyte will be ignited at the same time, resulting in strong flame and rapid expansion of gas and explosion.

2.5. Emergency Situation

Battery electrolyte contact

Despite of the protection design against any hazard, the damage of the battery may still be possible. If a small amount of battery electrolyte is released due to a serious damage of the outer casing, take the following actions immediately and seek medical advice:

1) Eye contact: Rinse eyes with a large amount of clean water thoroughly.
2) Skin contact: Wash the contacted skin with a large amount of clean water thoroughly.
3) Breathing difficulty due to inhalation: Move to fresh air immediately.

Fire hazard

WARNING

- If a small fire started shortly near the battery pack, try to disconnect the battery circuit breaker and cut off the power supply first, but only if you can do so without endangering yourself.
- If the battery is on fire, evacuate the crowd to an open area immediately before any attempt to extinguish the fire and report the fire.
- Wear a gas mask to avoid inhaling toxic gases and harmful substances when evacuating or attempting to extinguish the fire.

Applicable fire distinguishers for small-scale fire hazard:

1) Carbon dioxide (CO_2) fire extinguisher
2) Dry chemical fire distinguisher

Battery fire or explosion

DANGER

- If the battery is on fire, evacuate the crowd to an open area and report the fire immediately.
- Wear a gas mask to avoid inhaling toxic gases and harmful substances when evacuating.
- Do not use water to distinguish the burning battery. It can result in severe electrical shock.

3.

PRODUCT INFORMATION

3.1. Product Application Scope

This product is a high-performance Commercial & Industrial (C&I) Energy Storage System (ESS) equipped with advanced battery technology, ideal for large residential, small-scale industrial, and commercial applications. Designed to efficiently store energy for later use, the ESS features an integrated Battery Management System (BMS). This BMS optimizes battery performance while safeguarding against operation beyond its safe parameters, ensuring stability and durability.

One CHS2 ESS can be deployed with three CB2 energy storage systems at maximum for system expansion.

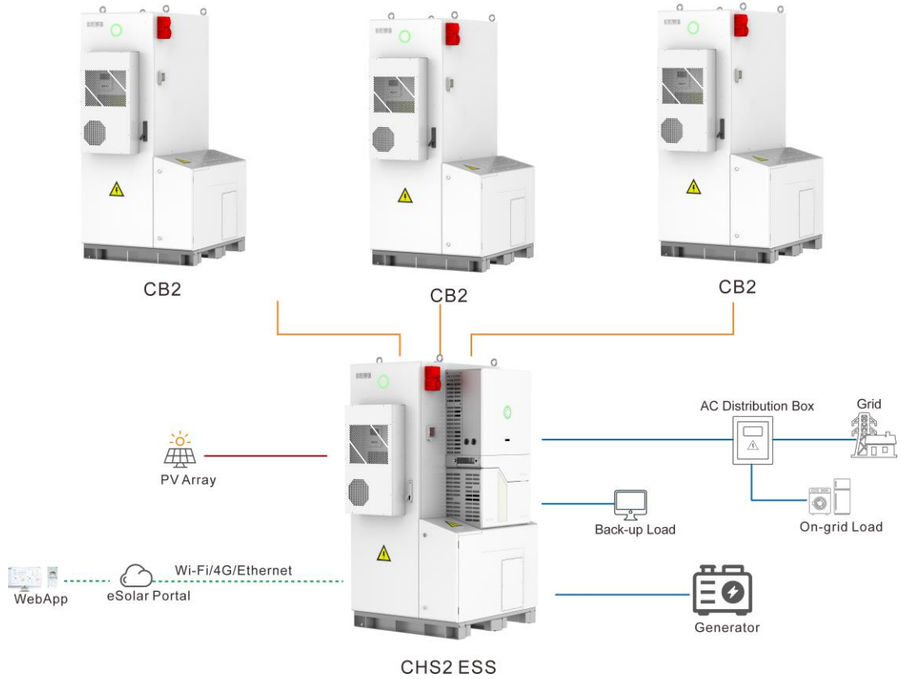


Figure 3.1. System overview

Note: The CH2 inverter has not been tested to Section 5 of AS/NZS 4777.2:2020. Multiple inverter combinations should not be used or external devices should be used in accordance with the requirements of AS/NZS 4777.1.

3.2. Specification of Product Model

CHS2 - ***x*K** - **T*x*** - **X**

① ② ③ ④

① CHS2 represents the product name.

② xK indicates the rated energy of the storage system in kW. For example, 50 means 50 kW. The value of x includes 29.9 and 50.

③ T means three phases. *x* indicates three phases with *x* number of MPPT. The value of x includes 4 and 6.

④ X indicates the battery rated voltage, rated capacity, and usable energy. The value of X includes 204.8V/280AH/51.5KWH, 256.0V/280AH/64.4KWH, 307.2V/280AH/77.3KWH, 358.4V/280AH/90.2KWH, 204.8V/280AH/103KWH, 256.0V/280AH/128.8KWH, 307.2V/280AH/154.6KWH, 358.4V/280AH/180.4KWH, 204.8V/280AH/154.5KWH, 256.0V/280AH/193.2KWH, 307.2V/280AH/231.9KWH, 358.4V/280AH/270.6KWH, 204.8V/280AH/206KWH, 256.0V/280AH/257.6KWH, 307.2V/280AH/309.2KWH, and 358.4V/280AH/360.8KWH.

3.3. Dimension

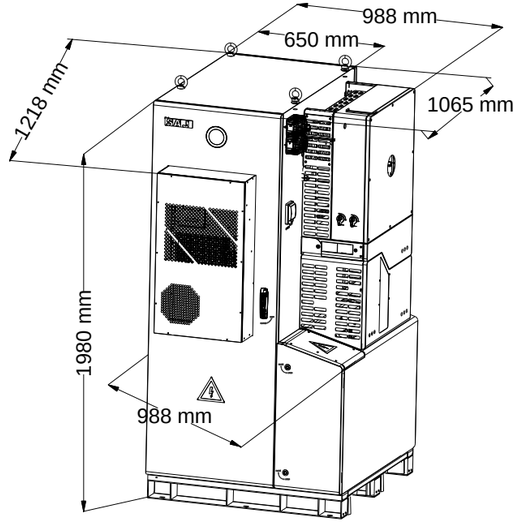


Figure 3.2. Dimensions of the ESS

3.4. Terminals Description

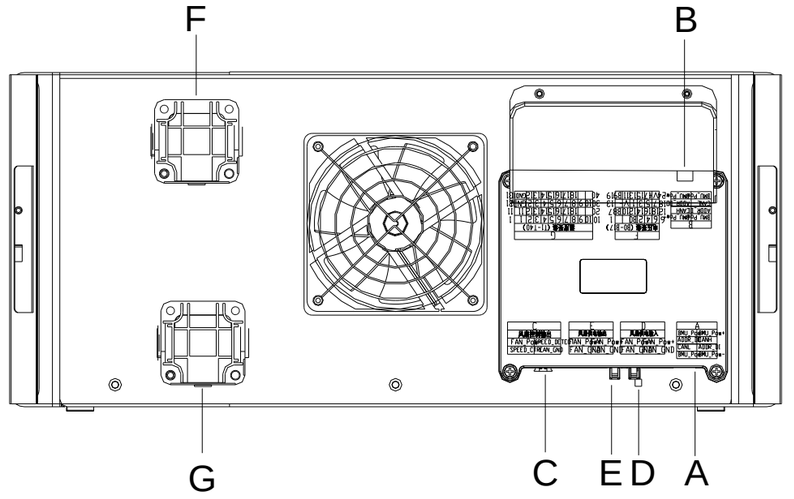


Figure 3.3. Electrical interfaces of battery modules

Callout	Silkscreen	Function
A	A	The communication input port.
B	B	The communication output port.
C	C	The fan control output port.
D	D	The fan power input port.
E	E	The fan power output port.
F	/	The positive port of battery connection.
G	/	The negative port of battery connection.

Table 3.1. Terminal descriptions of battery modules

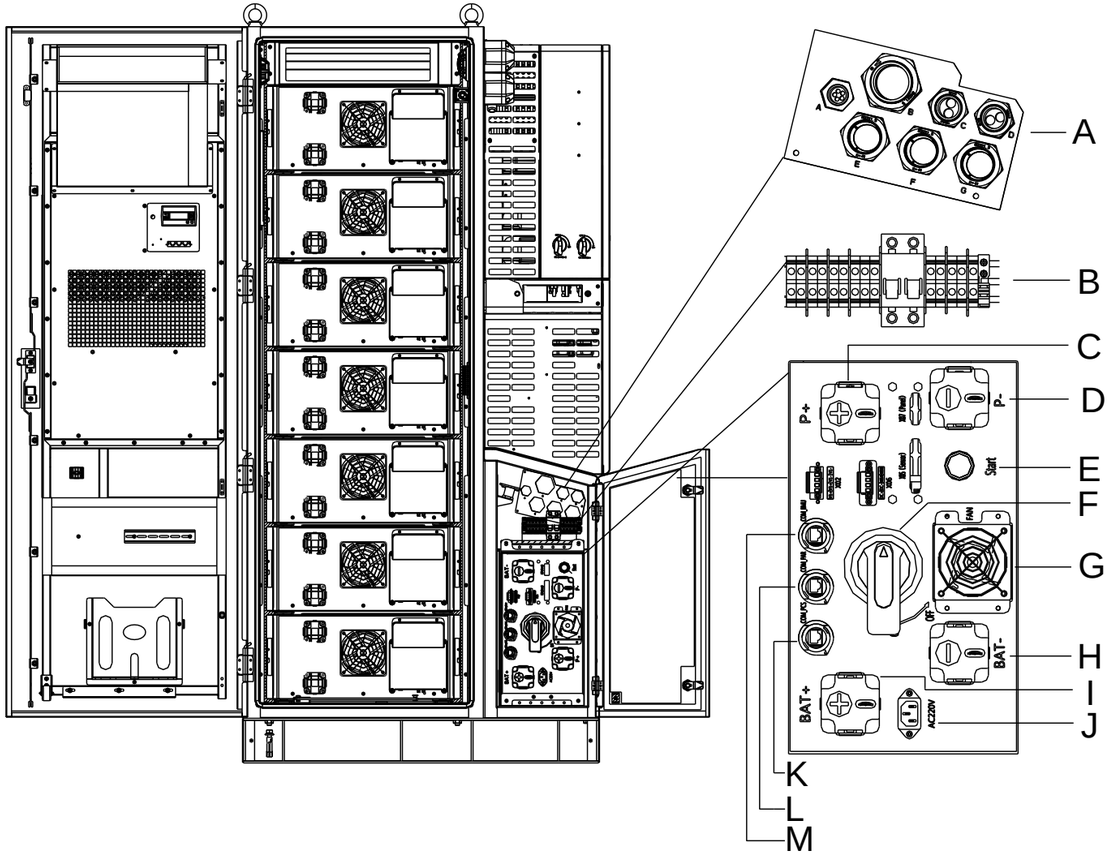


Figure 3.4. Electrical interfaces of the battery control unit

Callout	Silkscreen	Function
A	A, B, C, D, E, F, G	The ports for cable connections to/from the CH2 inverter and the expansion CB2 systems. All the batter power cables are connected before delivery. The installers need to connect the AC power cables to the grid, the DC power cables to the PV arrays, and the communication cables to the external systems on-site.
B	/	The AC circuit breaker.
C	P+	The positive port for DC input and output from/to the inverter.
D	P-	The negative port for DC input and output from/to the inverter.
E	Start	The Start button.
F	/	The main switch that controls the connection between the battery modules and the battery control unit.
G	FAN	The fan for system cooling. The 24V DC power supply cables from X02 and X06 to the battery modules are connected before delivery.
H	BAT-	The negative port for DC input and output from/to the first battery module.
I	BAT+	The positive port for DC input and output from/to the last battery module.
J	AC220V	The 220 V AC power supply for the air conditioner. The cables are connected before delivery.
K	COM_PCS	The communication port connecting to the BMS_1 port of the inverter. The cable is connected before delivery.
L	COM_PAR	The communication port connecting to the expanded battery system.
M	COM_BMU	The communication port connecting to the battery module.

Table 3.2. Terminal descriptions of the battery control unit

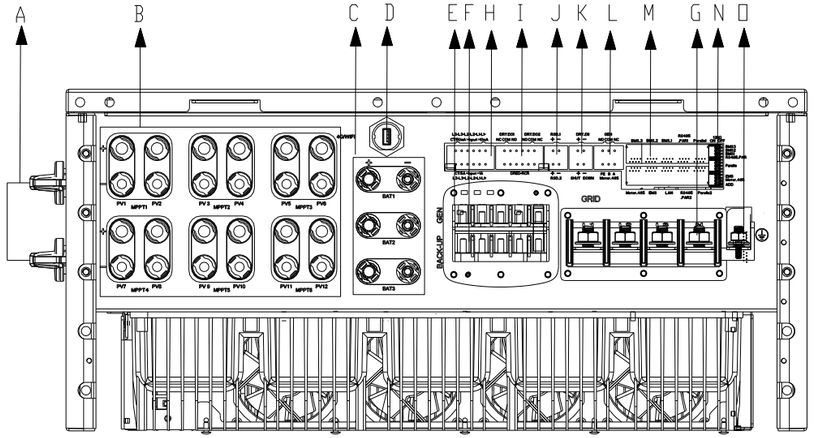


Figure 3.5. Electrical interfaces of the inverter

Callout	Silkscreen	Function
A	DC SWITCH 1 (PV1-6), DC SWITCH 2 (PV7-12)	The PV switches.
B	PV1-PV12	The PV input.
C	BAT1-BAT3	The battery connection ports.
D	4G/WIFI	The 4G/Wi-Fi communication port.
E	GEN	The external generator connection ports.
F	BACK-UP	The AC output connection ports for backup loads.
G	GRID	The grid connection port.
H	CT	The CT connection port.
I	DRY/DRED/RCR	The connection ports for dry contact, DRED and RCR devices.
J	RSD	The RSD connection port.
K	DRY/SHUT DOWN	The connection ports for dry contact and emergency shutdown devices.
L	GEN	The connection port for external generator.
M	BMS/LAN/EMS/METER/PARELLEL	The connection ports for the listed systems.
N	120Ω	The DIP switches for the 120Ω terminal resistors.
O	⏚	The grounding cable connection port.

Table 3.3. Terminal descriptions of the inverter

The following figure shows the battery connections before delivery:

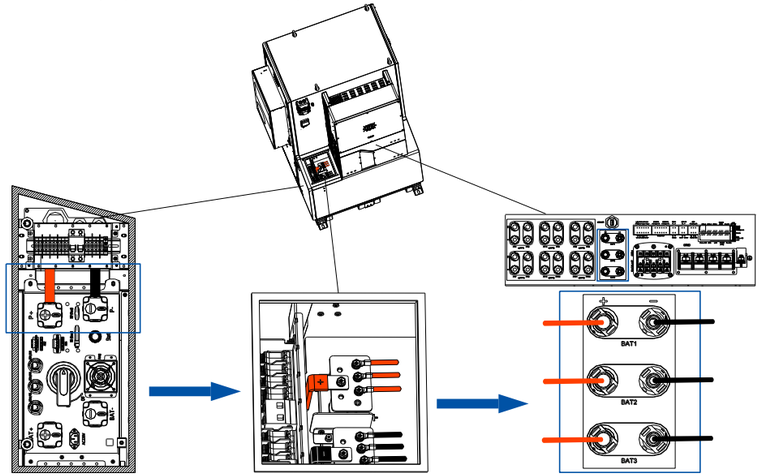


Figure 3.6. Battery cable connections before delivery

3.5. Datasheet

3.5.1. System

CHS2-29.9K-T4-X

Model	CHS2-29.9K-T4-204.8V/280Ah/51.5kWh	CHS2-29.9K-T4-256.0V/280Ah/64.4kWh	CHS2-29.9K-T4-307.2V/280Ah/77.3kWh	CHS2-29.9K-T4-358.4V/280Ah/90.2kWh
DC Input				
Max. PV Array Power [Wp]@STC	59998			
Max. DC Voltage [V]	1000			
MPPT Voltage Range [V]	180-850			
Rated DC Voltage [V]	600			
Start Voltage [V]	200			
Max. DC Input Current [A]	4*45			
Max. DC Short Circuit Current [A]	4*56.5			
Backfeed Current [A]	0			
Number of Strings per MPPT	2			
Battery Parameters				
Battery Type	LiFePO4			
Rated Energy [kWh]	57.3	71.6	85.9	100.3
Rated Capacity [Ah]	280			
Battery Voltage Range [V]	179.2-230.4	224-288	268.8-345.6	313.6-403.2
Max. Charging/Discharging Current [A]	140			
Max. DC Short Circuit Current [A]	250			
Depth of Discharge (%)	90			
Usable Energy [kWh]	51.5	64.4	77.3	90.2
AC Output [On-grid]				
Rated AC Power [W]	29999			
Rated Apparent Power [VA]	29999			
Max. Apparent Power [VA]	29999			
Rated Output Current [A]@230V AC	43.3			
Max. AC Output Current to Utility Grid [A]	43.3			
Current Inrush[A]	192			
Max. AC Fault Current [A]	182.6			
Max. AC Over Current Protection [A]	86.6			
Backfeed Current [A]	0			

Model	CHS2-29.9K-T4-204.8V/280Ah/51.5kWh	CHS2-29.9K-T4-256.0V/280Ah/64.4kWh	CHS2-29.9K-T4-307.2V/280Ah/77.3kWh	CHS2-29.9K-T4-358.4V/280Ah/90.2kWh
Rated AC Voltage [V]	3L+N+PE, 400			
Rated Input/Output Voltage/Range (V)	230/400V 0.85Un-1.1Un			
Rated Output Frequency/Range [Hz]	50: 45-55; 60: 55-65			
Power Factor [cos φ]	0i - 1 - 0c			
Total Harmonic Distortion [THDi]	<3%			
AC Input [On-grid]				
Rated AC Voltage [V]	3L+N+PE, 400			
Rated Input Frequency [Hz]	50, 60			
Max. Input Current [A]	150			
Max. Short Circuit Current [A]	150			
AC Input [Generator]				
Max. Input Power [W]	29999			
Max. Input Current [A]@230V	43.3			
Rated Input Voltage [v]	3L+N+PE, 400			
Rated Input Frequency/Range [Hz]	50: 45-55; 60: 55-65			
Max. Short Circuit Current [A]	43.3			
AC Output [Back-up]				
Max. Apparent Power [VA]	29999			
Peak Output Apparent Power [VA]	29999			
Rated AC Voltage [V]	3L+N+PE, 400			
Rated Output Frequency/Range [Hz]	50: 45-55; 60: 55-65			
Backfeed Current [A]	0			
Output THDv (@ Linear Load)	<3%			
Efficiency				
Max. Efficiency	≥98.0%			
Euro Efficiency	97.3%			
Max. Battery to AC Efficiency	96.0%			
Protection				
PV String Current Monitoring	Integrated			
PV Insulation Resistance Detection	Integrated			
Residual Current Monitoring	Integrated			
PV Reverse Polarity Protection	Integrated			
Anti-islanding Protection	AFD			
AC Overcurrent Protection	Integrated			
AC Short Circuit Protection	Integrated			
AC Overvoltage Protection	Integrated			

Model	CHS2-29.9K-T4-204.8V/280Ah/51.5kWh	CHS2-29.9K-T4-256.0V/280Ah/64.4kWh	CHS2-29.9K-T4-307.2V/280Ah/77.3kWh	CHS2-29.9K-T4-358.4V/280Ah/90.2kWh
DC Switch	Integrated			
DC Surge Protection	II			
AC Surge Protection	II			
AFCI	Integrated			
RSD	Optional			
General Parameters				
Communication	Wi-Fi/Ethernet/CAN/RS485			
Topology	Non-isolated			
Over Voltage Category	OVC II (DC), OVC III (AC)			
Operating Temperature Range	-30℃ to +50℃ (45℃ to 50℃ with derating)			
Cooling Method	Air conditioner			
Ambient Humidity	0-100% Non-condensing			
Altitude [m]	2000			
Ingress Protection	IP55			
Protective Class	I			
Dimensions [H*W*D] [mm]	1980*988*1065			
Weight [kg]	1050	1150	1250	1350
Warranty [Year]	10			
Standard	VDE4105, IEC61727/62116, VDE0126, AS4777.2, CEI 0 21, EN50549-1, G98, G99, C10-11, UNE217002, NBR16149/NBR16150, IEC62109-1/-2, EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4			

CHS2-50K-T6-X

Model	CHS2-50K-T6-204.8V/280Ah/51.5kWh	CHS2-50K-T6-256.0V/280Ah/64.4kWh	CHS2-50K-T6-307.2V/280Ah/77.3kWh	CHS2-50K-T6-358.4V/280Ah/90.2kWh
DC Input				
Max. PV Array Power [Wp]@STC	100000			
Max. DC Voltage [V]	1000			
MPPT Voltage Range [V]	180-850			
Rated DC Voltage [V]	600			
Start Voltage [V]	200			
Max. DC Input Current [A]	6*45			
Max. DC Short Circuit Current [A]	6*56.5			
Backfeed Current [A]	0			
Number of Strings per MPPT	2			
Battery Parameters				
Battery Type	LiFePO4			
Rated Energy [kWh]	57.3	71.6	85.9	100.3
Rated Capacity [Ah]	280			
Battery Voltage Range [V]	179.2-230.4	224-288	268.8-345.6	313.6-403.2
Max. Charging/Discharging Current [A]	140			
Max. DC Short Circuit Current [A]	250			
Depth of Discharge (%)	90			
Usable Energy [kWh]	51.5	64.4	77.3	90.2
AC Output [On-grid]				
Rated AC Power [W]	50000			
Rated Apparent Power [VA]	50000			
Max. Apparent Power [VA]	55000			
Rated Output Current [A]@230V AC	72.5			
Max. AC Output Current to Utility Grid [A]	79.8			
Current Inrush[A]	192			
Max. AC Fault Current[A]	182.6			
Max. AC Over Current Protection[A]	145			
Backfeed Current [A]	0			
Rated AC Voltage [V]	3L+N+PE, 400			
Rated Input/Output Voltage/Range(V)	230/400V 0.85Un-1.1Un			
Rated Output Frequency/Range [Hz]	50: 45-55; 60: 55-65			
Power Factor [cos φ]	0i - 1 - 0c			
Total Harmonic Distortion [THDi]	<3%			

Model	CHS2-50K-T6-204.8V/280Ah/51.5kWh	CHS2-50K-T6-256.0V/280Ah/64.4kWh	CHS2-50K-T6-307.2V/280Ah/77.3kWh	CHS2-50K-T6-358.4V/280Ah/90.2kWh
AC Input [On-grid]				
Rated AC Voltage [V]	3L+N+PE, 400			
Rated Input Frequency [Hz]	50, 60			
Max. Input Current [A]	150			
Max. Short Circuit Current [A]	150			
AC Input [Generator]				
Max. Input Power [W]	50000			
Max. Input Current [A]@230V	72.5			
Rated Input Voltage [v]	3L+N+PE, 400			
Rated Input Frequency/Range [Hz]	50: 45-55; 60: 55-65			
Max. Short Circuit Current [A]	72.5			
AC Output [Back-up]				
Max. Apparent Power [VA]	55000			
Peak Output Apparent Power [VA]	75000, 5s			
Rated AC Voltage [V]	3L+N+PE, 400			
Rated Output Frequency/Range [Hz]	50: 45-55; 60: 55-65			
Backfeed Current [A]	0			
Output THDv (@ Linear Load)	<3%			
Efficiency				
Max. Efficiency	≥98.0%			
Euro Efficiency	97.3%			
Max. Battery to AC Efficiency	96.0%			
Protection				
PV String Current Monitoring	Integrated			
PV Insulation Resistance Detection	Integrated			
Residual Current Monitoring	Integrated			
PV Reverse Polarity Protection	Integrated			
Anti-islanding Protection	AFD			
AC Overcurrent Protection	Integrated			
AC Short Circuit Protection	Integrated			
AC Overvoltage Protection	Integrated			
DC Switch	Integrated			
DC Surge Protection	II			
AC Surge Protection	II			
AFCI	Integrated			
RSD	Optional			

Model	CHS2-50K-T6-204.8V/280Ah/51.5kWh	CHS2-50K-T6-256.0V/280Ah/64.4kWh	CHS2-50K-T6-307.2V/280Ah/77.3kWh	CHS2-50K-T6-358.4V/280Ah/90.2kWh
General Parameters				
Communication	Wi-Fi/Ethernet/CAN/RS485			
Topology	Non-isolated			
Over Voltage Category	OVC II (DC), OVC III (AC)			
Operating Temperature Range	-30℃ to +50℃ (45℃ to 50℃ with derating)			
Cooling Method	Air Conditioner			
Ambient Humidity	0-100% Non-condensing			
Altitude [m]	2000			
Ingress Protection	IP55			
Protective Class	I			
Dimensions [H*W*D] [mm]	1980*988*1065			
Weight (kg)	1050	1150	1250	1350
Warranty [Year]	10			
Standard	VDE4105, IEC61727/62116, VDE0126, AS4777.2, CEI 0 21, EN50549-1, G98, G99, C10-11, UNE217002, NBR16149/NBR16150, IEC62109-1/-2, EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4			

CHS2-50K-T6-X

Model	CHS2-50K-T6-307.2V/280Ah/154.6kWh	CHS2-50K-T6-358.4V/280Ah/180.4kWh
DC Input		
Max. PV Array Power [Wp]@STC	100000	
Max. DC Voltage [V]	1000	
MPPT Voltage Range [V]	180-850	
Rated DC Voltage [V]	600	
Start Voltage [V]	200	
Max. DC Input Current [A]	6*45	
Max. DC Short Circuit Current [A]	6*56.5	
Backfeed Current [A]	0	
Number of Strings per MPPT	2	
Battery Parameters		
Battery Type	LiFePO4	
Rated Energy [kWh]	171.8	200.6
Rated Capacity [Ah]	280	
Battery Voltage Range [V]	268.8-345.6	313.6-403.2
Max. Charging/Discharging Current [A]	140	

Model	CHS2-50K-T6-307.2V/280Ah/154.6kWh	CHS2-50K-T6-358.4V/280Ah/180.4kWh
Max. DC Short Circuit Current [A]	250	
Depth of Discharge (%)	90	
Usable Energy [kWh]	154.6	180.4
AC Output [On-grid]		
Rated AC Power [W]	50000	
Rated Apparent Power [VA]	50000	
Max. Apparent Power [VA]	55000	
Rated Output Current [A]@230V AC	72.5	
Max. AC Output Current to Utility Grid [A]	79.8	
Current Inrush[A]	192	
Max. AC Fault Current[A]	182.6	
Max. AC Over Current Protection[A]	145	
Backfeed Current [A]	0	
Rated AC Voltage [V]	3L+N+PE, 400	
Rated Input/Output Voltage/Range(V)	230/400V 0.85Un-1.1Un	
Rated Output Frequency/Range [Hz]	50: 45-55; 60: 55-65	
Power Factor [cos φ]	0i - 1 - 0c	
Total Harmonic Distortion [THDi]	<3%	
AC Input [On-grid]		
Rated AC Voltage [V]	3L+N+PE, 400	
Rated Input Frequency [Hz]	50, 60	
Max. Input Current [A]	150	
Max. Short Circuit Current [A]	150	
AC Input [Generator]		
Max. Input Power [W]	50000	
Max. Input Current [A]@230V	72.5	
Rated Input Voltage [v]	3L+N+PE, 400	
Rated Input Frequency/Range [Hz]	50: 45-55; 60: 55-65	
Max. Short Circuit Current [A]	72.5	
AC Output [Back-up]		
Max. Apparent Power [VA]	55000	
Peak Output Apparent Power [VA]	75000, 5s	
Rated AC Voltage [V]	3L+N+PE,400	
Rated Output Frequency/Range [Hz]	50: 45-55; 60: 55-65	
Backfeed Current [A]	0	
Output THDv (@ Linear Load)	<3%	

Model	CHS2-50K-T6-307.2V/280Ah/154.6kWh	CHS2-50K-T6-358.4V/280Ah/180.4kWh
Efficiency		
Max. Efficiency	≥98.0%	
Euro Efficiency	97.3%	
Max. Battery to AC Efficiency	96.0%	
Protection		
PV String Current Monitoring	Integrated	
PV Insulation Resistance Detection	Integrated	
Residual Current Monitoring	Integrated	
PV Reverse Polarity Protection	Integrated	
Anti-islanding Protection	AFD	
AC Overcurrent Protection	Integrated	
AC Short Circuit Protection	Integrated	
AC Overvoltage Protection	Integrated	
DC Switch	Integrated	
DC Surge Protection	II	
AC Surge Protection	II	
AFCI	Integrated	
RSD	Optional	
General Parameters		
Communication	Wi-Fi/Ethernet/CAN/RS485	
Topology	Non-isolated	
Over Voltage Category	OVC II (DC), OVC III (AC)	
Operating Temperature Range	-30℃ to +50℃ (45℃ to 50℃ with derating)	
Cooling Method	Air Conditioner	
Ambient Humidity	0-100% Non-condensing	
Altitude [m]	2000	
Ingress Protection	IP55	
Protective Class	I	
Dimensions [H*W*D] [mm]	1980*988*1065	
Weight (kg)	2410	2610
Warranty [Year]	10	
Standard	VDE4105, IEC61727/62116, VDE0126, AS4777.2, CEI 0 21, EN50549-1, G98, G99, C10-11, UNE217002, NBR16149/NBR16150, IEC62109-1/-2, EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4	

3.5.2. Battery Information

Model	CB2-57.3-HV5	CB2-71.6-HV5	CB2-85.9-HV5	CB2-100.3-HV5
Rated Energy [kWh]	57.3	71.6	85.9	100.3
Usable Energy [kWh]	51.5	64.4	77.3	90.2
Rated Capacity [Ah]	280	280	280	280
No. of Battery Modules	4	5	6	7
Nominal Voltage [V]	204.8	256	307.2	358.4
Voltage Range [V]	179.2–230.4	224–288	268.8–345.6	313.6–403.2
Charge/Discharge Current [A]	140	140	140	140
Rated Power [kW]	28.6	35.6	42.9	50.1
Weight [kg]	960	1060	1160	1260
Depth of Discharge (%)	90			
Dimension [mm]	1980*988*1065			
Communication	CAN			
Operating Temperature Range [℃]	-30℃ to +50℃			
Cooling Method	Air conditioner			
Relative Humidity	5–95% (non-condensing)			
Altitude [m]	2000			
Ingress Protection	IP55			
Mounting	Ground-mounted			
Battery Designation	IFpP74/175/208/[1P16S]M/-20+55/95			
Control Module	**CBC2-HV5**			
Dimension [mm]	225*483*610			
Weight [kg]	28			
Battery Module	**CBU2-14.33-HV5**			
Rated Energy [kWh]	14.33			
Weight [kg]	115			
Dimension [mm]	231*523*805			
Applicable Standard	IEC62619-2017, UN38.3, IEC61000-6-2/4, IEC62477			

4.

INSTALLATION INSTRUCTIONS

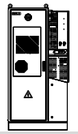
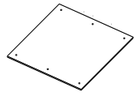
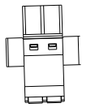
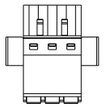
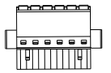
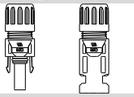
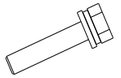
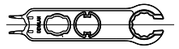
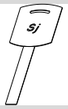
4.1. Unpacking

4.1.1. Check the Outer Package

Although SAJ products are thoroughly tested and checked before delivery, the products may suffer damages during transportation. Check the package for any obvious signs of damage, and if such evidence is present, do not open the package and contact your dealer as soon as possible.

4.1.2. Scope of Delivery

Contact after-sales if there are missing or damaged components.

				
CHS2 ESS x1	Positioning cardboard x1	2-pin plug x4	3-pin plug x2	6-pin plug x4
				
M4*10 flathead screw x4	PV positive terminal x12 PV negative terminal x12	M8*16 screw x2 M6*12 screw x1	M12*80 expansion tube x6	Terminal (RNBS 38-8) x2 (RNB70-10) x4 (SC50-10) x4
				
Terminal (SQNBS22-5) x10	Removal tool x1	RJ45 plug x10	Communication module (optional)	Socket wrench x1
				
Key1 x2	Key2 x2	Documents		

The documents include the user manual, quick installation guide and packaging list.

4.2. Installation Method and Position

4.2.1. Installation Position and Space Requirement

This device is equipped with an air conditioner for cooling and provides the ingress protection of IP 55 (Battery) and IP66 (Inverter). The device can be installed either indoors or outdoors. For outdoor installation, the pollution degree classification needs to be IP44 at the minimum.

Poor air ventilation will affect the working performance of internal electronic components and shorten the service life of the system. Reserve enough clearance around the product to ensure a good air circulation at the installation area.

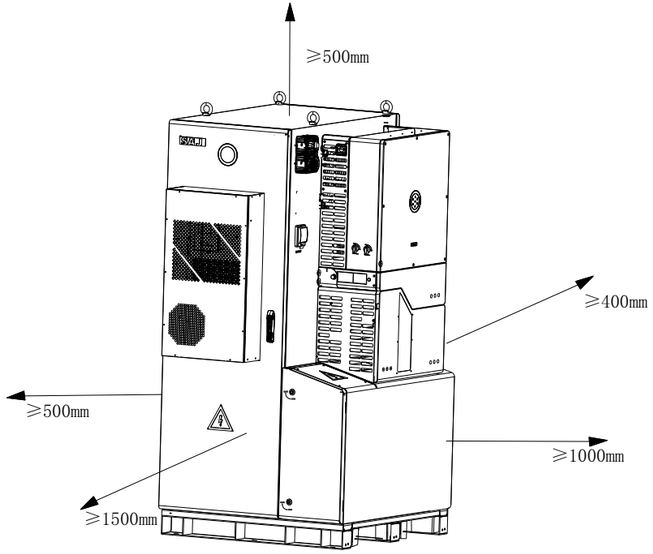


Figure 4.1. Installation space requirement of a single machine

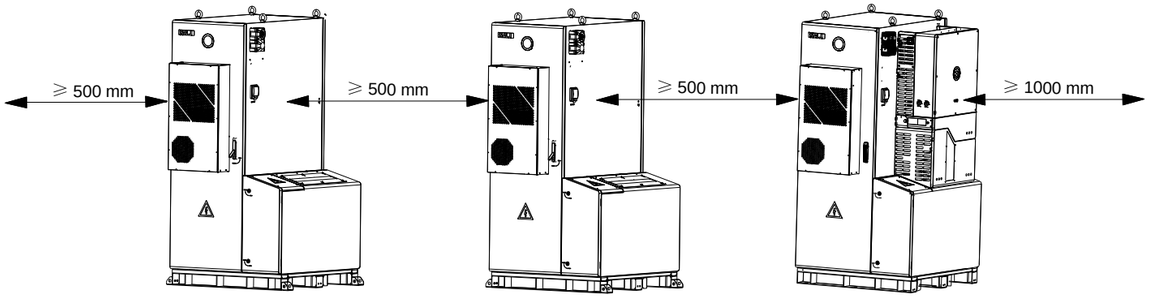


Figure 4.2. Installation space requirement of multiple machines

4.2.2. Mounting Method

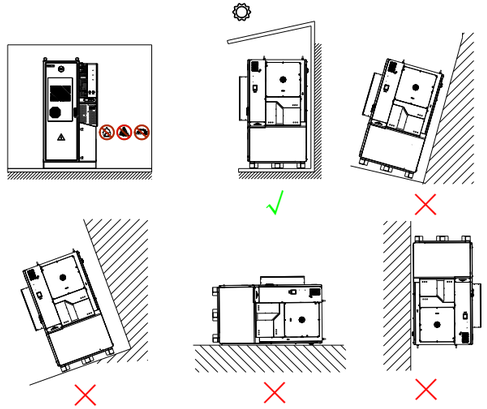


Figure 4.3. Mounting positions

- The equipment employs air conditioner cooling, and it can be installed indoor or outdoor.
- Mount vertically. Never install the device tilted forwards, sideways, horizontally or upside down.
- The ground should be flat without inclination. The load-bearing capacity of the ground should reach 1.5 tons.

Installation Environment Requirements

- The installation environment must be free of inflammable or explosive materials.
- Install the device away from heat sources.
- Do not install the device at a place where the temperature changes extremely.
- Keep the device away from children.
- Do not install the device at daily working or living arears, including but not limited to the following areas: bedroom, lounge, living room, study, toilet, bathroom, theater and attic.
- When installing the device at the garage, please keep it away from the drive-way.
- Keep the device from water sources such as taps, sewer pipes and sprinklers to prevent water seepage.

Note: When installed outdoors, the height of the device from the ground should be considered to prevent the device from soaking in water. The specific height is determined by the site environment.

4.3. Mounting Procedure

4.3.1. Installation Tools

Installation tools include but are not limited to the following recommended ones. Use other auxiliary tools on site if necessary.

Figure 4.4. Suggested installation tools

4.3.2. Transportation Equipment

The installers need to prepare proper equipment for transporting and lifting the product components. For example, a forklift or a crane.

Forklift

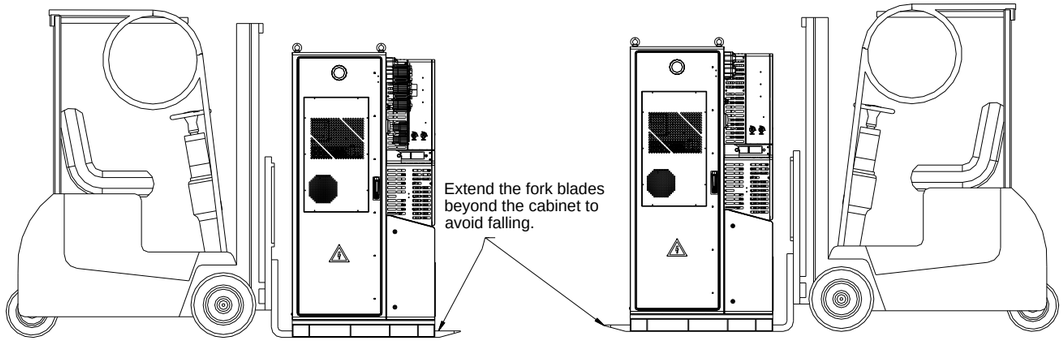


Figure 4.5. Transporting with a forklift

Use the following forklift to move or lift the cabinet:

- The load capacity must be greater than two tons.
- The length of the fork blades must be greater than 1.2 meters. Use fork extensions if needed.
- The fork blades can slide under the bottom of the cabinet without damaging the cabinet.

Follow specific guidelines below to move or lift the cabinet:

- Adjust the distance between the fork blades to ensure load stability.
- The fork blades must extend longer than the depth of the cabinet to avoid falling.

Crane

Use a crane to move or lift the cabinet. A force greater than two tons is required to move this device. The height between the sling and the top surface must be greater than or equal to 1.5 meters.

Notice: Make sure that the four rings are firmly fixed to the cabinet before and during any movement of the cabinet.

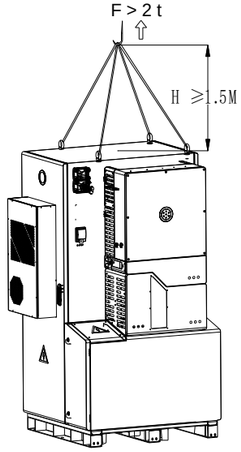


Figure 4.6. Transporting with a crane

4.3.3. Installation Personnel

⚠ CAUTION
• The forklift and crane operators must have valid operation license or certification and follow the operation safety rules.

4.3.4. Mount the Cabinet

Select one of the following options to secure the cabinet:

- Secure with the screw bolts.
- Secure with the mounting brackets.

To secure the cabinet with the screw bolts:

Step 1. Place the positioning cardboard on the floor where the machine is to be located. Mark six drilling holes with the cardboard on the floor.

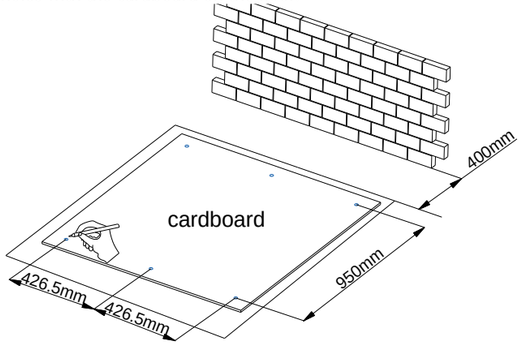


Figure 4.7. Marking the drilling positions

Step 2. Use an electrical drill to drill six holes on the floor at the depth of 80~90 mm. Put an expansion tube in each hole. (M12*80)

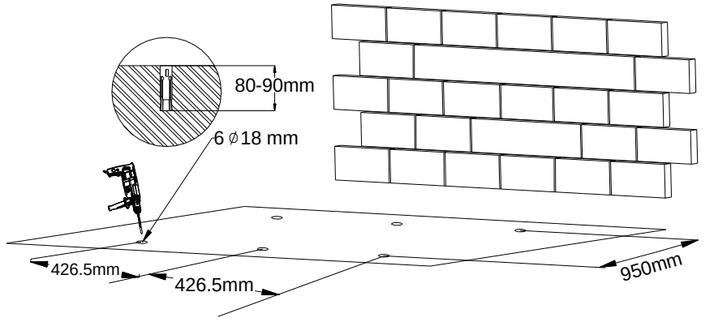


Figure 4.8. Drilling the holes

Step 3. Move and place the cabinet to the installation location with a forklift or crane. Align the holes at the cabinet bottom with the drilled holes.

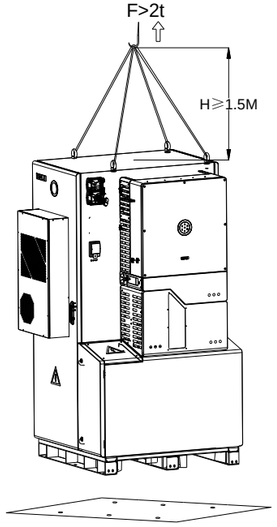


Figure 4.9. Placing the cabinet

Step 4. Use a wrench to secure the bottom of the cabinet to the floor with screws. (M12*80)

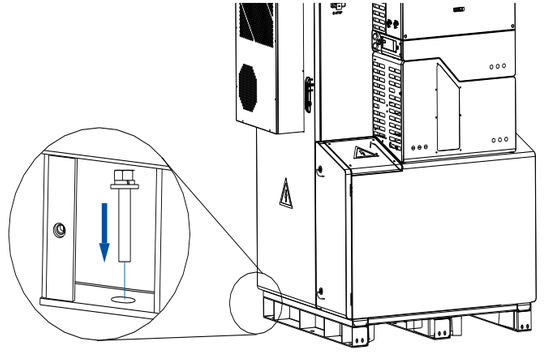


Figure 4.10. Securing the cabinet

To secure the cabinet with the mounting brackets:

Step 1. Move and place the cabinet to the installation location with a forklift or crane.

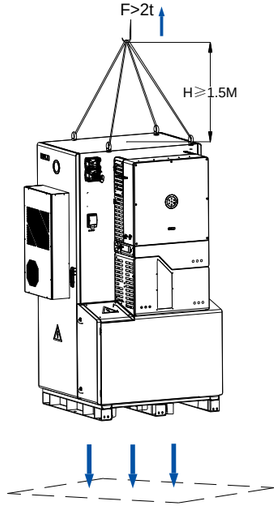


Figure 4.11. Placing the cabinet

Step 2. Place the four mounting brackets at the four corners of the cabinet and mark the drilling holes.

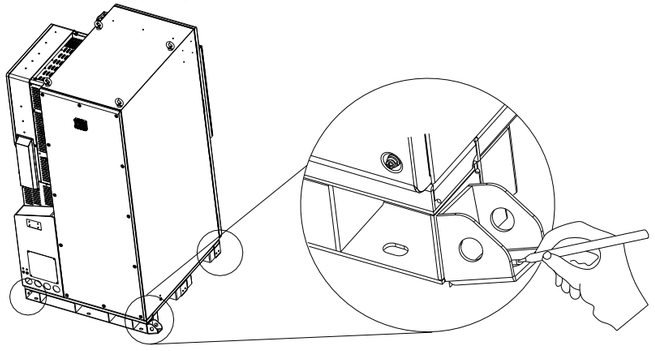


Figure 4.12. Marking the drilling positions

Step 3. Remove the mounting brackets, and use an electrical drill to drill four holes on the floor at the depth of 80-90 mm. Put an expansion tube in each hole. (M12*80)

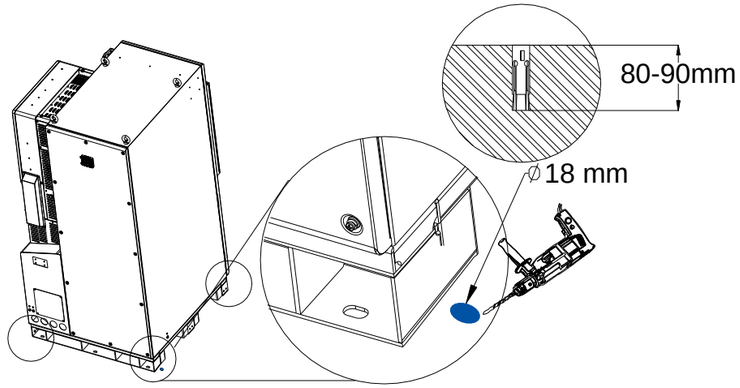


Figure 4.13. Drilling the holes

Step 4. Place the four mounting brackets back to the four corners and use a wrench to secure the brackets to the floor. (M12*80 screws: 47 N·m) (M8*25 screws: 13 N·m)

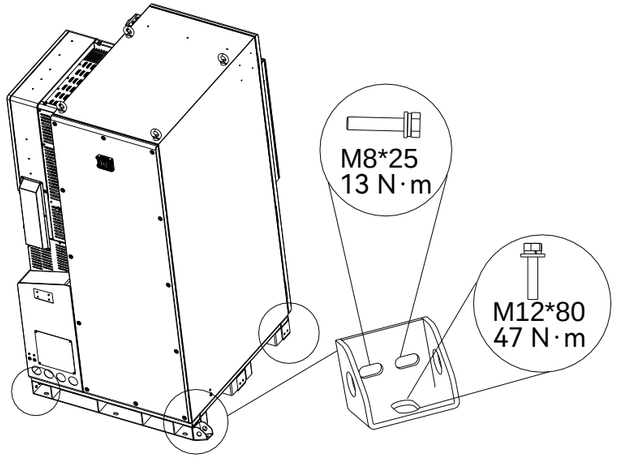


Figure 4.14. Securing the cabinet

5.

ELECTRICAL CONNECTION

5.1. Connect the Grounding Cable

Electrical connection must only be operated by professional technicians. Before connection, the technicians must wear necessary protective equipment, including insulating gloves, insulating shoes and safety helmet.

⚠ WARNING
Connect the grounding cable before other electrical connections.

The users need to prepare the cables and OT/DT terminals themselves. The recommended conductor cross-sectional area of the grounding cable is 6 mm^2.

Step 1. Assemble the cables with the RNBS38-8 OT/DT terminals as follows:

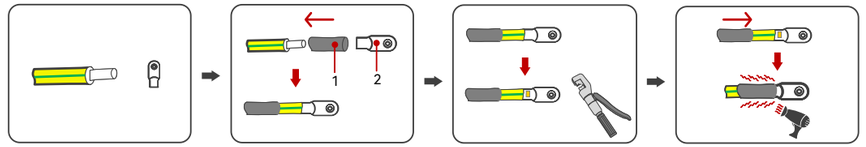


Figure 5.1. Preparing the grounding cable

1. Heat shrink tubing 2. OT/DT terminal

Step 2. Remove the screw of the grounding terminal, insert the screw through the OT/DT terminal, and tighten the cable with the screw.

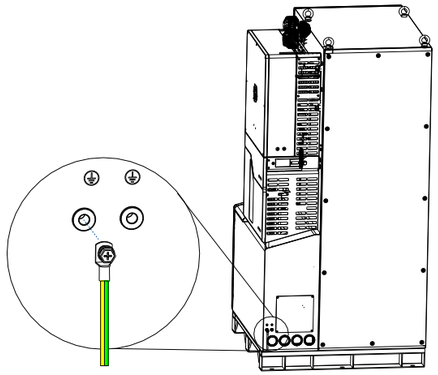


Figure 5.2. Connecting the grounding cable

5.2. Organize the Cables and Remove the Covers

Procedure

Step 1. Remove the metal plate at the bottom right corner of the cabinet for wiring convenience.

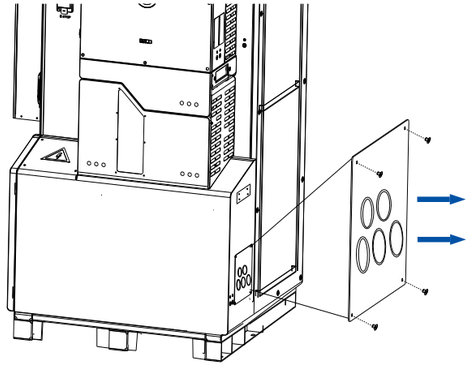


Figure 5.3. Removing the metal plate

Step 2. Pass the AC, PV, and communication cables through the cable outlet holes.

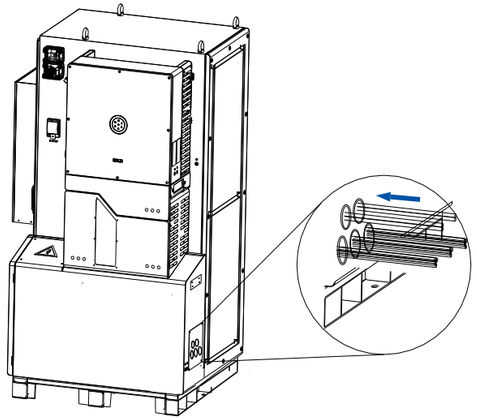


Figure 5.4. Organizing the cables

Step 3. Use a knife to cut the end of the cable sleeves at the cable outlet holes.

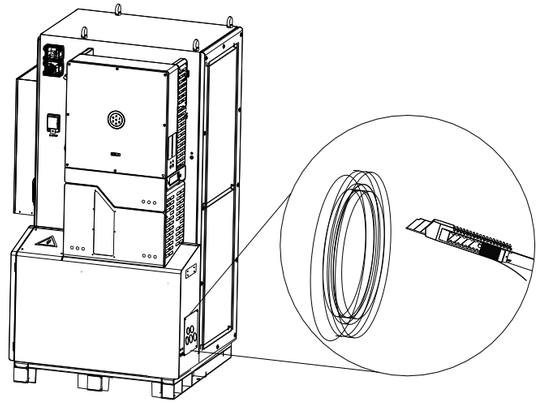


Figure 5.5. Cutting the cable sleeves

Step 4. Remove the decorative panels of the inverter.

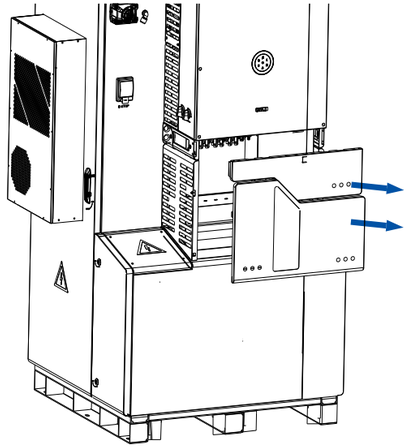


Figure 5.6. Removing the decorative panel

Step 5. Remove the AC cover, the middle beam, and the baffles under the inverter.

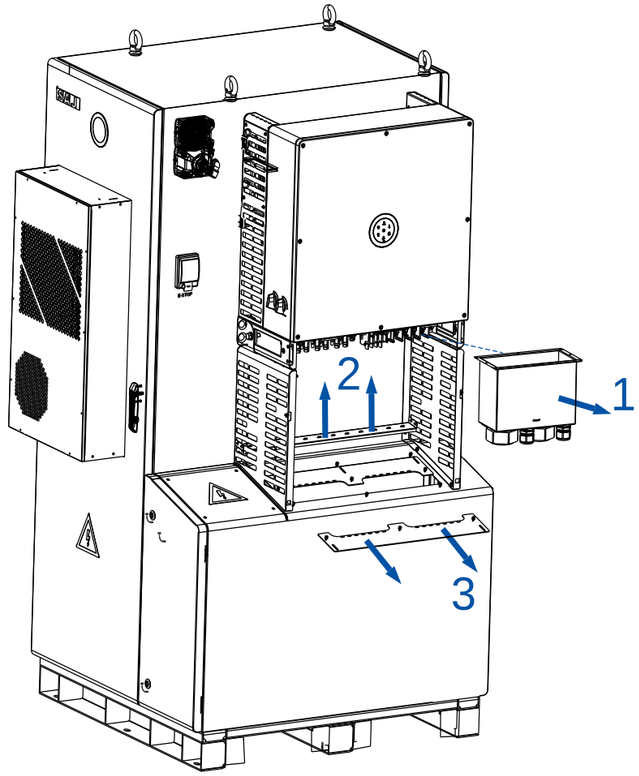


Figure 5.7. Removing the AC cover, middle beam, and baffle

5.3. Connect the AC Cables

Prepare the GRID cables according to the following specifications:

Model	Conductor cross-sectional area of cables (mm²)		Conductor material
	Range	Recommended value	Copper
CHS2-(29.9K, 50K)-(T4, T6)-X	35–70	50	
Grounding cable cross sectional area (mm²): 25			

Table 5.1. Recommended specifications of GRID cables

Note: If the grid-connection distance is large, select an AC cable with larger diameter for the actual condition.

Prepare the GEN and BACK-UP cables according to the following specifications:

Prepare the GRID cables according to the following specifications:

Model	Conductor cross-sectional area of cables (mm²)		Conductor material
	Range	Recommended value	Copper
CHS2-(29.9K, 50K)-(T4, T6)-X	16–25	25	
Grounding cable cross sectional area (mm²): 25			

Table 5.2. Recommended specifications of GEN and BACK-UP cables

Procedure

Step 1. Pass the AC cables through the GEN, BACK-UP, and GRID water-proof nuts of the AC cover box.

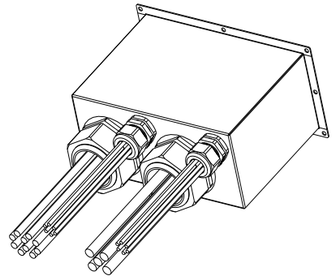


Figure 5.8. Threading the cables

Step 2. Peel off the insulation skin of the AC cables at proper length and crimp the cable ends with the RNB70-10 or SC50-10 OT/DT terminals tightly. Select the corresponding terminals depending on the cable specification.

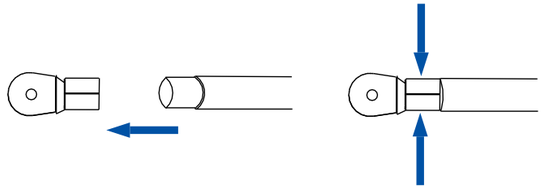


Figure 5.9. Stripping and crimping the cables

Step 3. Secure the inner core wires of the GRID, GEN, and BACKUP cables to the terminals of L1, L2, L3, N, and PE on the inverter.

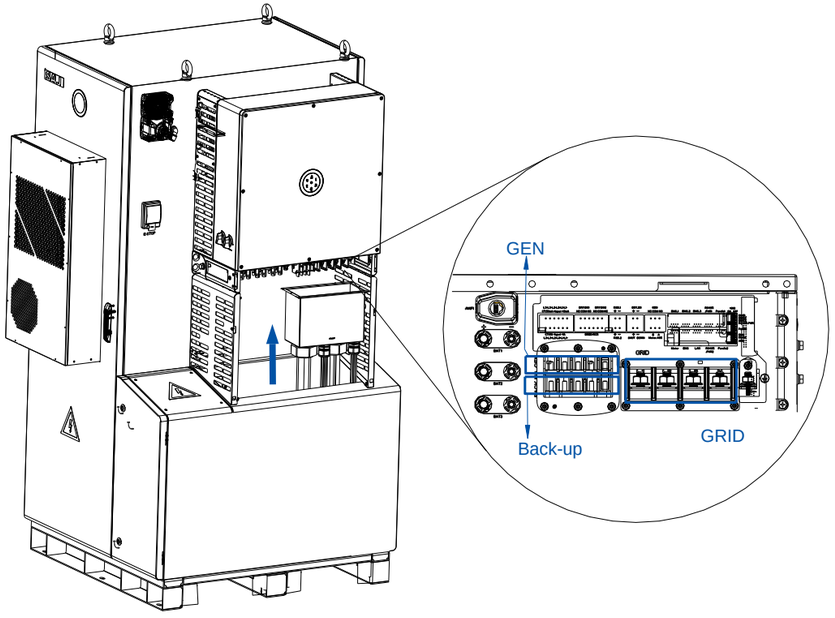


Figure 5.10. Inserting the cables

5.3.1. Earth Fault Alarm

This inverter complies with IEC 62109-2 clause 13.9 for earth fault alarm monitoring. If an earth fault alarm occurs, the ring light on the inverter LED panel will be lit up in red and an error code <44> can be viewed on the elekeeper (used to be called eSAJ Home) App.

5.3.2. External AC Circuit Breaker

Install an external circuit breaker to ensure that the inverter can be disconnected from the grid safely. Prepare the circuit breaker according to the following recommended rated current (A) specification:

Model	Recommended circuit breaker specification
CHS2-(29.9K, 50K)-(T4, T6)-X	200 A
Notice: Do not connect multiple inverters to one AC circuit breaker.	

Table 5.3. Recommended circuit breaker specification

5.3.3. Residual Current Device

The inverter is integrated with a RCMU that can detect the real time external current leakage. When the detected current exceeds the limitation, the inverter will be disconnected from the grid quickly.

An external residual current device can be connected with the inverter to protect the system from tripping when it is required by regional or local regulations. Either type A or type B RCD is compatible with the inverter. The action current of external residual current device should be 300 mA.

5.4. Connect the PV-side Cables

⚠WARNING
· Make sure the PV array is well insulated to the ground before connecting it to the inverter. Otherwise, after the PV array is connected, an error code <31> will be reported on the App after system startup and commissioning. · The inverter cannot be used with functionally earthed PV arrays.

Conductor cross-sectional area of cables (mm²)		Conductor material
Range	Recommended value	Outdoor copper wire cable, complying with 1000 V DC
4.0–6.0	4.0	

Table 5.4. Recommended specifications of DC cable

Note: When the inverters are used in parallel, it is necessary to ensure that the PV power of all inverters is consistent as much as possible.

⚠ WARNING

· Danger to life due to electric shock from touching the live components or DC cables.
· When the photovoltaic array is exposed to light, it supplies DC voltage to the PCE. Touching live DC cables can result in death or lethal injures.
· DO NOT touch the non-insulated parts or cables.
· Disconnect the inverter from voltage sources.
· DO NOT disconnect the DC connectors under load.
· Wear suitable personal protective equipment for all operations.

! NOTICE

· Place the connector separately after unpacking to avoid confusion about cable connections.
· Connect the positive connector to the positive side of the solar panels, and connect the negative connector to the negative side of the solar side. Be sure to connect them in the correct way.

Step 1. Remove the upper cover of the PV cover.

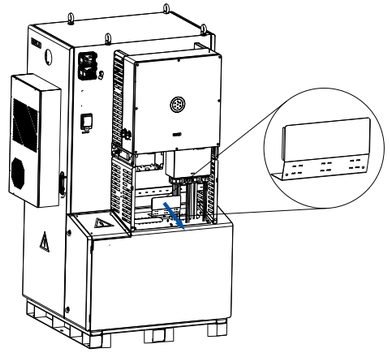


Figure 5.11. Removing the PV cover

Step 2. Loosen the lock screws on the positive and negative connectors.

Figure 5.12. Loosening the lock screws

Step 3. Use a 3-mm wide-bladed screwdriver to strip the insulation layer by 8 to 10 mm from one end of each cable.

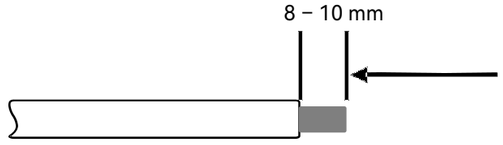


Figure 5.13. Striping the insulation

Step 4. Insert the cable ends to the sleeves. Use a crimping plier to assembly the cable ends.

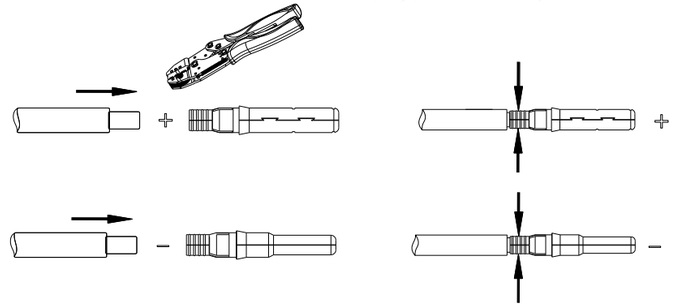


Figure 5.14. Assembling the cable ends

Step 5. Insert the positive and negative cables into the positive and negative connectors. Gently pull the cables backward to ensure firm connection.

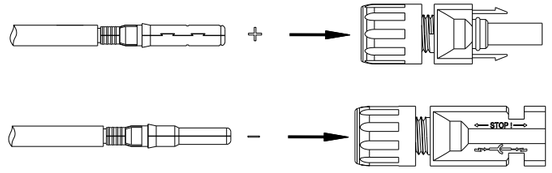


Figure 5.15. Assembling the cables

Step 6. Tighten the lock screws on the positive and negative cable connectors with the D4 assembly tool.

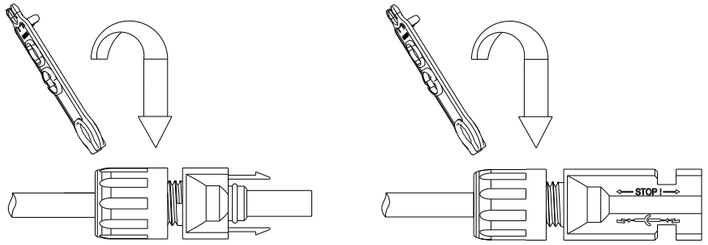


Figure 5.16. Tightening the connectors

Step 7. Make sure the two DC switches are at the OFF position.

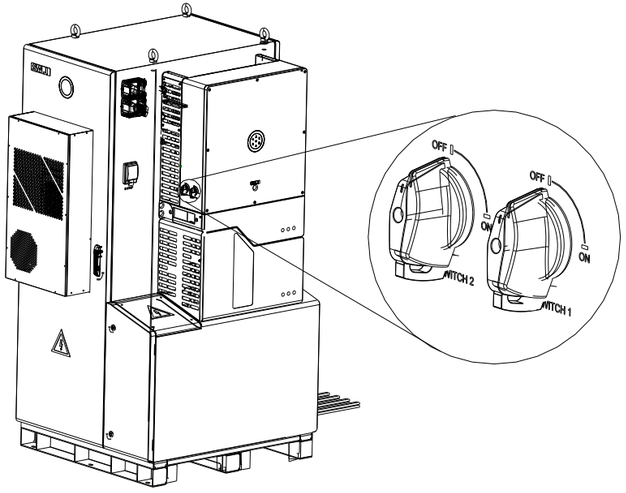


Figure 5.17. DC switch OFF

Step 8. Insert the positive and negative cable connectors into the positive and negative PV ports on the inverter until you hear a “click” sound.

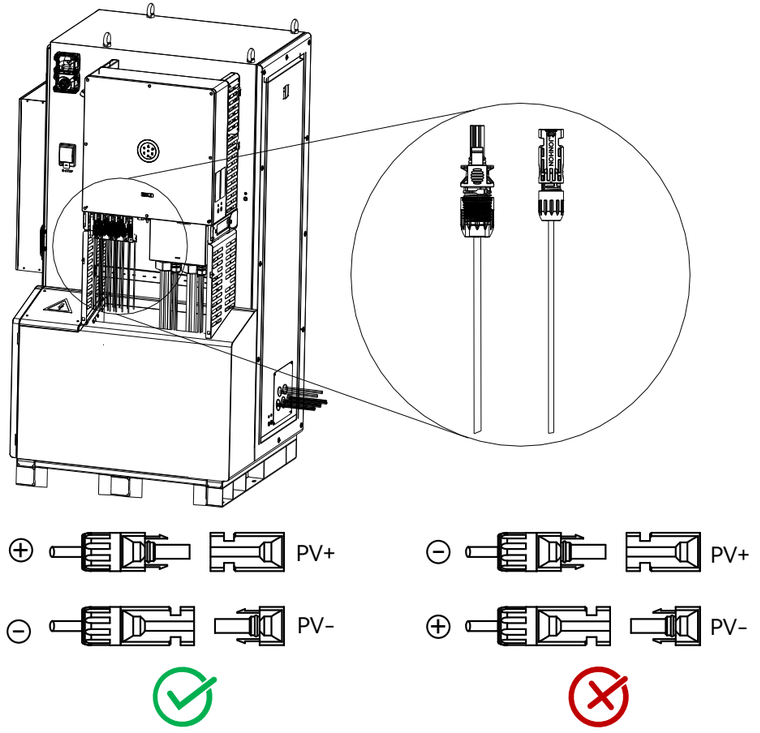


Figure 5.18. Inserting PV connectors

Step 9. Install the PV cover back on the PV port, and secure the cover with screws.

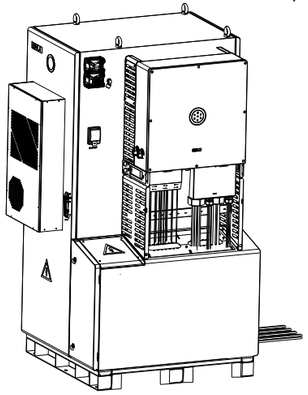


Figure 5.19. Installing the PV cover

5.5. Communication Connection

5.5.1. Communication Interfaces Overview

The inverter provides the communication interfaces and ports that allow the inverter to communicate with external equipment and systems like the generator, the energy management system (EMS), and so on. The following figure shows the communication ports of the inverter:

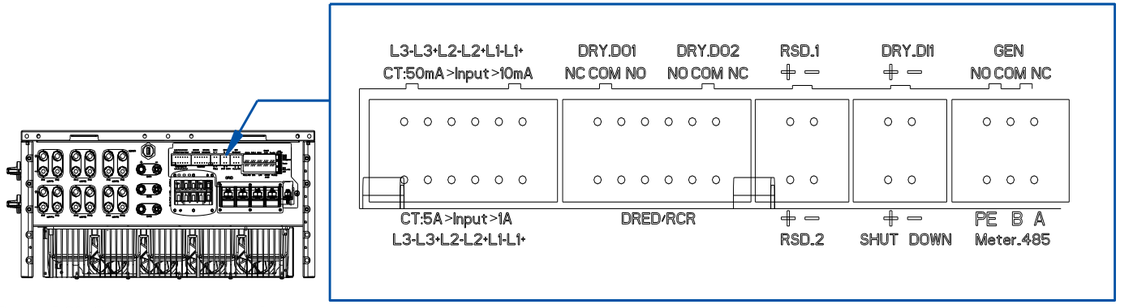


Figure 5.20. Communication interfaces overview

5.5.2. Connect the Communication Cables and Plugs

Step 1. Prepare the wires for the 2-pin, 3-pin, and 6-pin plugs depending on which communication functions are required.

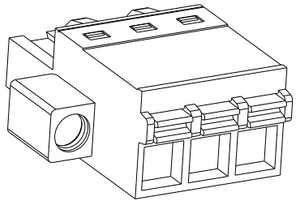


Figure 5.21. 3-pin plug

Step 2. Peel off the insulation skin of the wire by proper length. Insert the wire into the plug and press the orange button to secure the cable.

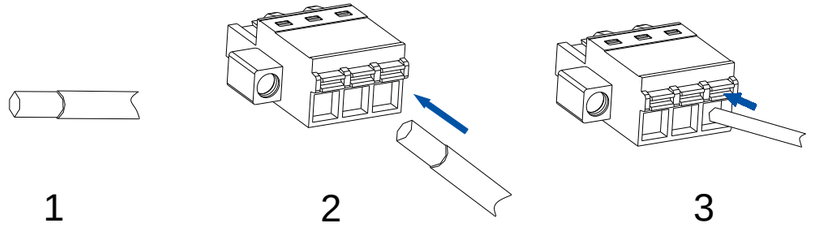


Figure 5.22. Assembling wires for plugs

Step 3. Connect the communication plugs for the corresponding functions according to the port descriptions in sections 5.5.3 “Meter Connection for Export Limit Setting” to 5.5.9 “DIP Switch Connection”.

5.5.3. Meter Connection for Export Limit Setting

The METER.485 port can connect with meter CHINT's DTSU666 to provide RS485 communication.

Note: The electric meter needs to be CHINT's DTSU666 electric meter.

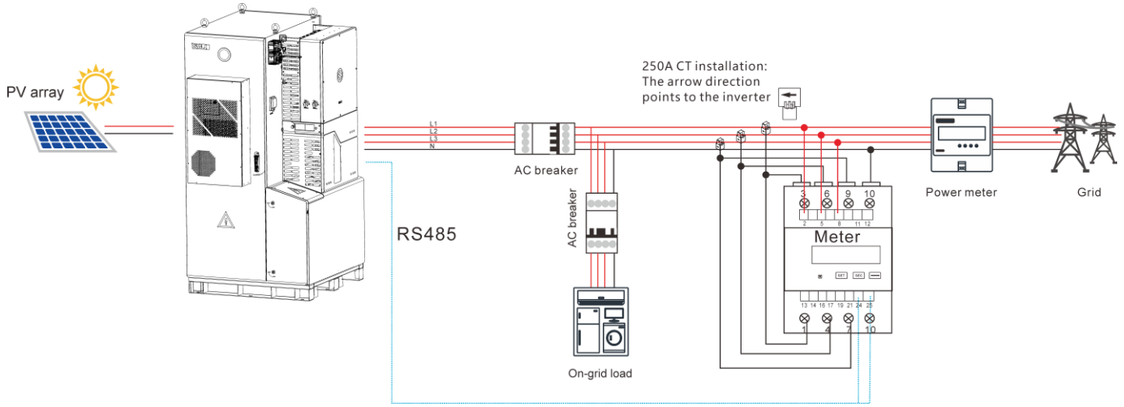


Figure 5.23. System diagram – one meter

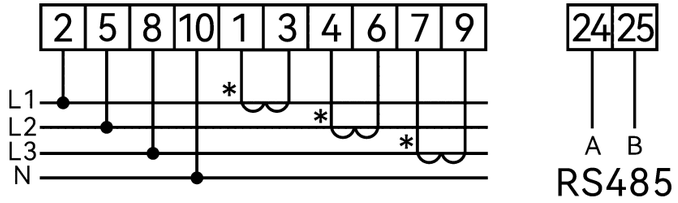


Figure 5.24. Meter connection

When two meters are used, set the address of the inverter-side meter to 2. Do NOT change the default address 1 of the grid-side meter. The CT arrow direction points to the CHS2 inverter.

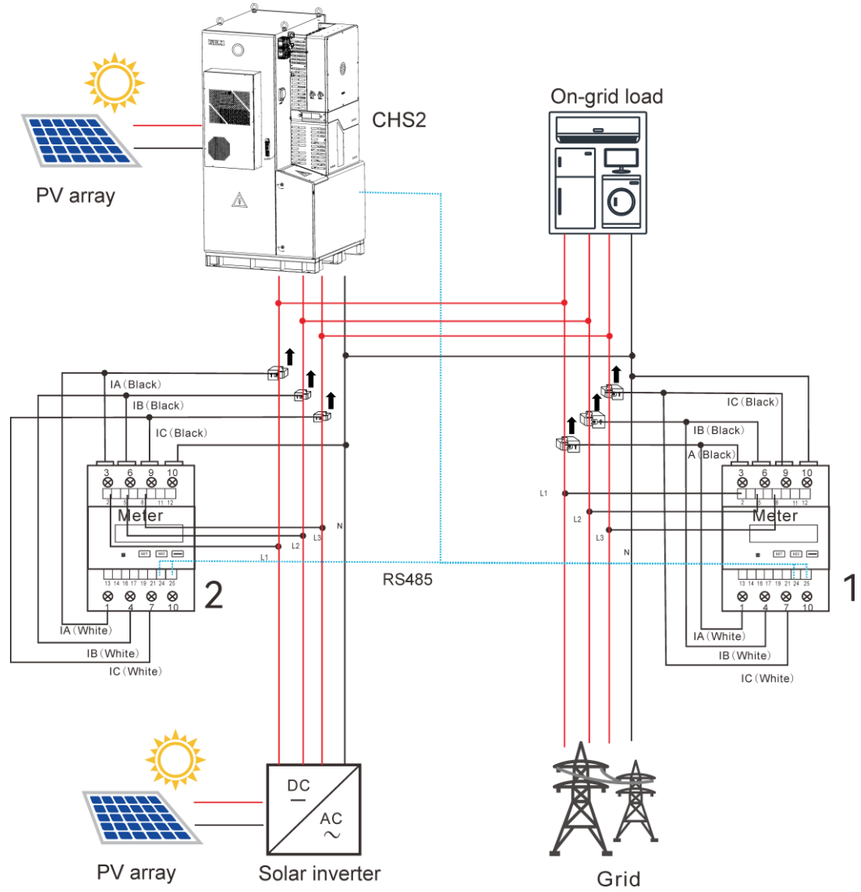
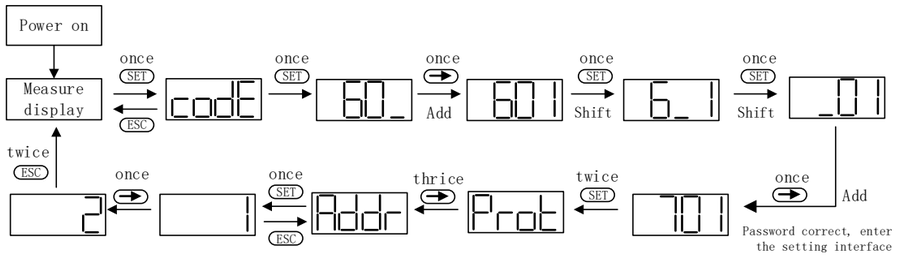


Figure 5.25. Meter connection – two meters

Meter DTSU666		
	**Button**	**Description**
	SET	Confirmation or cursor shift (when input digits)
	ESC	Exit
	→	Add

Table 5.5. Meter DTSU666 description

To set a three-phase meter, perform the following operations:



a. Power on the meter and enter **Measure display**, and then press **SET** twice to enter the password 701.

b. Press the → button to adjust the value of the first digit. One increment per pressing.

c. Press **SET** once to shift to the second digit and adjust the value in the same way. Set the default password to **701**.

d. When the password is entered correctly, press **SET** twice to enter the port interface and press the → button three times to enter the address page. Then, press **SET** once to start the meter address setting.

e. Press the → button to adjust the value of the address. One increment per pressing.

f. After the address is set successfully, press **ESC** twice to exit **Measure display** for the meter to start working.

5.5.4. Dry Contact Connection

The DRY.DO1 and DRY.DO2 ports are reserved as an output dry contact for future use.

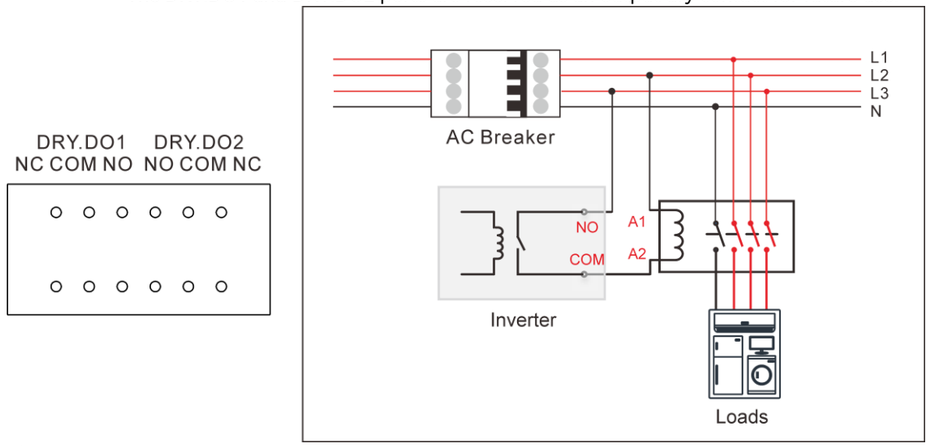


Figure 5.26. Output dry contact connection

5.5.5. Generator Connection

The GEN port can connect with the generator to control the start and stop of the generator.

When the inverters are deployed in parallel, the generator needs connect to the DO4 interface of the EMS device.

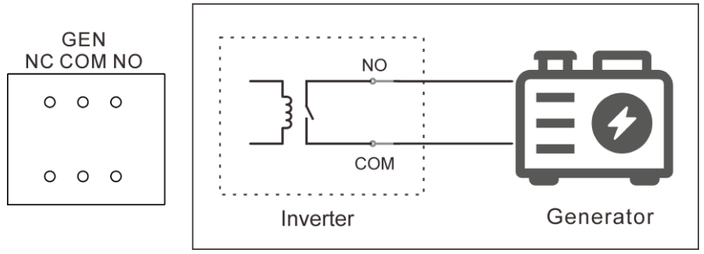


Figure 5.27. Generator connection

5.5.6. DRM Connection

The DRED ports can connect with demand response enabling devices (DRED) to provide the DRED signal control function. This function meets the Australia DERD certification requirements and other regions.

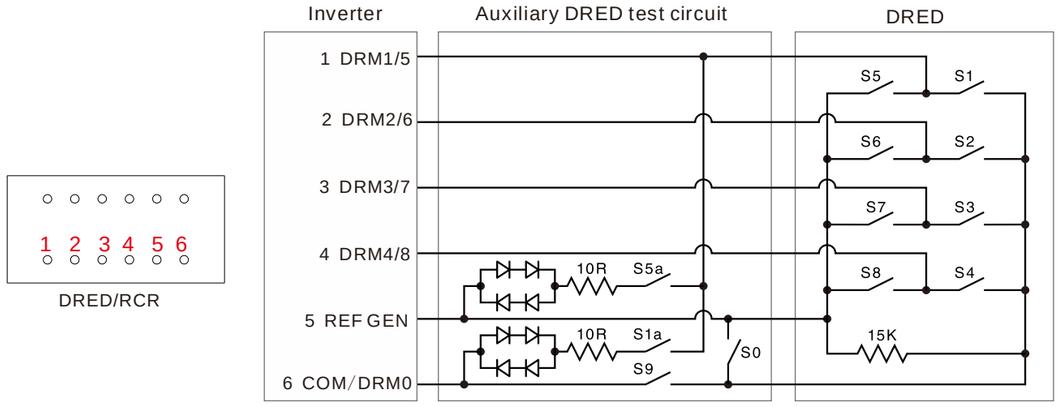


Figure 5.28. RCD connection

5.5.7. 12V Power Output Connection

The RSD_1 port can supply power to the fast shutdown module of the photovoltaic system at the rated voltage of 12 V. The two ports control the fast shutdown and startup of the PV system by turning on or off the power supply to the fast shutdown module.

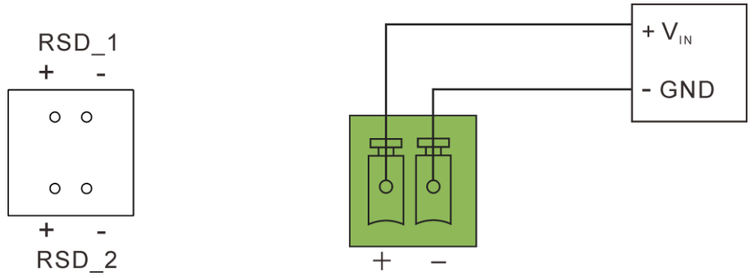


Figure 5.29. PV connection

The RSD_1 and RSD_2 ports can supply power to the external energy management system (EMS) in the parallel deployment of the inverters.

At least two inverters must provide the power supply to the EMS in parallel deployment. The length of the power supply wire to the EMS is limited to 6 meters.

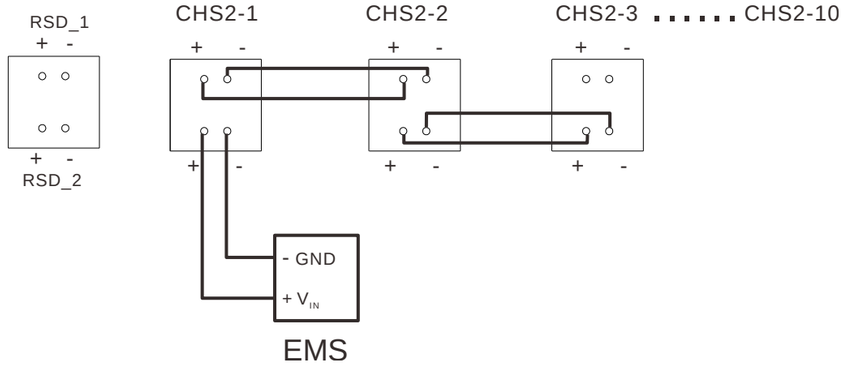


Figure 5.30. EMS connection in parallel

5.5.8. Emergency Stop Dry Contact Connection

The SHUT DOWN + and - ports can connect with an external switch to stop the inverter immediately in emergent situations.

DRY_DI1: Reserved for input dry contact connection.

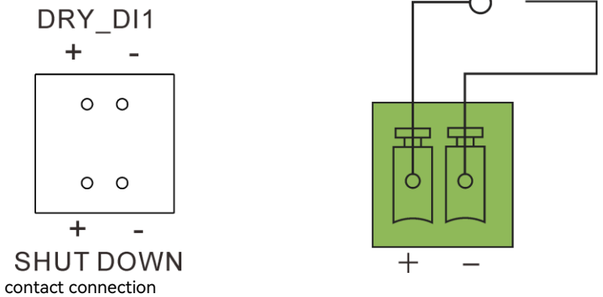


Figure 5.31. Emergency stop dry contact connection

5.5.9. DIP Switch Connection

The SW1/2/3 dual inline package (DIP) switches are provided to control the activation of 120 Ω terminal resistors to ensure the communication stability of the corresponding communication functions.

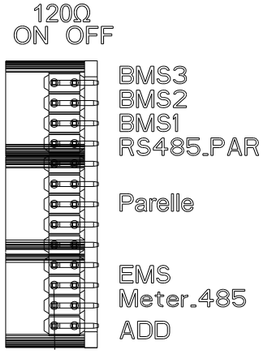


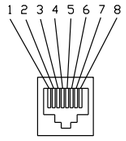
Figure 5.32. DIP switches

Switch	Function
BMS3, BMS2, BMS1	Provide the 120 Ω terminal resistors for the CAN communication between battery management systems (BMS). Turn the switch on as needed.
RS485.PAR	Provide the 120 Ω terminal resistors for RS485 PAR1 communication. Turn the switch on as needed.
Parallel	Provide the 120 Ω terminal resistors when multiple inverters are deployed in parallel. Turn the switches to the ON position on the two inverters that are physically farthest apart.
EMS	Provide the 120 Ω terminal resistors for RS485 communication with the EMS. Turn the switch on as needed.
METER.485	Provide the 120 Ω terminal resistors for RS485 communication with the external meters. Turn the switch on as needed.
ADD	Reserved for future use.

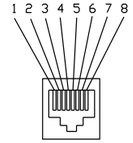
Table 5.6. DIP switch functions

5.5.10. RJ45 Ports Connection

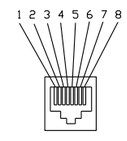
EMS	
1	NC
2	NC
3	NC
4	NC
5	NC
6	NC
7	RS485-A
8	RS485-B



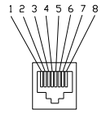
RS485_PAR1/RS485_PAR2	
1	NC
2	NC
3	NC
4	NC
5	NC
6	NC
7	RS485-A
8	RS485-B



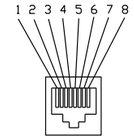
METER	
1	RS485-1B
2	RS485-1A
3	NC
4	RS485-2B
5	RS485-2A
6	NC
7	RS485-3A
8	RS485-3B



BMS_1/ BMS_2/ BMS_3	
1	Shut down—BMS
2	GND_S
3	NC
4	CANH
5	CANL
6	NC
7	NC
8	NC



Parelle1/ Parelle2	
1	SYN B
2	SYN A
3	SYN B
4	SYN B
5	SYN A
6	SYN A
7	CANL
8	CANH



LAN	
1	TX_D1+
2	TX_D1-
3	RX_D2+
4	BI_D3+
5	BI_D3-
6	RX_D2-
7	BI_D4+
8	BI_D4-

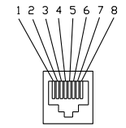
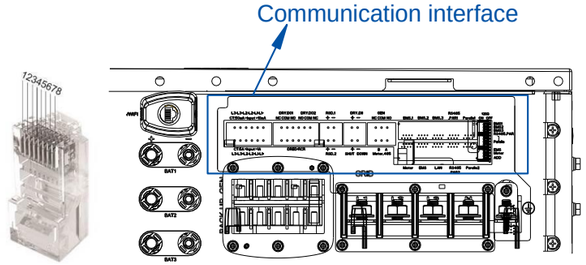


Table 5.7. RJ45 pin definitions

NOTICE

Confirm that the DC switches are OFF during installation to avoid short circuit.

Step 1. Prepare the RJ45 cables using the original RJ45 plugs in the delivery package. Connect the cables for the corresponding functions as needed.



Step 2. Install the crossbeam suspended in the middle of the inverter and the baffle under the inverter back to their original positions.

Step 3. Secure all parts of the grid and backup connector tightly.

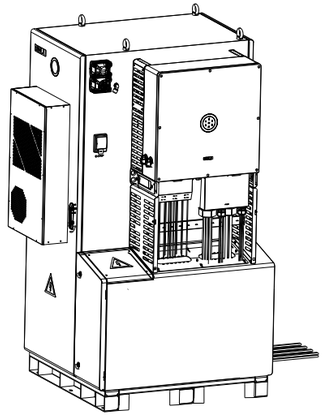


Figure 5.33. Securing cables and connectors

5.6. Install the Communication Module

Step 1. Plug in the communication module to the 4G/WIFI port and rotate the module to secure it.

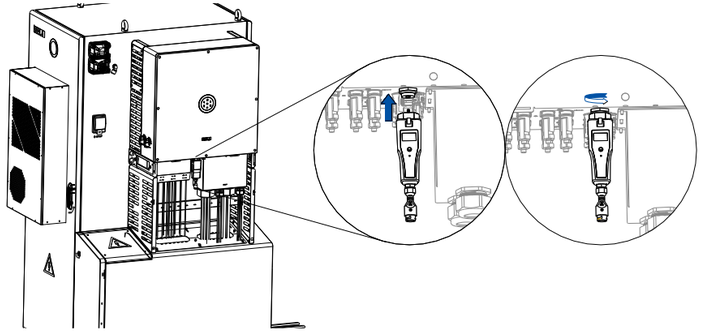


Figure 5.34. Installing the communication module

Step 2. Install back the decorative panels on the front of the inverter.

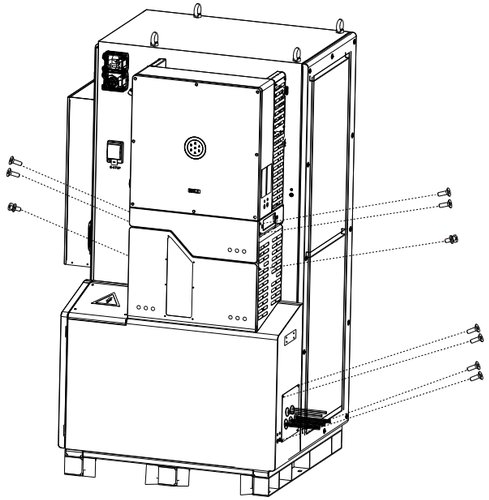
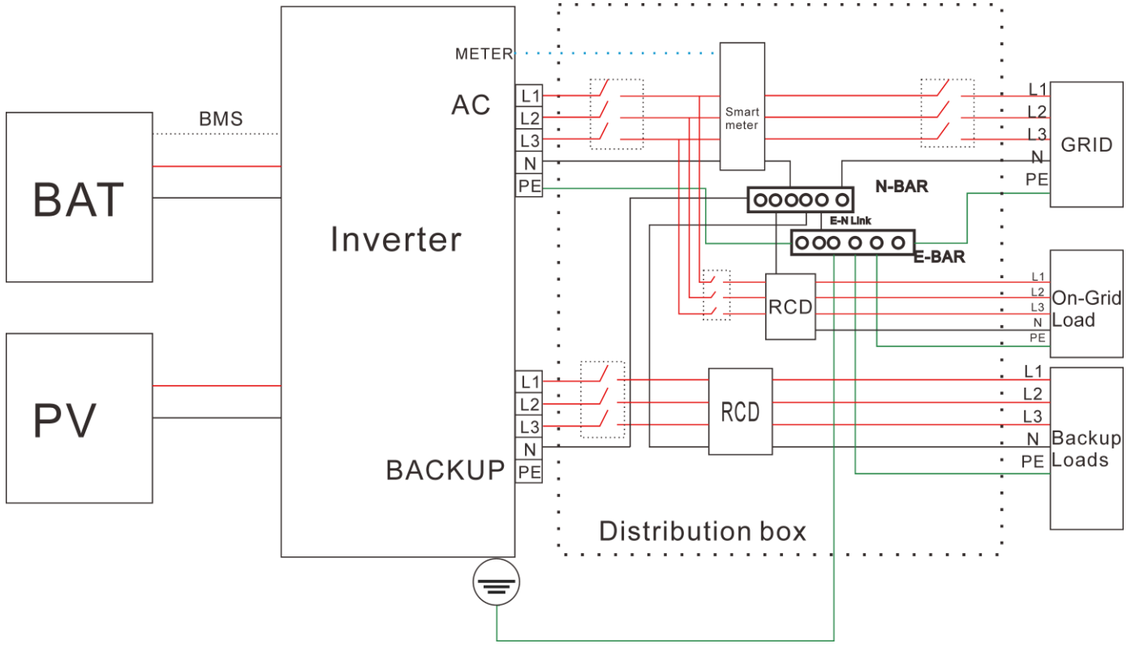


Figure 5.35. Installing the decorative cover

5.7. System Connection

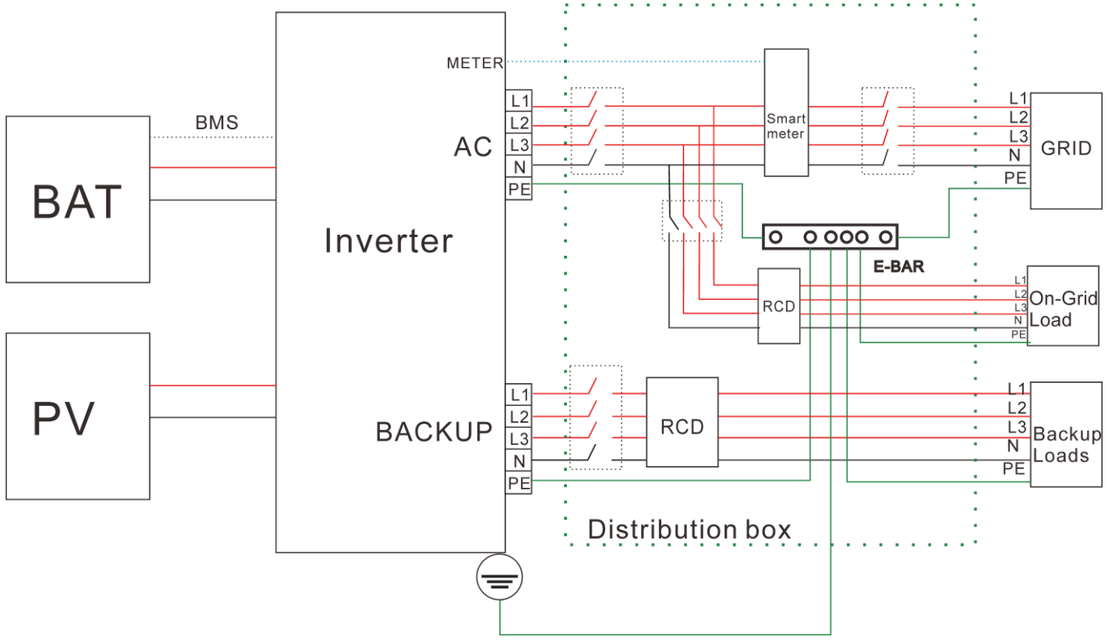
The following figure shows the system connection applicable in Australia and New Zealand.

- For safety, the neutral (N) cables of the grid and backup-load sides must be connected together.
- The PE terminal of the BACK-UP port is not connected.
- The E-BAR and the N-BAR must be short-circuited.



The following figure shows the system connection for the grid system without special requirements.

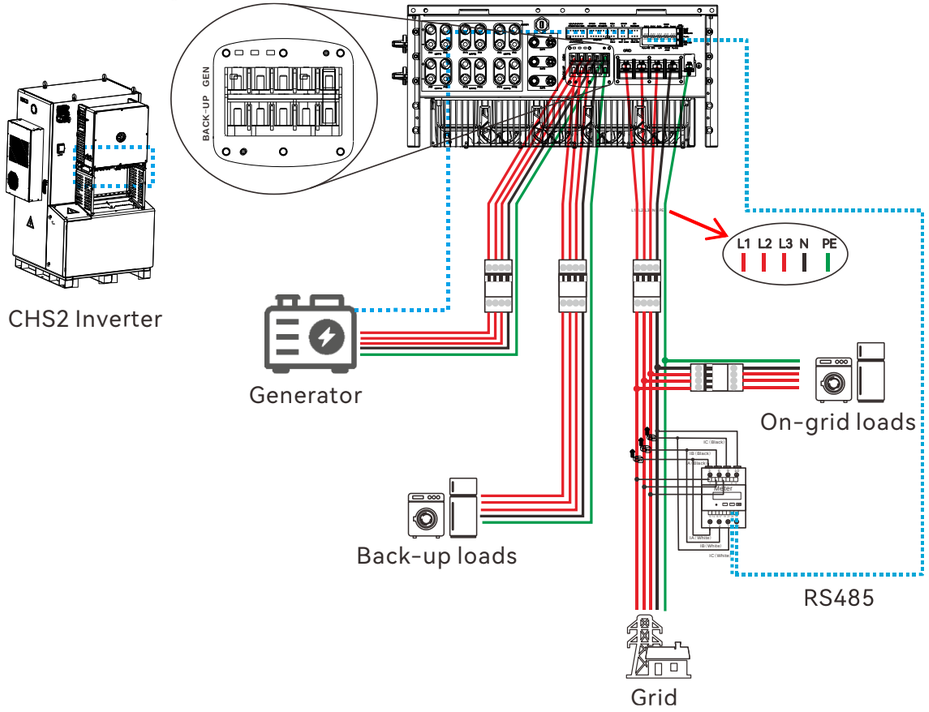
Note: The backup PE line and earthing bar must be grounded properly. Otherwise, the backup function may be inactive during blackout.



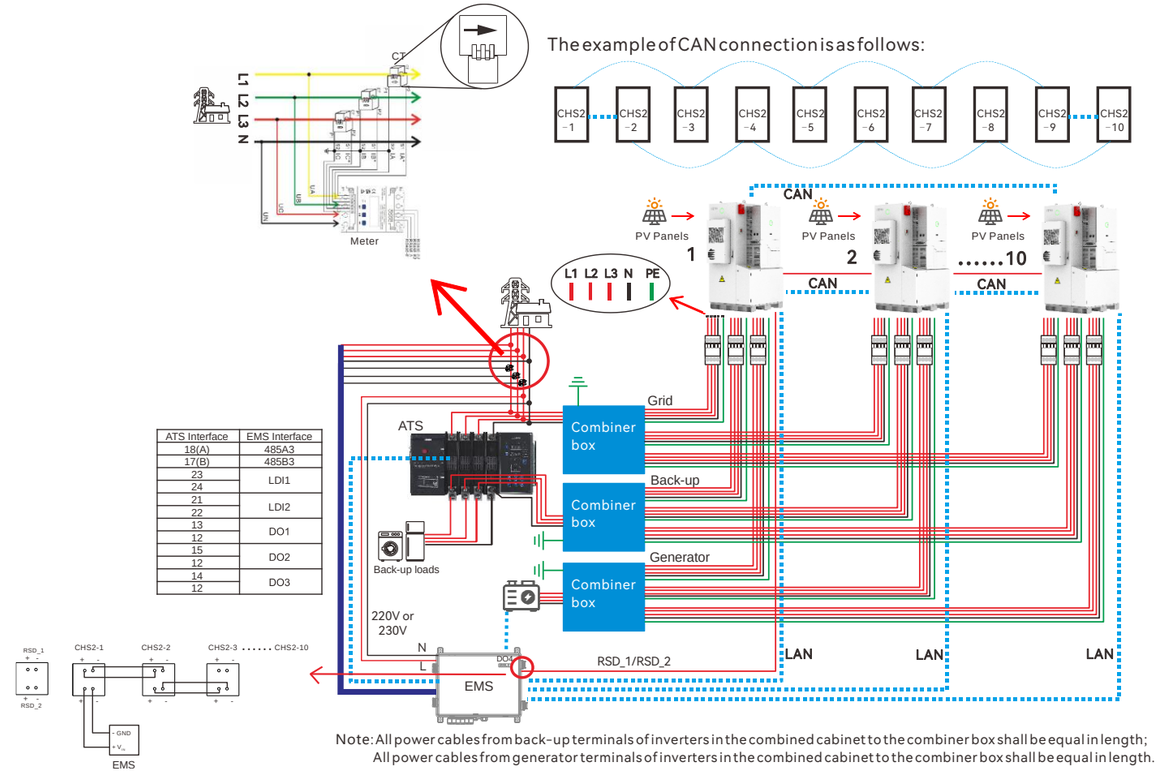
5.8. System Connection Diagrams

5.8.1. Backup Single Deployment

The following diagram shows the system connections of a single machine where both the backup and the on-grid loads are enabled.



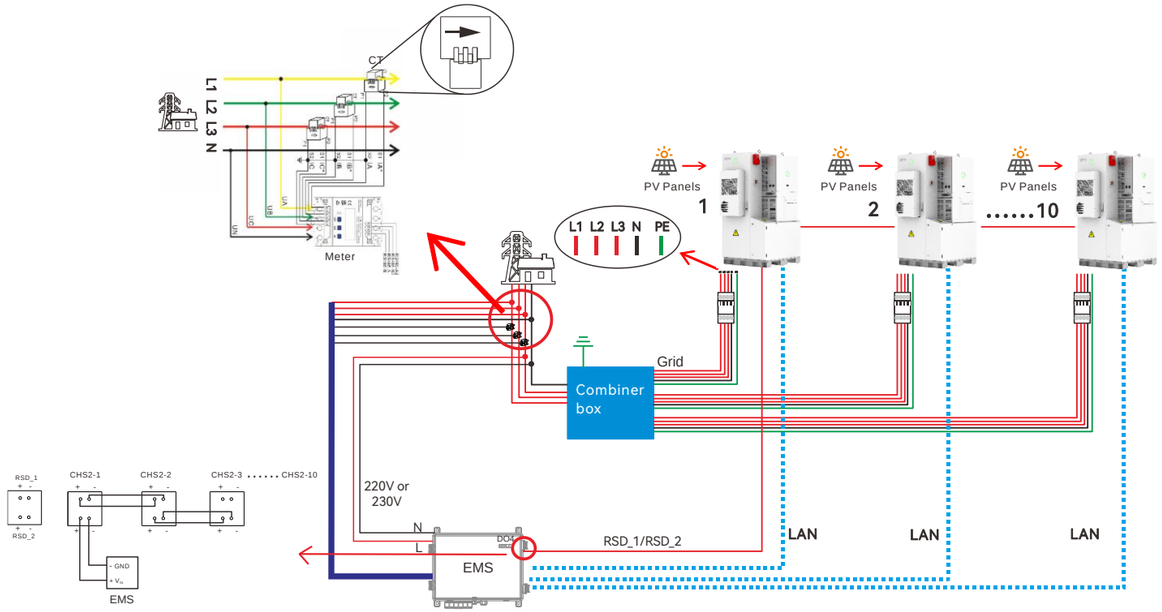
5.8.2. Back-up Parallel Deployment



ATS Interface	EMS Interface
18(A)	485A3
17(B)	485B3
23	LDI1
24	
21	LDI2
22	
13	DO1
12	
15	DO2
12	
14	DO3
12	

Note: All power cables from back-up terminals of inverters in the combined cabinet to the combiner box shall be equal in length;
All power cables from generator terminals of inverters in the combined cabinet to the combiner box shall be equal in length.

5.8.3.On-grid Parallel Deployment



5.9. AFCI

The inverter is equipped with an arc-fault circuit interrupter (AFCI). With AFCI protection, when there is an arc signal on the DC side due to the aging of the cable or loose contact, the inverter can quickly detect it and cut off the power to prevent fire to ensure the PV system safety.

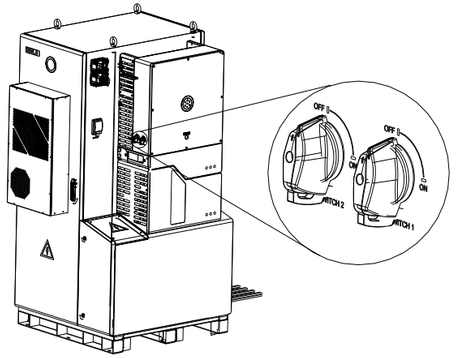
6.

COMMISSIONING

6.1. Start Up and Shut Down the Inverter

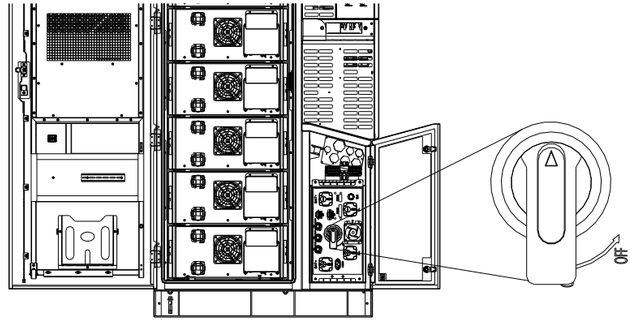
6.1.1. Start Up

Step 1. Turn the two DC switches to the **ON** position on the inverter to enable the PV side connection.



Step 2. Turn on the external AC circuit breaker to enable the connection to the grid.

Step 3. Rotate the Main switch on the battery control unit to the **ON** position.



Step 4. Press and hold the START switch on the battery control unit for 3 seconds until the LED light flashes in green. It indicates that the battery system is started up.

Note: If the main switch suddenly trips while the machine is running, reset the main switch and rotate the main switch to the ON position again.

Step 5. Close the cabinet doors and keep the keys at a safe place.

6.1.2. Shut Down

Step 1: Turn off the external AC circuit breaker to disconnect from the grid.

Step 2: Rotate the Main switch on the battery control unit to the OFF position to shut down the battery system.

Step 3: Turn off the two DC switches on the inverter to disconnect from the PV.

Note: After closing the cabinet door, lock the door handle with the two locks.

6.2. LED Indicators Introduction

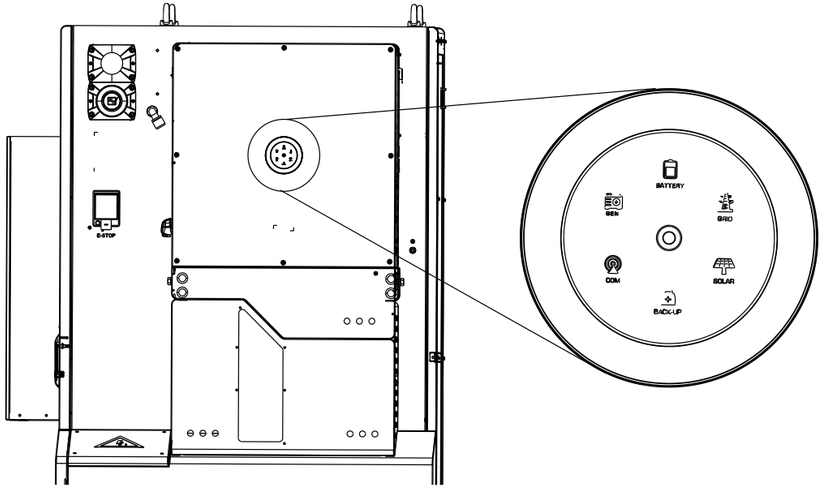


Figure 6.1. LED indicators

LED indicator	Status	Description
	Off	The inverter is powered off.
	Breathing	The inverter is at the initial state or standby state.
	Solid on	The inverter is running properly.
	Breathing	The inverter is upgrading.
	Solid on	The inverter is faulty.
 System	Solid on	The inverter is importing electricity from the grid.
	On 1s, off 1s	The inverter is exporting electricity to the grid.
	On 1s, off 3s	No importing or exporting.
	Off	Off-grid.
 Battery	Solid on	The battery is discharging.
	On 1s, off 1s	The battery is charging.
	On 1s, off 3s	Low SOC.
	Off	The battery is disconnected or inactive.
 Grid	Solid on	The inverter is connected to the grid.
	On 1s, off 1s	Counting down to grid connection.
	On 1s, off 3s	The grid is faulty.
	Off	No grid.
 Solar	Solid on	The PV array is running properly.
	On 1s, off 1s	The PV array is faulty.
	Off	The PV array is not working.

LED indicator	Status	Description
Backup	Solid on	The AC side load is running properly.
	On 1s, off 1s	The AC side consumption is overloaded.
	Off	The AC side is turned off.
Communication	Solid on	The communication with both the BMS and the meter is working.
	On 1s, off 1s	The meter communication is working, but the BMS communication is lost.
	On 1s, off 3s	The BMS communication is working, but the meter communication is lost.
	Off	Lost communication with both the BMS and the meter.
GEN	Solid on	The power input of the generator is connected.
	On 1s, off 1s	The power output of the generator is connected.
	Off	Disconnected from the generator.

Note: One breathing interval is 6 seconds.

Table 6.1 LED indicators description

6.3 Install the App

The elekeeper (used to be called eSAJ Home) App can be used for both nearby and remote monitoring. It supports Bluetooth/4G or Bluetooth/Wi-Fi to communicate with the device.

On your mobile phone, search for "elekeeper" in the App store and download the App.

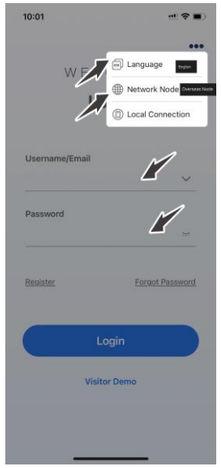
6.4 Log in to the App and Perforne the Initialization Settings

1. Log in to the App by using one of the following manners:

- **Account Login**

a. Open the App and tap the three-dot icon ••• on the top right corner. Set the **Language** to **English** and **Network Node** to **European Node** or **International Node**. Then, use your account to log in to the App.

If you do not have an account, register first.



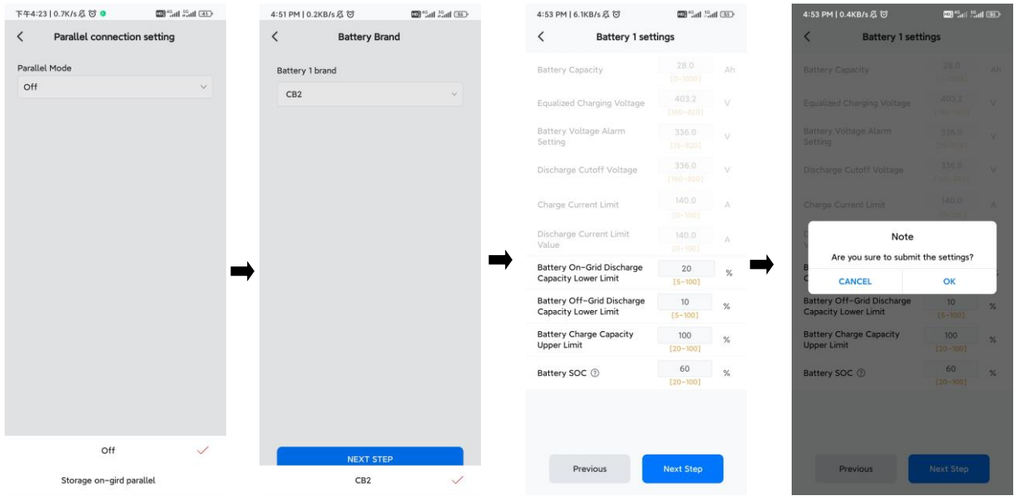
b. Go to the **Service** interface and select **Remote Configuration**. Tap **Bluetooth** and enable the Bluetooth function on your mobile phone. Then, tap **Next**.

2. Choose your inverter according to your inverter SN. Tap the inverter to enter inverter settings.
3. Complete the inverter settings by following the instructions on the screen.

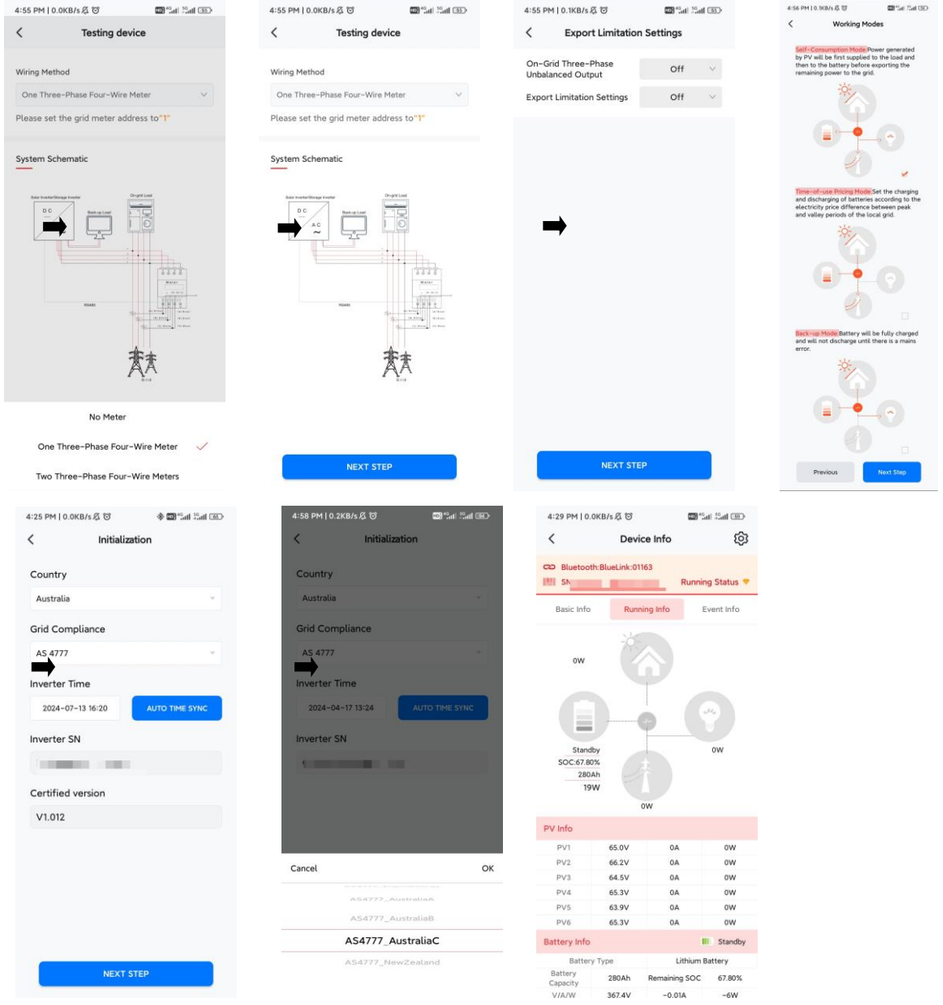
- For **Country**, select Australia.
- For **Grid Compliance**, select the value according to your setpoint (region of installation):
  - **AS4777_AustraliaA**: For large interconnected power system. For example, all Australian networks other than those specified below.
  - **AS4777_AustraliaB**: For small interconnected power systems. For example, Western Power.

    AS4777_AustraliaC: For isolated or remote power systems. For example, Horizon Power and TasNetworks.

Example:



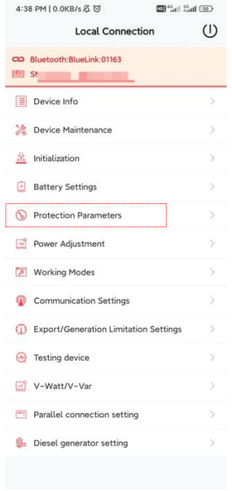
Note: When the inverters are used in parallel, you need to select **Storage on-grid parallel**. For more instructions on parallel App operation, please refer to the user manual provided with the EMS product.

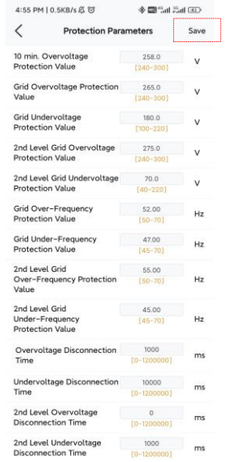


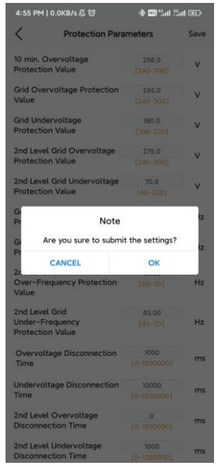
6.5 Set the Protection Parameters

The following parameters are set based on local safety rules and regulations.

The corresponding modification of protection parameters will take effect only after saving.







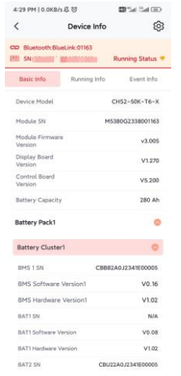
6.6 View the Inverter Settings

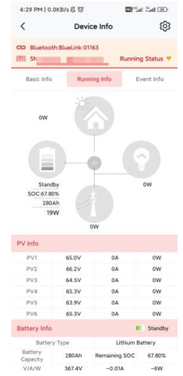
After the above configurations, view the device information.

- **Device info**: **Basic Info**, **Running Info**, and **Event Info**

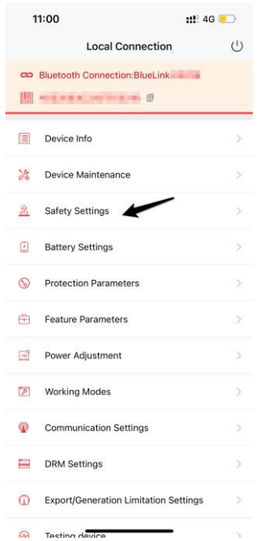
  On **Basic Info:** You can view the inverter firmware version, including **Display Board Version** (ARM) and **Control Board Version**.

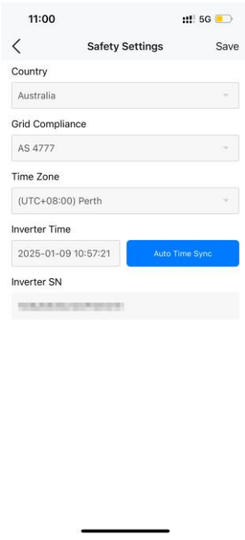
- **Safety Settings**: **Country** and **Grid Compliance**.

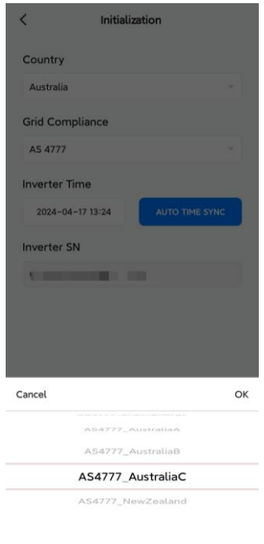


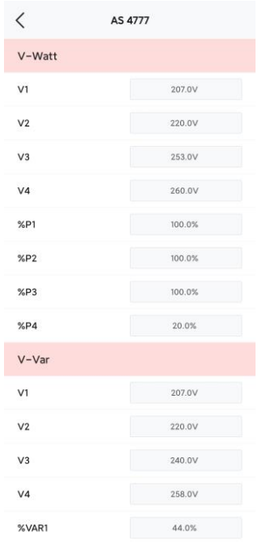


After initialization, you can change the country and grid compliance on the **Safety Settings** page. Example:

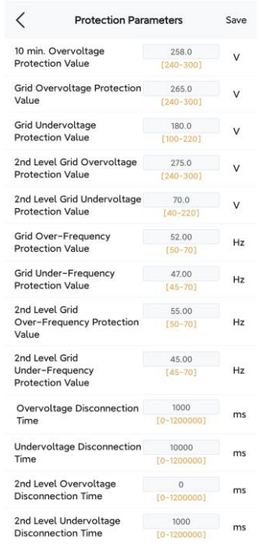








The power quality response modes and the grid connection settings can be viewed on the **Protection Parameters** page. For example:



6.7 Remote Monitoring

Connect the internet via the eSolar AIO3 module, and upload the inverter data onto the server and customers could monitor running information of the inverter remotely via the eSolar Web Portal or their mobilepone.

For details, refer to the user manual of the eSolar AIO3 communication module.

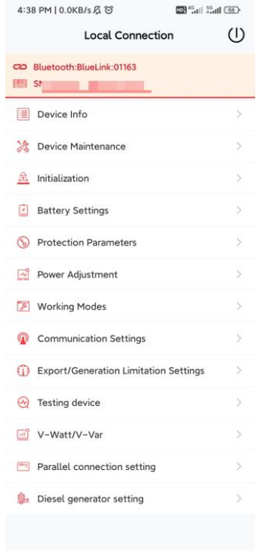
6.8 Working Modes

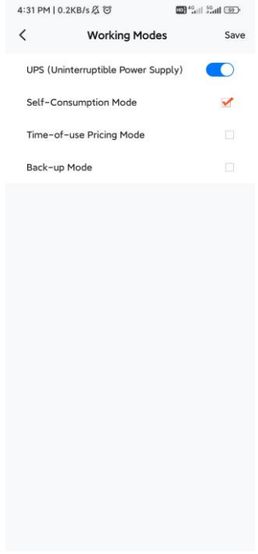
6.8.1 Selecting Working Modes

Self-consumption Mode: When the solar is sufficient, electricity generated by photovoltaic system will be supplied to load first, the surplus energy will be stored in battery, then the excess electricity will be exported to the grid. When the solar is insufficient, the battery will release electricity to supply load.

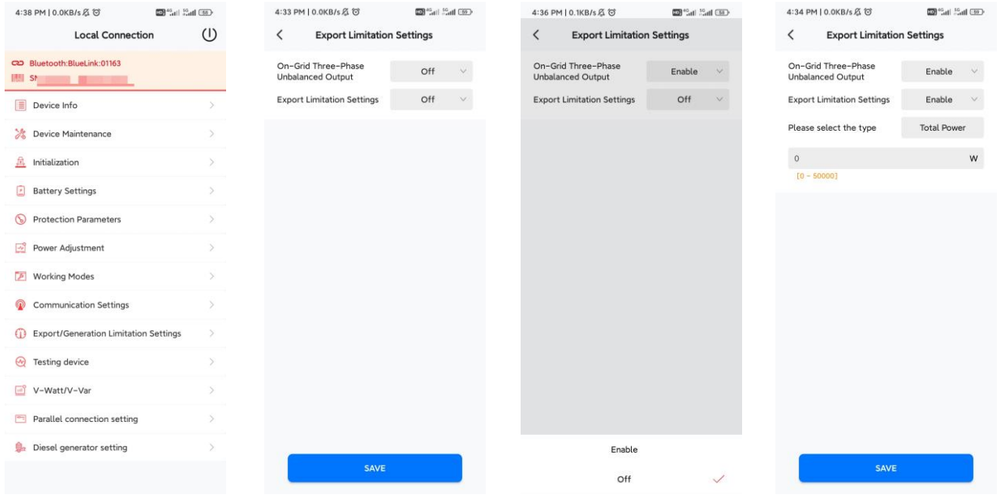
Back-up Mode: Reserved Backup SOC setting value can be adjusted, when battery SOC is less than reserved SOC value, battery can only be charged, until SOC reaches reserved value, the battery will be stopped charging; when SOC is larger than SOC setting value, battery will behave as Self-use mode.

Time-of-use Mode: Battery charging period and discharging period can be set, during charging period, battery can only be charged, while in discharging period, battery can only be discharged, the rest of the period, battery will behave as Self-use mode.





6.9 Export Limit Setting



On the Local Connection page, tap **Export/Generation Limitation Setting** to set the parameters. Contact SAJ technical support for the password.

There are two methods to control the export limit, the two methods are alternative to each other.

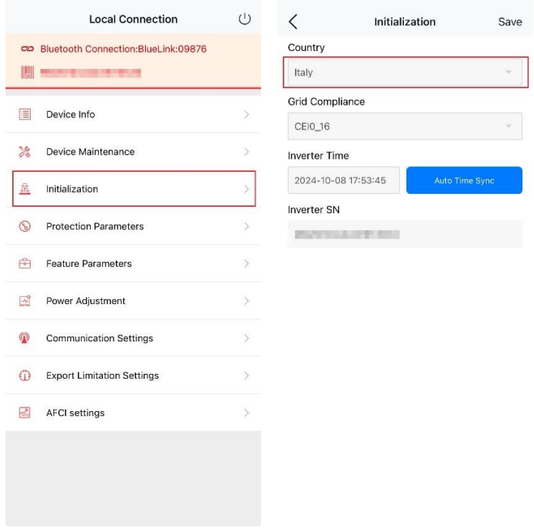
- Method 1: Export limitation setting is to control the electricity exported to the grid.
- Method 2: On-Grid Three-Phase Unbalanced Output is to control the electricity generated by the inverter.

6.10 Self-test (For Italy Only)

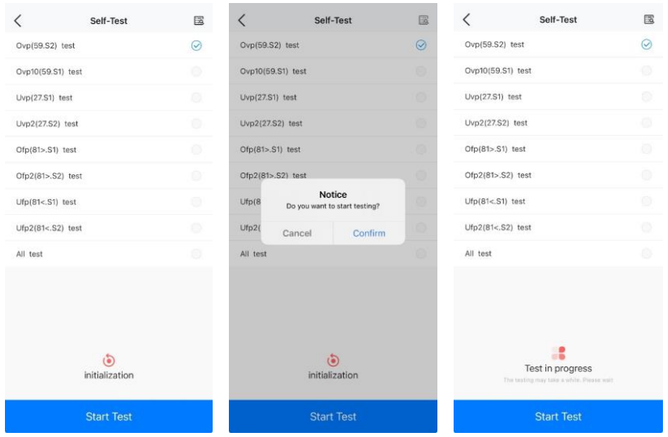
Italian Standard CEI0-21 requires a self-test function for all inverter that connected to utility grid. During the self-testing time, inverter will check the reaction time for over frequency, under frequency, overvoltage and undervoltage. This self-test is to ensure the inverter can disconnect from grid when required. If the self-test fails, the inverter will not feed into the grid.

Prerequisite

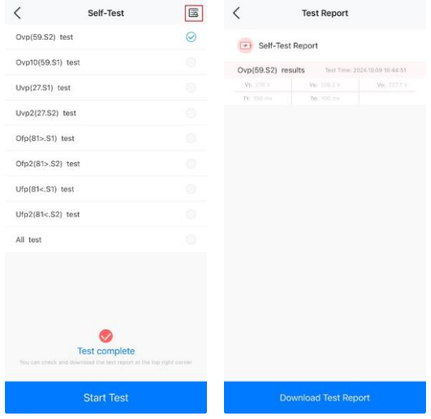
- Ensure that the communication module (Wi-Fi/Bluetooth/Ethernet) of the inverter is connected to the network.
- Ensure that **Country** is set to **Italy** and **Grid Compliance** is selected properly. To check the settings, choose **Initialization** on the **Local Connection** page.



1. On the **Local Connection** page, choose **Self-Test**. Set the self-test parameters if needed.
2. Choose the self-test items as required and tap **Start Test**. It takes around 5 minutes to complete each item, and around 40 minutes to complete all the items.



3. After the self-test is completed, tap the search icon on the top right corner to check the test report. Download the test report if the self-test fails and contact SAJ or your inverter supplier.



6.11 Configuring the Reactive Power Control (For Australia Only)

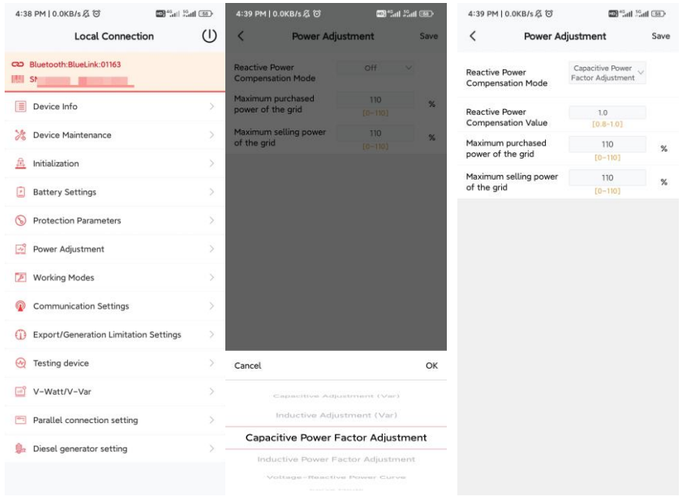
6.11.1 Setting the Fixed Power Factor Mode and Fixed Reactive Power Mode

Step 1. Log in to the App and connect to the inverter through Bluetooth connection.

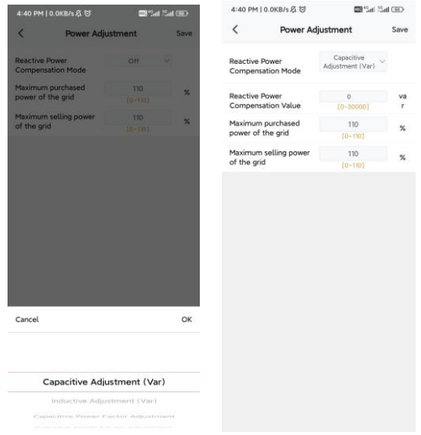
Step 2. Select **Power Adjustment**.

Step 3. Select **Inductive Adjustment (Var)** or **Capacitive Var** according to your local grid regulation. The power ranges from -60% Pn to 60% Pn.

Example of fixed power factor mode:



Example of fixed reactive power mode:



6.11.2 Setting the V-Watt and Volt-Var Modes

This inverter complies with AS/NZS 4777.2: 2020 for power quality response modes. The inverter satisfies different regions of DNSPs' grid connection rules requirements for volt-watt and volt-var Settings. e.g.: AS4777 series setting as shown below.

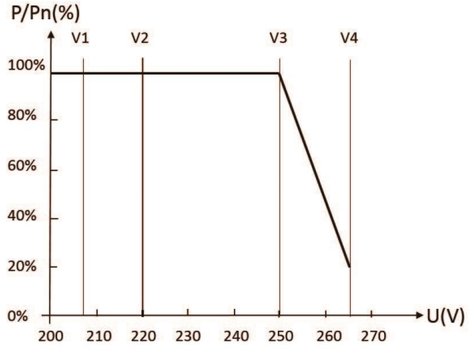


Figure 6.3 Curve for a Volt-Watt response mode (AS4777 Series)

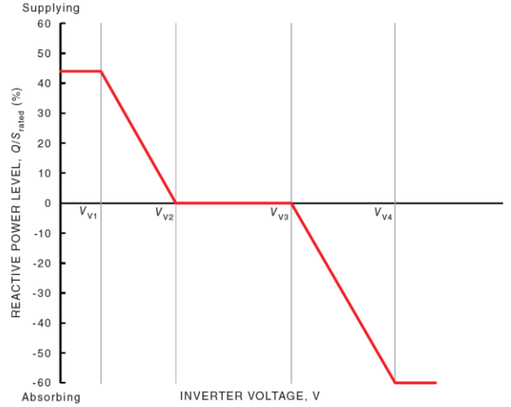
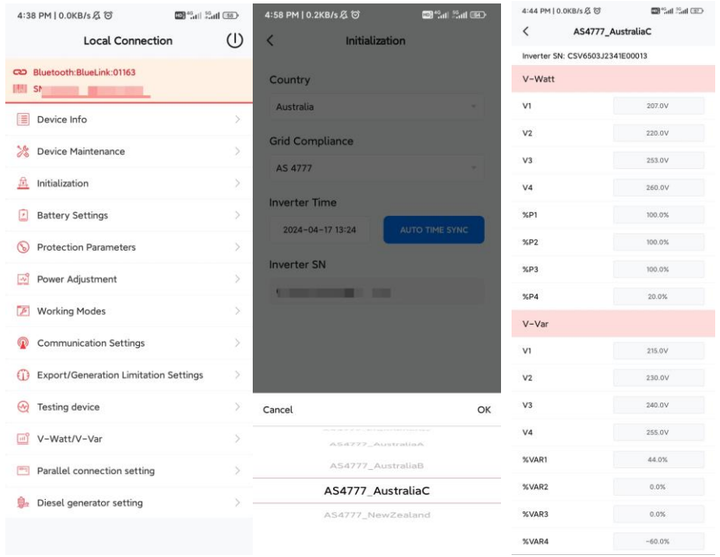


Figure 6.4 Curve for a Volt-Var control mode (AS4777 Series)

Step 1. Since AS4777 grid compliance has been set during production, select the corresponding grid compliance according to state regulation during installation. You can choose a state regulation compliance with your local grid via Elekeeper.

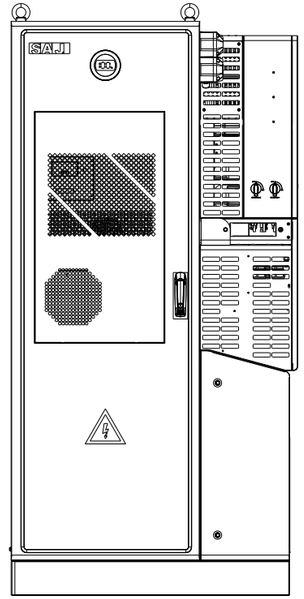
Step 2. Log in to Elekeeper App.

Step 3. Tap **V-Watt/V-Var** to enter DNSPs settings, and choose a suitable state regulation from the drop-down list.



Note: With regard to the Power rate limit mode, SAJ sets the product WGra to 16.67%Pn by default in the following cases according to the requirements of 3.3.5.2 as 4777.2: 2020.

1. Soft ramp up after connection.
2. Reconnect or soft ramp up/down following a response to frequency disturbance.



7.

TRANSPORTATION & STORAGE

7.1. Transportation

Lithium batteries can be dangerous if not transported properly. This product has passed the test of UN38.3 and meets the transportation requirements as dangerous goods with lithium batteries. After the installation of the battery on site, the original packaging including the lithium battery identification should be kept. When the battery needs to be returned to the factory for repair, pack the battery with the original packaging to reduce unnecessary inconveniences.

Take care of the product during transportation and storage. Do not stack the products.

7.2. Storage

The battery should be installed within 6 months since it is delivered from the factory and used with compatible inverters. Before installation, store the battery according to the following instructions:

1) Store it in a dry and ventilated environment. Keep it at least 600 mm away from heat sources;

2) For storage period less than 3 months, keep it in an environment with storage temperature from -20℃ to +40℃ with humidity lower than 85% RH;

3) For long-term storage longer than 3 months but shorter than 6 months, put it in an environment with storage temperature from -20℃ to +25℃ with humidity lower than 85% RH.

4) For long term storage without installation, contact SAJ technical support to charge the battery to no less than 50% SOC everyone six months.

NOTICE
The battery remains 50% power when it is sent from the factory.

The battery cannot be disposed of as household refuse. When the service life of the battery reaches the limit, it is not required to return it to the dealer or SAJ, but it must be recycled to the special waste lithium battery recycling station in the area.

8.

TROUBLESHOOTING

8.1. Troubleshooting

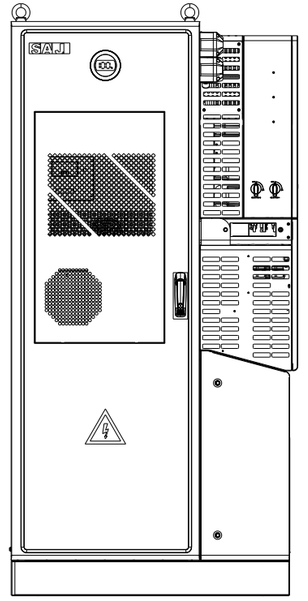
Contact your supplier for troubleshooting and remedy.

Code	Fault
1	Master Relay Error
2	Master EEPROM Error
3	Master Temperature High Error
4	Master Temperature Low Error
5	Lost Communication M<->S
6	GFCI Device Error
7	DCI Device Error
8	Current Sensor Error
9	Master Phase1 Voltage High
10	Master Phase1 Voltage Low
11	Master Phase2 Voltage High
12	Master Phase2 Voltage Low
13	Master Phase3 Voltage High
14	Master Phase3 Voltage Low
15	Grid Voltage 10Min High
16	Off Grid Output Voltage Low
17	Off Grid Output Short Circuit
18	Master Grid Frequency High
19	Master Grid Frequency Low
20	BAT Input Mode Error
21	Phase1 DCV High
22	Phase2 DCV High
23	Phase3 DCV High
24	Master No Grid Error
25	DC Reverse Connect Error
26	Parallel machine CAN Com Error
27	GFCI Error
28	Phase1 DCI Error
29	Phase2 DCI Error
30	Phase3 DCI Error
31	ISO Error
32	Bus Voltage Balance Error
33	Master Bus Voltage High
34	Master Bus Voltage Low
35	Master Grid Phase Lost

36	Master PV Voltage High
37	Master Islanding Error
38	Master HW Bus Voltage High
39	Master HW PV Current High
40	Master Self-Test Failed
41	Master HW Inv Current High
42	Master AC SPD Error
43	Master DC SPD Error
44	Master Grid NE Voltage Error
45	Master Fan1 Error
46	Master Fan2 Error
47	Master Fan3 Error
48	Master Fan4 Error
49	Lost Communication between Master and Meter
50	Lost Communication between M<->S
51	Lost Communication between inverter and Grid Meter
52	HMI EEPROM Error
53	HMI RTC Error
54	BMS Device Error
55	BMS Lost. Conn
56	CT Device Err
57	AFCI Lost Err
58	Lost Com. H<->S Err
59	Lost Communication between inverter and PV Meter
61	Slave Phase1 Voltage High
62	Slave Phase1 Voltage Low
63	Slave Phase2 Voltage High
64	Slave Phase2 Voltage Low
65	Slave Phase3 Voltage High
66	Slave Phase3 Voltage Low
67	Slave Frequency High
68	Slave Frequency Low
73	Slave No Grid Error
74	Slave PV Input Mode Error
75	Slave HW PV Curr High
76	Slave PV Voltage High
77	Slave HW Bus Volt High
81	Lost Communication D<->C
83	Master Arc Device Error
84	Master PV Mode Error
85	Authority expires

86	DRM0 Error
87	Master Arc Error
88	Master SW PV Current High
89	Battery Voltage High
90	Battery Current High
91	Battery Charge Voltage High
92	Battery Over Load
93	Battery Soft Connect TimeOut
94	Output OverLoad
95	Battery Open Circuit Error
96	Battery Discharge Voltage Low
97	BMS Internal Communication Error
98	Battery Module Sequence Error
99	Discharge Overcurrent Protection
100	Charge Overcurrent Protection
101	Module Under Voltage Protection
102	Module Over Voltage Protection
103	Single Cell Under Voltage Protection
104	Single Cell Over Voltage Protection
105	BMS hardware error
106	Charging temperature low protection
107	Charging temperature high protection
108	Discharging temperature low protection
109	Discharging temperature high protection
110	BMS relay error
111	Pre-charge error
112	BMS Insulation error
113	BMS supplier incompatibility
114	Battery cell supplier impartibility
115	Battery cell incompatibility
116	The battery pack model does not match
117	Circuit breaker is open
118	Temperature difference is too wide
119	Voltage difference is too wide (Class II)
120	Voltage difference is too wide (Class I)
121	BMS over temperature protect
122	Short circuit protect
123	Total voltage match failed
124	The system is locked
125	FUSE error protection
126	Voltage on charging port is high protection

129	CO sensor triggered
130	Stroke switch triggered
131	Temperature sensor triggered
132	Smoke sensor triggered
133	Water sensor triggered
134	Aerosol triggered
135	Emergency stop
136	T/H sensor communication lost
137	Air conditioning communication lost
138	Temperature inside cabinet too high
139	Temperature inside cabinet too low
140	Humidity too high
141	Humidity too low
142	Coil anti-freeze
143	Defrost probe error
144	Fuse error
145	Condensing temperature probe error
146	Temperature probe inside cabinet error
147	Outlet air temperature probe error
148	Humidity probe error
149	Internal fan error
150	Compressor error
151	High voltage alarm
152	Low voltage alarm
153	High voltage alarm lock alarm
154	Phase sequence alarm
155	CO sensor communication lost
156	Temperature of T/H sensor is too high
162	Gen Start or Stop fail
163	Lost Communication Gen Meter
165	The wood originating port is overloaded



9.

ROUTINE MAINTENANCE

9.1. Suggested Maintenance Operations

Product parts	Operation	Standard	Interval	Power OFF
Cabinet	Visual inspection: • Rust • Door locks • Air vents	No obvious coating peeling or scratches. No obvious paint fading or rusting. Door lock is not damaged. No dust accumulation in the vent. No insects, rats, snakes and other animals.	Quarterly	No
Air Conditioner	Visual inspection: • Outer appearance • Rust • Fan • Filter	No obvious damage. No obvious paint fading or rusting. No screw loose and falling off. The fan rotates normally without abnormal noises. The surface of the filter is clean and not blocked.	Quarterly	No
EMS	Viewing the indicator status.	The indicator is steady green.	Quarterly	No
Distributor Box	Visual inspection: • Check the appearance • Rust • Anything unusual in the cabinet	No obvious coating peeling, scratches. No obvious paint fading or rusting. The cabinet is clean and free of unexpected objects.	Quarterly	No
Labels	Visual inspection.	Clearly visible and free from defacement.	Quarterly	No
Air Conditioner External Fan	Clean the external fan filter.	The filter surface is clean and free of clogging.	Every 6 months	No
Battery Package	Charge the battery	If the system is not in use for a long period of time, charge the battery to no less than 50% SOC.	Every 6 months	Yes
Battery Package	Visual inspection: • Check the appearance • Rust • Screws • Fan • Front panel vents	No obvious damage. No obvious paint fading or rusting. The screws are not loosen or falling off. The fan rotates normally without abnormal noises. The surface of the front panel vents is clean and not clogged.	Yearly	Yes
Grounding and Equipotential Junction Point	• Ground wire • Internal equipotential	The grounding resistance must not be greater than 4Ω. Equipotential connections inside the cabinet are correct.	Yearly	Yes
Security Function	Emergency button	Check that the emergency stop button is working.	Yearly	Yes

10.

APPENDIX

10.1. Recycling and disposal

This device should not be disposed as a residential waste.

The device that has reached the end of its operation life is not required to be returned to your dealer; instead, it must be disposed by an approved collection and recycling facility in your area.

10.2. Warranty

Visit the SAJ website for warranty conditions and terms: https://www.saj-electric.com/.

10.3. Contacting Support

Guangzhou Sanjing Electric Co., Ltd.

Address: SAJ Innovation Park, No.9, Lizhishan Road, Guangzhou Science City, Guangdong, P.R.China.

Postcode: 510663

Website: https://www.saj-electric.com/

Technical Support & Service

Tel: +86 20 6660 8588

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International Sales

Tel: 86-20-66608618/66608619/66608588/66600086

Fax: 020-66608589

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China Sales

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Fax: 020-66608589

10.4. Trademark

SAJ is the trademark of Sanjing.