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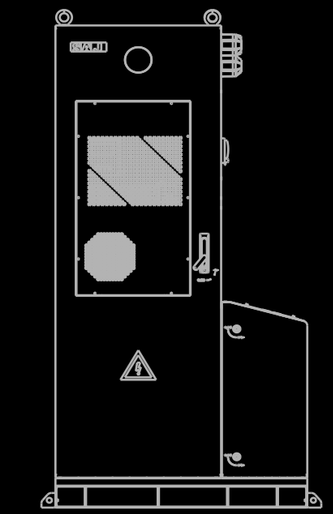


CB2 Series

C&I ENERGY STORAGE SYSTEM
USER MANUAL

CB2-57.3-HV5 CB2-71.6-HV5
CB2-85.9-HV5 CB2-100.3-HV5

Preface

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

This manual provides information about installation, operation, maintenance, troubleshooting and safety. Please follow the instructions of this manual so that we can ensure delivery of our professional guidance and whole-hearted 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.

We make constant improvements on the products and their documentation. This manual is subject to change without notice; these changes will be incorporated in new editions of the publication. To access the latest documentation, visit the SAJ website at https://www.saj-electric.com/.

Guangzhou Sanjing Electric Co., Ltd.

TABLE OF **CONTENTS**

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 SAJ products:

- CB2-57.3-HV5
- CB2-71.6-HV5
- CB2-85.9-HV5
- CB2-100.3-HV5

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 contained in this manual can install, maintain and repair the battery. 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. Follow the appropriate rules and regulations of the country or region where you install the battery systems.

DANGER

- 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

- Only qualified personnel with full knowledge of local safety regulations and local standards on battery can install, maintain, and operate on this product.
- SAJ electric shall not be liable for any loss or warranty claims arising from any unauthorized change of product which may cause fatal injury to the operator, third party or equipment performance.
- For personal and property safety, do not short-circuit the positive (+) and negative (-) electrode terminals.

CAUTION

- Do not modify or change any components in the battery.
- Risk of damage due to improper modification of the battery.
- 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.
- The CB2 battery system can only be used as a set with SAJ's CH2 high voltage series storage inverter. Otherwise, it cannot function normally.

2.2. Explanations of Symbols

Symbol	Description
	**Danger of electrical voltage** This device is directly connected to the public grid. All the operations to the battery shall only be carried out by qualified personnel.
	**No open flames** Do not place or install near flammable or explosive materials.
	**Danger of hot surface** The components inside the battery will release a lot of heat during operation. Do not touch the metal plate housing during operating.
	**Attention** Keep the product out of the reach of children.
	**An error has occurred** See Chapter Troubleshooting 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 basic requirements of the Guideline Governing Low-Voltage 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.
- It is recommended not to mix the old and new battery modules, because doing so will not only cause capacity mismatch, but also affect battery performance and service life.
- It is recommended not to mix batteries with different SOC states, and better use batteries from the same production batch together to reduce the risk of abnormalities.
- If the user wants to expand the capacity later, it is recommended to add a cluster of batteries with the same configuration and use them in parallel with the original batteries.

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.

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. Application Scope

The CB2 battery system is a high-voltage battery system that can integrate in the commercial and industrial (C&I) photovoltaic storage solutions. It features an internally housed Battery Management System (BMS) designed to maintain battery efficiency and ensure performance stability.

One CH2 inverter can be integrated with four CB2 battery systems at maximum. All the CB2 systems are required to have the same rated energy.

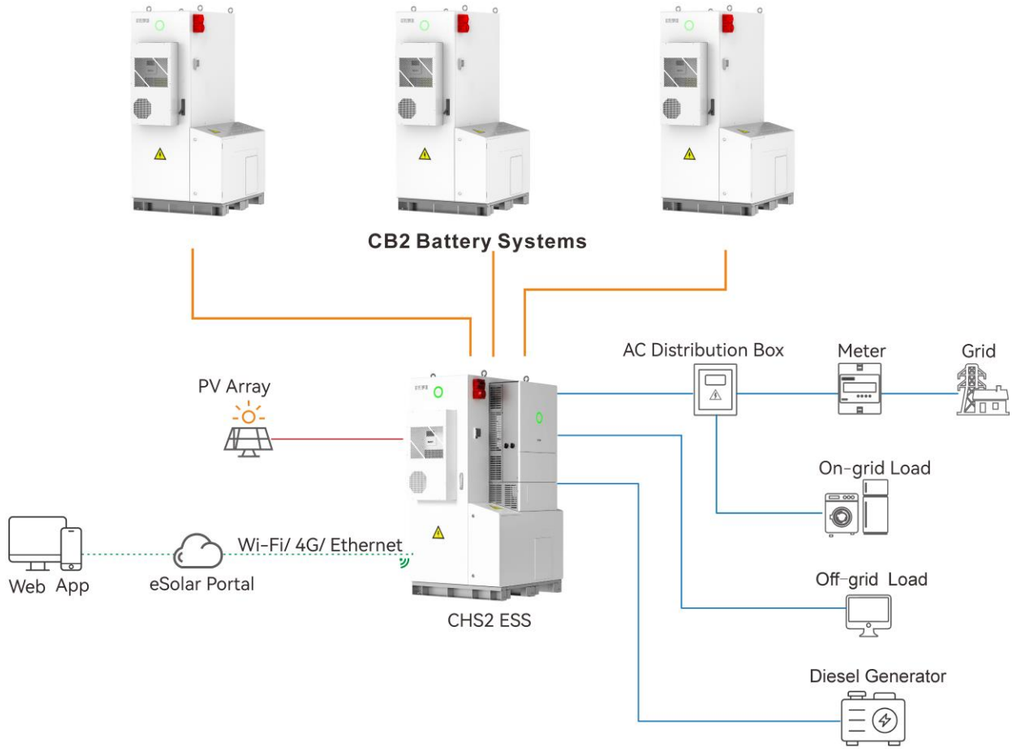


Figure 3.1. CB2 battery system application

3.2. Applicable CH2 Inverters

The CB2 battery systems support to be integrated with SAJ CH2 series inverters to work as a commercial & industrial (C&I) energy storage system (ESS).

- Integration with CH2 inverter A:

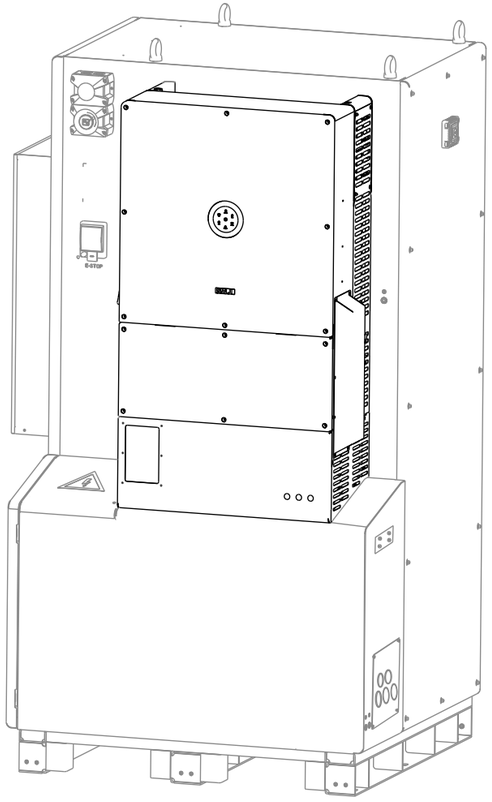


Figure 3.2. Integration with CH2 inverter A

- Integration with CH2 inverter B:

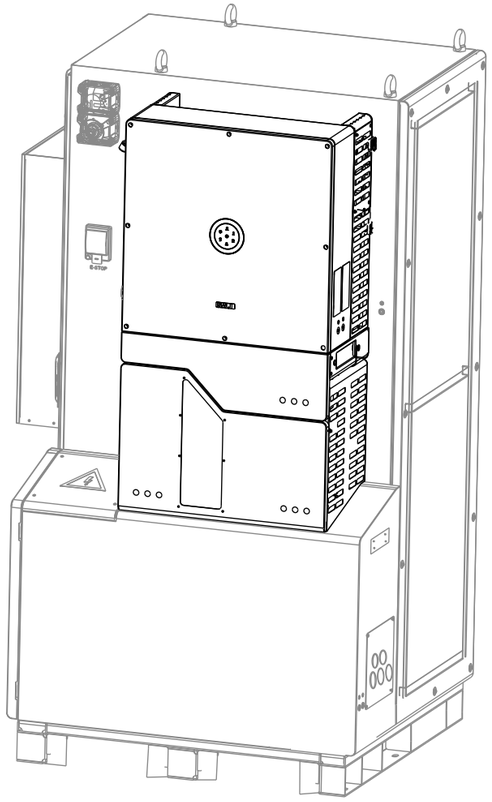


Figure 3.3. Integration with CH2 inverter B

3.3. Specification of Product Model

CB2 – X.X – HV5

① ② ③

① CB2 represents the product name.

② X.X represents the rated energy of the battery in kWh. For example, 57.3 means 57.3 kWh.

③ HV means high voltage, and 5 represents the battery cell manufacturer.

3.4. Product Overview

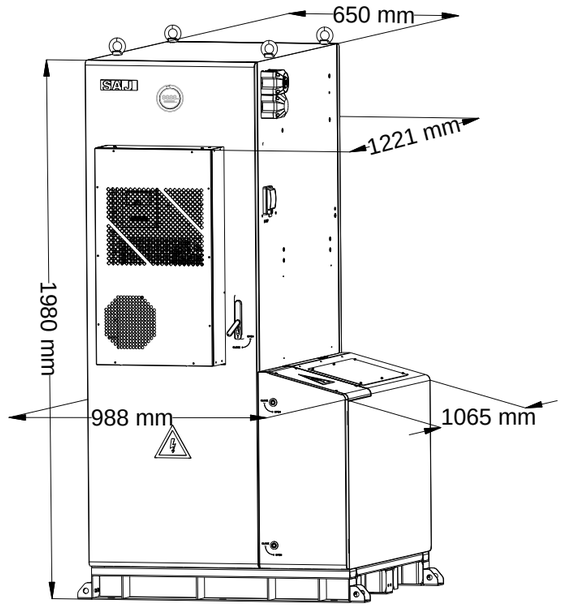


Figure 3.4. Dimensions of CB2

3.5. Battery Terminals Description

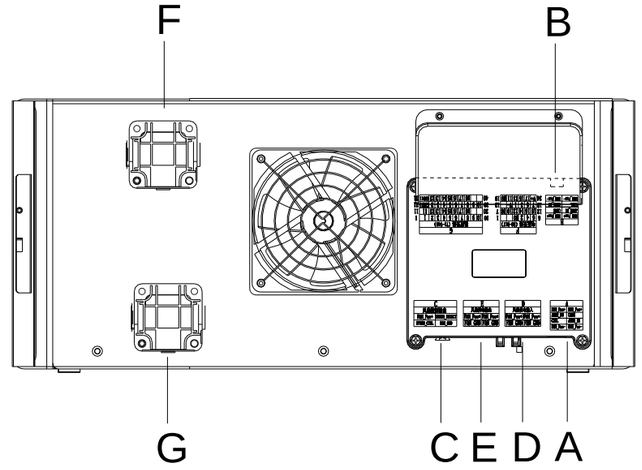


Figure 3.5. Battery terminals

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 for battery cable connection.
G	/	The negative port for battery cable connection.

Table 3.1. Terminal descriptions of battery modules

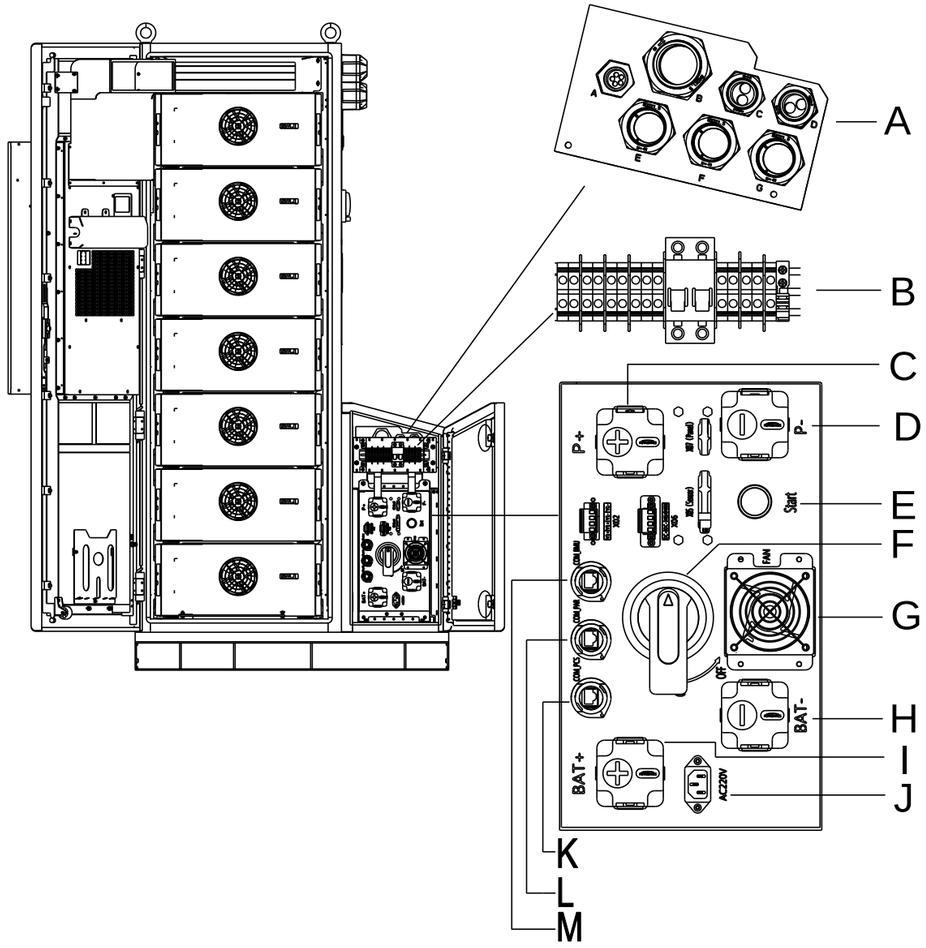


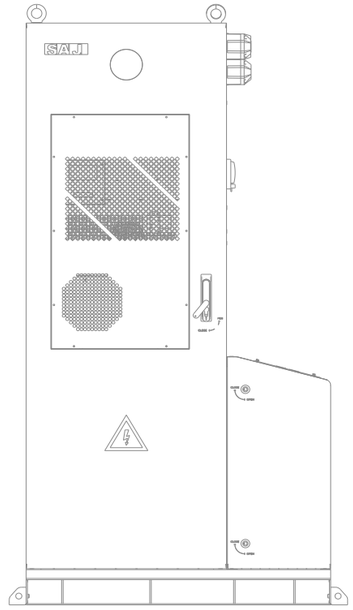
Figure 3.6. Battery control unit interfaces

Callout	Silkscreen	Function
A	A, B, C, D, E, F, G	The water-proof ports for cable connections to/from the CH2 inverter and the expansion CB2 systems.
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.
G	FAN	The fan for system cooling.
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.
K	COM_PCS	The communication port connecting to the **BMS_1** port of the inverter.
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

3.6. Datasheet

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]	150	150	150	150
Rated Power [kW]	28.6	35.6	42.9	50.1
Weight [kg]	960	1060	1160	1260
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 and Inspection

4.1.1. Checking the Package

The battery components may incur damage during transportation. Inspect the packaging for any evident signs of damage. If such signs are present, do not open the package and contact your dealer immediately.

4.1.2. Scope of Delivery

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

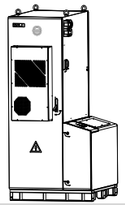
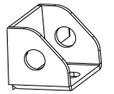
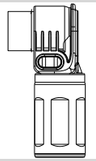
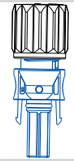
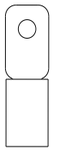
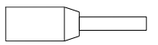
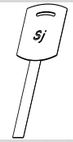
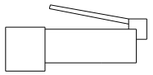
			
CB2 battery system	M12*80 expansion bolt x4	M8*25 screw x8	Mounting bracket x4
			
Power cable terminal x1 (For CH2 inverter A)	Power cable terminal x3 (For CH2 inverter B)	RNBS38-8 terminal x2	SQNBS60-6 terminal x4
			
E2508 terminal x4	Key 1 x2 (For battery cabinet)	Key 2 x2 (For battery control unit cabinet)	RJ45 termination resistor x2
			
Documents			

Table 4.1. Packing list

4.2. Installation Method and Position

4.2.1. Installation Position and Space

The CB2 battery system is equipped with air conditioner convection cooling. It is suggested to install the system indoors or under a sheltered place to prevent it from exposure to direct sunlight, rain, and snow erosion.

Poor air ventilation will affect the working performance of internal electronic components and shorten the service life of the system. Reserve at least the following space around the whole battery system to ensure good air circulation at the installation area:

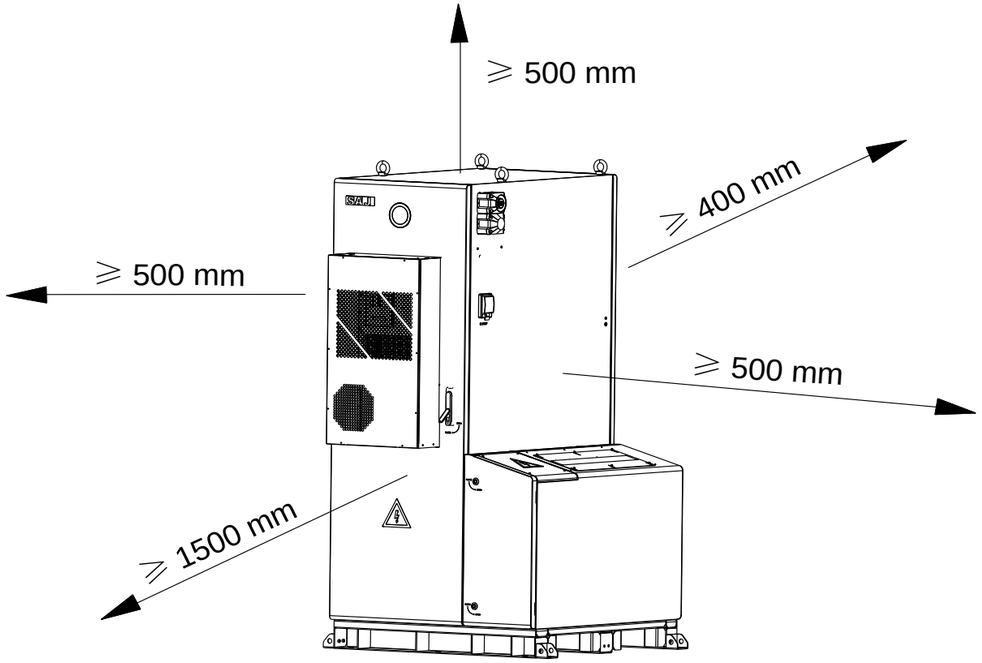


Figure 4.1. Installation space

4.2.2. Mounting Method

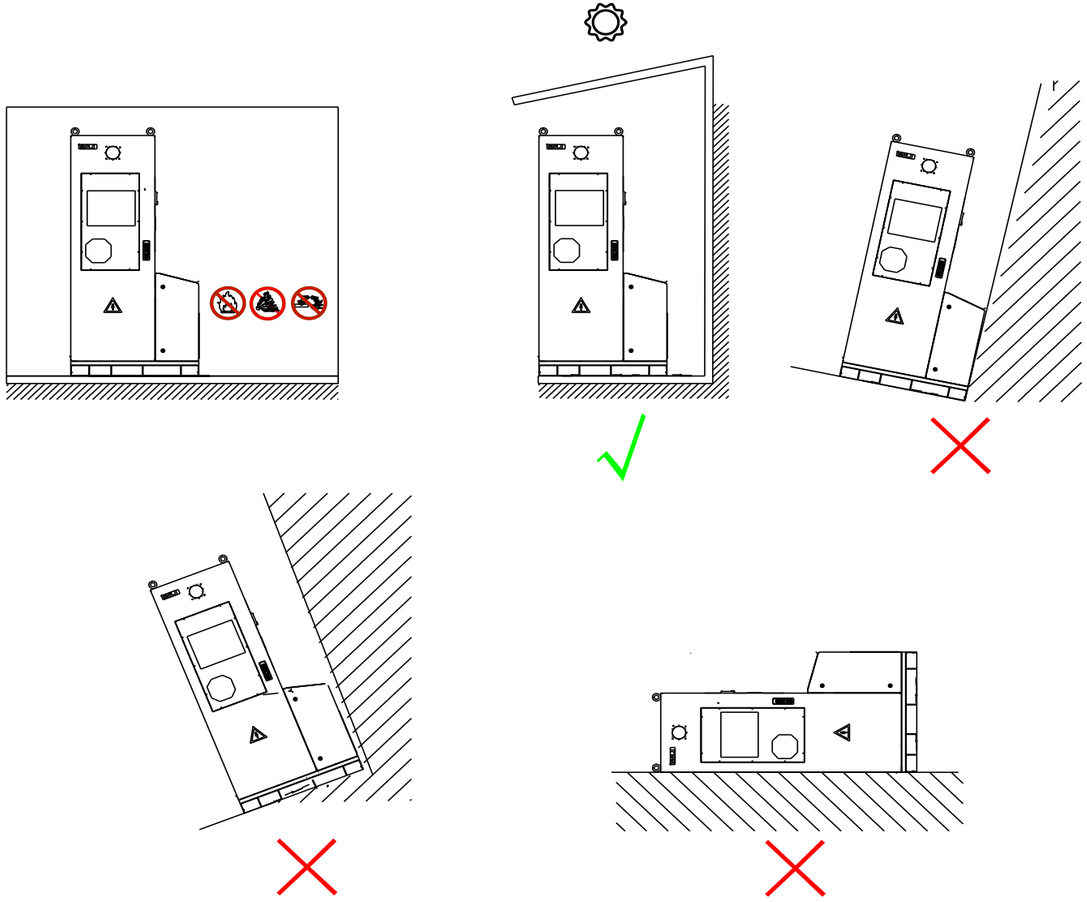


Figure 4.2. Mounting method

- The equipment employs air conditioner convection cooling, and it can be installed either indoors or outdoors.
- Mount vertically. Never install the device tilted forwards, sideways, horizontally or upside down.
- The ground should be flat without any 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 battery away from any heat source.
- Do not install the battery at a location where the temperature changes extremely.
- Keep the battery away from children.
- Do not install the battery 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 battery at the garage, please keep it away from the driveway.
- Keep the battery from water sources such as taps, sewer pipes and sprinklers to prevent water seepage.

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

4.3. Mounting Preparation

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.

4.3.2. Suggested installation tools

4.3.3. Transportation Equipment

The installers need to prepare proper equipment for transporting and lifting the cabinets. For example, a forklift or a vertical roller conveyor.

Forklift

Use the following forklift to move or lift the battery 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 cabinet bottom without damaging the cabinet.

Follow specific guidelines below to move or lift the battery 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.

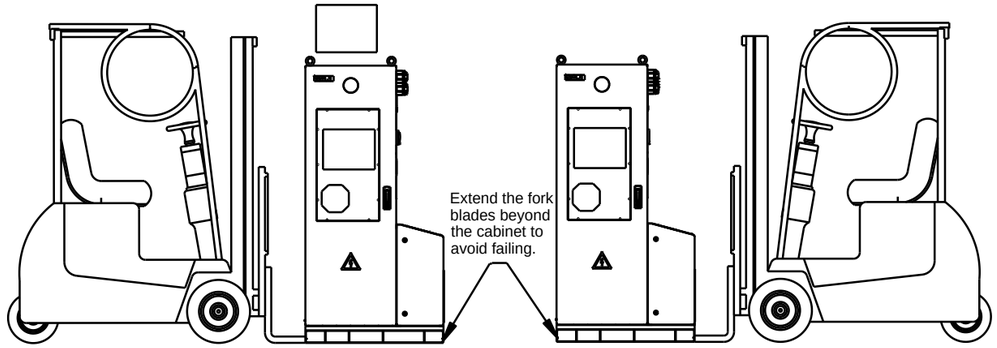


Figure 4.3. Forklift transportation

Crane

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

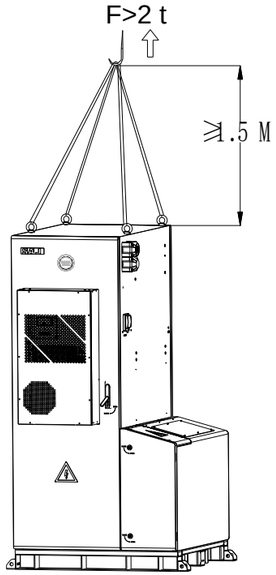


Figure 4.4. Transporting with a crane

4.3.4. Installation Personnel

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

4.4. Mount the CB2 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.

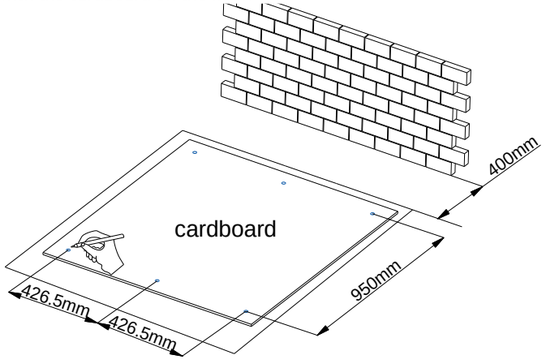


Figure 4.5. Marking the drilling positions

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 screw)

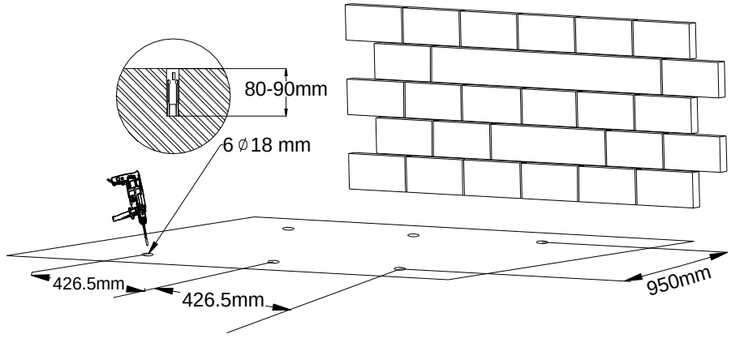


Figure 4.6. Drilling the holes

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.

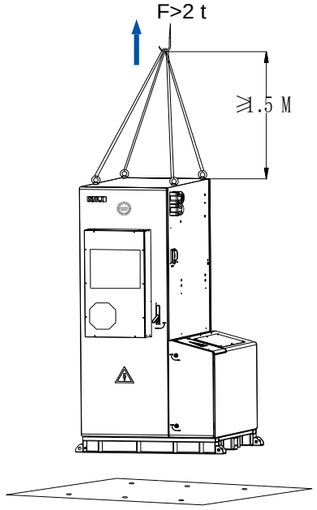


Figure 4.7. Placing the cabinet

Step 4. Use a wrench to secure the bottom of the cabinet to the floor with screws.

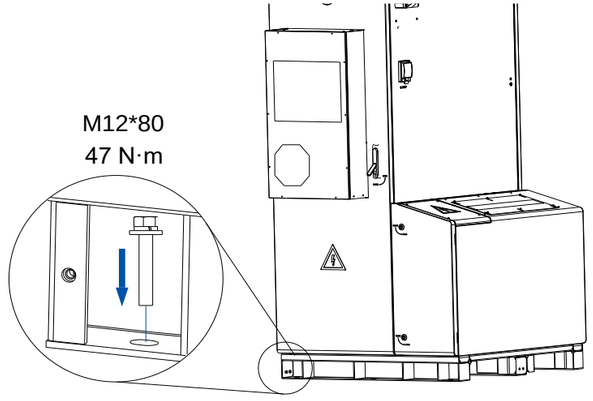


Figure 4.8. Securing the cabinet

To secure the cabinet with the mounting brackets:

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

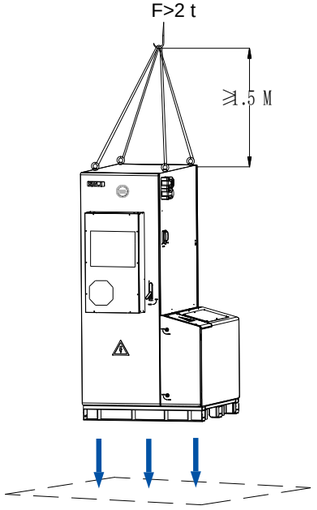


Figure 4.9. Placing the cabinet

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

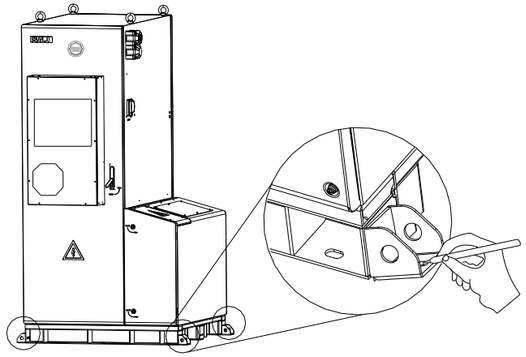


Figure 4.10. Marking the drilling positions

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)

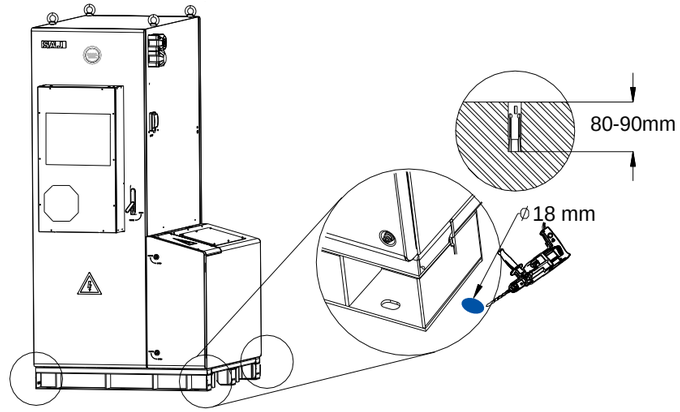


Figure 4.11. Drilling the holes

Step 4. Place the four mounting brackets back to the four corners and use a wrench to secure the brackets to the floor.

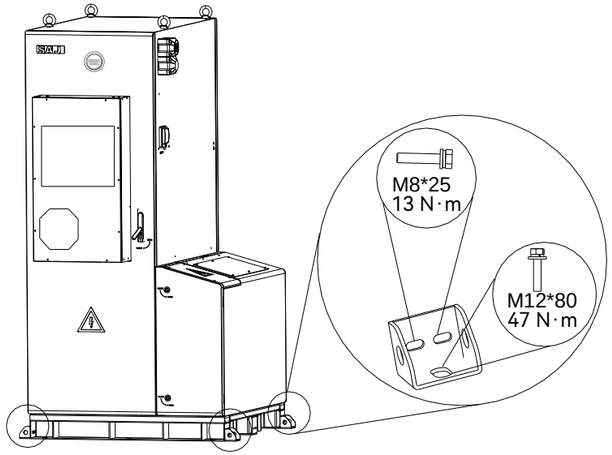


Figure 4.12. Securing the cabinet

5.

ELECTRICAL CONNECTION

WARNING

- Power off the battery system before connecting the power cables to avoid high voltage electrical shock.
- The electrical connection of high voltage battery systems must be operated by qualified technicians in accordance with local and national power grid standards and regulations.
- Before connection, the technicians must wear necessary personal protective equipment, including insulating gloves, insulating shoes and safety helmet.
- For battery power cable connections, ensure that the positive cables are connected to the positive ports; the negative cables are connected to the negative ports.

5.1. Multi-cluster Connections (CH2 Inverter A)

Follow this procedure to connect the grounding, battery power, communication, and 220V AC cables when multiple clusters of CB2 battery systems are deployed with the following CH2 inverter.

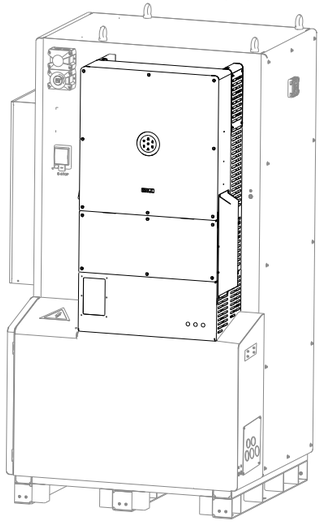


Figure 5.1. CH2 Inverter A

Note: The decorative panels and electrical connection terminals are different between CH2 inverter A and B. For connection instructions with CH2 inverter B, see Section 5.2 Multi-cluster Connections (CH2 Inverter B) on page 46.

One CH2 inverter can be integrated with four CB2 battery systems at maximum.

The following figure shows the overall connections of grounding, battery power, communication, and 220V AC cables for CH2 inverter A.

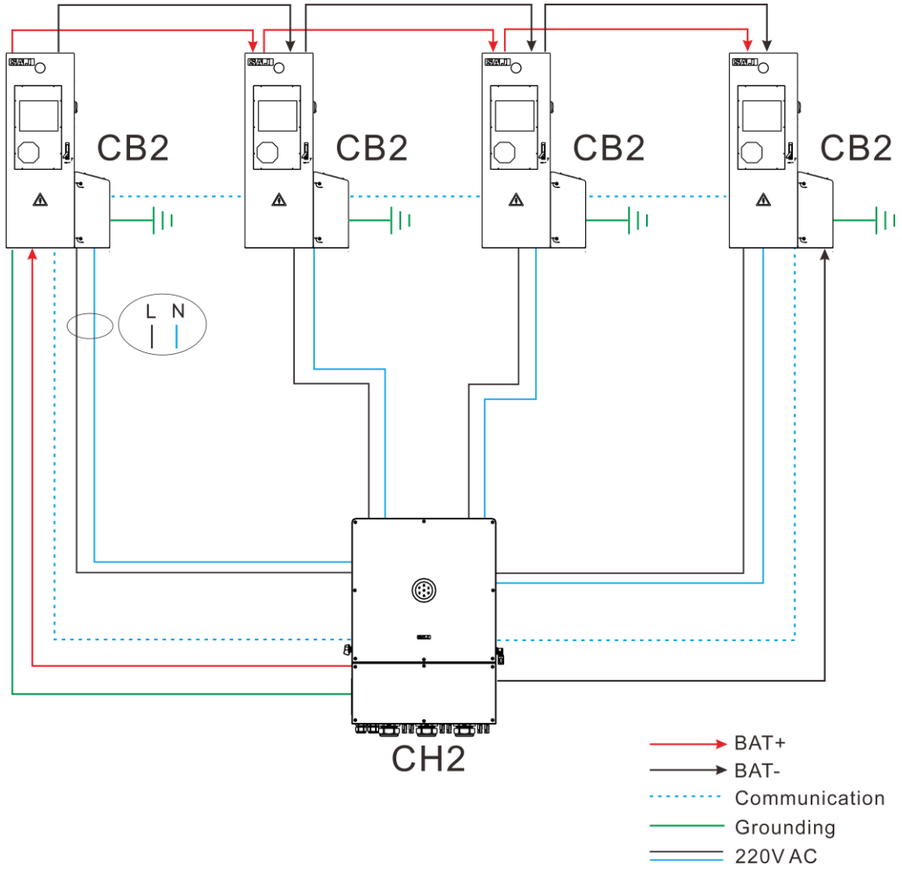


Figure 5.2. Multi-cluster battery system connections

The connection guideline and procedure for multiple clusters are similar. The following procedure describes the connection of a four-cluster system.

Before you start

Prepare the following cables according to the listed specifications:

Function	Type	Cross-sectional area (mm^2)	Outer Diameter (mm)	Conductor	Voltage Withstand (V)	Connecting Terminal
Grounding	Outdoor cable	35	-	Copper	1000 V AC	RNBS38-8 OT/DT
Battery power	Outdoor cable	50	13-13.8	Copper	1000 V DC	SQNBS60-6
220V AC	Outdoor twisted pair power cable	2.5	7-12	Copper	220 V AC	E2508
Communication	Category 5 Enhanced shielded outdoor cable	-	5.5-7	-	-	RJ45 plug

Table 5.1. Cable specifications (with Inverter A)

Procedure

Step 1. Connect the grounding cable.

> **WARNING**
>
> Connect this grounding cable before starting other electrical connections.

a. Plan the grounding cable connections on the CB2 cabinets as the following diagram shows.

Note: All the grounding cables must be connected to ensure equipotential bonding for safety purpose.

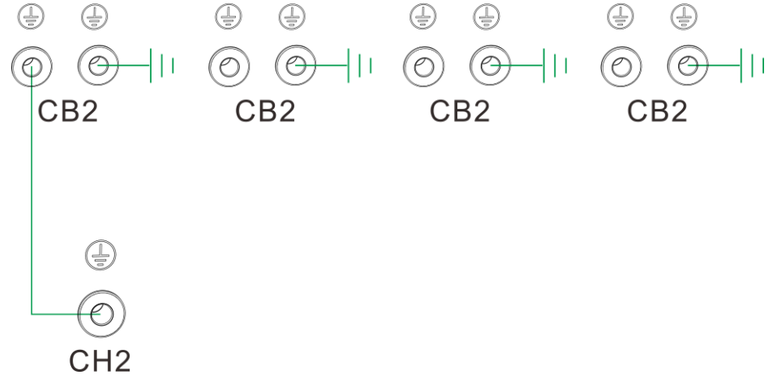


Figure 5.3. Grounding cable connections

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

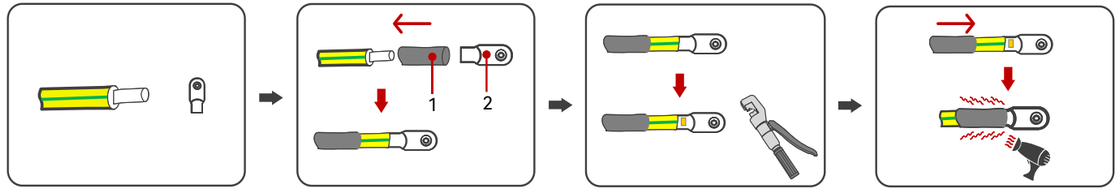


Figure 5.4. Preparing the grounding cable

1. Heat shrink tubing 2. OT/DT terminal

c. Secure the grounding cables on the CB2 cabinets as shown below. Remove the screw of the grounding terminal on the back side of the cabinet, insert the screw through the OT/DT terminal, and tighten the cable with the screw.

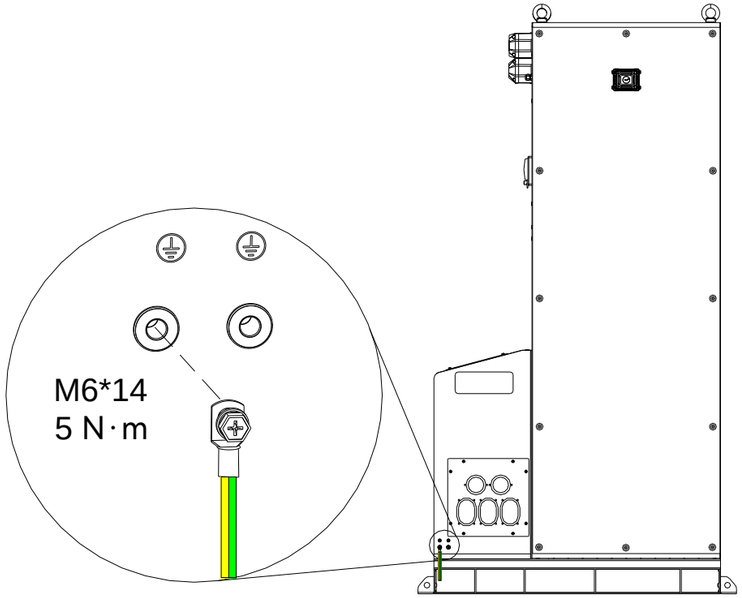


Figure 5.5. Connecting the grounding cables

Step 2. Unlock the battery control unit cabinet with key 2. Remove the three covers from the CB2 cabinet to prepare for the cable connections.

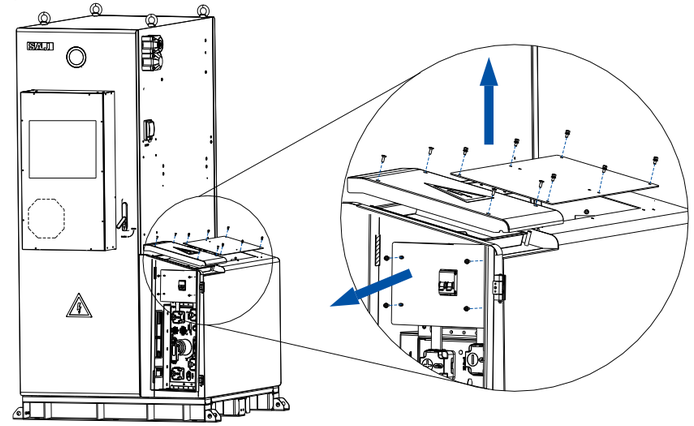


Figure 5.6. Removing the covers

Step 3. Pass the cables through the water-proof holes at the back of the cabinet to the corresponding **A** to **G** ports inside the cabinet.

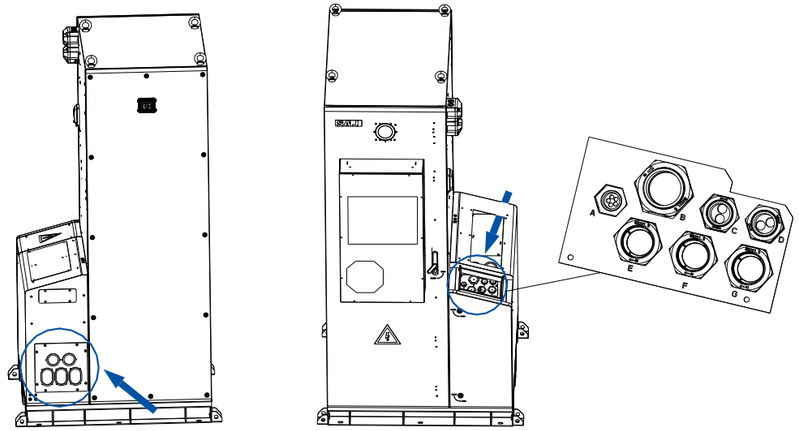


Figure 5.7. Passing through the cables

Step 4. Connect the positive and negative battery power cables.

a. Plan the positive and negative battery power cables according to the following diagram.

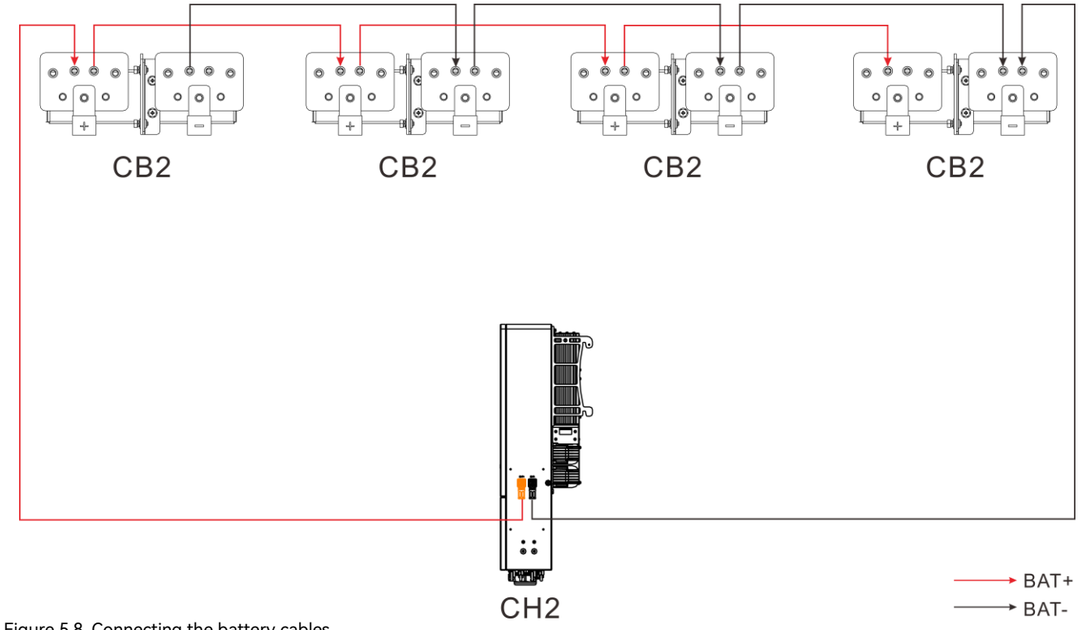


Figure 5.8. Connecting the battery cables

b. Keep the existing positive power cable connection between CH2 and the first CB2 system. Prepare the negative power cable between the CH2 and the last CB2 system and the cables between the CB2 systems.

c. Loosen the lock screw off the negative connector. Insert the cable into the cable connector and crimp the cable and the copper tube of the connector.

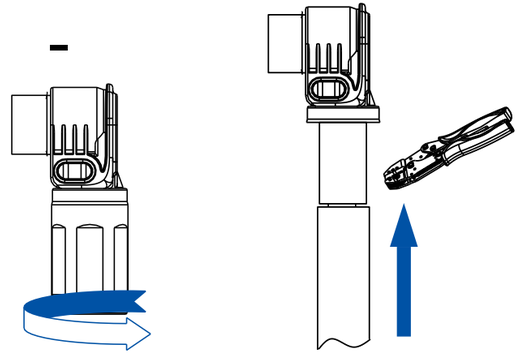


Figure 5.9. Assembling the battery connector

d. Fasten the lock screw back to the negative connector.

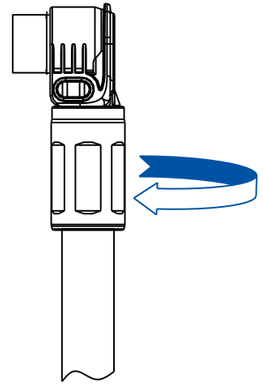


Figure 5.10. Fastening the lock screw

e. Insert the negative power cable to the **BAT-** port on the right side of CH2.

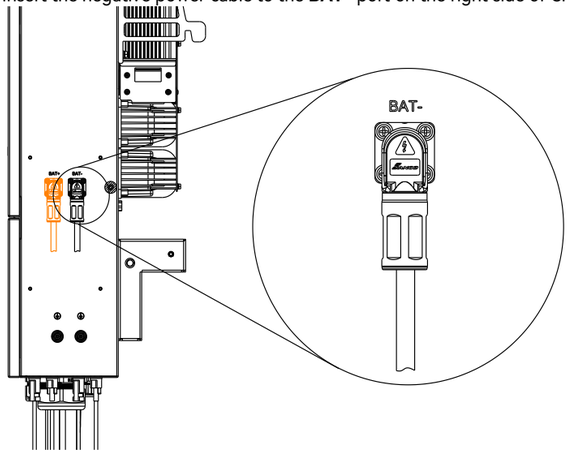


Figure 5.11. Connecting battery power cables on CH2

f. For the other cable ends connecting to the power cable plate on CB2, crimp the cable with the SQNBS60-6 terminal.

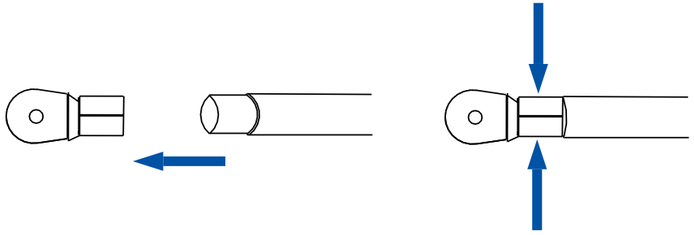


Figure 5.12. Crimping the power cables

g. Pass the cable through the corresponding **A** to **G** ports on the CB2 cabinets:

CB2 systems	Port	Number of cables passing through
CB2 system 1	E, F	1
CB2 system 2	C, E, F, G	1
CB2 system 3	C, E, F, G	1
CB2 system 4	E, F	1

Table 5.2. Ports for battery power cables

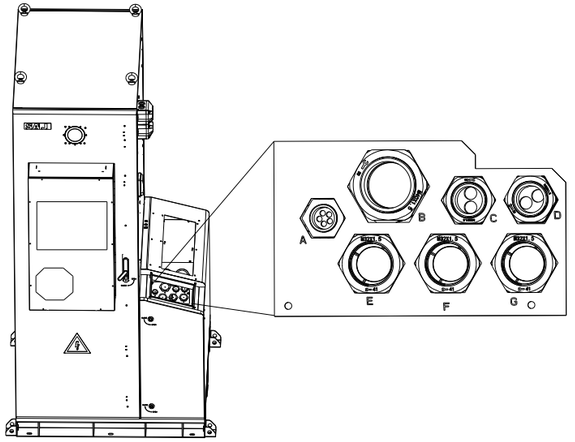


Figure 5.13. Ports for battery power cables

h. Secure the other end of the positive and negative power cables on the power cable plates of the CB2 systems with screws according to Figure 5.8.

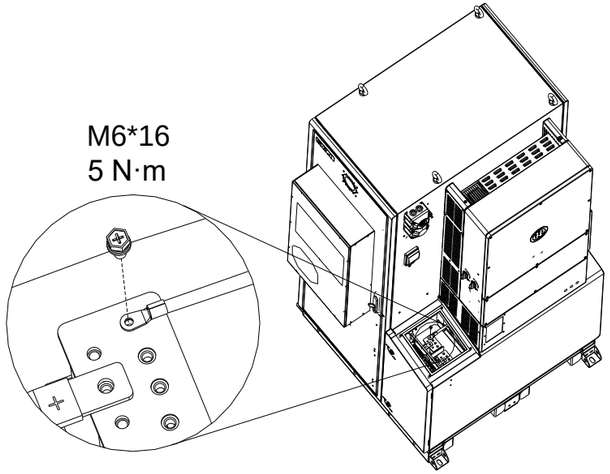


Figure 5.14. Securing the cables on CB2

Step 5. Connect the 220V AC cables for the inverter to provide power supplies to the battery systems.

a. Plan the N and L AC cables according to the following diagram.

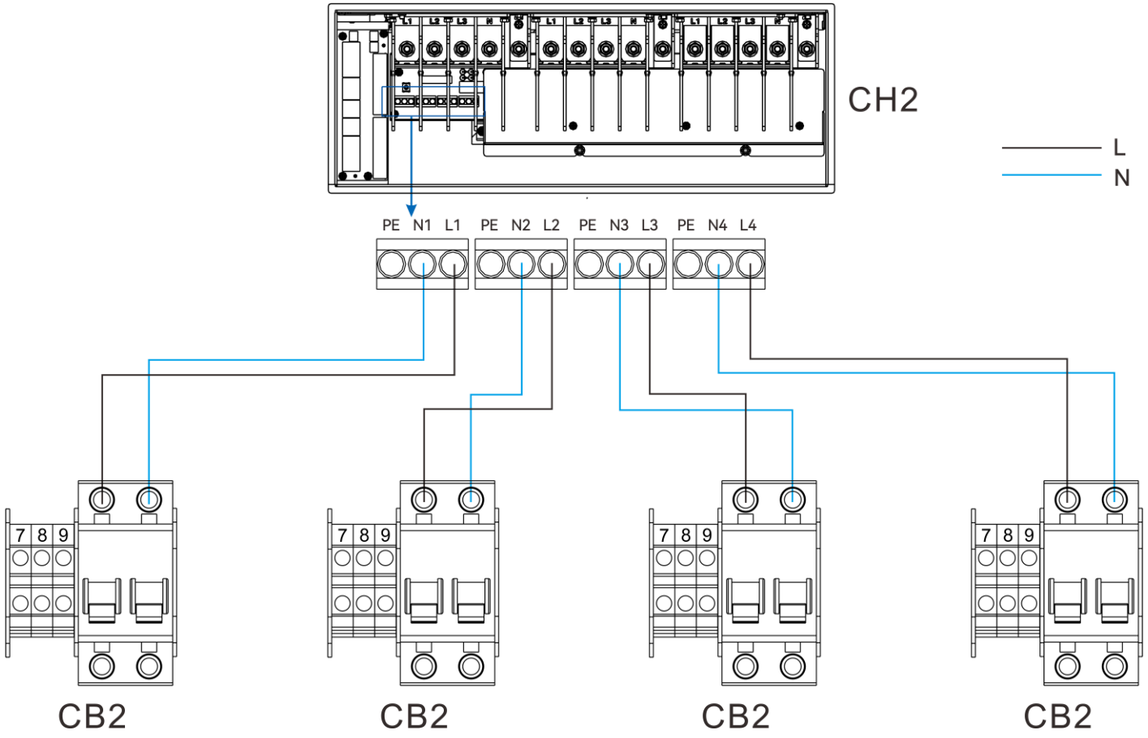


Figure 5.15. Connecting the AC cables

Note: Follow the exact diagram above to connect the AC cables. Wrong connections of N or L cables could result in damaging the internal components of the CB2 system.

b. Strip off the insulation skin on both cable ends by 8-10 mm.

c. Crimp both cable ends with the E2508 terminals.

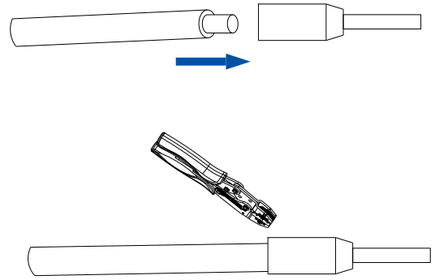


Figure 5.16. Crimping AC cable ends

d. On the CH2 side, insert one end of the cable terminal to the N1/N2/L3 and L1/L2/L3 ports on CH2 according to Figure 5.15. Secure the cable terminals with screws.

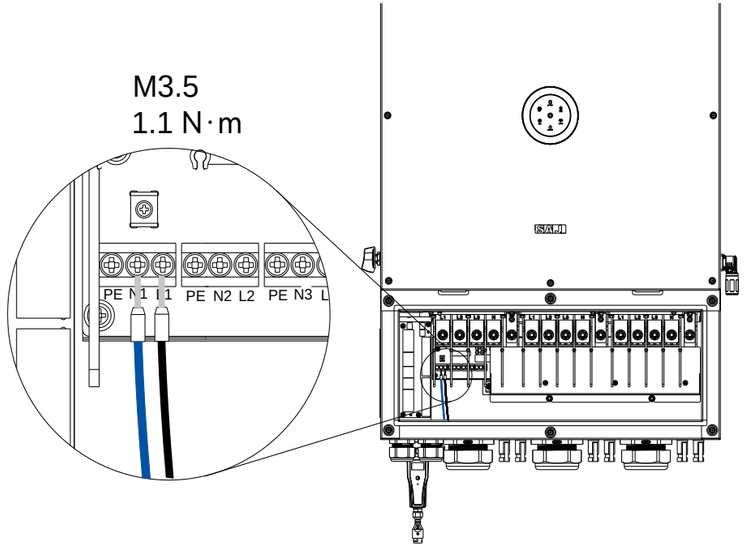


Figure 5.17. Connecting the AC cables on CH2

e. On the CB2 side, pass the cables through the corresponding **A** to **G** ports on CB2:

CB2 systems	Port	Direction	Number of cables passing through
CB2 system 1	A	In	4
	D	Out	6
CB2 system 2	A	In	2
CB2 system 3	A	In	2
CB2 system 4	A	In	2

Table 5.3. Ports for 220V AC N and L cables

f. Secure the N and L cables on the circuit breaker above the battery control unit on each CB2.

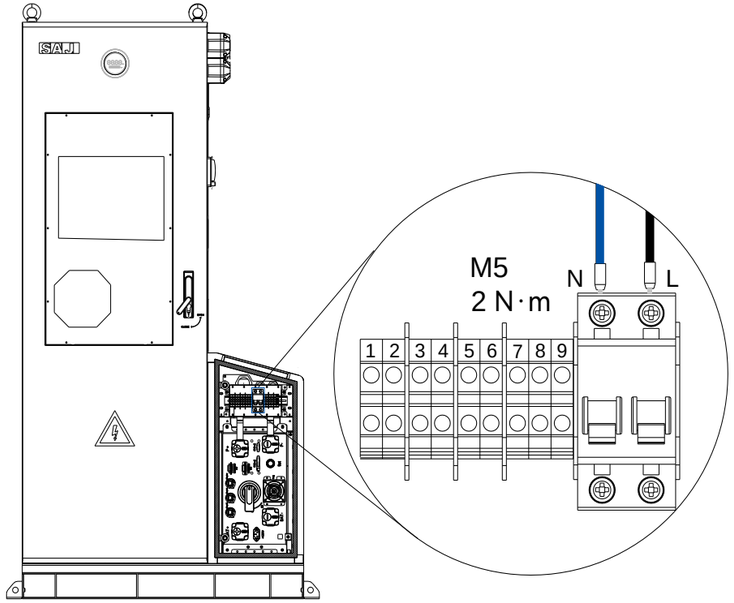


Figure 5.18. Connecting the AC cables on CB2

Step 6. Connect the communication cables between CH2 and the CB2 systems.

a. Plan the communication cable connections according to the following diagram.

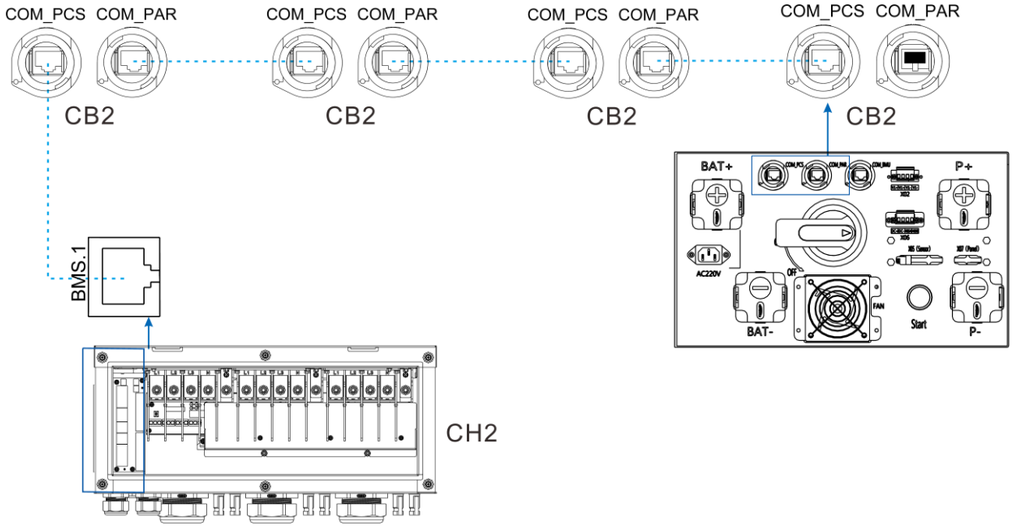


Figure 5.19. Connecting the communication cables

b. On the CB2 side, pass the cables through the corresponding **A** to **G** ports on CB2:

CB2 systems	Port	Number of cables passing through
CB2 system 1	C	1
CB2 system 2	B	2
CB2 system 3	B	2
CB2 system 4	B	1

Table 5.4. Ports for communication cables

c. Insert the 220Ω RJ45 termination resistor in the **COM_PAR** port of the last CB2 cabinet.

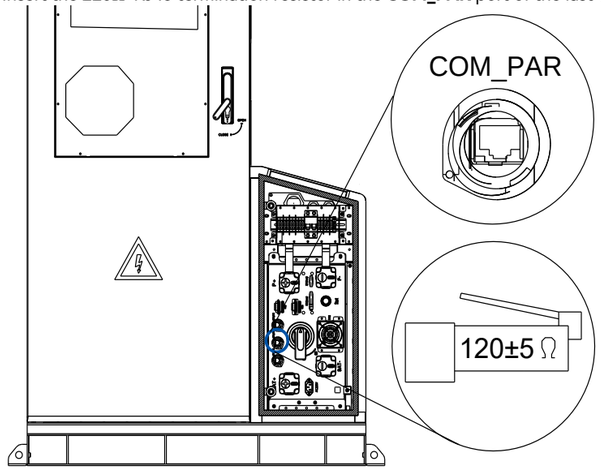


Figure 5.20. Inserting the resistor

Step 7. Install the covers back on the cabinet.

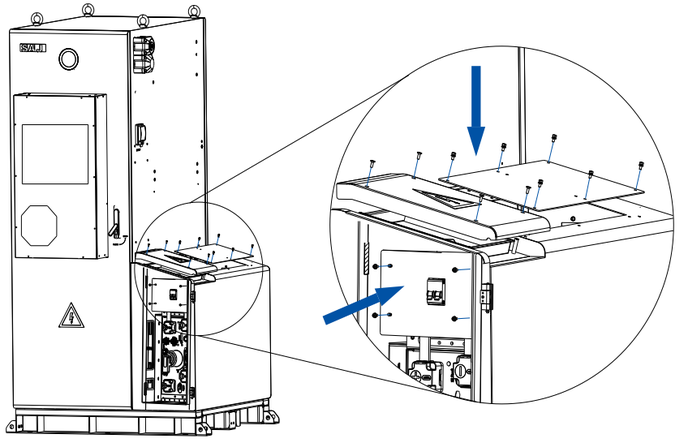


Figure 5.21. Installing the covers

5.2. Multi-cluster Connections (CH2 Inverter B)

Follow this procedure to connect the grounding, battery power, communication, and 220V AC cables when multiple clusters of CB2 battery systems are deployed with the following CH2 inverter.

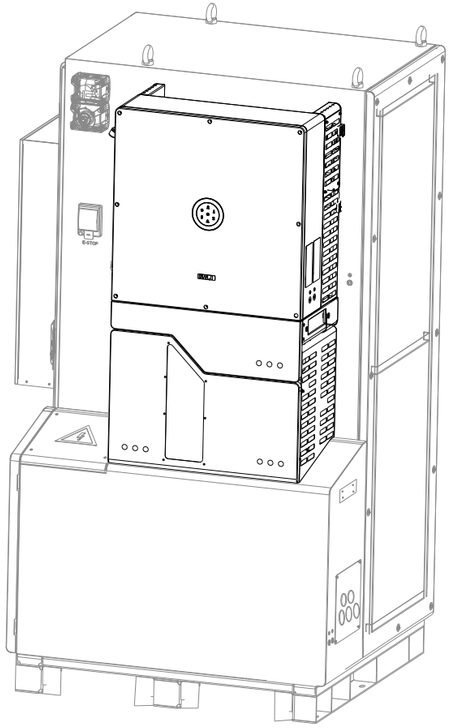


Figure 5.22. CH2 Inverter B

One CH2 inverter can be integrated with four CB2 battery systems at maximum.

The following figure shows the overall connections of grounding, battery power, communication, and 220V AC cables for CH2 inverter B.

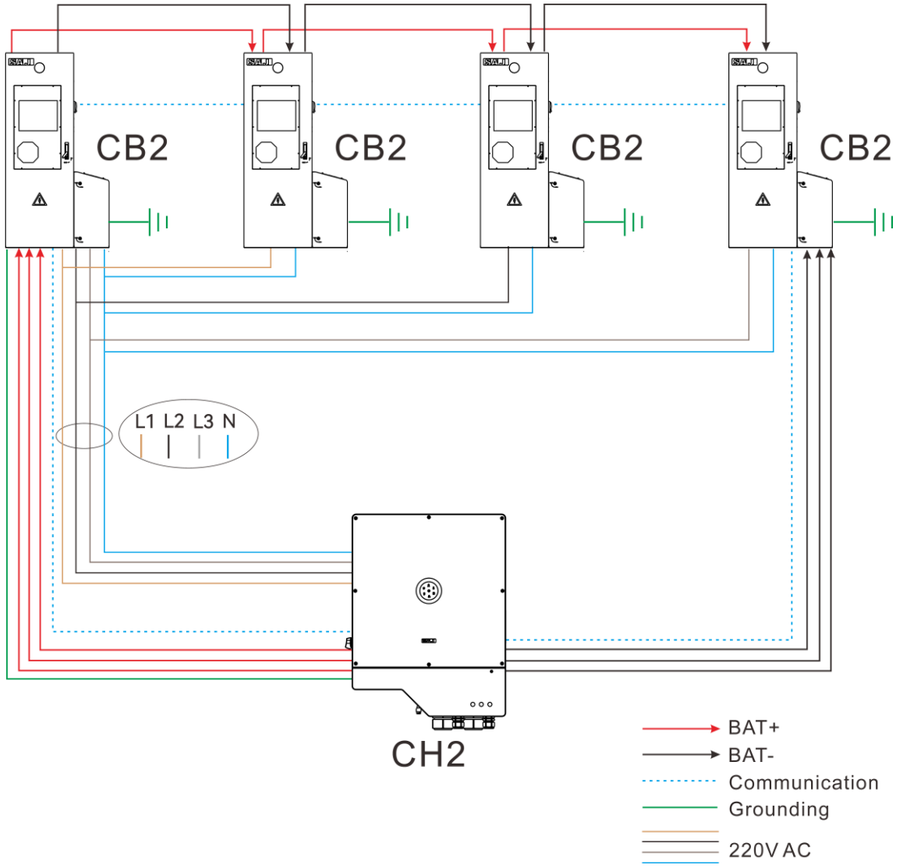


Figure 5.23. Multi-cluster battery system connections

The connection guideline and procedure for multiple clusters are similar. The following procedure describes the connection of a four-cluster system.

Before you start

Prepare the following cables according to the listed specifications:

Function	Type	Cross-sectional area (mm^2)	Outer Diameter (mm)	Conductor	Voltage Withstand (V)	Connecting Terminal
Grounding	Outdoor cable	35	-	Copper	1000 V AC	RNBS38-8 OT/DT
Battery power	Outdoor cable	50	13-13.8	Copper	1000 V DC	SQNBS60-6
220V AC	Outdoor twisted pair power cable	2.5	< 5	Copper	220 V AC	E2508
Communication	Category 5 Enhanced shielded outdoor cable	-	5.5-6.5	-	-	RJ45 plug

Table 5.5. Cable specifications (with Inverter B)

Procedure

Step 1. Connect the grounding cable.

> **WARNING**
>
> Connect this grounding cable before starting other electrical connections.

a. Plan the grounding cable connections on the CB2 cabinets as the following diagram shows.

Note: All the grounding cables must be connected to ensure equipotential bonding for safety purpose.

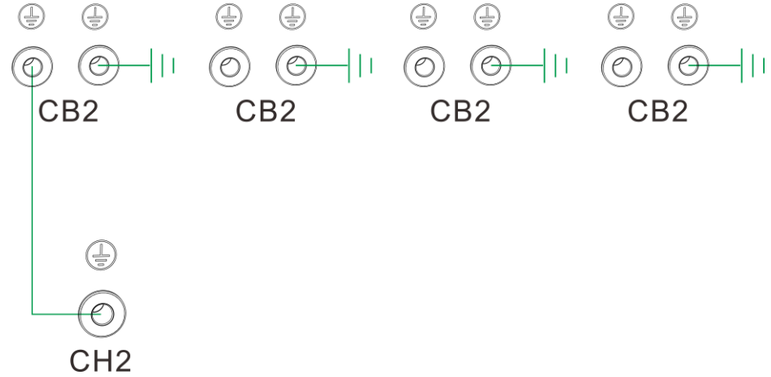


Figure 5.24. Connecting the grounding cables

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

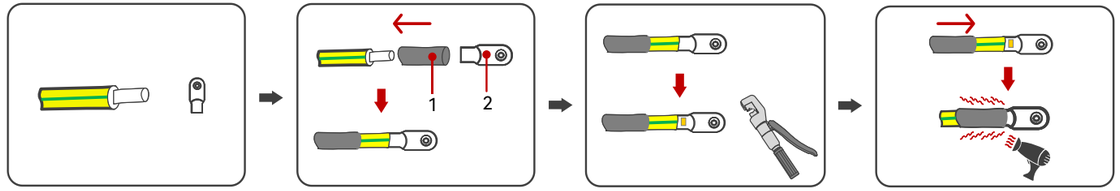


Figure 5.25. Preparing the grounding cable

1. Heat shrink tubing 2. OT/DT terminal

c. Secure the grounding cables on the CB2 cabinets according to the following diagram. Remove the screw of the grounding terminal on the back side of the cabinet, insert the screw through the OT/DT terminal, and tighten the cable with the screw.

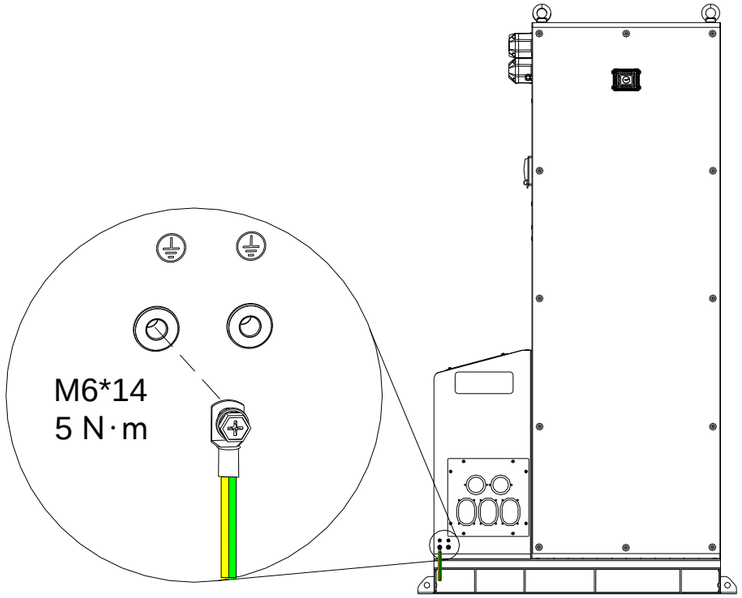


Figure 5.26. Connecting the grounding cables

Step 2. Unlock the battery control unit cabinet with key 2. Remove the three covers from the CB2 cabinet to prepare for the cable connections.

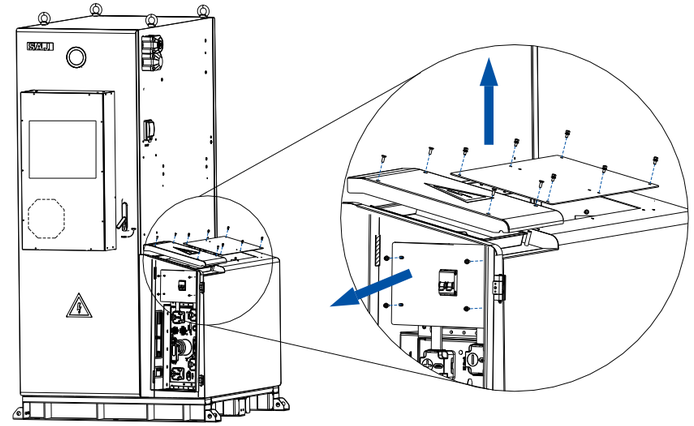


Figure 5.27. Removing the covers

Step 3. Pass the cables through the water-proof holes at the back of the cabinet to the corresponding A to G ports inside the cabinet.

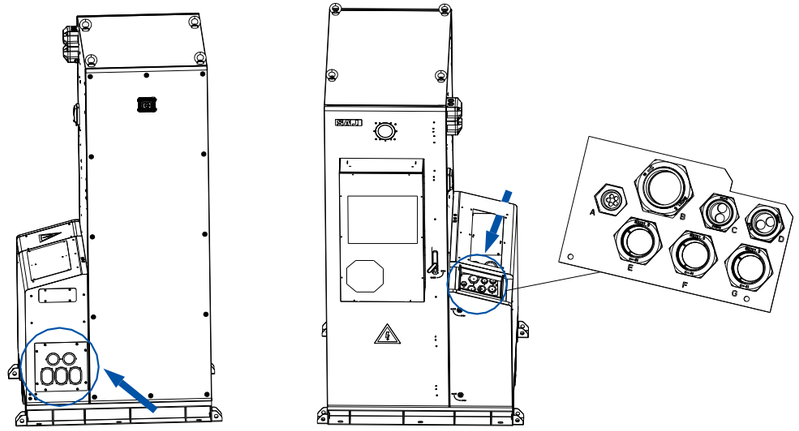


Figure 5.28. Passing through the cables

Step 4. Connect the positive and negative battery power cables.

a. Plan the battery cable connections according to the following diagram.

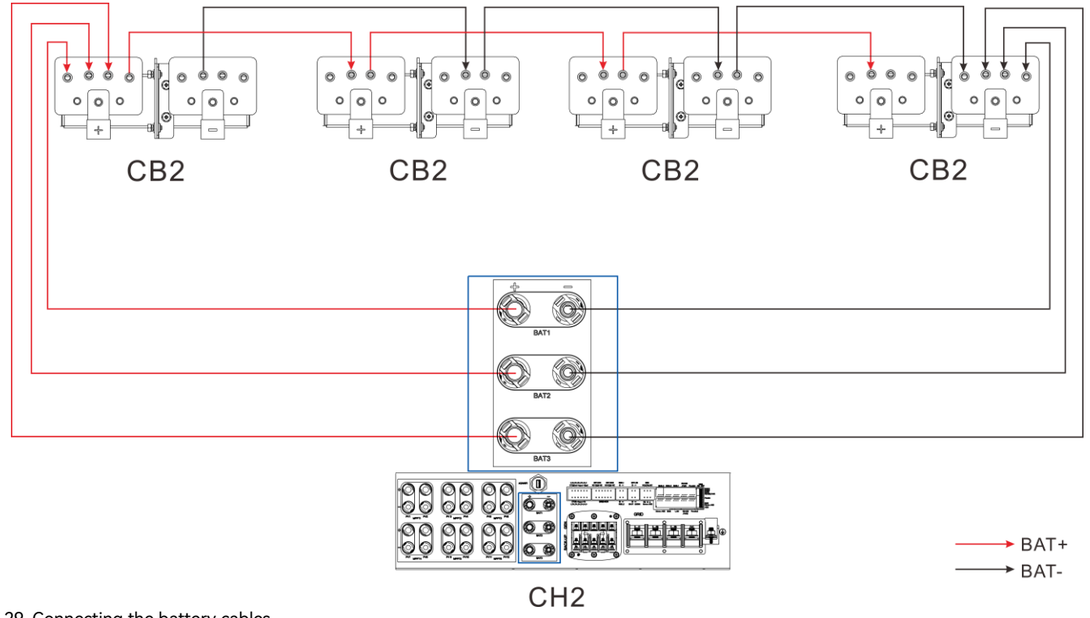


Figure 5.29. Connecting the battery cables

b. Keep the existing positive power cable connection between CH2 and the first CB2 system. Prepare the negative power cable between the CH2 and the last CB2 system and the cables between the CB2 systems.

c. For the negative cable connecting to the CH2 inverter, use a 3-mm wide-bladed screwdriver to strip off the insulation skin on one end of the negative cable.

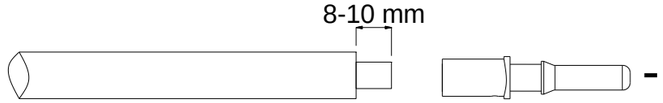


Figure 5.30. Stripping off the insulation

d. Insert the cable end to the sleeve. Use a crimping plier to assembly the cable end.

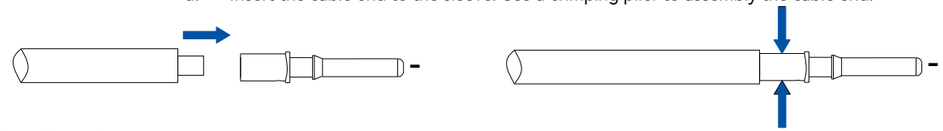


Figure 5.31. Inserting the cable ends

e. Insert the assembled cable end into the blue negative battery connector. Then, gently pull the cable backwards to ensure that it is firmly connected.

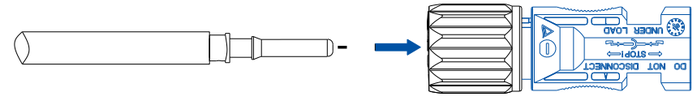


Figure 5.32. Inserting the cable ends

f. Tighten the nut on the negative cable connector.

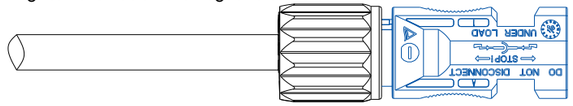


Figure 5.33. Inserting the cable ends

g. Insert the negative cable connector to the **BAT-** port on the CH2 inverter until you hear a “click” sound.

h. For the other cable ends connecting to CB2, crimp the cable with the SQNBS60-6 terminal.

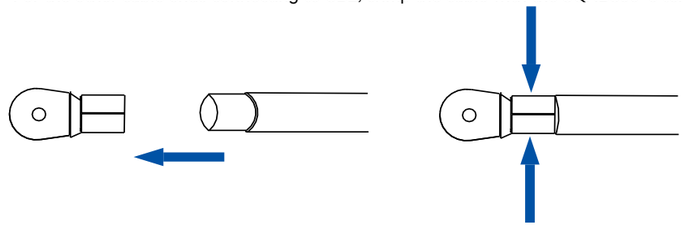


Figure 5.34. Crimping the power cables

i. Pass the cable through the corresponding **A** to **G** ports on the CB2 cabinets:

CB2 systems	Port	Number of cables passing through
CB2 system 1	E, F	1
CB2 system 2	C, E, F, G	1
CB2 system 3	C, E, F, G	1
CB2 system 4	E, F	1

Table 5.6. Ports for battery power cables

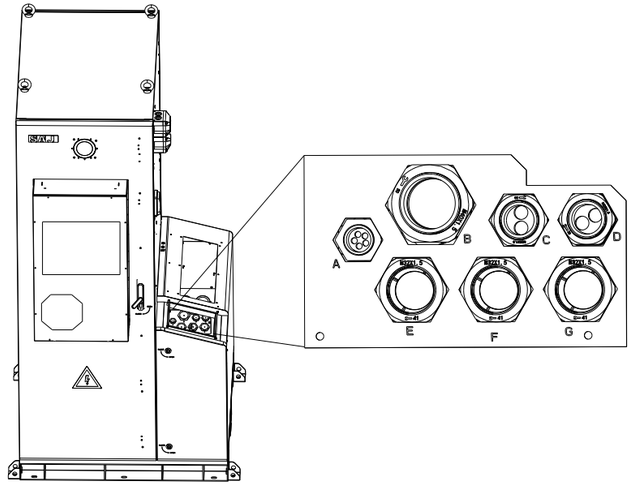


Figure 5.35. Ports for battery power cables

j. According to Figure 5.29, secure the positive power cable ends to the positive ports on the power cable plate on the CB2 cabinets; secure the negative cable ends to the negative ports on the plate.

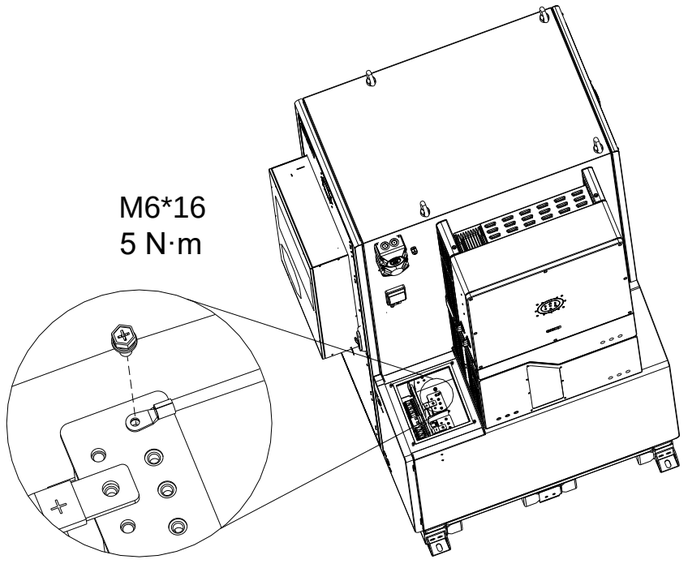


Figure 5.36. Connecting power cables on CB2

Step 5. Connect the 220V AC cables for the inverter to provide power supplies to the battery systems.

a. Plan the L1, L2, L3, and N AC cables according to the following diagram.

The cables are connected between CH2 and the first CB2 out-of-the-box. The installer only needs to connect the cables from the first CB2 to the other expansion CB2 system accordingly.

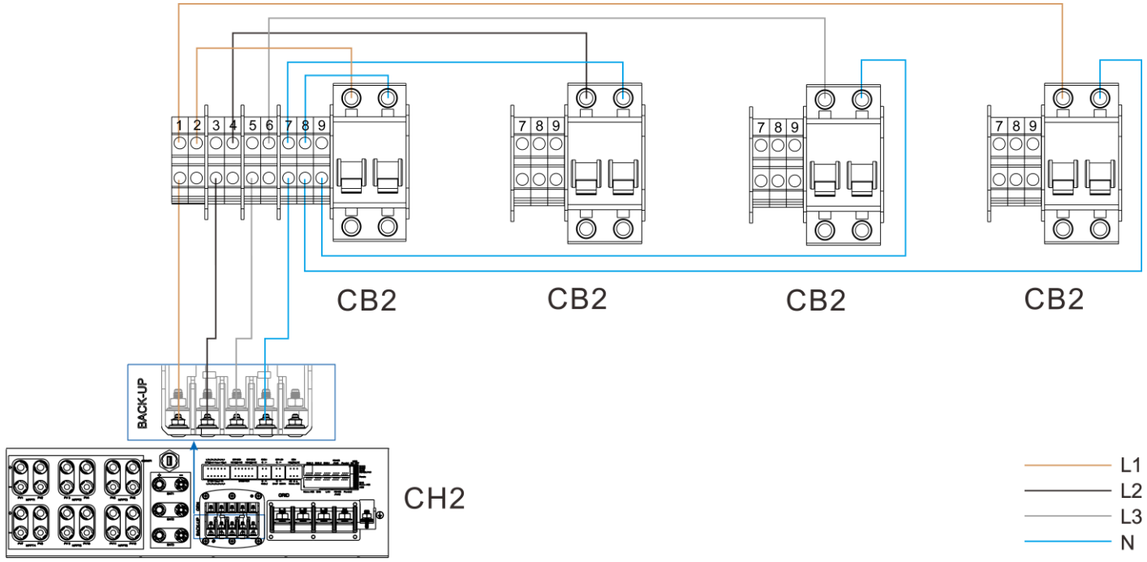


Figure 5.37. Connecting the AC cables

Note: Follow the exact diagram above to connect the AC cables. Wrong connections of N or L cables could result in damaging the internal components of the CB2 system.

b. Strip off the insulation on both cable ends by 8-10 mm.

c. Crimp both cable ends with the E2508 terminals.

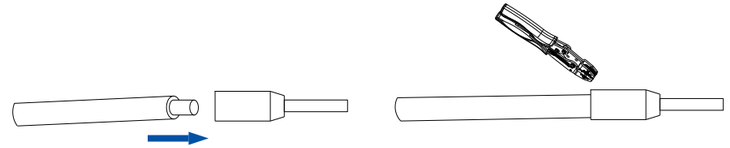


Figure 5.38. Crimping AC cable ends

d. On the CB2 side, pass the cables through the corresponding **A** to **G** ports on CB2:

CB2 systems	Port	Number of cables passing through
CB2 system 1	A	2
CB2 system 2	A	2
CB2 system 3	A	2
CB2 system 4	A	2

Table 5.7. Ports for 220V AC N and L cables

e. Connect and secure the cable terminals on the AC terminal blocks of the CB2 cabinets according to Figure 5.37.

Take CB2 system 1 and 2 for example:

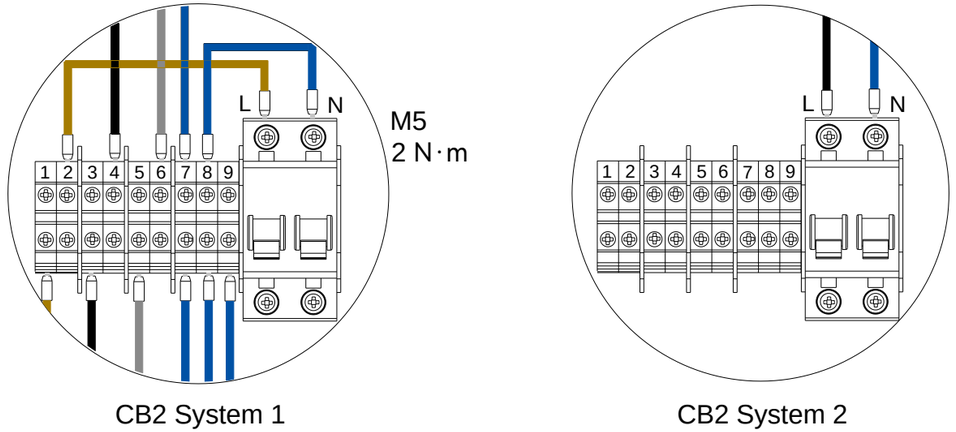


Figure 5.39. Connecting the AC cables on CH2

Step 6. Connect the communication cables between CH2 and the CB2 systems.

a. Plan the cable connections according to the following diagram:

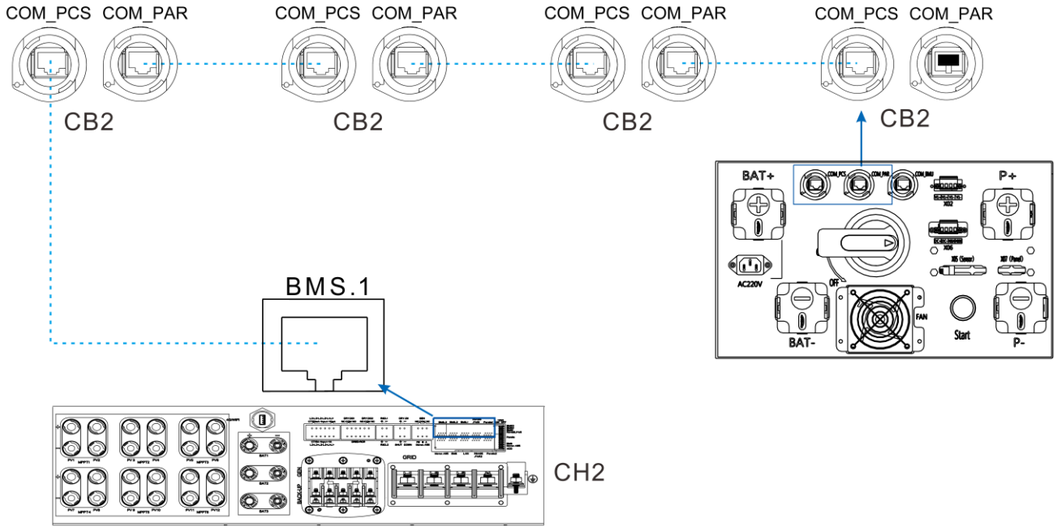


Figure 5.40. Connecting the communication cables

b. On the CB2 side, pass the cables through the corresponding **A** to **G** ports on CB2:

CB2 systems	Port	Number of cables passing through
CB2 system 1	B	1
CB2 system 2	B	2
CB2 system 3	B	2
CB2 system 4	B	1

Table 5.8. Ports for communication cables

c. Insert the 220Ω RJ45 termination resistor in the **COM_PAR** port of the last CB2 battery system.

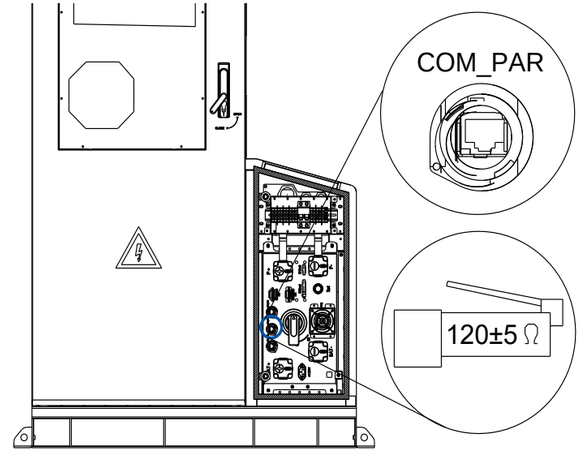


Figure 5.41. Inserting the resistor

Step 7. Install the covers back on the cabinet.

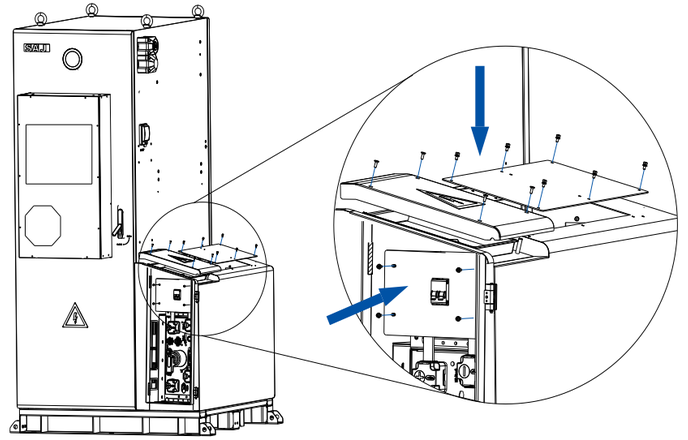


Figure 5.42. Installing the covers

6.

COMMISSIONING

6.1. Start Up

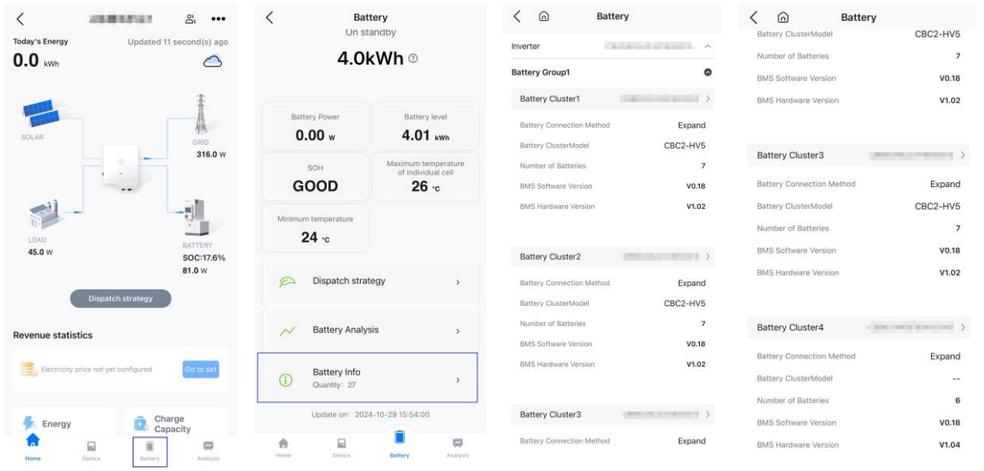
Step 1. Turn ON the DC switches on the inverter. Turn on the AC circuit breaker.

Step 2. Rotate the main switch to the ON position. Press and hold the START button for 3 seconds until the LED light flashes in green.

Note: If the main switch suddenly trips while the machine is running, rotate the switch to OFF and then back to ON.

6.2. Check Battery Status

Step 1. Log in to the Elekeeper App, and check the **Battery Info** at the Elekeeper App. Make sure that the numbers of battery clusters and battery modules are as expected for each battery group.



Step 2. Close the cabinet door, and lock the door handle. Keep the two keys in a safe location.

6.3. Shut Down

Step 1. Turn off the AC circuit breaker.

Step 2. Rotate the main switch to the OFF position.

Step 3. Turn off the DC switches on the inverter.

Note: After closing the cabinet door, lock the cabinets.

7.

BATTERY MAINTENANCE

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.

NOTICE

- The battery remains 50% power when it is sent from the factory.
- The inverter and the battery do not require regular maintenance.

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

For the errors reported as below, take the suggested troubleshooting actions in the listed order first. If the error persists after you take the suggested actions or no specific action is suggested, contact the service support for further assistance.

The troubleshooting operations must be performed by authorized technicians.

Error Code	Error Message	Possible Cause	Actions
97	BMS internal communication error	1. Communication error between battery control unit and battery module. 2. RJ45 plug is not installed. The battery control unit cannot get the correct number of connected battery modules.	1. Check if the communication cable is connected properly. 2. Check if the RJ45 plug is installed.
98	Battery sequence error	1. Cable connection is wrong. 2. No RJ45 plug is installed. 3. Communication cable connection is wrong.	1. Connect the cable correctly. 2. Check if the RJ45 plug is installed. 3. Check if the communication cable is working.
99	Discharge overcurrent protection	Discharging current exceeds the set limit.	Wait until the error is cleared or restart the CB2 system.
100	Charge overcurrent protection	Charging current exceeds the set limit.	
101	Battery system undervoltage protection	Total voltage is lower than the set limit.	Force charging the battery.
102	Battery system overvoltage protection	Total voltage is higher than the set limit.	Wait until the error is cleared or restart CB2 system.
103	Battery cell undervoltage protection	Single battery cell voltage is lower than the set limit.	Force charging the battery.
104	Battery cell overvoltage protection	Single battery cell voltage is higher than the set limit.	Wait until the error is cleared or restart CB2 system.

Error Code	Error Message	Possible Cause	Actions
105	BMS hardware error	1. Single battery module voltage sensor error. 2. Temperature sensor error. 3. Current sensor error.	1. Check if the battery temperature and voltage sensor cable connections are loose. 2. Check if the current sensor cable connection is loose. 3. Replace BMS.
106	Charging overcooling protection	Battery charging at low temperature.	Wait until the battery temperature increases and the error is cleared.
107	Charging overtemperature protection	Battery temperature too high.	Wait until the battery temperature decreases and the error is cleared.
108	Discharging overcooling protection	Battery temperature too low.	Disconnect the relay to stop discharging. Wait until the battery temperature increases and the error is cleared.
109	Discharging overtemperature protection	Battery temperature too high.	Wait until the battery temperature decreases and the error is cleared.
110	BMS relay error	1. Cathode or anode relay is adhesive. 2. Cathode or anode relay is unable to close.	Replace the relay.
111	Pre-charge error	1. Pre-charge relay is damaged. 2. Pre-charge resistor is open circuit. 3. BMS is damaged.	1. Replace the pre-charge relay. 2. Replace the pre-charge resistor. 3. Replace the BMS.
112	BMS insulation error	Battery module has electricity leakage.	Contact technical support.
113	BMS model incompatibility	The BMS of battery module and battery control unit is incompatible.	Check if the models of battery module and battery control unit are compatible.
114	Battery supplier incompatibility	Supplier of battery module and battery cell are incompatible.	Check if the model of battery module is correct.
115	Battery model incompatibility	Battery cells are incompatible.	Check if the model of battery module is correct.

Error Code	Error Message	Possible Cause	Actions
116	Inconsistent battery module model	The model of the battery module is inconsistent.	Contact the technical support.
117	Circuit breaker open	1. Circuit breaker is open. 2. Circuit breaker auxiliary contact error.	Replace the circuit breaker.
118	Temperature difference too large	1. Temperature sensor error. 2. Battery life span.	1. Check if the temperature sensor cable connection is loose.
119	Voltage difference too large (Class II)	1. Sensor cable is loose. 2. Battery life span.	1. Check if the voltage sensor cable connection is loose. 2. Replace BMS.
120	Voltage difference too large (Class I)	1. Sensor cable is loose.	1. Check if the voltage sensor cable connection is loose. 2. Replace BMS.
121	BMS overtemperature protection	1. Ambient temperature is high. 2. Overload.	1. Check if the ambient temperature is high. 2. Check if overloaded.
122	Short circuit protection	P+ and P- short circuit.	Check if the cable is connected correctly.
123	Overall voltage mismatch	Connection is wrong.	Contact technical support to locate the fault.
124	System locked	System is faulty.	
125	FUSE error protection	Fuse is damaged.	
126	Abnormal Voltage Protection at Battery Port	The voltage at the battery port is too high. The positive and negative battery cables are wrongly connected.	
129	High CO concentration fault	The CO concentration inside the cabinet is higher than the threshold.	Check the CO concentration inside the cabinet.
130	Limit switch fault	The cabinet door is open.	Close and lock the cabinet door.
131	High temperature fault	The temperature and humidity sensor detects that the temperature is higher than the threshold.	Check the temperature inside the cabinet.

Error Code	Error Message	Possible Cause	Actions
132	High smoke concentration fault	The smoke concentration inside the cabinet is higher than the threshold.	Check the smoke inside the cabinet.
133	Water ingress fault	The water sensor detects that the water ingress inside the cabinet is higher than the threshold.	Check the water ingress inside the cabinet.
134	Aerosol trigger fault	The aerosol suppression system inside the cabinet is activated.	Check for any fire on or near the cabinet. If yes, handle the situation as an emergency as instructed in Section 2.5 on page 4.
135	Emergency stop fault	The emergency stop button is triggered.	Reset the emergency stop button.
136	Temperature and humidity sensor communication fault	• Power supply failure of the temperature and humidity sensor. • Communication cable connection fault of the temperature and humidity sensor.	Check that the cable connections are correct.
137	Air conditioner communication fault	• Power supply failure of the air conditioner. • Communication cable connection fault of the air conditioner.	Check that the cable connections are correct.
138	High temperature fault	Internal fault of the air conditioning system.	Contact technical support for further assistance.
139	Low temperature fault		
140	High humidity fault		
141	Low humidity fault		
142	Coil fault		
143	Defrost probe fault		
144	Fuse anomaly fault		
145	Condensing temperature probe fault		

Error Code	Error Message	Possible Cause	Actions
146	Cabinet temperature probe fault	Internal fault of the air conditioning system.	Contact the technical support.
147	Discharge air temperature probe fault		
148	Humidity probe fault		
149	Internal fan fault		
150	Compressor fault		
151	High pressure fault		
152	Low pressure fault		
153	High pressure alarm lockout fault		
154	Phase sequence fault		
155	CO sensor communication fault	• Power supply failure of the CO sensor. • Communication cable connection fault of the CO sensor.	Check that the cable connections are correct.
156	Temperature and humidity sensor high temperature	The temperature of the temperature and humidity sensor is higher than the threshold.	Check the status of the temperature and humidity sensor. Check the interior of the cabinet.

9.

APPENDIX

9.1. 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.

9.2. Warranty

Check the product warranty conditions and terms on the SAJ website: https://www.saj-electric.com/

9.3. 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

Fax: +86 20 6660 8589

E-mail: service@saj-electric.com

International Sales

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

Fax: 020-66608589

E-mail: info@saj-electric.com

China Sales

Tel: 020-66600058/66608588

Fax: 020-66608589

9.4. Trademark

SAJ is the trademark of Sanjing.