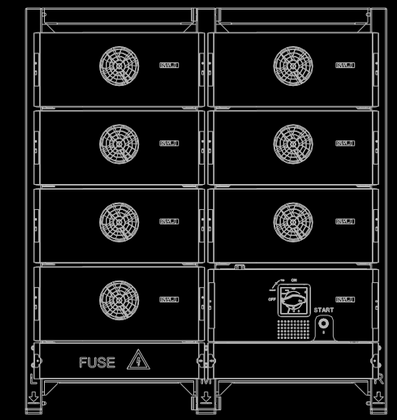
GUANGZHOU SANJING ELECTRIC CO., LTD

Tel: (86)20 66608588 **Fax:** (86)20 66608589 **Web:** www.saj-electric.com
Add: SAJ Innovation Park, No.9, Lizhishan Road, Science City, Guangzhou High-tech Zone, Guangdong, P. R. China

V0.0



CB2 Series

C & I ENERGY STORAGE BATTERY SYSTEM

USER MANUAL

CB2-X-HV5 (X=57.32 kWh, 71.65 kWh, 85.98 kWh, 100.31 kWh, 114.64 kWh, 128.97 kWh, 143.3 kWh, 157.63 kWh, 171.96 kWh, 186.29 kWh)

Preface

Thank you for choosing SAJ battery. 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, greener world.

Please check for the latest version at 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 battery system:

- CB2-X-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℃.
· 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, retrieve and process 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** Install the product out of the reach of children.
	**An error has occurred** See Chapter 9.1 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

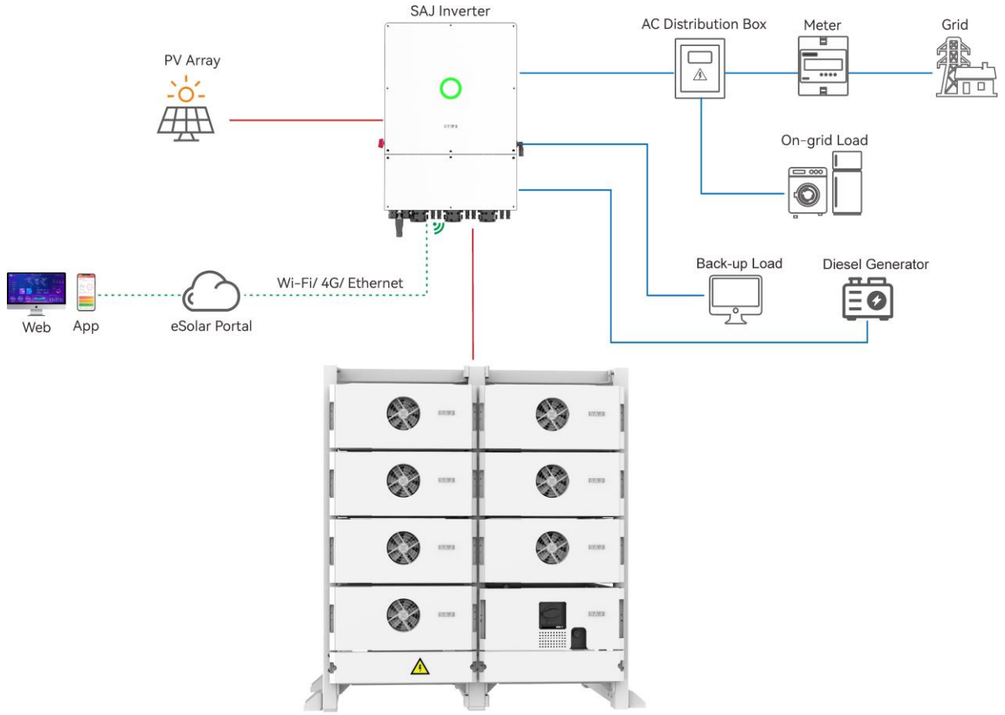
- If the battery is on fire, evacuate the crowd to an open area and report the fire immediately.
- Wear a gas mask to avoid inhaling toxic gases and harmful substances when evacuating.
- Do not use water to distinguish the burning battery. It can result in severe electrical shock.

3.

PRODUCT INFORMATION

3.1. Application Scope of Products

The CB2 battery system is integrated into commercial and industrial (C&I) photovoltaic storage solutions. It features an internally housed Battery Management System (BMS) designed to maintain battery efficiency and prevent operation beyond its specified limits. The CB2 is a high-voltage battery system, engineered for reliability and performance.



CB2 Battery System

3.2. Specification of Product Model

CB2 – X – HV5

① ② ③

① CB2 represents the product name.

② X represents the battery system energy in kWh. The value of X includes 57.32, 71.65, 85.98, 100.31, 114.64, 128.97, 143.3, 157.63, 171.96, and 186.29.

③ HV means high voltage. 5 represents the battery serial.

3.3. Product Dimensions

Dimensions of CBT2-100.3-HV5 battery rack: 1253*1106*857 (mm)

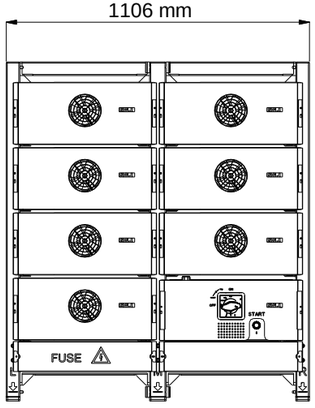


Figure 3.1. Front view

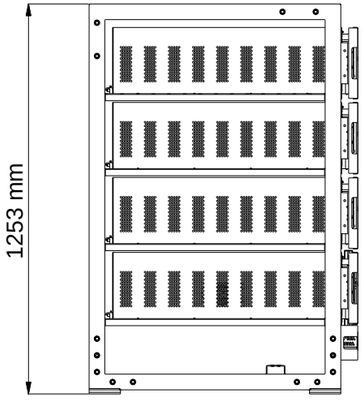


Figure 3.2. Left-side view

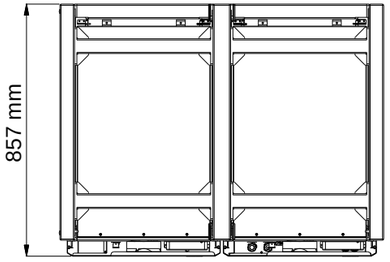


Figure 3.3. Top view

Dimensions of CBT2-186.2-HV5 battery rack: 1970*1106*857 (mm)

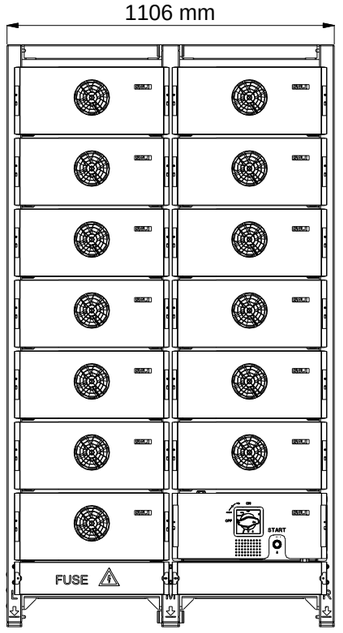


Figure 3.4. Front view

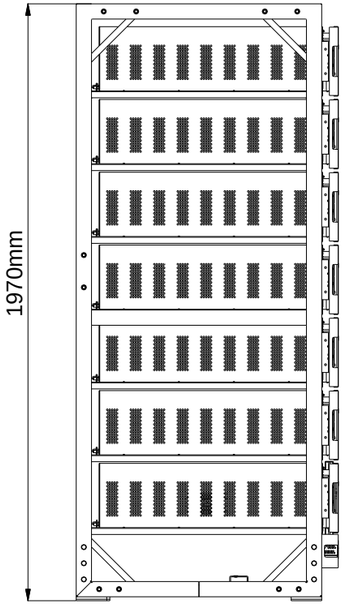


Figure 3.5. Left-side view

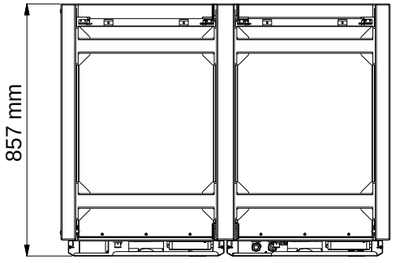


Figure 3.6. Top view

3.4. Terminals of Battery Module

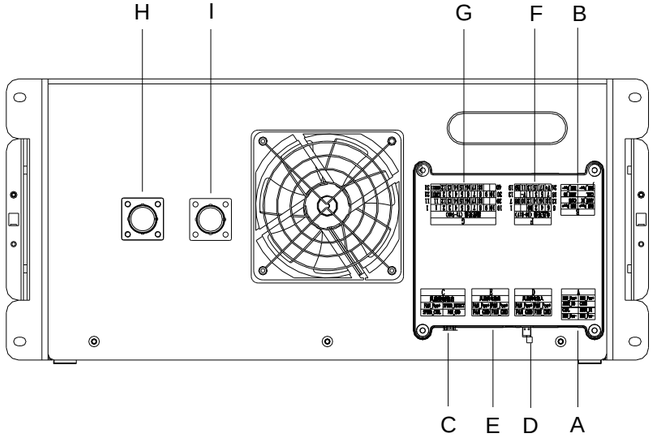


Figure 3.7. Terminals of the battery modules

Callout	Silkscreen	Function
A	A	● For CBU2 Unit 1: the communication port connecting with the CBC2 battery control module. ● For the other CBU2 battery modules: the communication port connecting with the previous battery module in the rack.
B	B	The communication port connecting with the next battery module in the rack.
C	C	The port for fan system control.
D	D	● For CBU2 Unit 1: the port for fan power supply output connecting with the X02 port on the battery control module. ● For the other CBU2 battery modules: the port for fan power supply connecting with the E port of the previous battery module.
E	E	The port for fan power supply output connecting with the D port of the next battery module in the rack.
F	F	The port for battery voltage sampling.
G	G	The port for battery temperature sampling.
H	/ (Orange)	● For CBU2 Unit 1: the positive DC port connecting with the BAT+ port on the battery control module. ● For the other battery modules: the positive DC port connecting with the negative DC (I) port of the previous battery module in the rack.
I	/ (Black)	● For the last CBU2: the negative DC port connecting with the BAT- port on the battery control module. ● For the other CBU2 battery modules: the negative DC port connecting with the positive DC (H) port of the next battery module in the rack.

Table 3.1. Terminals of the battery module

3.5. Terminals of Battery Control Module

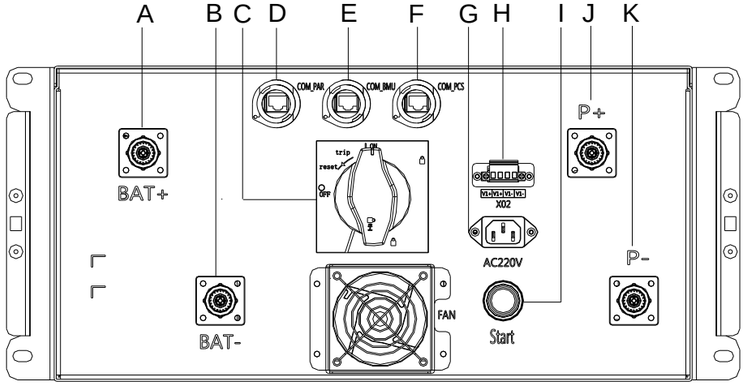


Figure 3.8. Terminals of the battery control module

Callout	Silkscreen	Function
A	BAT+	The positive port for DC input and output from/to the first battery module.
B	BAT-	The negative port for DC input and output from/to the last battery module.
C	/	The circuit switch that controls the ON/OFF of the whole battery system.
D	COM_PAR	The communication port connecting with the COM_PAR port of the next CB2 battery system.
E	COM_BMU	The communication port connecting with the A port of the first battery module.
F	COM_PCS	The communication port connecting with the BMS port of the inverter.
G	AC220V	The 220 V AC power supply from the inverter for the fans.
H	X02	The 24 V DC power supply to the fans.
I	Start	The Start button of the battery system.
J	P+	The positive port for DC input and output from/to the inverter.
K	P-	The negative port for DC input and output from/to the inverter.

Table 3.2. Terminals of the battery control module

3.6. Datasheet

3.6.1. CB2 Battery System

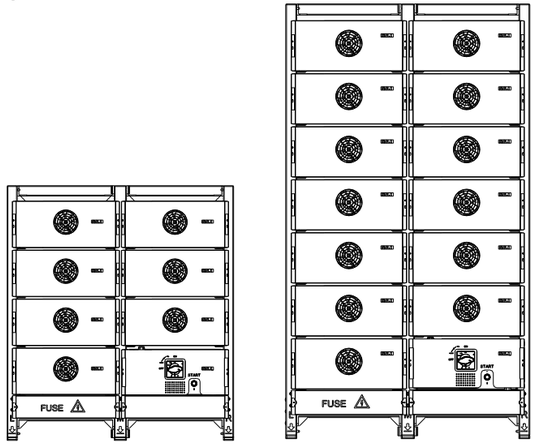


Figure 3.9. CB2 battery system

Model	CB2-X-HV5 *
Battery System Energy [kWh]	57.3–186.2
Rated Capacity [Ah]	280
Charge/Discharge Current [A]	150
Short Circuit Current [A]	250
Quantity of Modules	4–13
Communication	CAN
Operating Temperature Range [℃]	Charging: 0℃ to +50℃; Discharging: -20℃ to +50℃
Cooling Method	Smart Fan Cooling
Relative Humidity	5–90% (No condensing)
Altitude [m]	2000
Ingress Protection	IP20
Mounting	Ground-mounted
Protective Class	Class I
Weight [kg]	With 7 battery modules: 980; With 13 battery modules: 1670

***** The value of **X** includes 57.32, 71.65, 85.98, 100.31, 114.64, 128.97, 143.3, 157.63, 171.96, and 186.29 in kWh.

3.6.2. CBC2 Battery Control Module

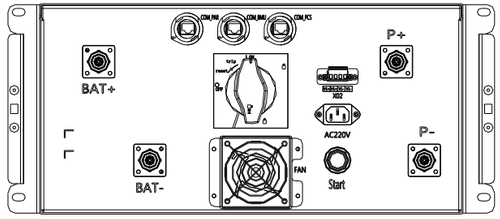


Figure 3.10. CBC2 battery control module

Model	CBC2-HV5
Voltage Range [V]	160–1000
Weight [kg]	28
Dimension [H*W*D] [mm]	225*523*534

3.6.3. CBU2 Battery Module

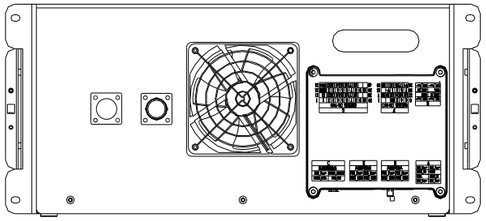


Figure 3.11. CBU2 battery module

Model	CBU2-14.33-HV5
Rated Energy [kWh]	14.33
Rated Voltage [V]	51.2
Voltage Range [V]	44.8–57.6
Weight [kg]	115
Dimension [H*W*D] [mm]	231*523*804
Applicable Standard	IEC62619-2017, UN38.3, IEC61000-6-2/4, IEC62477

3.6.4. CBT2 Battery Rack

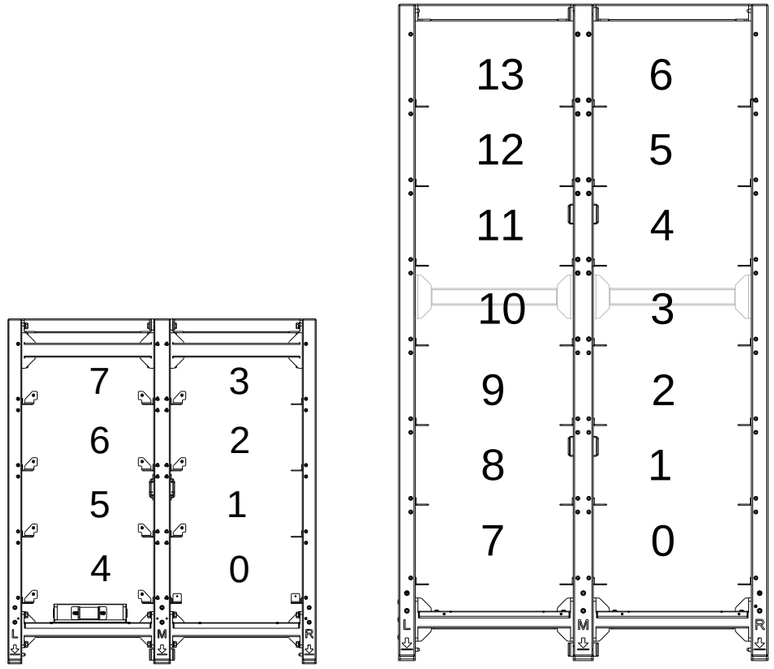
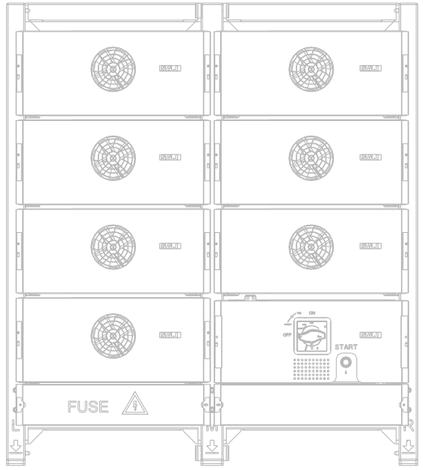


Figure 3.12. CBT2 battery rack

Model	CBT2-100.3-HV5	CBT2-186.2-HV5
Weight [kg]	93	138
Dimension [H*W*D] [mm]	1253*1106*857	1970*1106*857



4.

INSTALLATION

4.1. Unpacking and Inspection

4.1.1. Check the Package

Despite thorough testing and inspection prior to delivery, 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. Unpack the Components

Contact after sales if there are missing or damaged components.

Before you start

- Place the unpacked racks and components on a wooden frame or some protective cover on the floor to avoid damaging the racks and components. See Figure 4.1 as an example.
- Categorize all the components for installation convenience.

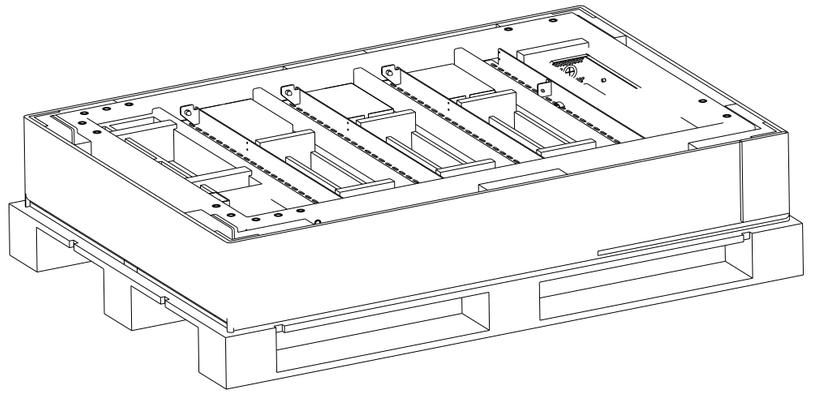
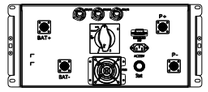


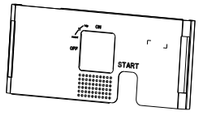
Figure 4.1. Unpacking on a protective frame

4.1.3. Scope of Delivery

Package of CBC2 Battery Control Unit

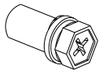


Battery control unit



Front cover

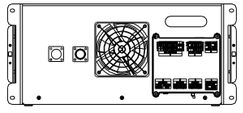
M3*8 screw x2



M6*16 screw x4

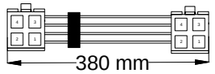
Documents

Package of CBU2 Battery Module



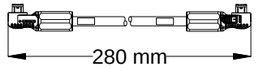
Battery module

Front cover

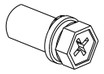


Fan power cord

Communication cable



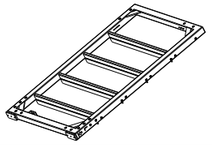
Power cable



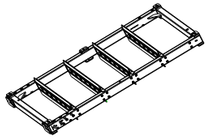
M6*16 screw x4

M3*8 screw x2

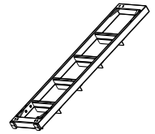
Package of CBT2-100.3-HV5 Battery Rack



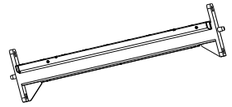
Left-side (L) frame



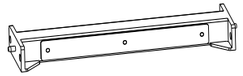
Middle (M) frame



Right-side (R) frame

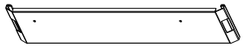


Front bottom beam x2



Back bottom beam x2

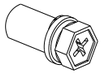
Other beams x4



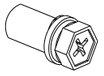
Bottom cover x2

Fuse box

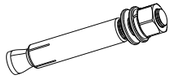
M4*10 screw x6



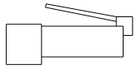
M12*25 screw x40



M6*12 screw x2

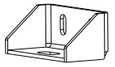


M12*80 expansion tube x4

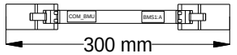


RJ45 termination resistor x2

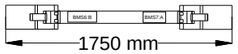
OT/DT terminal (RNBS38-8) x2



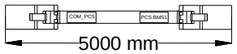
Mounting bracket x4



Communication cable

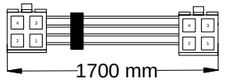


Communication cable

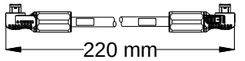


Communication cable

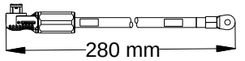
Fan power cord



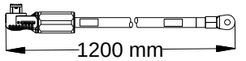
Fan power cord



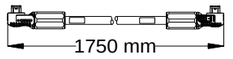
Power cable



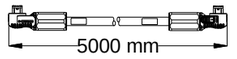
Power cable



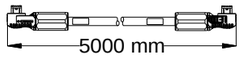
Power cable



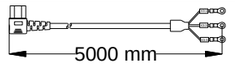
Power cable



Power cable (orange)

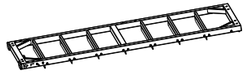
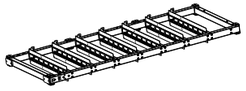
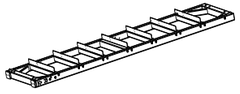
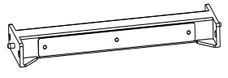
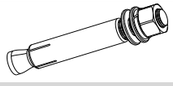
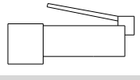
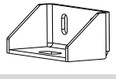
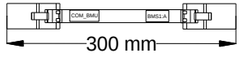
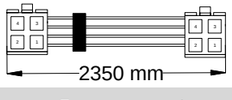
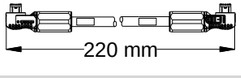
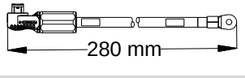
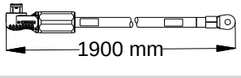
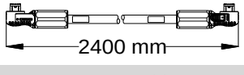
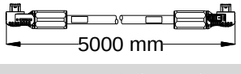
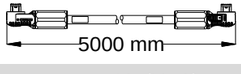
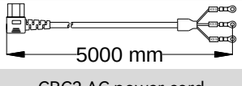


Power cable (black)



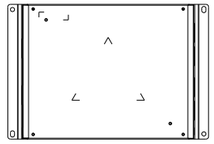
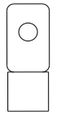
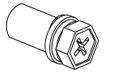
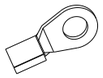
CBC2 AC power cord

Package of CBT2-186.2-HV5 Battery Rack

			
Left-side (L) frame	Middle (M) frame	Right-side (R) frame	Front bottom beam x2
			
Back bottom beam x2	Other beams x6	Bottom cover x2	Fuse box
			
M4*10 screw x6	M12*25 screw x48	M6*12 screw x2	M12*80 expansion tube x4
			
RJ45 termination resistor x2	OT/DT terminal (RNBS38-8) x2	Mounting bracket x4	
			
Communication cable	Communication cable	Communication cable	Fan power cord
			
Fan power cord	Power cable	Power cable	Power cable
			
Power cable	Power cable (orange)	Power cable (black)	CBC2 AC power cord

Package of Distribution Box

The distribution box can be ordered and installed for multi-rack deployment of the CB2 battery systems.

				
Distribution box	OT/DT terminal (SQNBS60-6) x6	M6*14 screw x6	M4*10 screw x4	OT/DT terminal (RNBS38-8)

4.2. Installation Method and Position

4.2.1. Installation Space Requirement

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 clearance around the whole battery rack to ensure a good air circulation at the installation area:

- Front side: 1200 mm
- Left/right/back/top side: 300 mm

The required installation clearance is the same for CBT2-100.3 and CBT2-186.2 battery racks.

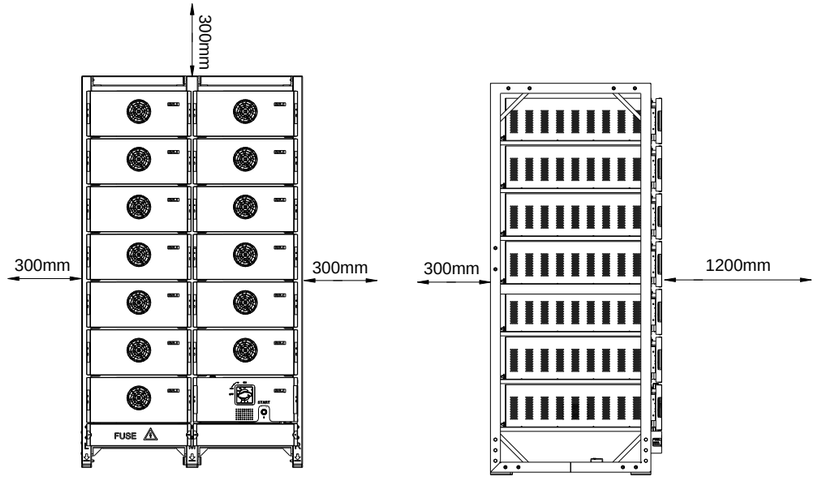
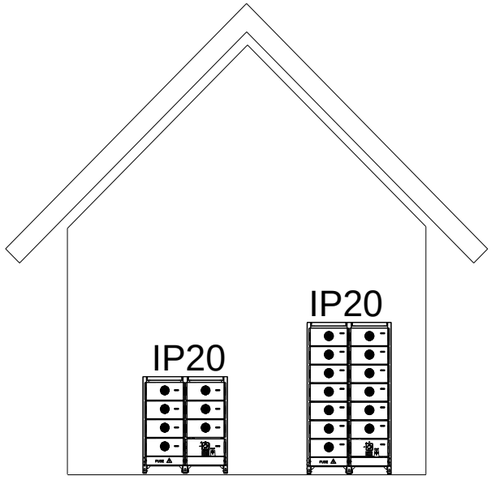


Figure 4.2. Installation clearance

4.2.2. Installation Distance from the Inverter

The delivered power and communication cables between the CB2 battery system and the inverter are of 5000 mm. The installation distance between the CB2 battery rack and the inverter should be within the reach of the provided cables.

4.2.3. Installation Position



- The equipment can only be installed indoors.
- Mount vertically. Never install the battery tilted forwards, sideways, horizontally or upside down.
- The ground should be flat and no inclination.
- For CBT2-100.3 fully equipped with 7 CBU2 battery modules, the load-bearing capacity of the ground must reach 1.5 tons.
- For CBT2-186.2 fully equipped with 13 CBU2 battery modules, the load-bearing capacity of the ground must reach 2 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, keep it away from the driveway.
- Keep the battery from water sources such as taps, sewer pipes and sprinklers to prevent water seepage.

4.3. Mounting Preparation

4.4.1. Installation Tools

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

Figure 4.3. Installation tools

4.4.2. Transportation Equipment

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

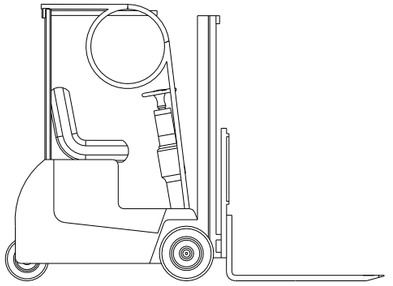
Forklift

Use the following forklift to move or lift the battery rack and the battery system components:

- 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.

Follow specific guidelines below to move or lift the battery rack and the battery system components:

- Always operate facing the front side.
- The fork blades must extend longer than the depth of the components to avoid falling.



Vertical roller conveyor

Use the recommended roller conveyor to move or lift the battery rack and the components. For example:

Figure 4.4. Vertical roller conveyor

4.4.3. Installation Personnel

> **CAUTION**
>
> - The forklift operators must have valid operation license or certification and follow the operation safety rules.
> - At least four operators or installation engineers are needed to move and install the battery control unit and the battery modules during the whole installation procedure.

4.4. Mounting Procedures

4.4.1. Assemble CB2 Battery System

The following procedure shows the assembly of CBT2-100.3 battery rack and the installation of the CBC2 battery control unit and the CBU2 battery modules. The assembly of the CBT2-186.2 battery rack is similar to CBT2-100.3.

Procedure

Step 1. Place the left (**L**) side frame of the rack on the floor with the inside facing upwards.

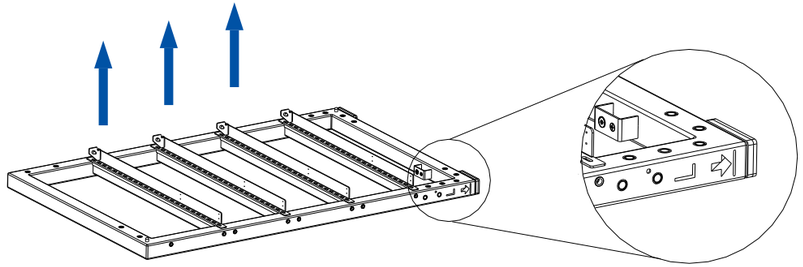


Figure 4.5. Placing L side frame

Step 2. Insert the front bottom beam onto the frame, and secure the beam a little with two screws without tightening completely. (M12*25)

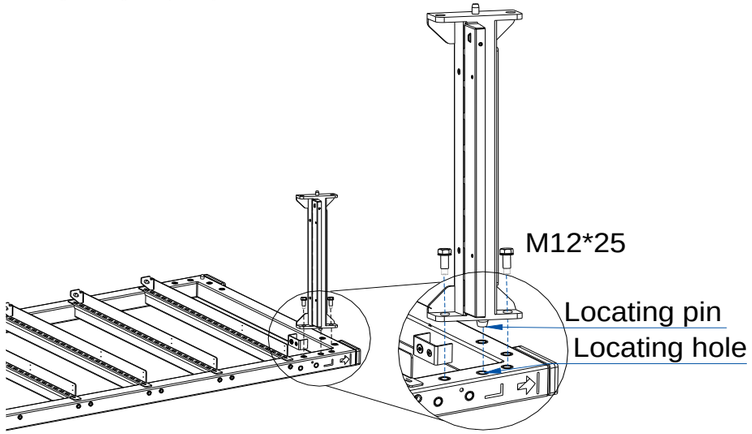


Figure 4.6. Inserting right bottom beam

Step 3. Insert the left bottom beam onto the frame, and secure the beam a little with two screws without tightening completely.

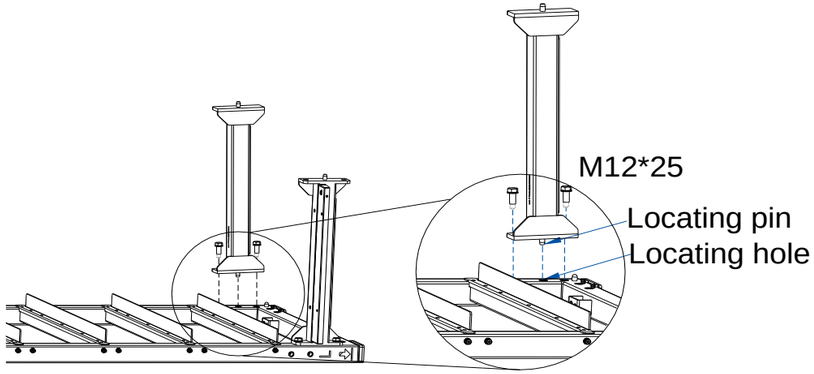


Figure 4.7. Inserting left bottom beam

Step 4. Place the top two beams onto the frame, and secure the beam a little bit. (M12*25)

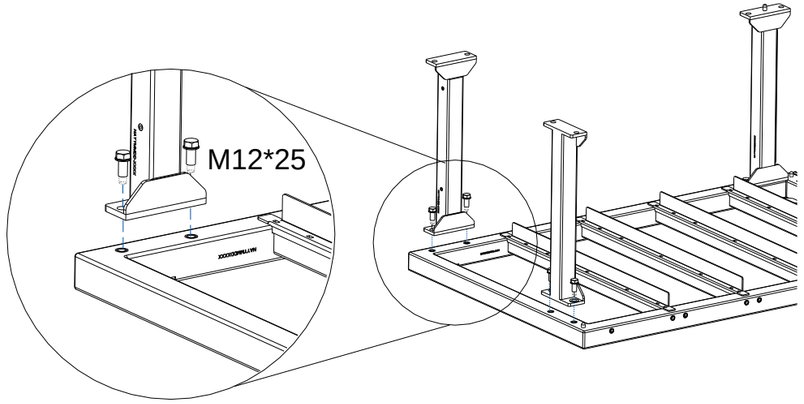


Figure 4.8. Inserting top beams

Step 5. Place the middle (**M**) side frame of the rack onto the four beams. Align with the help of the bottom locating pins and the securing holes of the top beams.

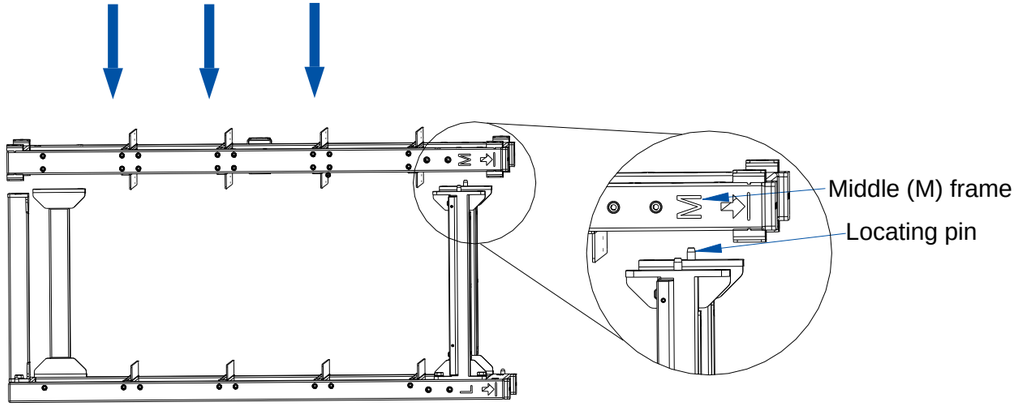


Figure 4.9. Placing M side frame

Step 6. Tighten all the 16 screws of the four beams completely. (M12*25; 47 N·m)

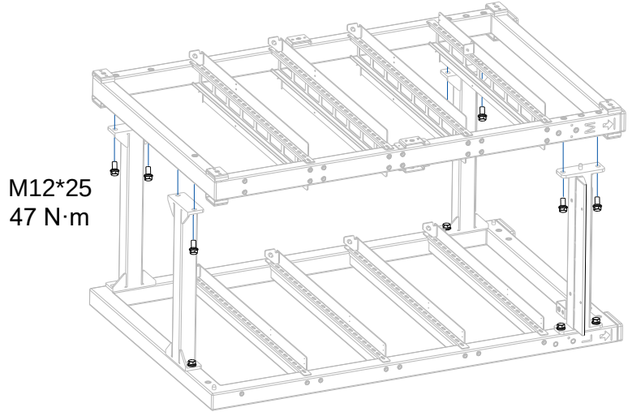


Figure 4.10. Tightening all screws

Step 7. Insert the two right bottom beams onto the frame as step 2 and 3, and secure each beam a little with two screws without tightening completely. (M12*25)

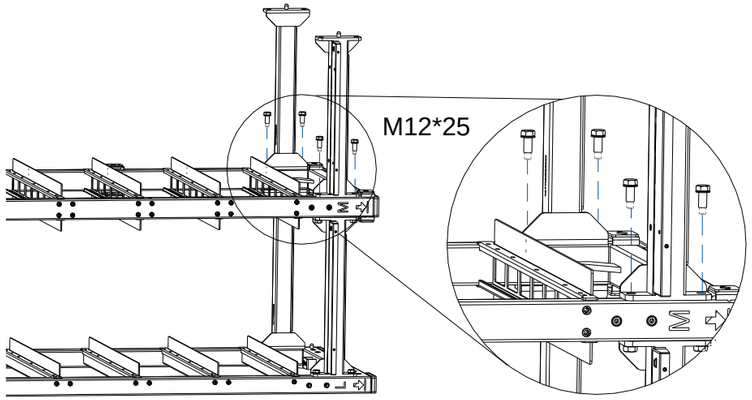


Figure 4.11. Inserting bottom beams

Step 8. Place the top two beams onto the frame as step 4, and secure the beam a little bit. (M12*25)

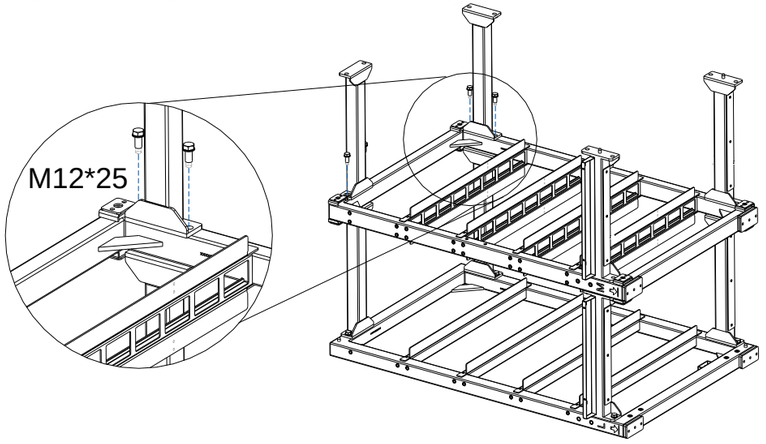


Figure 4.12. Inserting top beams

Step 9. Place the right (**R**) side frame of the rack onto the four beams as step 5. Align with the help of the bottom locating pins and the securing holes of the top beams.

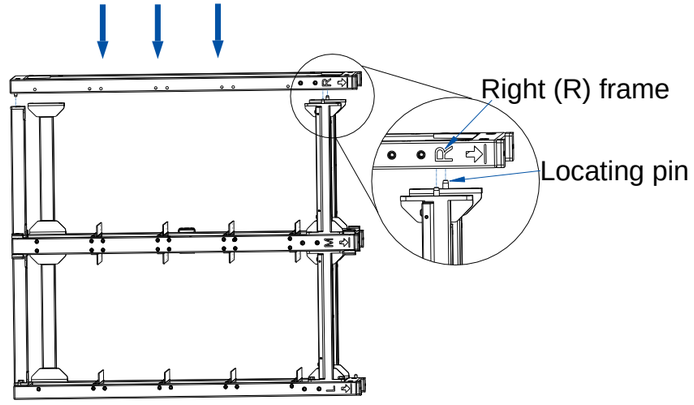


Figure 4.13. Placing R side frame

Step 10. Tighten all the 16 screws of the four beams completely. (M12*25; 47 N·m)

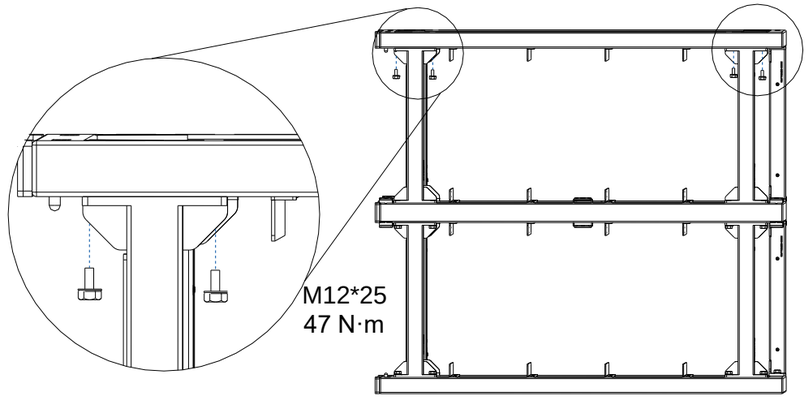


Figure 4.14. Tightening screws

Step 11. Turn the whole battery rack to stand it upright. At least two installation engineers are required.

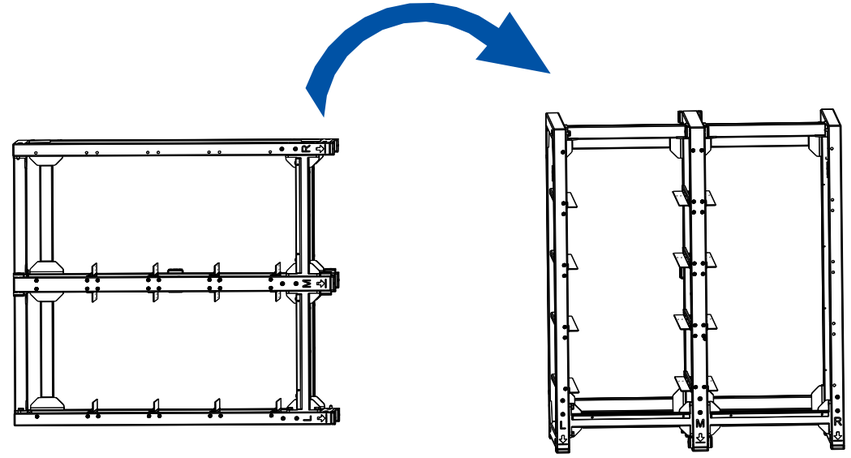


Figure 4.15. Turning the rack upright

Step 12. Lift the battery rack from the front side of the rack, and move the rack to the target position with a forklift or roller conveyor.

Note: Make sure that the battery rack is located within the reach to the inverter through cable connections. The provided power and communication cables are of 5000 mm.

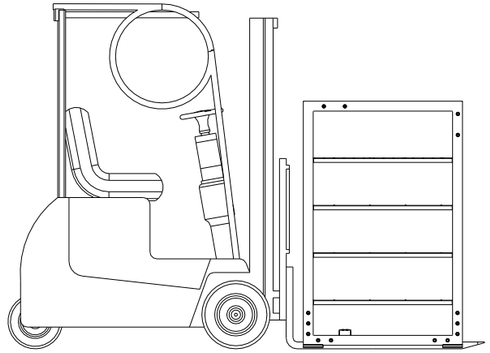


Figure 4.16. Placing the battery rack

Step 13. Install the fuse box on the left bottom beam. (M4*10; 1.6 N·m)

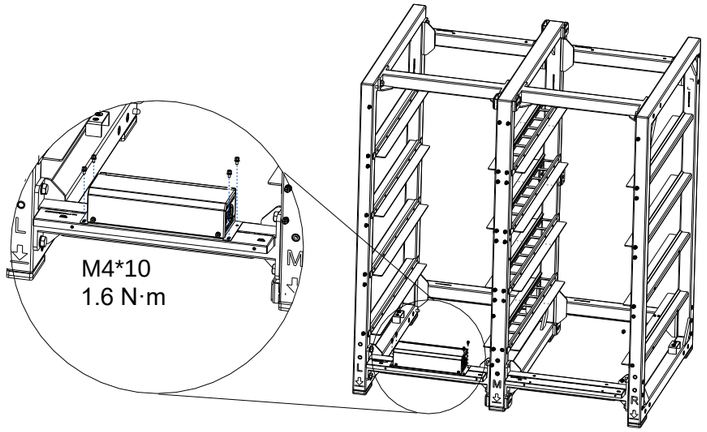


Figure 4.17. Installing the fuse box

Step 14. Push the battery modules into sections 1-7 of the rack, and push the battery control unit into section 0 of the rack.

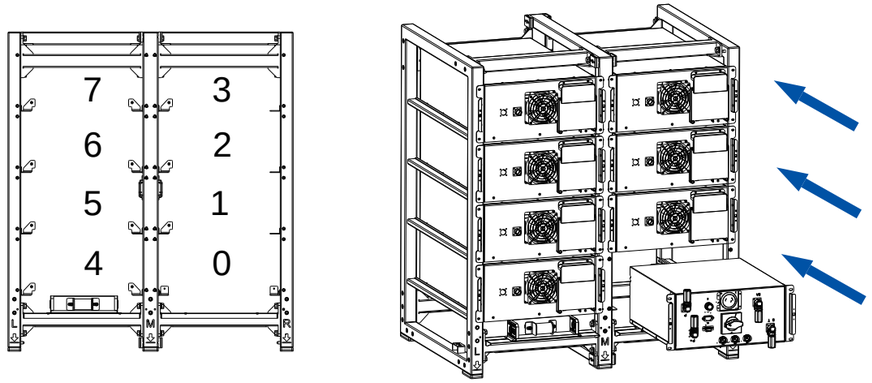


Figure 4.18. Placing battery modules and control unit

> **NOTICE**
>
> At least four operators are needed to lift and move the modules into the rack to avoid potential dropping or personal injury.

Step 15. Lock each battery module and the battery control unit with four bolts. (M6*16; 5 N·m)

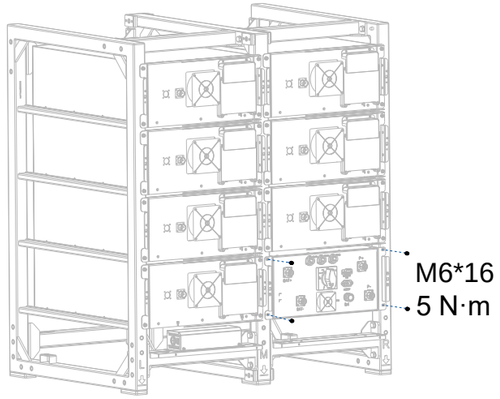


Figure 4.19. Securing battery modules and control unit

Step 16. Place the four mounting brackets onto the right and left side of the rack and mark the drilling holes.

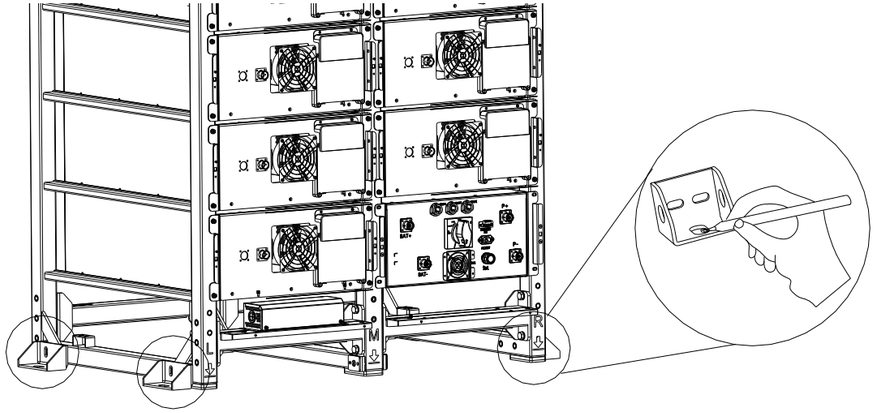


Figure 4.20. Marking drilling holes

Step 17. Drill four holes on the ground according to the marked drilling holes at the depth of 80-90 mm.

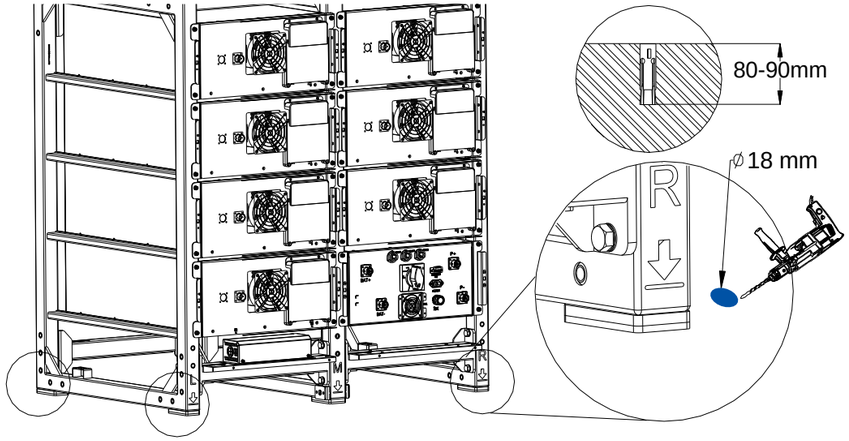


Figure 4.21. Drilling holes

Step 18. Install the mounting brackets to both sides of the rack with the screws. (M12*25; 47 N·m) (M12*80; 47 N·m)

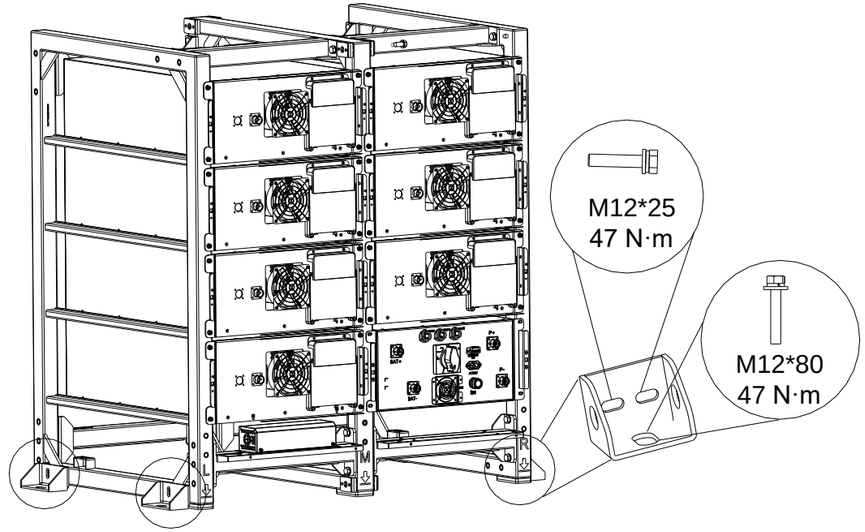


Figure 4.22. Installing mounting brackets

5.

ELECTRICAL CONNECTION

5.1. Connect the Grounding Cable

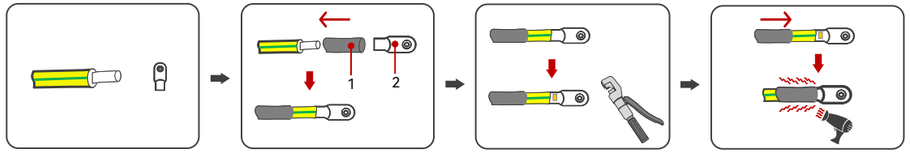
Electrical connection must only be operated by professional technicians. Before connection, the technician must wear necessary protective equipment, including insulating gloves, insulating shoes and safety helmet.

⚠ WARNING
· Connect this grounding cable before other electrical connection.

The user needs to prepare the grounding cable according to the following specification:

Cross-sectional area of cables (mm^2)
≥ 6

Step 1. Prepare the cable end with the OT/DT terminal.



1. Heat shrink tubing 2. OT/DT terminal

Figure 5.1. Preparing the grounding cable

Step 2. Secure the OT/DT terminal to connect the grounding cable. Connect the other cable end to the standard grounding bar. (M6*12; 5 N·m)

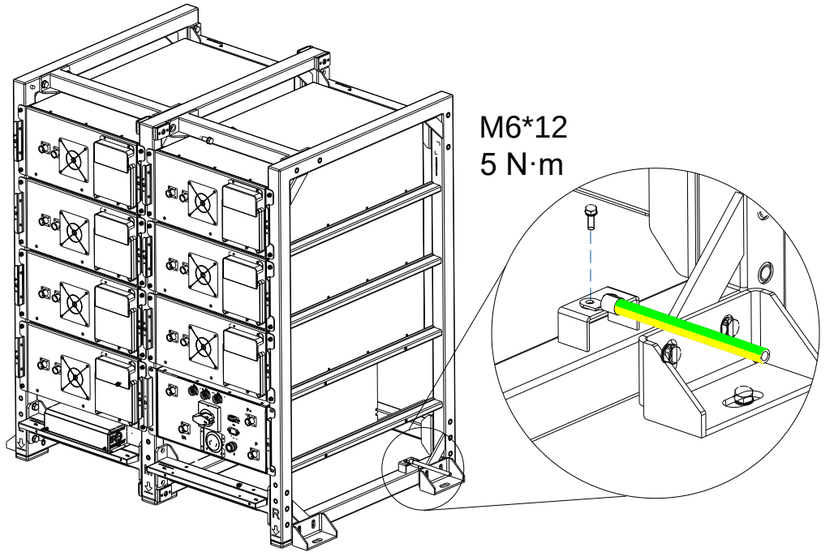


Figure 5.2. Connecting the grounding cable

5.2. Connect Battery Power Cables

⚠WARNING

- 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.
- Power off the battery system before connecting the power cable to avoid high voltage danger.
- On one battery module, do NOT connect its positive port to its negative port.

Step 1. Make sure the main switch is at the OFF position.

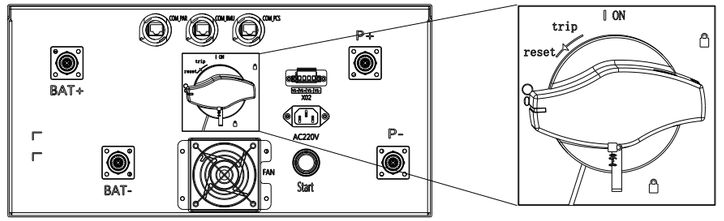


Figure 5.3. Main switch at OFF

Step 2. Remove the covers of all the fan control units and the fuse box.

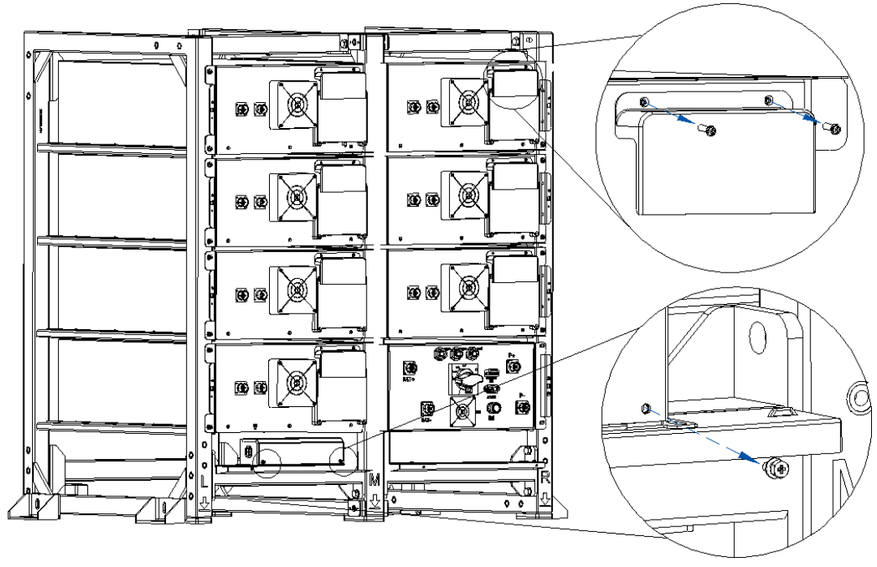


Figure 5.4. Removing fuse box cover

Step 3. Connect the battery power cable according to the following figure and cable descriptions. The figure shows the full configuration of 7 battery units as an example.

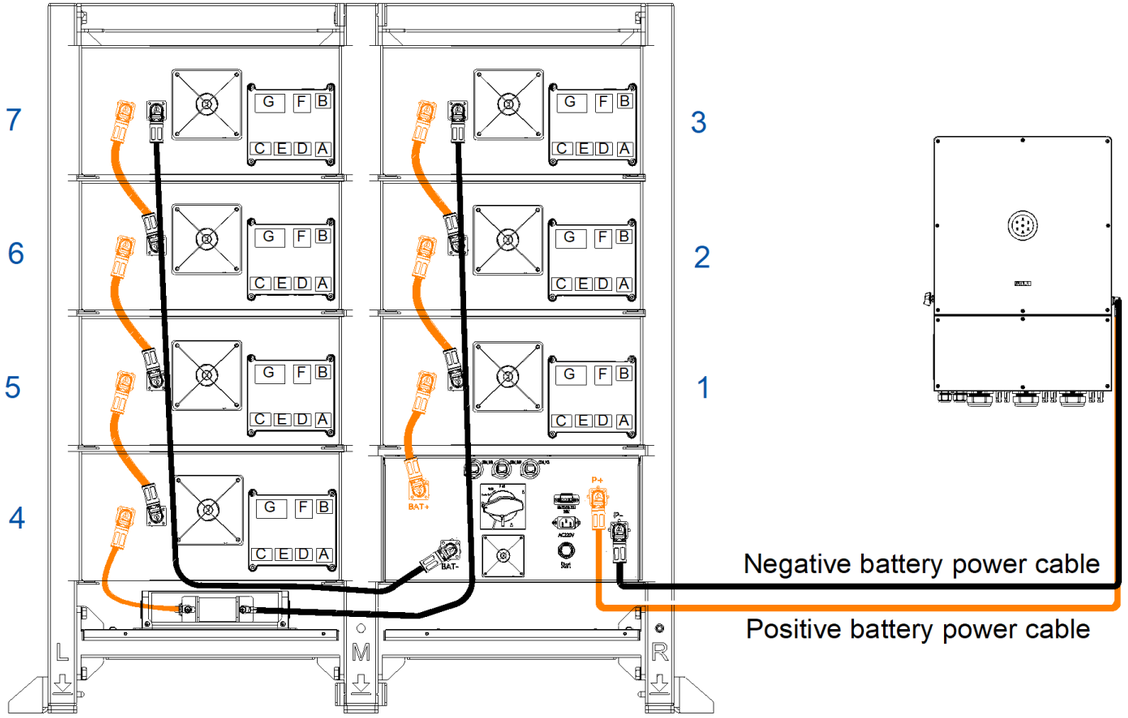


Figure 5.5. Connecting battery power cables

Package	Cable Length (mm)	From port	To port
CBU2	280	CBU2 Unit *N* negative (black)	CBU2 Unit *N+1* positive (orange)
CBT2-100.3	220	CBC2 BAT+	CBU2 Unit 1 positive (orange)
	1750	CBC2 BAT-	CBU2 Unit 7 negative (black)
	1200	CBU2 Unit 3 negative (black)	Fuse negative (right)
	280	CBU2 Unit 4 positive (orange)	Fuse positive (left)
	5000	CBC2 P+	CH2 inverter battery positive
	5000	CBC2 P-	CH2 inverter battery negative
CBT2-186.2	220	CBC2 BAT+	CBU2 Unit 1 positive (orange)
	2400	CBC2 BAT-	CBU2 Unit 13 negative (black)
	1900	CBU2 Unit 6 negative (black)	Fuse negative (right)
	280	CBU2 Unit 7 positive (orange)	Fuse positive (left)
	5000	CBC2 P+	CH2 inverter battery positive
	5000	CBC2 P-	CH2 inverter battery negative

Table 5.1. Battery power cable connections

Note:

- CBU2 Unit *N* refers to any battery module in the system; Unit *N+1* refers to the next battery module.
- For CBT2-100.3 deployed with less than 7 CBU2 battery modules, CBU2 Unit 7 represents the last battery module on the top left shelf.
- For CBT2-186.2 deployed with less than 13 CBU2 battery modules, CBU2 Unit 13 represents the last battery module on the top left shelf.

5.3. Connect the Battery Communication Cables

Step 1. Connect the battery communication cables according to the following figure and cable descriptions.

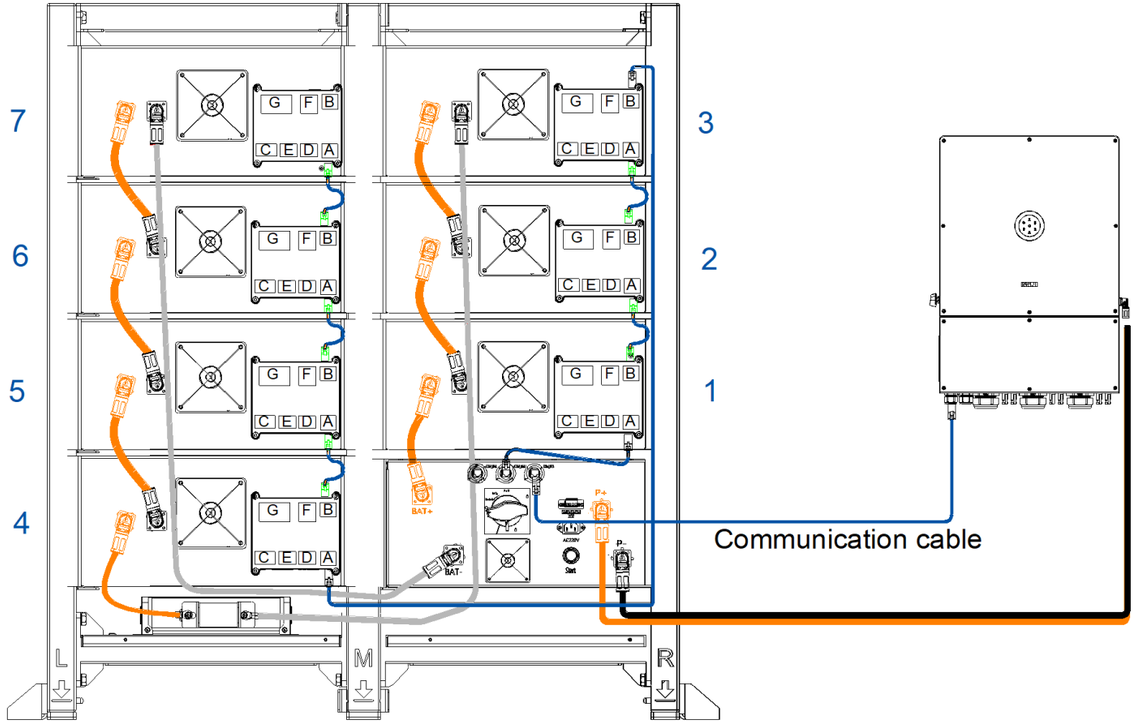


Figure 5.6. Connecting battery communication cables

Package	Cable Length (mm)	From port (Silkscreen)	To port (Silkscreen)
CBU2	200	A of CBU2 Unit *N* (BMS:A)	B of CBU2 Unit *N+1* (BMS:B)
CBT2-100.3	300	CBC2 COM (COM_BMU)	CBU2 Unit 1 A (BMS1:A)
	1750	CBU2 Unit 3 B (BMS3:B)	CBU2 Unit 4 A (BMS4:A)
	5000	CBC2 COM_PCS (COM_PCS)	CH2 inverter BMS1, BMS2, or BMS3 (PCS:BMS1)
CBT2-186.2	300	CBC2 COM (COM_BMU)	CBU2 Unit 1 A (BMS1:A)
	2400	CBU2 Unit 6 B (BMS6:B)	CBU2 Unit 7 A (BMS7:A)
	5000	CBC2 COM_PCS (COM_PCS)	CH2 inverter BMS1, BMS2, or BMS3 (PCS:BMS1)

Table 5.2. Battery communication cable connections

Step 2. Insert the RJ45 termination resistors into the following ports:

- CBC2 COM_PAR port
- B port of the last CBU2 Unit

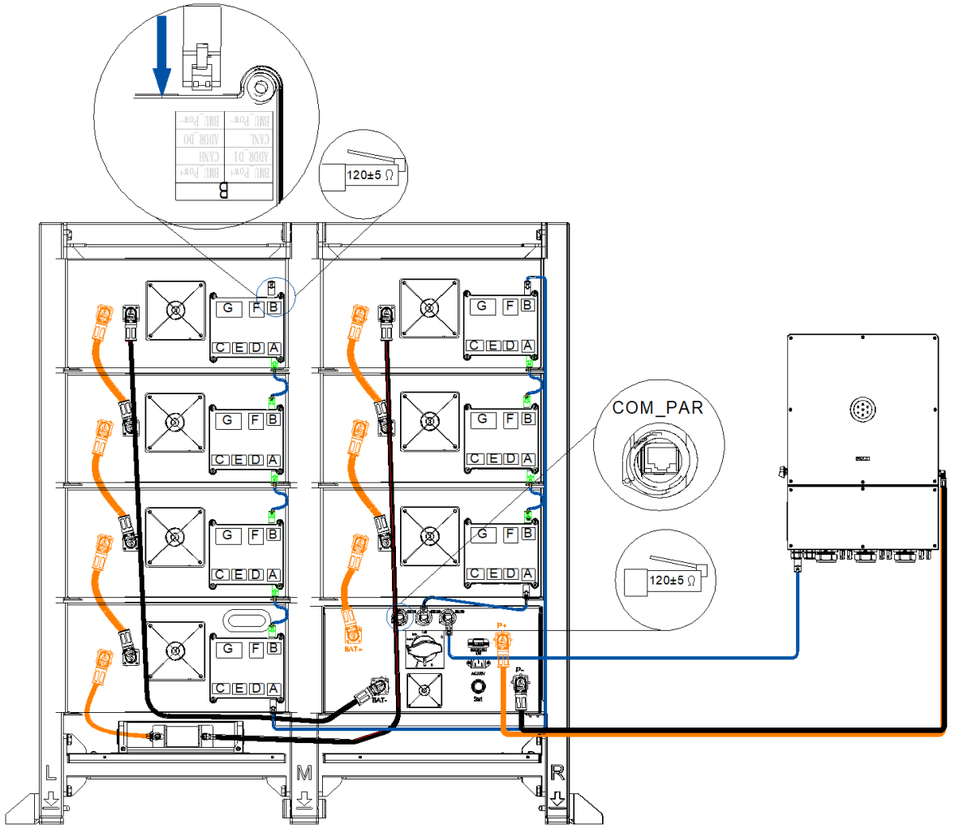


Figure 5.7. Inserting RJ45 terminal resistors

5.4. Connect the Battery Fan Power Cables

Step 1. Connect the battery fan power cables according to the following figure and cable descriptions.

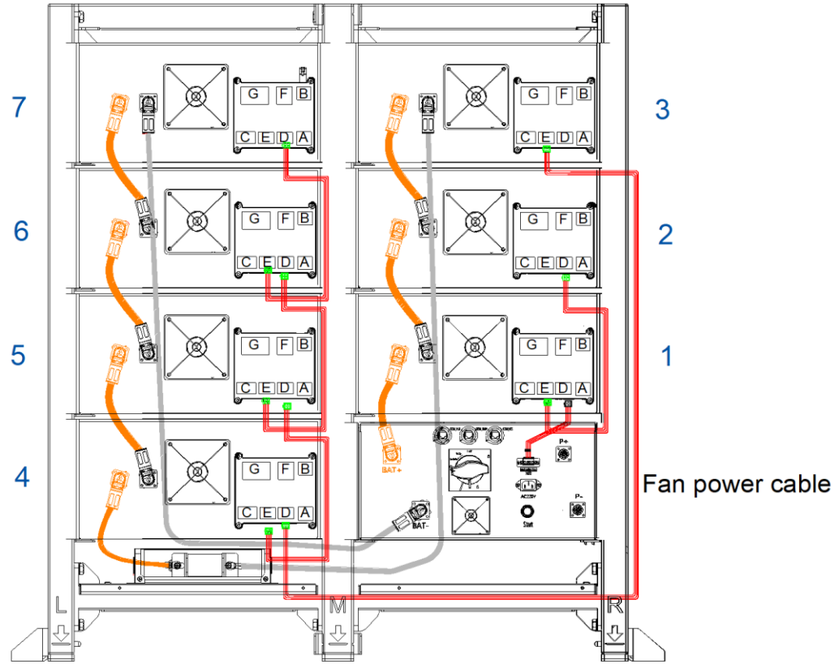


Figure 5.8. Connecting battery fan power cables

Package	Cable Length (mm)	From port	To port
CBU2	380	E of CBU2 Unit *N*	D of CBU2 Unit *N+1*
CBT2-100.3	1700	CBU2 Unit 3 E	CBU2 Unit 4 D
	150	CBC2 X02	CBU2 Unit 1 D
CBT2-186.2	2350	CBU2 Unit 6 E	CBU2 Unit 7 D
	150	CBC2 X02	CBU2 Unit 1 D

Table 5.3. Fan power cable connections

Step 2. Plug in one end of the AC power cord to the CBC2 battery control unit.

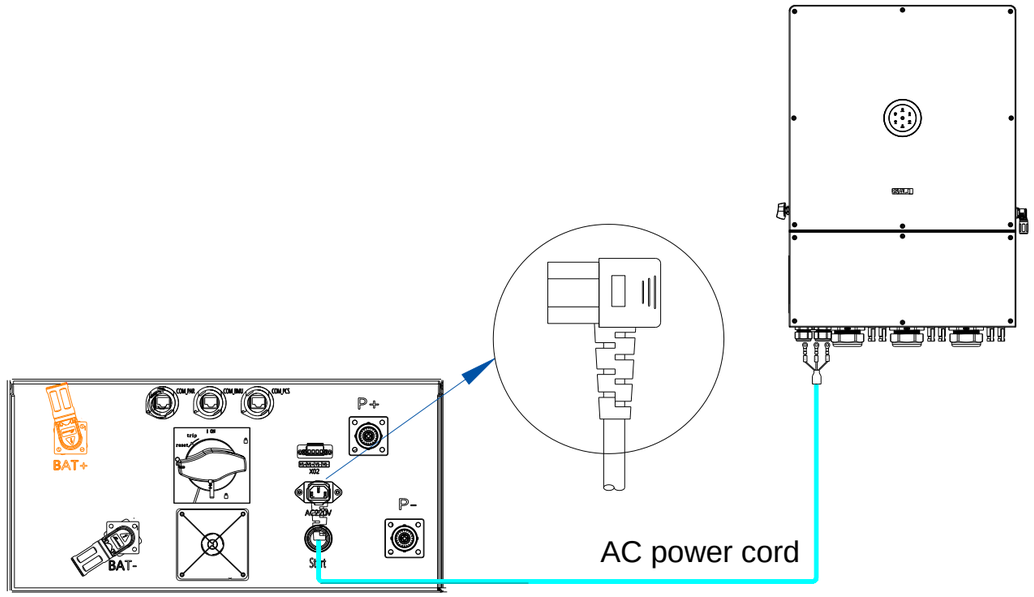


Figure 5.9. Connecting AC power cord

Package	Cable Length (mm)	From port	To port
CBT2-100.3	5000	CBC2 AC220V	CH2 inverter AC-OUT
CBT2-186.2	5000		

Table 5.4. AC power cord connection

Step 3. Insert the other end of the AC power cable cord through the AC-OUT port of the inverter; secure the X3:1, X3:3, and X3:5 connectors to the PE, N, and L ports of the inverter correspondingly. (M3.5; 1 N·m)

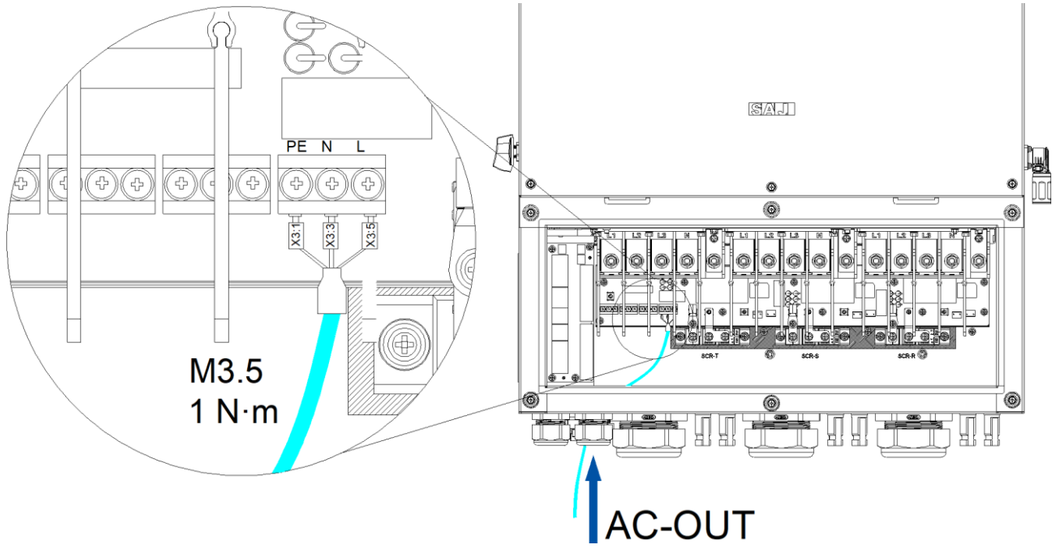


Figure 5.10. Securing AC power cord

5.5. Install the Covers

Step 1. Install back the covers of all the fan control units by using the PH1 screwdriver.

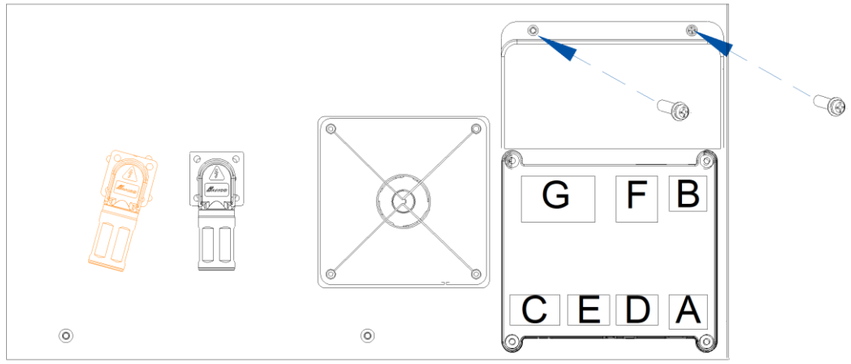


Figure 5.11. Installing fan control unit covers

Step 2. Install back the cover of the fuse box. (M4*10; 1.6 N·m)

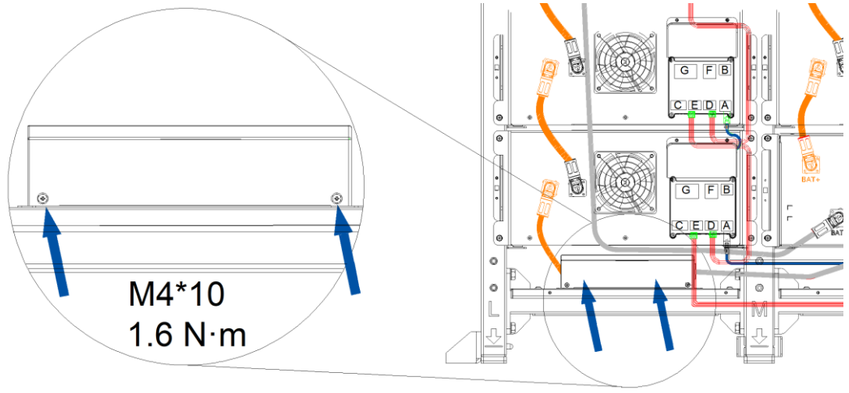


Figure 5.12. Installing fuse box cover

Step 3. Install the front covers of all the CBU2 battery modules and the CBC2 battery control unit; install the two bottom covers. (CBC2 and CBU2: M3*8; 0.6 N·m) (Bottom covers: M4*10; 1.6 N·m)

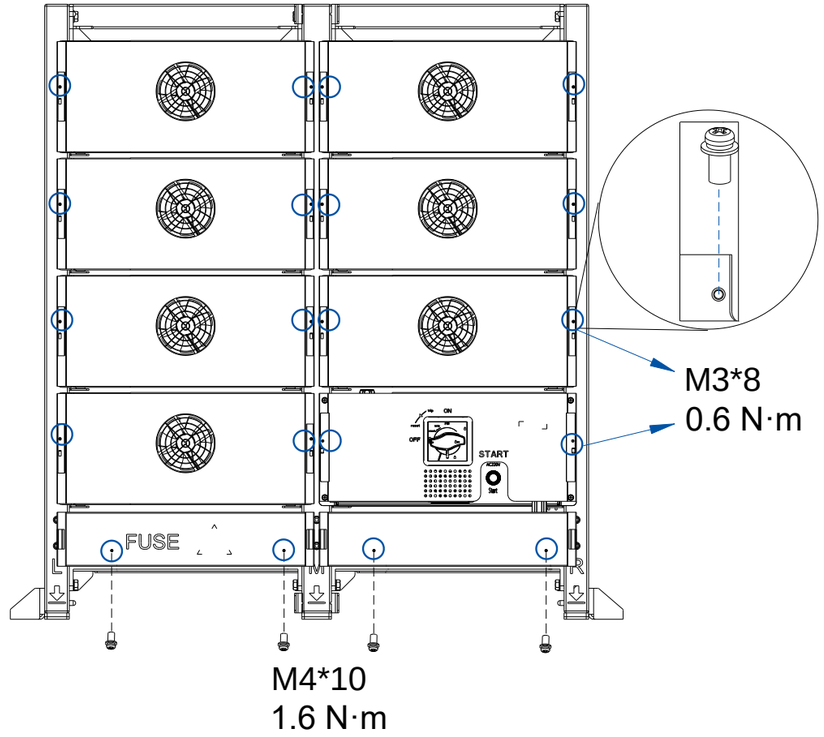


Figure 5.13. Installing the front covers

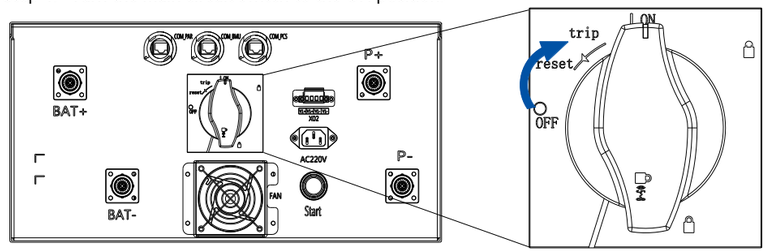
6.

STARTUP AND SHUTDOWN

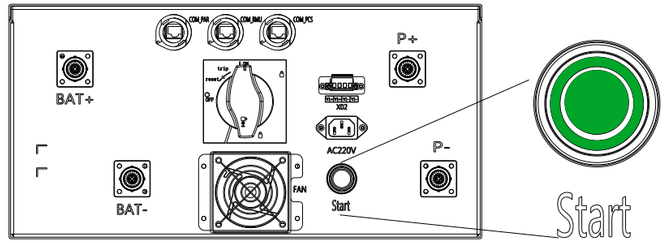
6.1. Start Up and Shut Down the Battery System

6.1.1. Start Up

Step 1. Turn the main circuit switch to the ON position.



Step 2. Press the Start button for a few seconds until the button lights up in green.



Step 3. Lock the main circuit switch to the ON position with an external lock to avoid unexpected operation of the switch. Store the key at a proper location.

6.1.2. Shut Down

To shut down the battery system, rotate the main circuit switch to the OFF position.

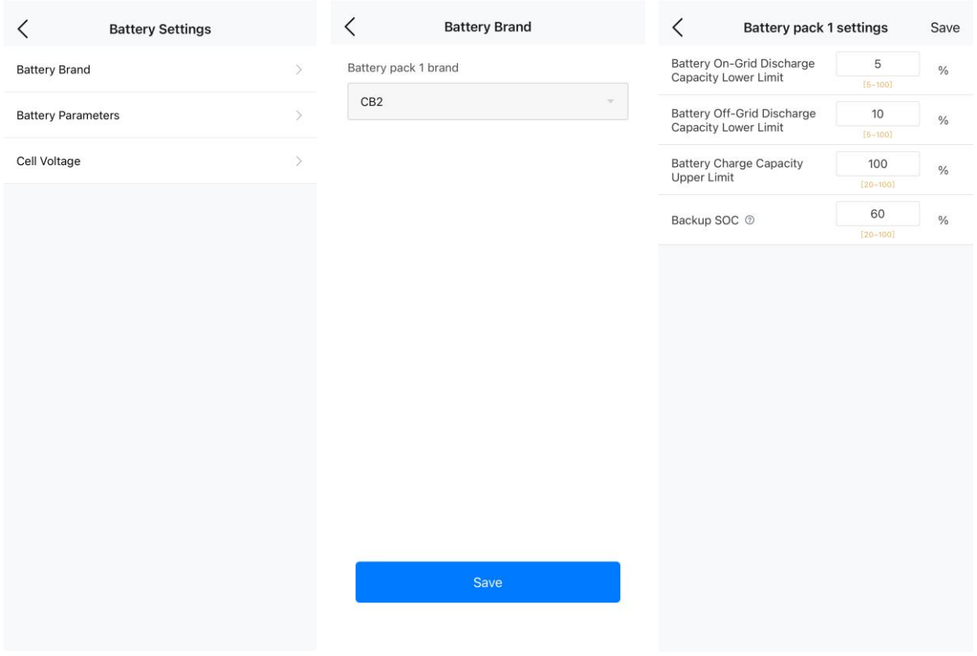
If the battery system trips during operation, the main circuit switch turns to the trip position automatically. To restart the system after the issues are fixed, rotate the main switch to the OFF and then the ON position.

6.2. Commissioning

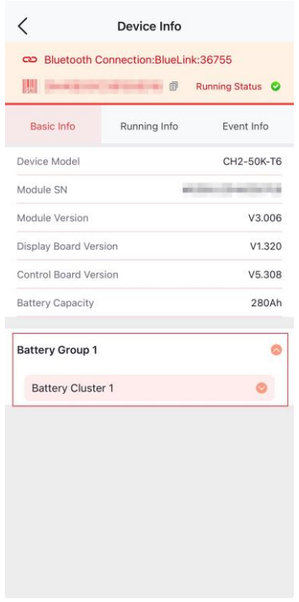
The installation technicians can configure the **Battery Settings** during the initialization of the CH2 inverter on the Elekeeper App.

For example, the following battery settings are available on the Elekeeper App:

- **Battery Brand**: select **CB2**.
- **Battery Parameters**: set the parameters as needed.
- **Cell Voltage**: view the cell voltage of each battery module as needed.



After the CH2 inverter is initialized, the battery group information can be displayed on the **Device Info** page of the inverter on the Elekeeper App. For example:



For detailed commissioning instructions of the CH2 inverter, refer to the CH2 User Manual.

7.

SYSTEM EXPANSION

7.1. Expand CB2 Battery System

The user can install a new rack of CB2 battery system and connect to the existing system to deploy a multi-rack battery system. In this case, the multi-rack battery systems can provide required capacity of energy in various C&I scenarios.

Regarding the integration with the CH2 inverter, one CH2 inverter can connect with 4 racks of CB2 battery systems. A distribution box is deployed between each CB2 battery system and the CH2 inverter.

The following figure shows the expansion from one-rack to two-rack deployment:

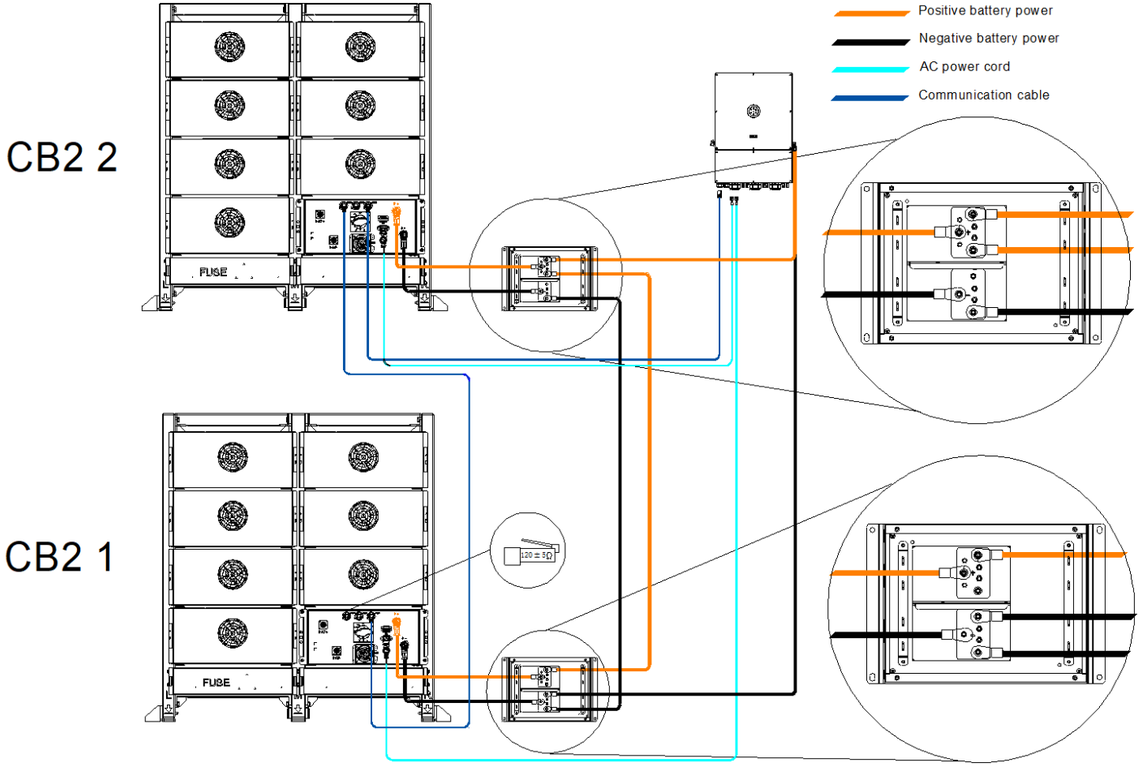


Figure 7.1. One-rack to two-rack expansion

Expand from one-rack to multi-rack deployment

Take the following steps to expand from CB2 one-rack deployment to multi-rack deployment.

Before you start

- Order the distribution boxes for each CB2 battery system in the new deployment.
- Prepare the cable connections between each CB2 battery system, distribution box, and CH2 inverter. See Figure 7.1 One-rack to two-rack expansion for reference.

  Note:

  - The required battery power cable is of 1 AWG. Use the packaged SQNBS60-6 terminals in the distribution box to prepare the cable ends.
  - All the battery power cables from the CB2 system to the distribution box must be of equal length.
  - All the battery power cables between two distribution boxes must be of equal length.

Procedure

Step 1. Assemble and install the new CB2 battery systems according to Section 4 Installation.

Step 2. Connect the grounding cable of the new CB2 battery system according to Section 5.1 Connect the Grounding Cable.

Step 3. Turn off the running CB2 battery system and the CH2 inverter to be integrated with the new CB2 battery systems.

DANGER
There might be residual currents in the inverters because of large capacitors. Wait at least 5 minutes before operating on the inverters and the battery systems.

Step 4. Remove the following cable connections between the CB2 battery system and the CH2 inverter:

- Positive and negative battery power cables
- AC power cord

Step 5. Connect the following battery power cables: between each CB2 system and distribution box; between each distribution box and the CH2 inverter; between two distribution boxes.

Step 6. Connect the communication cable from the CBC2 **COM_PCS** port of CB2 system 1 to the CBC2 **COM_PAR** port of the next CB2 system 2. Insert the RJ45 termination resistor to the CBC2 **COM_PAR** port of CB2 system 1.

Step 7. Connect the battery fan power cables of the new CB2 systems according to Section 5.4 Connect the Battery Fan Power Cables.

Step 8. Install back the covers of the new CB2 systems according to Section 5.5 Install the Covers.

Step 9. Turn on all the CB2 systems and the CH2 inverter.

Step 10. Check that the new CB2 battery group is displayed on the **Device Info** page of the inverter on the Elekeeper App.

The following figures show the expansion from multi-rack to multi-rack deployment:

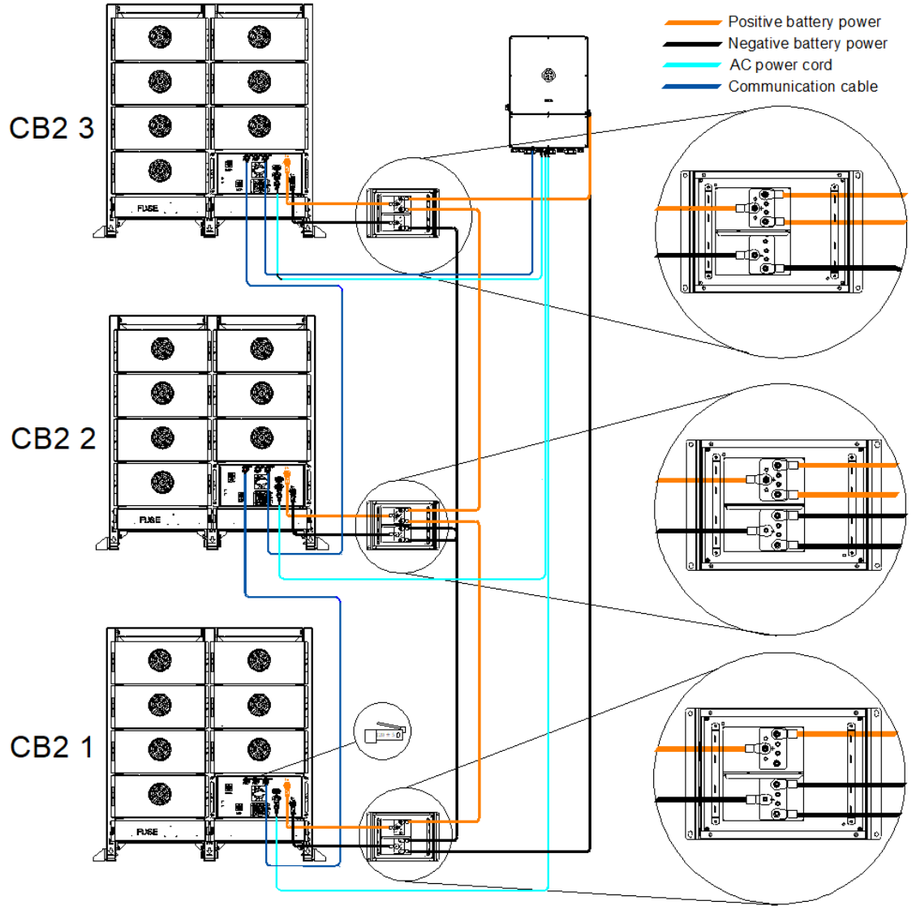


Figure 7.2. Two-rack to three-rack expansion

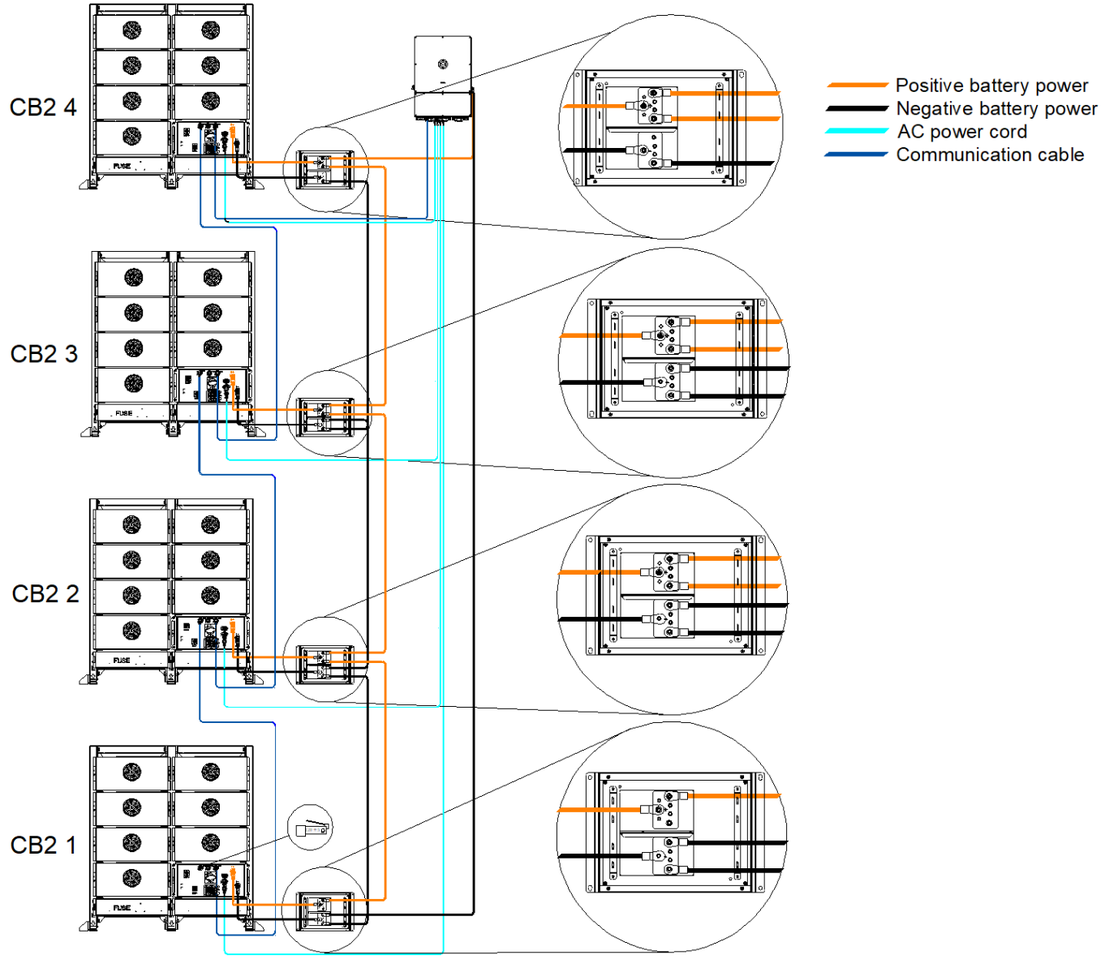


Figure 7.3. Two-rack to four-rack expansion

Expand from multi-rack to multi-rack deployment

Take the following steps to expand from CB2 multi-rack deployment to multi-rack deployment.

Before you start

- Order the distribution boxes for each new CB2 battery system.
- Prepare the cable connections between the new CB2 battery system, distribution box, and CH2 inverter. See Figure 7.2 Two-rack to three-rack expansion and Figure 7.3 Two-rack to four-rack expansion for reference.

  Note:
  - The required battery power cable is of 1 AWG. Use the packaged SQNBS60-6 terminals in the distribution box to prepare the cable ends.
  - All the battery power cables from the CB2 system to the distribution box must be of equal length.
  - All the battery power cables between two distribution boxes must be of equal length.

Procedure

Step 1. Assemble and install the new CB2 battery systems according to Section 4 Installation.

Step 2. Connect the grounding cable of the new CB2 battery system according to Section 5.1 Connect the Grounding Cable.

Step 3. Turn off the running CB2 battery systems and the CH2 inverter that will integrate with the new CB2 battery systems.

DANGER
There might be residual currents in the inverters because of large capacitors. Wait at least 5 minutes before operating on the inverters and the battery systems.

Step 4. Connect the following battery power cables: between each CB2 system and distribution box; between each distribution box and the CH2 inverter; between two distribution boxes.

Step 5. Connect the communication cable from the CBC2 **COM_PCS** port of the first CB2 system to the CBC2 **COM_PAR** port of the next CB2 system. Insert the RJ45 termination resistor to the CBC2 **COM_PAR** port of the first CB2 system.

Step 6. Connect the battery fan power cables of the new CB2 systems according to Section 5.4 Connect the Battery Fan Power Cables.

Step 7. Install back the covers of the new CB2 systems according to Section 5.5 Install the Covers.

Step 8. Turn on all the CB2 systems and the CH2 inverter.

Step 9. Check that the new CB2 battery groups are displayed on the **Device Info** page of the inverter on the Elekeeper App.

8.

TRANSPORTATION & STORAGE

8.1. Transportation

Lithium batteries are dangerous goods. Passed the test of UN38.3, this product meets the transportation requirements for dangerous goods for lithium batteries. After the installation of the battery on site, the original packaging (contains the lithium battery identification) should be kept. When the battery needs to be returned to the factory for repair, please pack the battery with the original packaging to reduce unnecessary trouble.

8.2. 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 longer the battery is stored, the lower the SOC. When the battery remaining voltage fails to reach the startup voltage requirement, the battery may be damaged.
- To check the remaining power of the battery: Close the battery breaker switch and press the main switch. When the LED light is solid green, it indicates that the battery is working properly. If the LED light is red or off, it indicates that the battery is faulty.

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.

9.

TROUBLESHOOTING

9.1. Troubleshooting

Error Code	Error Message	Possible Cause	Solution
97	BMS internal communication error	1. Communication error between battery control unit and battery module. 2. RJ45 plug is not installed. Therefore, the battery control unit cannot get the correct number of connected battery modules.	1. Check if communication cable is connected properly. 2. Check if 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.
100	Charge overcurrent protection	Charging current exceeds the set limit.	Wait until the error is cleared or restart.
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.
103	Battery module undervoltage protection	Single battery module voltage is lower than the set limit.	Force charging the battery.
104	Battery module overvoltage protection	Single battery module voltage is higher than the set limit.	Wait until the error is cleared or restart.
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.

Error Code	Error Message	Possible Cause	Solution
106	Charging overcooling protection	Battery charging at <0℃.	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 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 the battery supplier.
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.
116	Battery voltage inconsistency	Battery module voltage are inconsistent.	Check if the model of battery module is correct.
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.

Error Code	Error Message	Possible Cause	Solution
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.	Contact technical support to locate the fault.
125	FUSE error protection	Fuse is damaged.	Contact technical support to locate the fault.
126	Charging port overvoltage protection	Inverter output voltage is high.	Contact technical support to locate the fault.

10.

APPENDIX

10.1. Recycling and Disposal

This device should not be disposed as a residential waste.

An inverter 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

Fax: +86 206660 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

10.4. Trademark

SAJ is the trademark of Sanjing.