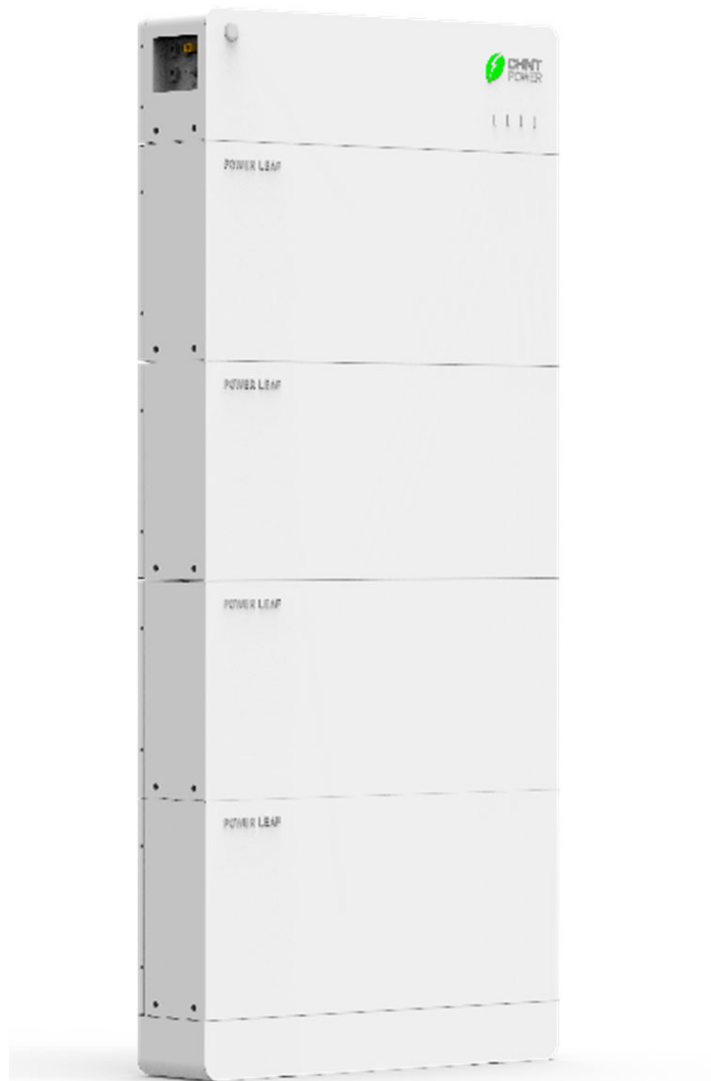




User Manual for CPS ESSR-05/10/15/20KH1 Energy Storage Battery Unit



Shanghai Chint Power Systems Co., Ltd.

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0 Introduction



This manual contains important information about product installation and safe operation. Please read it carefully before use.

Thank you for choosing CPS ESSR H1 Series residential energy storage battery unit (hereinafter referred to as "battery unit" in this manual) produced by Chint Power Systems Co., Ltd. (hereinafter referred to as "Chint Power"). With innovative design and perfect quality control, the energy storage battery produced by Chint Power has high reliability.

This manual mainly introduces the product characteristics, performance indicators, appearance and interfaces, operating instructions, installation and maintenance of the CPS ESSR H1 Series CPS ESSR-05/10/15/20KH1 residential energy storage battery unit.

This manual is applicable to the following personnel:

- Professional technicians for installation, operation and maintenance of the product;
- Users of the product.

Please keep this manual properly for reference at any time. In case of any problems during installation or operation, please refer to this manual first, and the instructions in it can help you solve common problems. If the problem persists, you can contact the local dealer or representative.

Any reproduction, disclosure or copy in whole or in part is forbidden without prior written authorization. Chint Power reserves the right to modify and update this manual without prior written authorization. CHINT doesn't accept any responsibilities whatsoever for potential errors or possible lack of information in this document.

Users can get the latest manual from our sales channel or our official website: www.chintpower.com.

1 Safety Instructions

Read this manual carefully before installing and operating the energy storage battery. If the equipment is not properly installed and used in accordance with the contents of this manual, resulting in damage to the equipment, Chint Power has the right to refuse warranty claims.

Please read this manual carefully before installation. If any damage to the equipment occurs as a result of installation and operation not in accordance with the instructions in this manual, we reserve the right to deny warranty!

1.1 Explanation of safety symbols in the manual

**DANGER!**

A high-level potential hazard that, if not avoided, will result in death or serious injury.

**WARNING!**

A moderate-level potential hazard that, if not avoided, may result in death or serious injury.

**CAUTION!**

A low-level potential hazard that, if not avoided, may result in moderate or mild injury.

**NOTICE!**

A potential risk that, if not avoided, may result in the equipment not functioning properly or causing property damage.

**IMPORTANT!**

Additional information in the manual that highlights and supplements the content and may also provide tips or tricks to optimize the use of the product, which helps solve problems or save time.

1.2 Interpretation of product markings



DANGER! Electric Shock!

There is a high voltage inside the machine body, so the instructions in the User Manual must be followed for operation of this product.



Keep away from fire source!

There is a lithium-ion battery in the equipment, which need to be stored or used away from fire sources.



DANGER! Explosion!

The battery itself is at risk of explosion and therefore shall be used as required.



Read the Manual!

Refer to the user manual for further details.



WARNING!

Serious injury or equipment damage may result if the equipment is not operated in accordance with the warnings.



Protective Earth!

This marking is located at the protective earth (PE) terminal and shall be firmly earthed to ensure operator safety.



Waste Sorting!

The battery box shall not be disposed of with domestic waste at the end of its service life.



Recycling

The battery box shall be disposed of in an appropriate environmentally-safe recycling facility.



Certification Marking

The product complies with the provisions of the CE Directive.



Safety Gear

Wear safety gears when handling the battery box.

1.3 Precautions

WARNING!



When installing, operating and maintaining the equipment, read this manual first and follow all safety precautions marked on the equipment and in the manual.

DANGER!



- There is voltage in the equipment, and non-standard operation may cause electric shock or fire, resulting in death, serious injury or serious property loss.
 - It is strictly prohibited to install, use and operate outdoor equipment and cables in severe weather such as thunder and lightning, rain, snow and strong wind of force 6.
 - It is prohibited to not carry out installation, wiring, maintenance, replacement and other operations with electricity.
 - It is prohibited to clean the equipment with water.
 - Before touching any conductor surface or terminal, the voltage at the contact point shall be measured to confirm that there is no risk of electric shock.
 - Paint scratches during equipment transportation and installation shall be repaired in time. It is strictly prohibited to expose the scratched parts to the outdoor environment for a long time.
 - The battery terminal components shall not be affected during handling. Lifting and handling via the battery terminal bolts are not allowed.
 - Under no circumstances shall the structure and installation sequence of the equipment be changed without the permission of the manufacturer.
 - In case of fire, evacuate the building or equipment area and press the fire alarm bell, or call the fire alarm number. Under no circumstances shall re-entry into a burning building be permitted.
-

NOTICE!



- During transportation, transfer, installation, wiring and maintenance, the requirements of laws, regulations and relevant standards of the country and region where the equipment is located must be met.
- The materials prepared by the user and the tools required during the operation must meet the requirements of laws, regulations and relevant standards of the country and region where they are located.
- The grid connection can only be carried out after obtaining the permission of the power department of the country and region where it is located.
- The composition and working principle of the entire PV grid-connected power generation system and the relevant standards of the country/region where the project is located shall be fully familiarized.

**CAUTION!**

Check the wall bracket again before hanging the machine to ensure that the wall bracket is firmly fixed on the supporting surface.

2 Product Introduction

2.1 Introduction to residential energy storage battery unit

CPS ESSR H1 series energy storage battery unit is suitable for residential energy storage. The energy storage battery includes a power control module and a battery extension module, which can store and discharge electric energy according to the requirements of inverter management system. The input and output ports of the CPS ESSR H1 series energy storage battery unit are with DC power.

Battery charging: The power control module connects with the energy storage terminals (BAT+, BAT-) of the inverter to charge the battery under the control of the inverter and store the excess energy generated by the PV system in the battery.

Battery discharging: When the PV energy is insufficient to supply power to the load, the energy storage battery unit shall help to control the battery to supply power to the load, and output the energy stored in the energy storage battery unit to the load through the inverter.

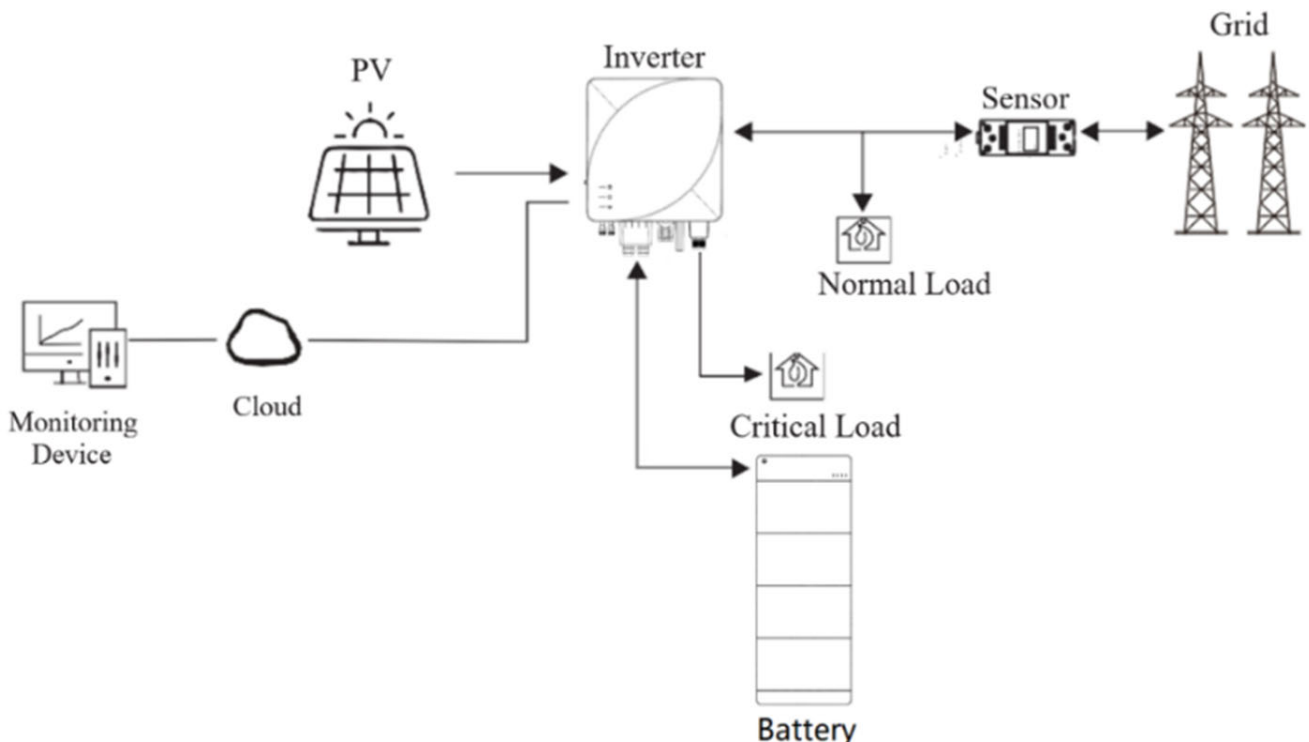


Fig 2-1: Typical Application of Energy Storage Battery Unit

NOTICE



- The max. voltage of PV side is 1000V (overvoltage category: II);
- The max. voltage of AC side is 400V (overvoltage category: III).

2.2 Model marking

The model of CPS ESSR H1 series energy storage battery unit is CPS ESSR-05 (10/15/20) KH1. The following is an example of the meaning of CPS ESSR-05KH1.

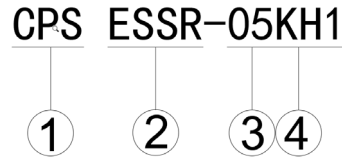


Figure 2-1: Model of Energy Storage Battery Unit

| No. | Name | Meaning |
|-----|--------------|---|
| 1 | Company name | CPS: Chint Power Systems |
| 2 | Product type | Residential energy storage system |
| 3 | Energy level | 05K: energy level of 5.12 kWh |
| 4 | Design code | H1: product number of high voltages (HV) series |

Table 2-1 Instruction of Model Meaning

2.3 Instruction of energy storage capacity

The energy storage battery unit supports capacity extension. Up to 3 battery stacks can be connected in parallel, each of which can support up to 4 battery extension modules.

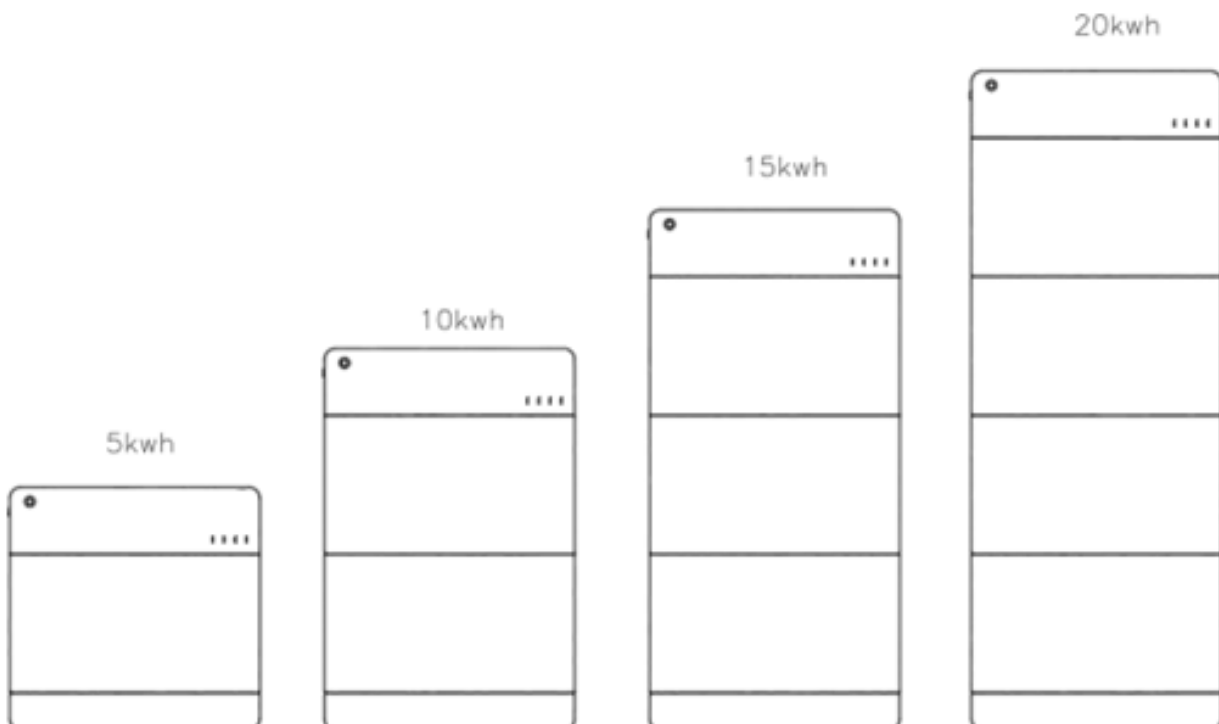


Figure 2-2 Instruction of Energy Storage Capacity

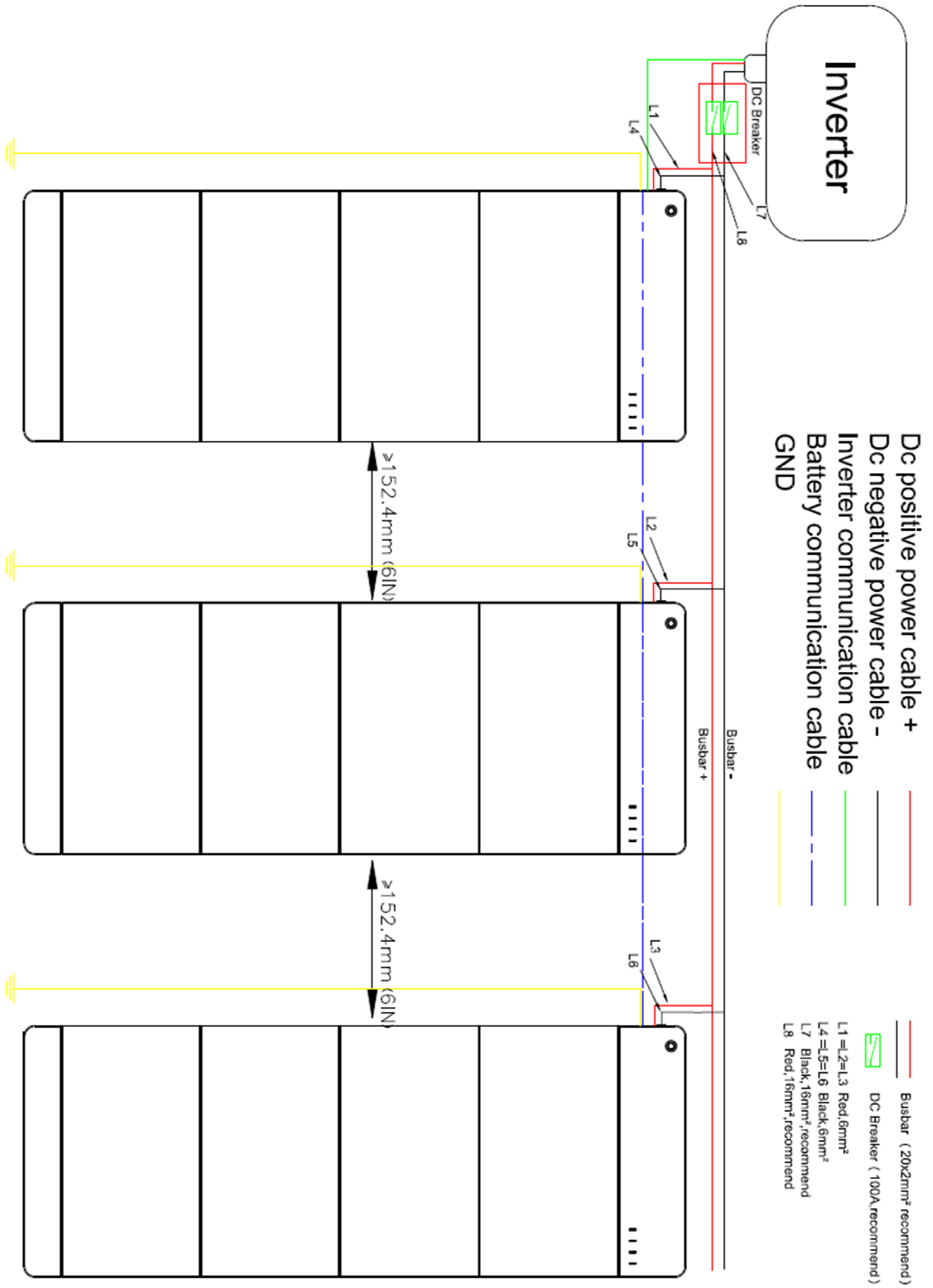


Figure 2-3 Energy Storage extension Instruction

2.4 Dimension and appearance

1. Introduction to overall appearance of energy storage battery unit

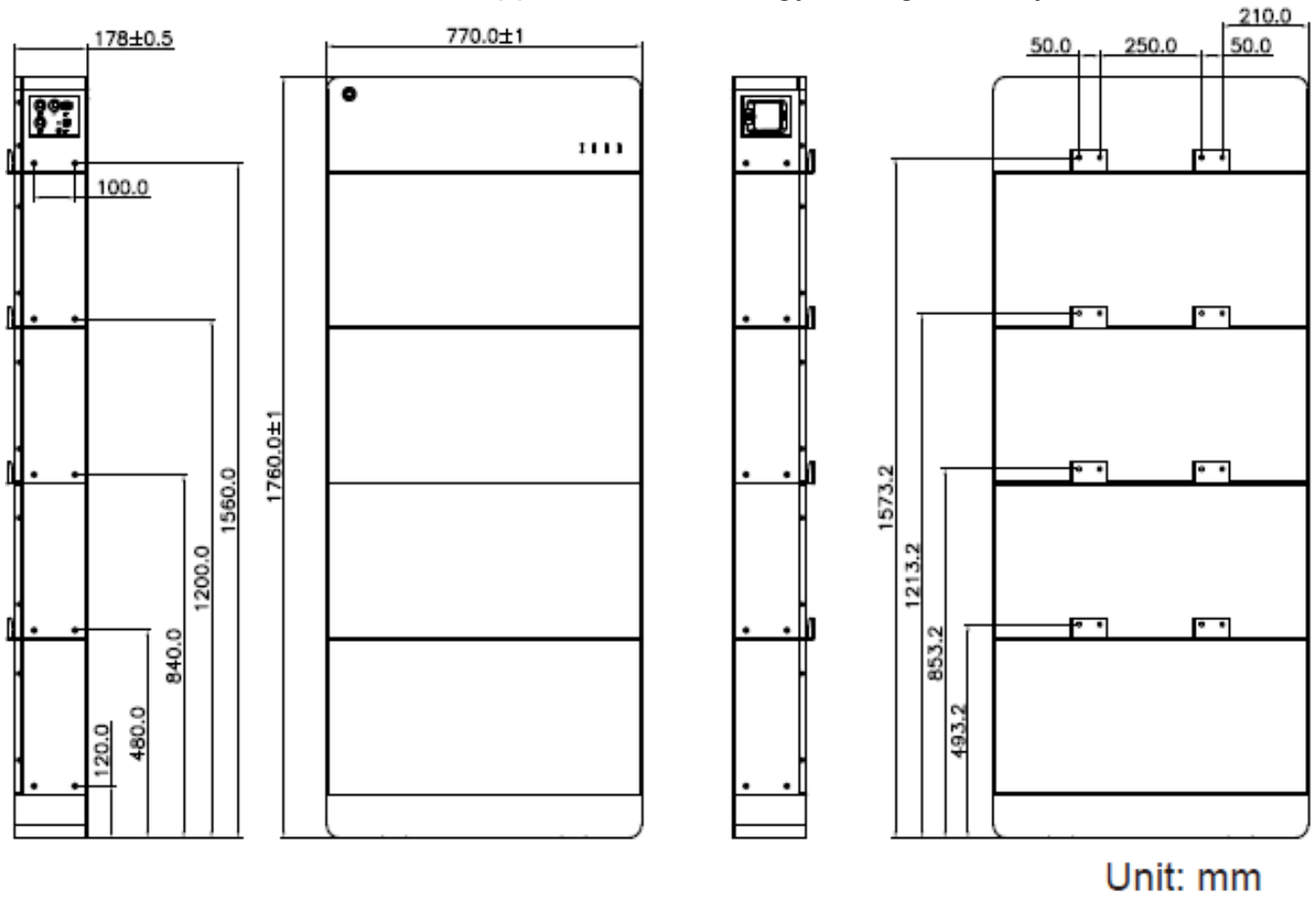


Figure 2-4 Dimensions of Energy Storage Battery Unit

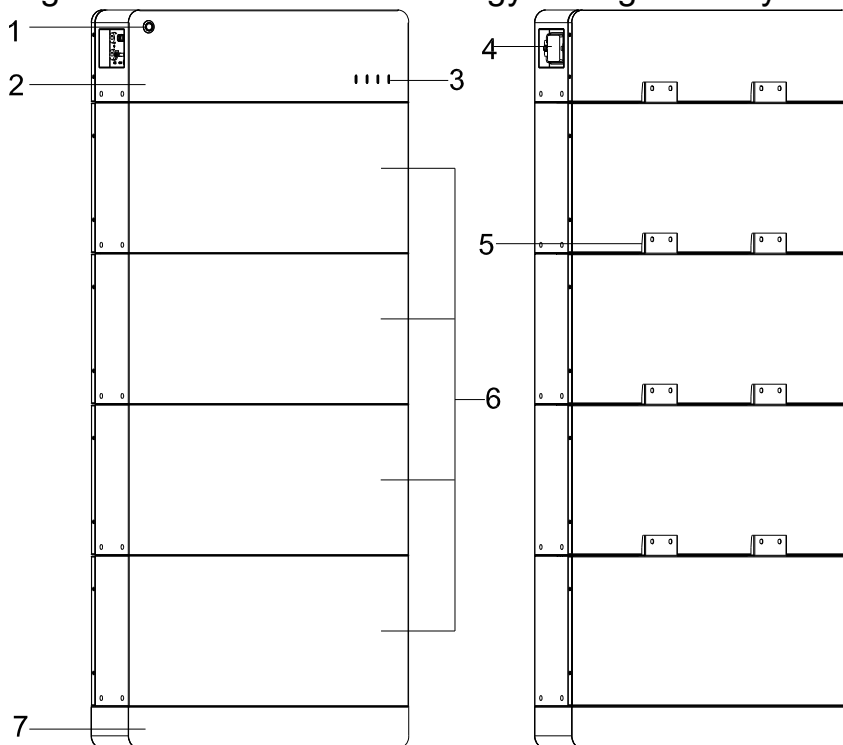


Figure 2-5 Product Appearance

| No. | Name | Function |
|-----|--------------------------|--|
| 1 | On/Off button | Indicating startup/shutdown and operation state |
| 2 | Power control module | Controlling battery operation and inverter communication |
| 3 | LED indicator | Indicating SOC of the battery of the product |
| 4 | Circuit breaker | Manual break switch |
| 5 | Wall anchor | Fasten battery module onto wall |
| 6 | Battery extension module | Battery extension unit |
| 7 | Base | Carrying battery extension module |

Table 2-2 Main Components of the Product

2. Power control module

The power control module is responsible for battery module management and communication, with a rated current of 40A.

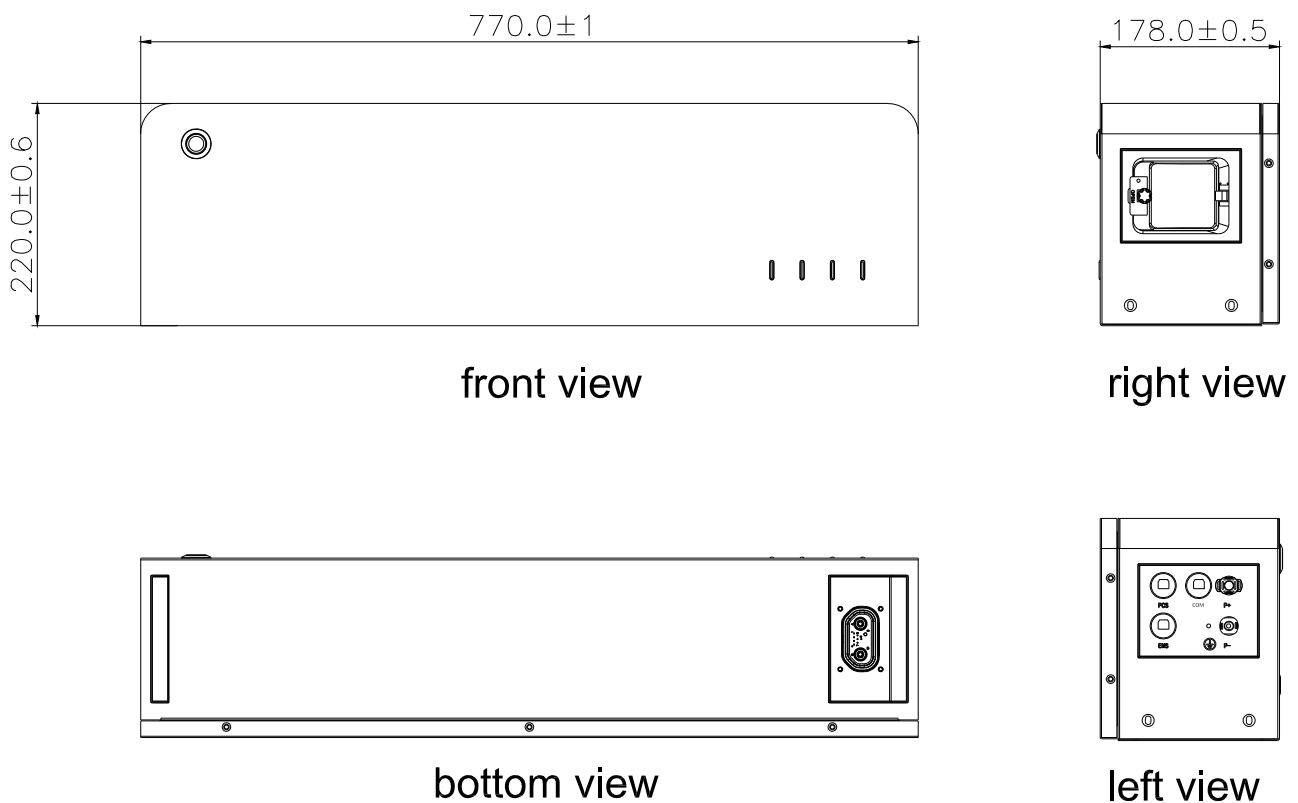


Figure 2-6 Dimensions of Power control module

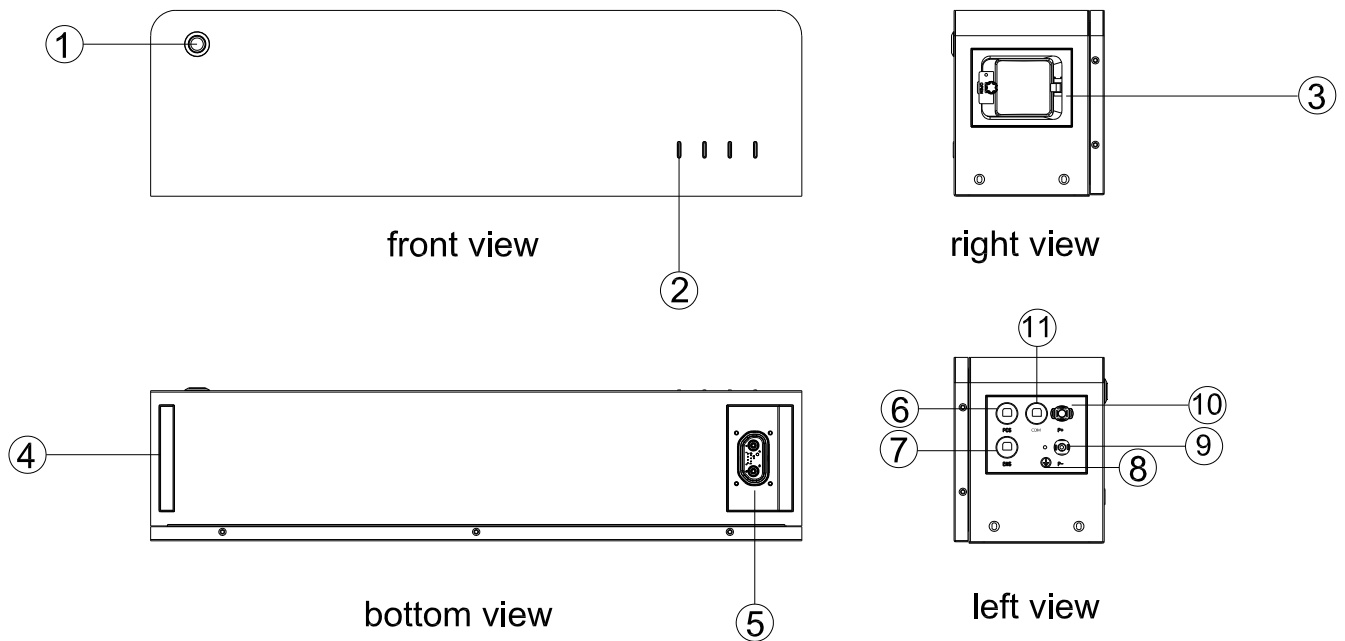


Figure 2-7 Appearance of Power control module

| No. | Name | Function |
|-----|-------------------------------------|---|
| 1 | Button | Turn On/off the system |
| 2 | LED indicator | Indicating SOC of the battery of the product |
| 3 | Circuit breaker | Manual break switch |
| 4 | Positioning area | Positioning the module |
| 5 | Power plug-in female terminal | Power and communication terminal |
| 6 | Inverter communication port | Inverter communication/extension communication IN |
| 7 | EMS communication port | EMS communication |
| 8 | Grounding terminal | Grounding lead-out terminal |
| 9 | Negative terminal of battery output | Negative terminal of battery output |
| 10 | Positive terminal of battery output | Positive terminal of battery output |
| 11 | Extension communication port | Extension communication OUT |

Table 2-3 Main Components of Power control module

3. Battery extension module

The standard rated capacity of the battery extension module is 5.12 kWh, and it supports the stack installation of up to 4 modules.

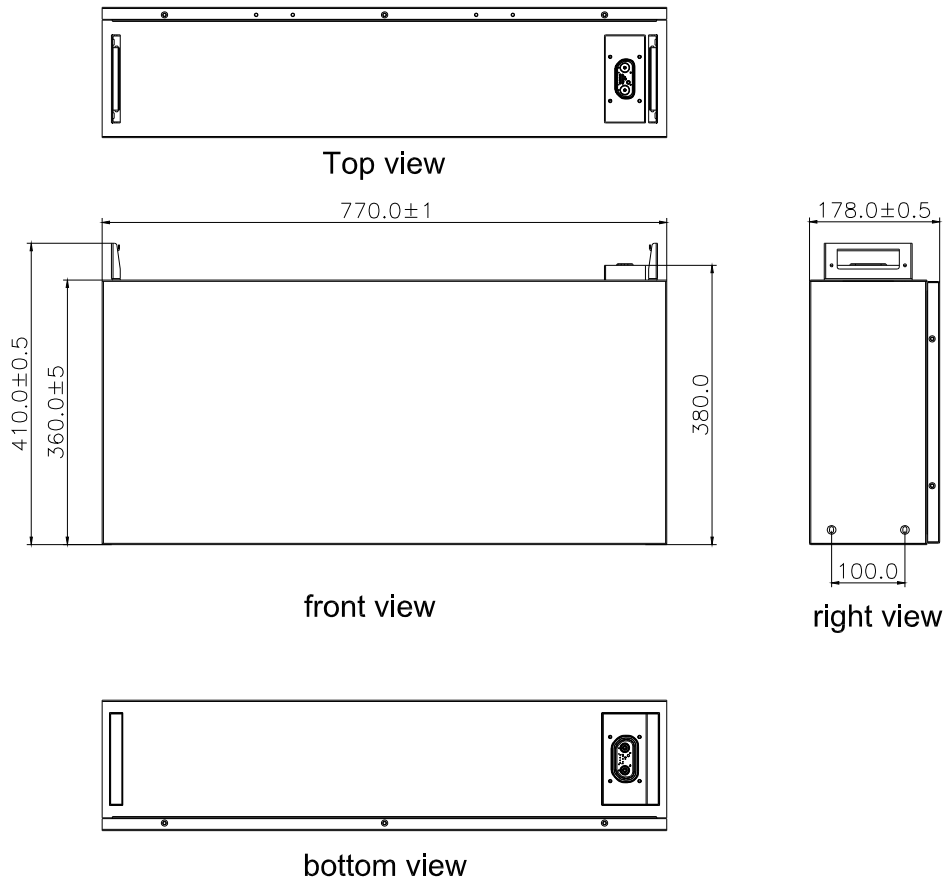


Figure 2-8 Dimensions of battery extension module

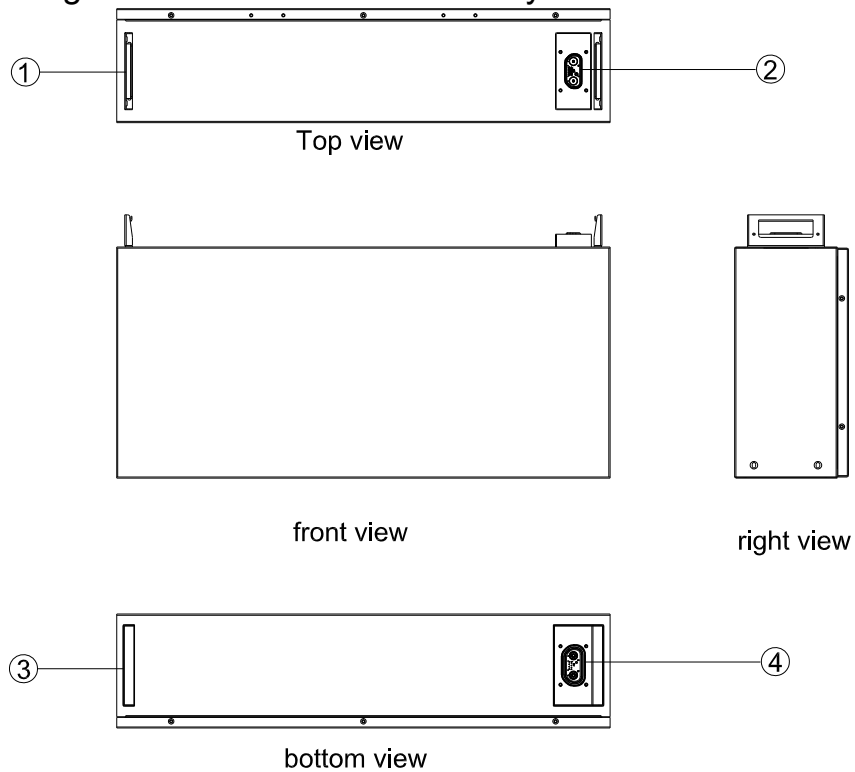


Figure 2-9 Appearance of battery extension module

| No. | Name | Function |
|-----|-------------------------------|----------------------------------|
| 1 | Handle | Handle and positioning |
| 2 | Power plug-in male terminal | Power and communication terminal |
| 3 | Positioning area | Positioning hole |
| 4 | Power plug-in female terminal | Power and communication terminal |

Table 2-4 Main Components of battery extension module

4. Base module

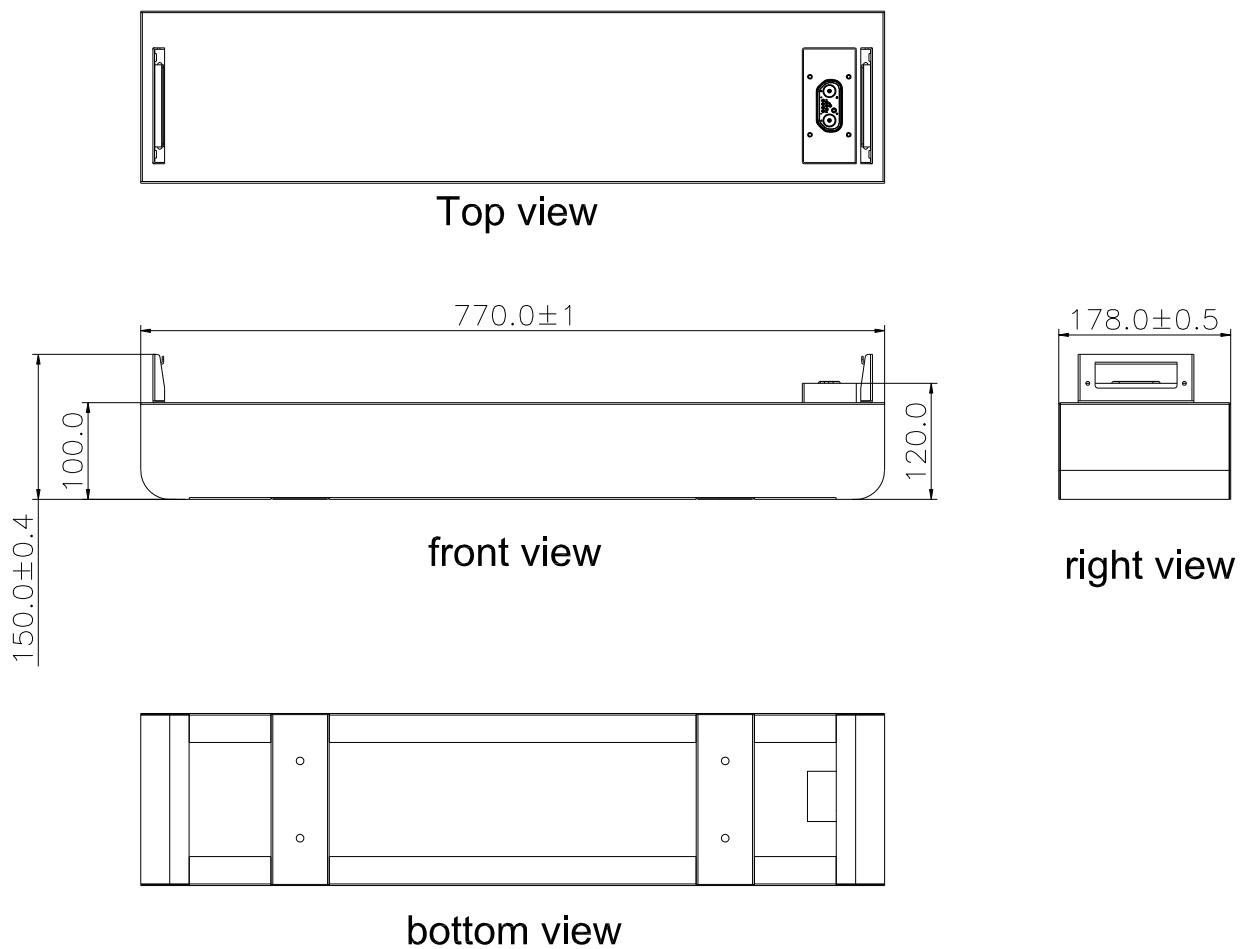


Figure 2-10 Dimensions of Base Module

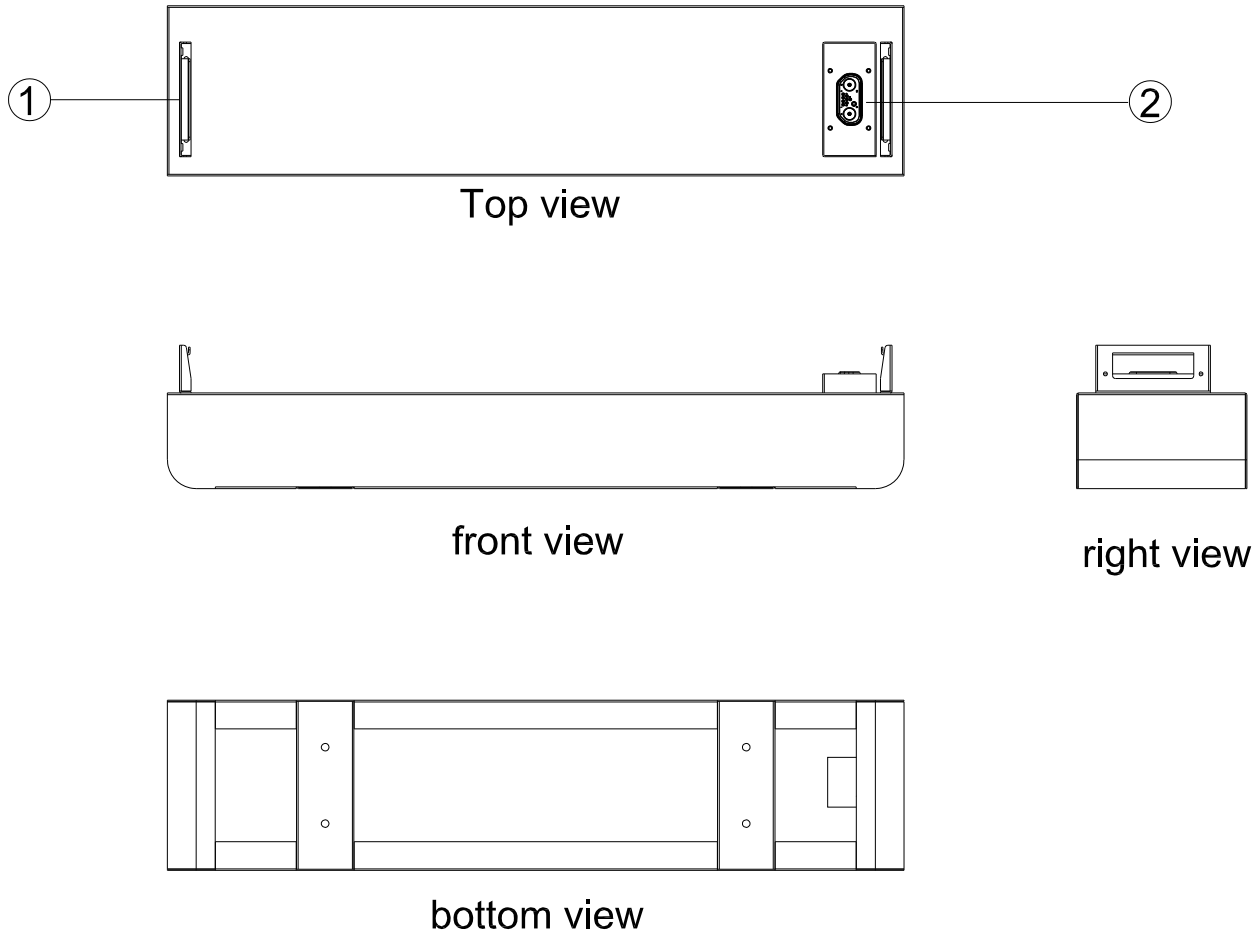


Figure 2-11 Appearance and Composition of Base Module

| No. | Name | Function |
|-----|-----------------------------|----------------------------------|
| 1 | Handle | Handle and positioning |
| 2 | Power plug-in male terminal | Power and communication terminal |

Table 2-5 Main Components of Base Module

2.5 LED display instruction

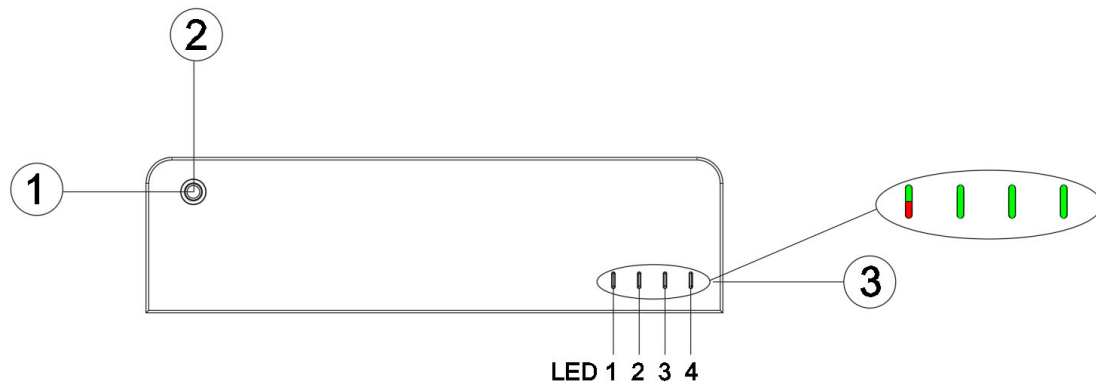


Figure 2-12 Power-on Button and Indicator

| No. | Description | Indicator Meaning |
|-----|----------------------------------|--|
| 1 | ON/OFF button | Power on/off the battery unit |
| 2 | System operation state indicator | <ul style="list-style-type: none"> In standby state, the operation state indicator flashes (on for 0.25s and off for 3.75s); In charging process (charging current is greater than 1A), the operation state indicator flashes slowly (on for 0.5s and off for 1.5s); If heating film starts working, this indicator will keep on. In discharging process (discharge current is greater than 1.6A), the operation state indicator flashes fast (on for 0.5s and off for 0.5s); |
| 3 | Alarm indicator | <ul style="list-style-type: none"> After the alarm is started, the alarm indicator flashes (on for 0.5s and off for 0.5s) After the protection is started (except for undervoltage protection and overvoltage protection), the alarm indicator flashes; When there is no alarm and no protection, the alarm indicator goes off. |
| | SOC indicators | <ul style="list-style-type: none"> In standby state, SOC (State of charging) indicators display normally; During charging, SOC indicators LED1, LED2, LED3 and LED4 flash slowly accordingly when SOC is 0~25%, 25~50%, 50~75% and ≥75%; During discharging process, SOC indicators LED4, LED3, LED2 and LED1 flash fast when SOC is 0~25%, 25%~50%, 50%~75%, and ≥75% before reaching undervoltage protection. |

Table 2-6 Panel Buttons and Indicators

2.6 Product protection function

- Short circuit protection
- Overcharge protection
- Over-discharge protection
- Over current protection
- Temperature protection
- Balance between cells
- Power module temperature monitoring
- Ambient temperature monitoring
- Cell temperature monitoring

3 Installation

3.1 Inspection before installation

Before unpacking, check whether the packaging box and all safety signs, warning labels, and nameplates on the packaging box and the product are intact. These signs must always be clearly visible and cannot be removed or covered until the product is scrapped.

Before installation, check whether the following items are contained in the packing box of each battery extension module and whether there is any damage. The delivery list of each battery extension module is as follows:

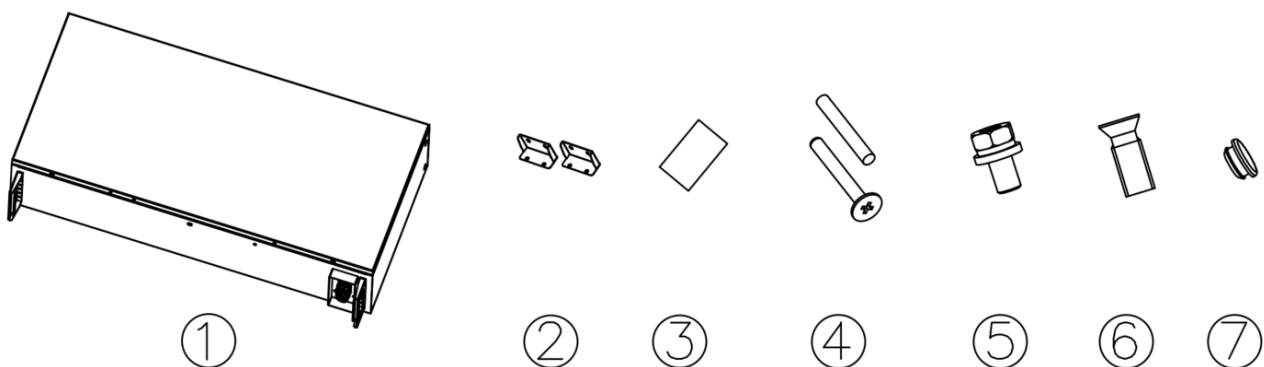


Figure 3-1 delivery list of each battery extension module

| No. | Accessory Name | QTY | Purpose |
|-----|------------------------------|-----|--|
| 1 | Battery extension module | 1 | One extension module is 5.12kWh |
| 2 | Wall anchor | 2 | Fasten extension module onto wall |
| 3 | Document bag | 1 | Include packing list, warranty card |
| 4 | Φ8 X 40 tapping screw | 4 | Lock wall anchor onto wall |
| 5 | M4x10 combination screw | 4 | Lock extension module and handle |
| 6 | M4x10 countersunk head screw | 4 | Fasten wall anchor onto battery extension module |
| 7 | Dust plug | 4 | Prevent dust from entering groove |

Table 3-1 Accessories in packing box of each battery extension module

Before installation, check whether the following items are contained in the packing box of the power control module and whether there is any damage. The delivery list of the power control module is as follows:

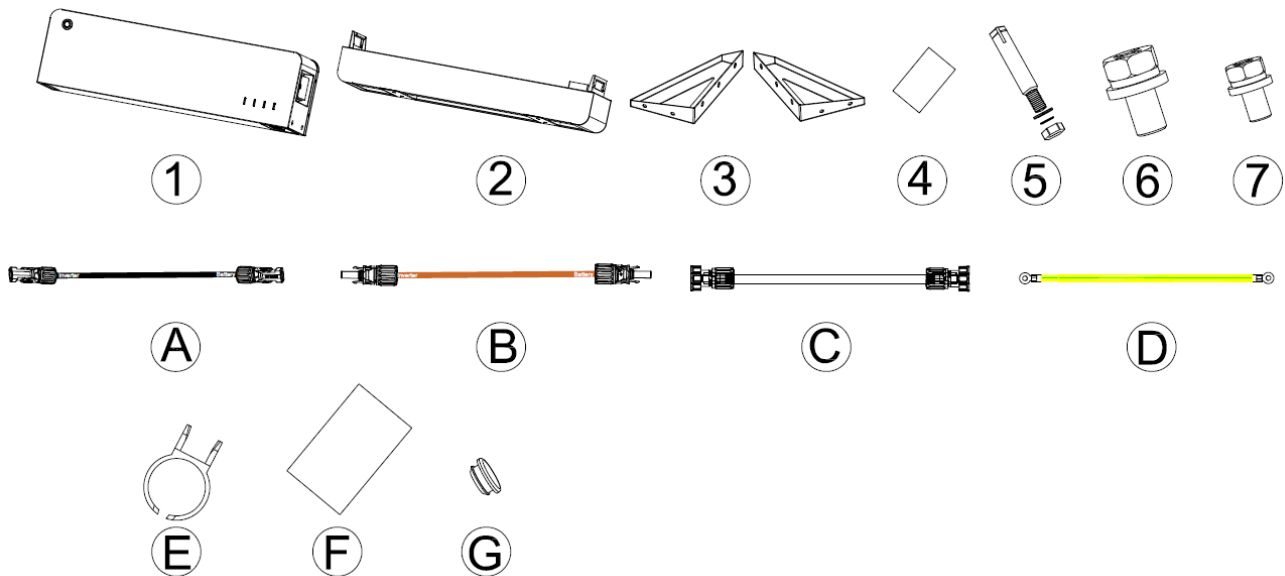


Figure 3-2 delivery list of power control module

| No. | Accessory Name | QTY | Purpose |
|-----|-----------------------------------|-----|---|
| 1 | Power control module | 1 | Control battery operation and PCS communication |
| 2 | Base | 1 | Install battery extension module |
| 3 | Wall bracket | 1 | Support the whole battery unit |
| 4 | Document bag | 1 | Include packing list, warranty card and quick guide |
| 5 | M12X100 expansion screw | 6 | Fasten wall bracket |
| 6 | M8x16 combination screw | 4 | Fasten wall bracket and base |
| 7 | M4x10 combination screw | 5 | Fasten control moduel & GND cable |
| A | Negative power output cable (2m) | 1 | Connect inverter to battery P- |
| B | Positive power output cable (2m) | 1 | Connect inverter to battery P+ |
| C | Inverter communication cable (2m) | 1 | Communicate with inverter |
| D | Grounding cable (2m) | 1 | GND |
| E | Removal tool | 1 | Removal tool for PV/BAT connector |
| F | Positioning template | 1 | Locate mounting holes |
| G | Dust plug | 4 | Prevent dust from entering groove |

Table 3-2 Accessories in packing box of power control module

IMPORTANT!



- This table is for standard configuration. If the purchased machine has optional accessories, the accessories may be different.
- If the packaging box, various labels, nameplates are damaged or the accessories are incomplete, please contact the dealer.

3.2 Installation tools

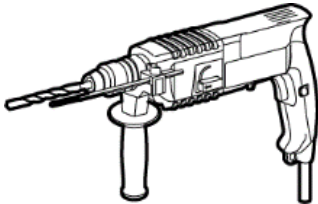
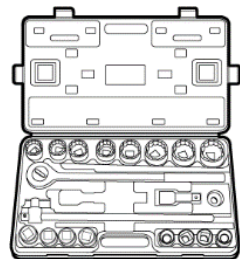
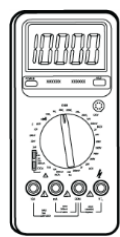
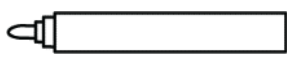
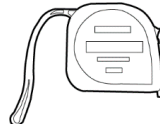
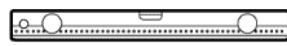





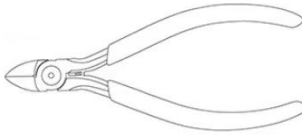

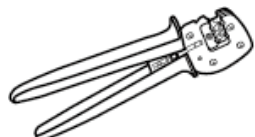
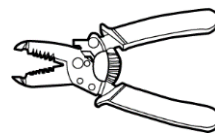
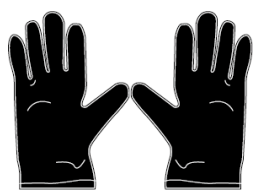
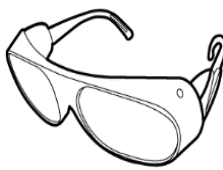

| Type | Tools and Instruments | | |
|---------------------|---|--|--|
| Installation |  Impact drill (Drill bit $\Phi 8$, $\Phi 16$ m) |  Torque socket wrench |  Multimeter |
| |  Marker |  Steel tape |  Level ruler |
| |      Torque screwdriver |  Diagonal pliers |  Rubber hammer |
| |  Wire Crimpers (Type: PV- CZM-22100/19100) |  Wire stripper | |
| Personal protection |  Safety gloves |  Protective glasses |  Safety shoes |

Table 3-3 Preparation of Installation Tools

3.3 Installation torques

| No. | Name | Purpose | Torque value |
|-----|-----------------------|---|--------------|
| 1 | M4 torque screwdriver | Tighten M4x10 combination screw, M4x10 countersunk head screw and Φ8x40 tapping screw | 1.2 N.m |
| 2 | #14 socket wrench | Tighten and M8x16 combination screw | 22-26 N.m |
| 3 | #19 socket wrench | Tighten M12X100 expansion screw | 40-45N.m |

Table 3-4 Installation Torques

3.4 Installation requirements

3.4.1 Environment requirements

The service life of the inverter can be prolonged by avoiding the battery unit from direct sunlight, direct rain and snow accumulation.

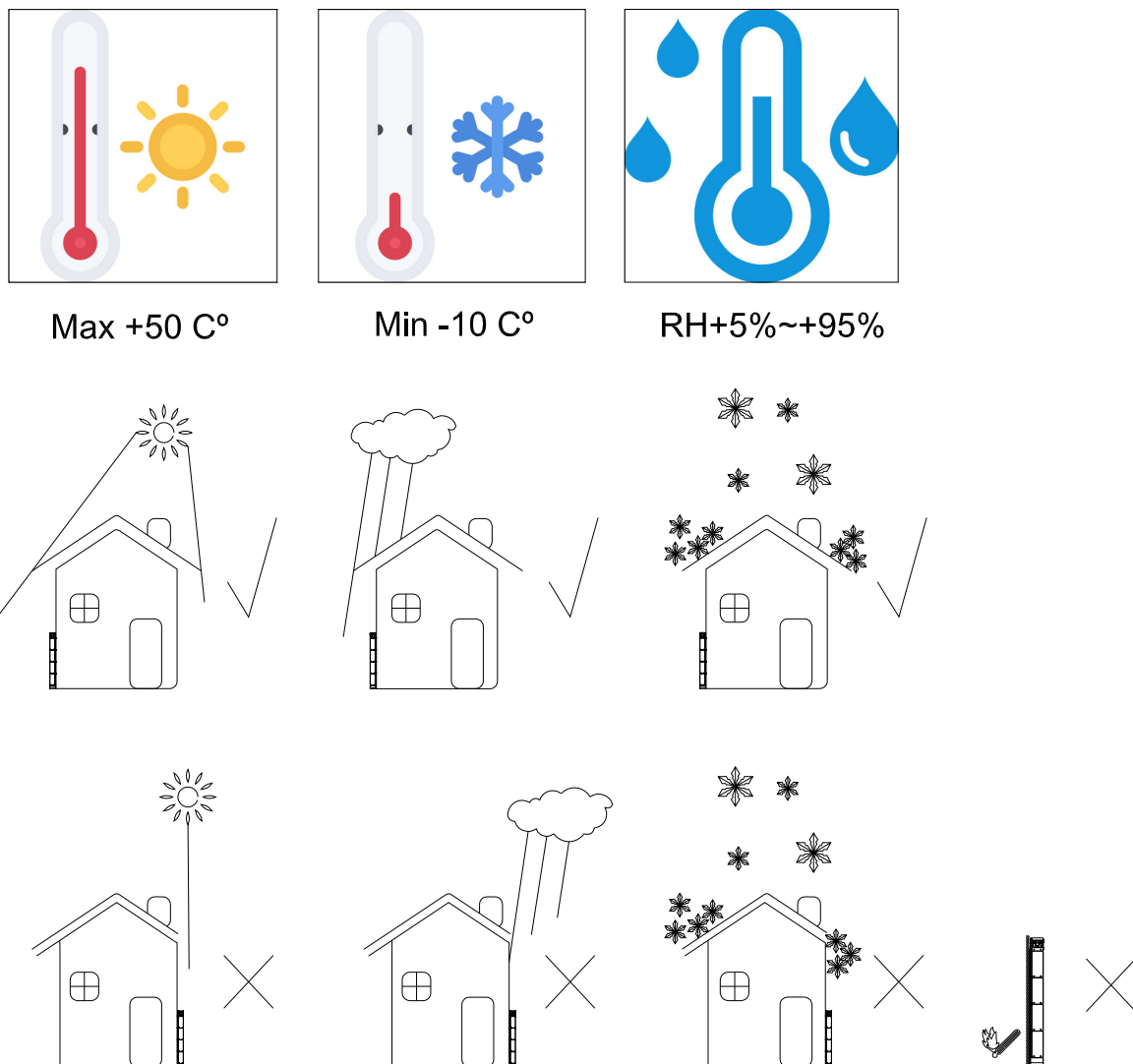


Figure 3-3 Schematic Diagram of Installation Environment

3.4.2 Installation method

Before installing the battery unit, confirm whether the installed supporting structure can bear the weight of the battery unit, check whether the ground is level, and install the energy storage battery unit according to the following instructions:

- a) Vertical installation only;
- b) No forward tilting installation;
- c) No inverted installation;
- d) No horizontal installation;

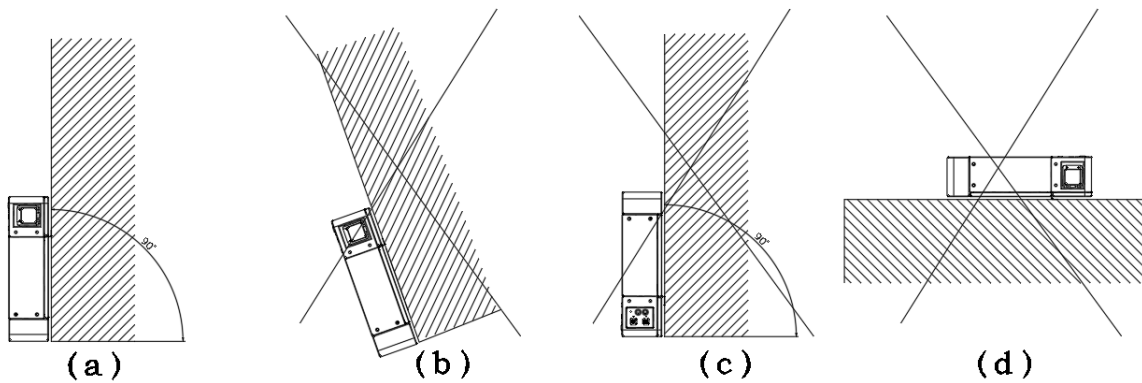


Figure 3-4 Floor Installation

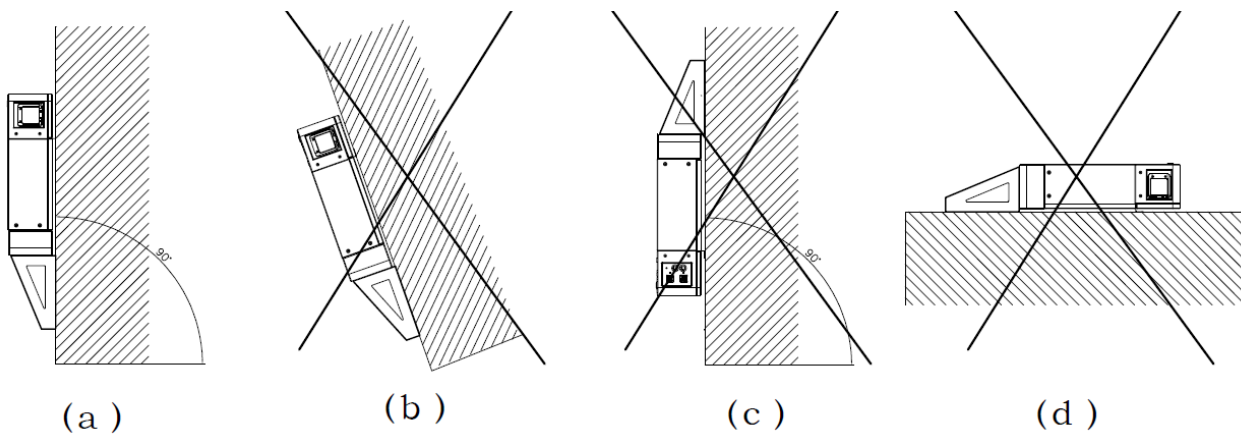


Figure 3-5 Wall-bracket Installation

3.4.3 Installation space

The distance between the energy storage battery unit and the surrounding objects shall meet the following conditions:

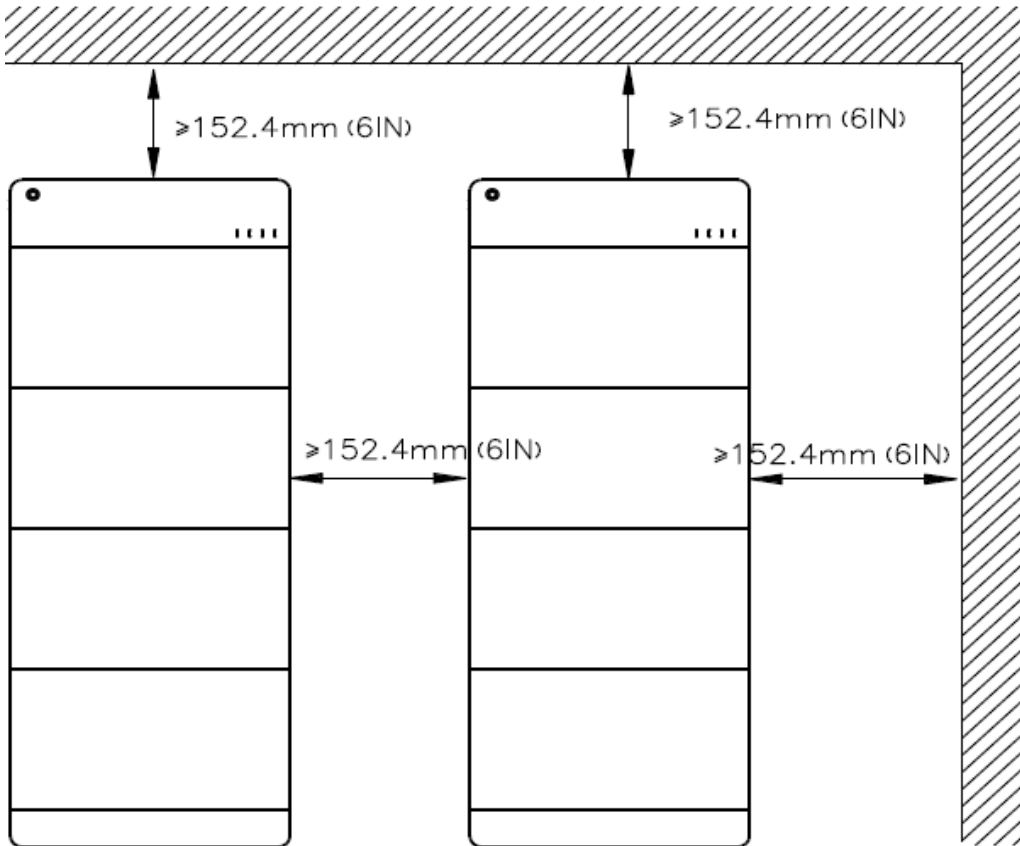


Figure 3-6 Dimensional Requirements for Floor Installation

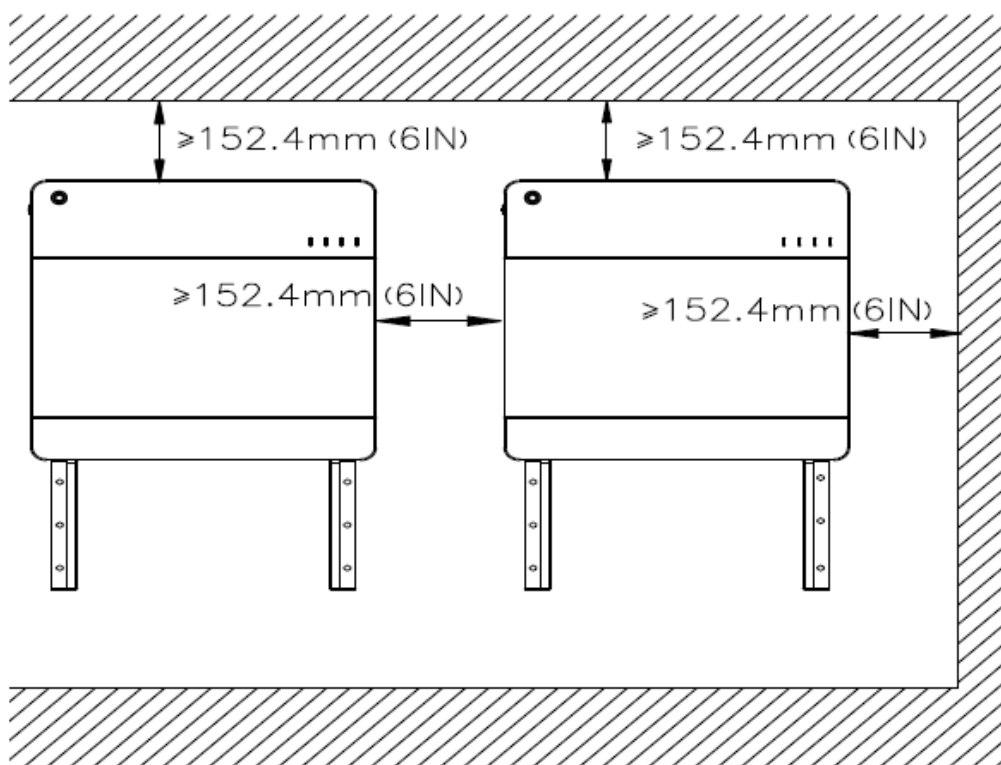


Figure 3-7 Dimensional Requirements for Wall-bracket Installation

NOTICE



The distance between two parallel energy storage battery units must be \geq 152.4 mm (6 in.), and good ventilation shall be ensured. If the surroundings are relatively closed, increase the spacing appropriately.

3.5 Installation methods

3.5.1 Floor installation

1. Place base on a level floor and keep within 19 mm from wall surface. Align reference line of positioning template with top line of base and then position the template onto the wall. Drill correct number of holes according to hole positions on the template, and knock plastic pipes of $\Phi 8 \times 40$ tapping screws into the wall. Tools: electric drill (with $\Phi 8$ mm drill bit), and rubber mallet.

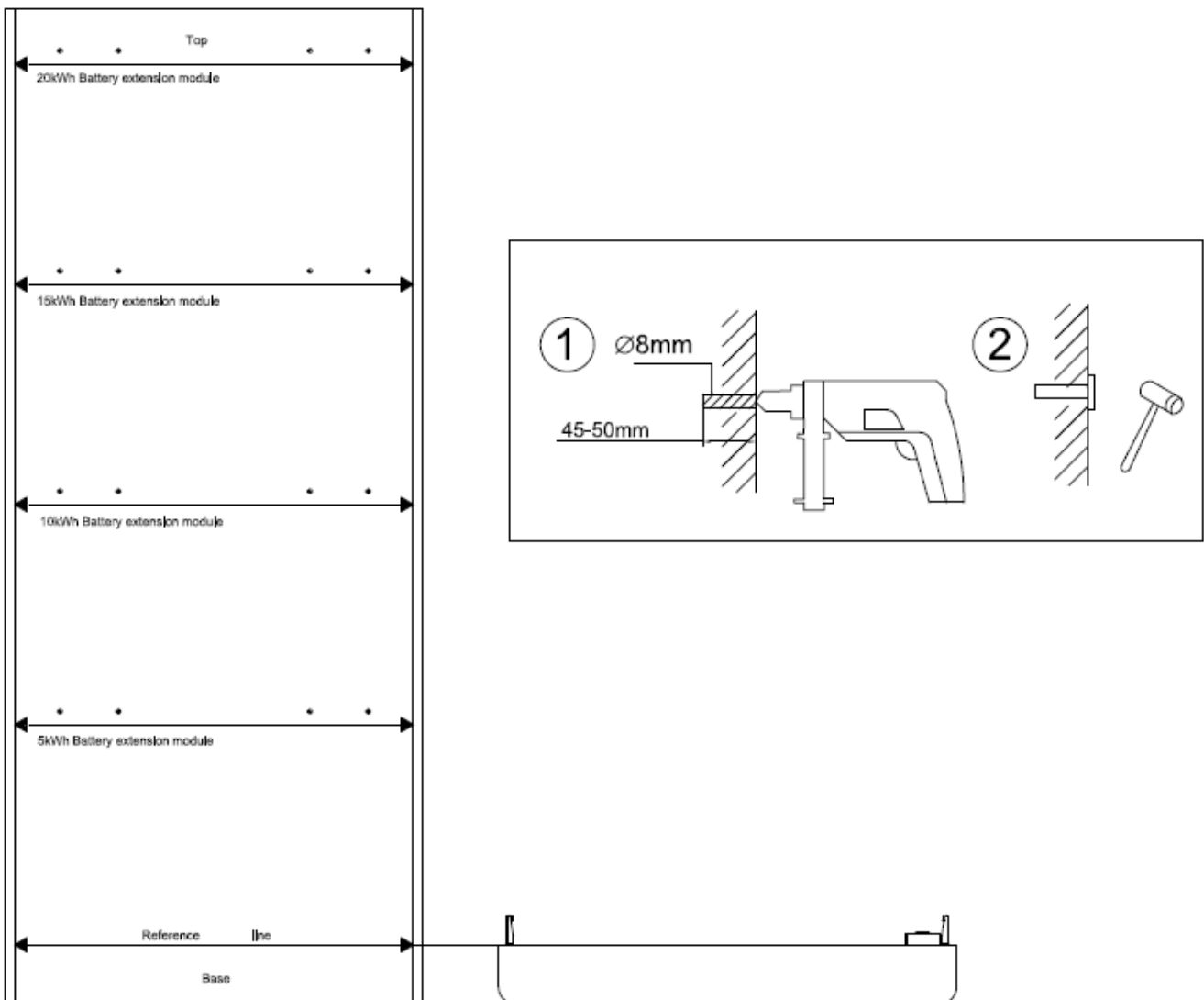


Figure 3-8 Drill correct number of holes

- Two people jointly lift the battery extension module, align the battery extension module interface with the base and place it on the base.

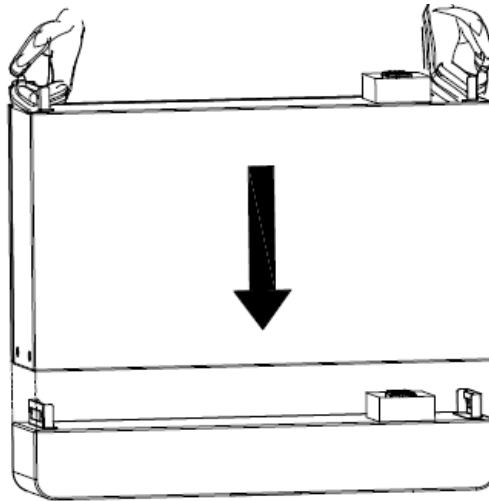


Figure 3-9 Position battery extension module on of base

- Lock screws into screw holes on both sides of the battery extension module, to ensure extension module is securely installed on the base; fasten wall anchor on the battery extension module, and then fasten it on the wall. Similarly, install other battery extension modules in turn and fasten them.

Tools: M4x10 combination screw, M4x10 countersunk head screw, $\Phi 8 \times 40$ tapping screws, M4 torque screwdriver.

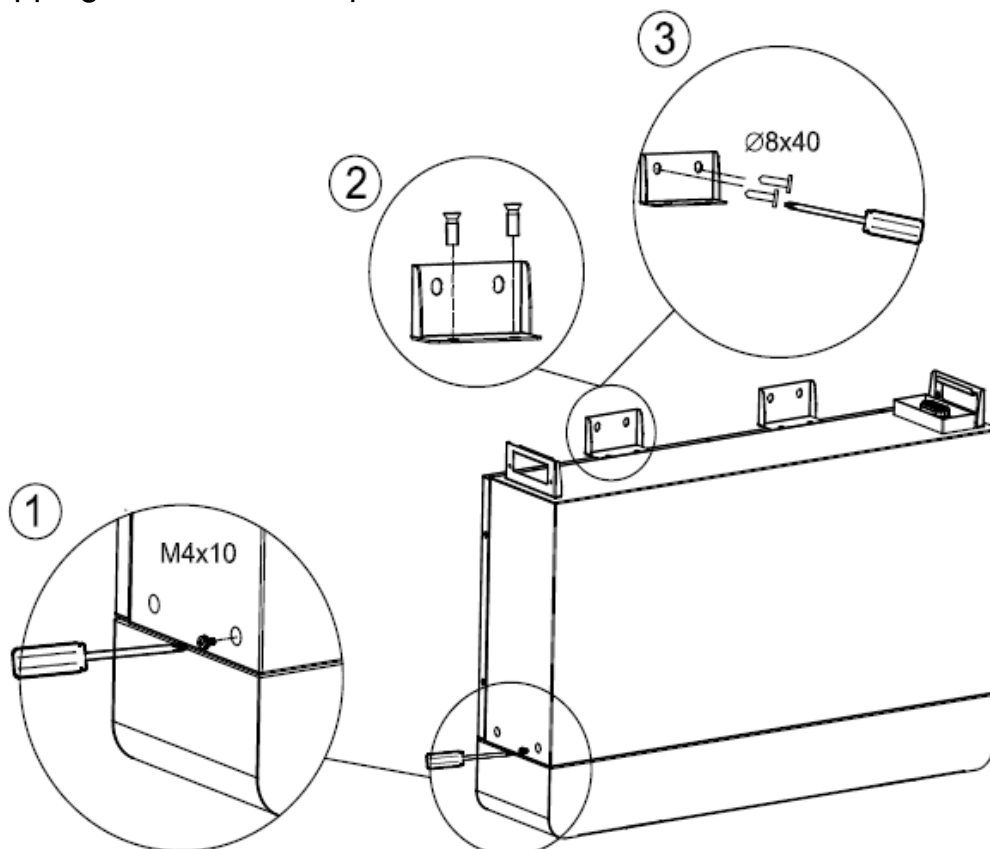


Figure 3-10 install battery extension Module

4. Fasten power control module onto the battery extension module.

Tools: M4x10 combination screw and M4 torque screwdriver

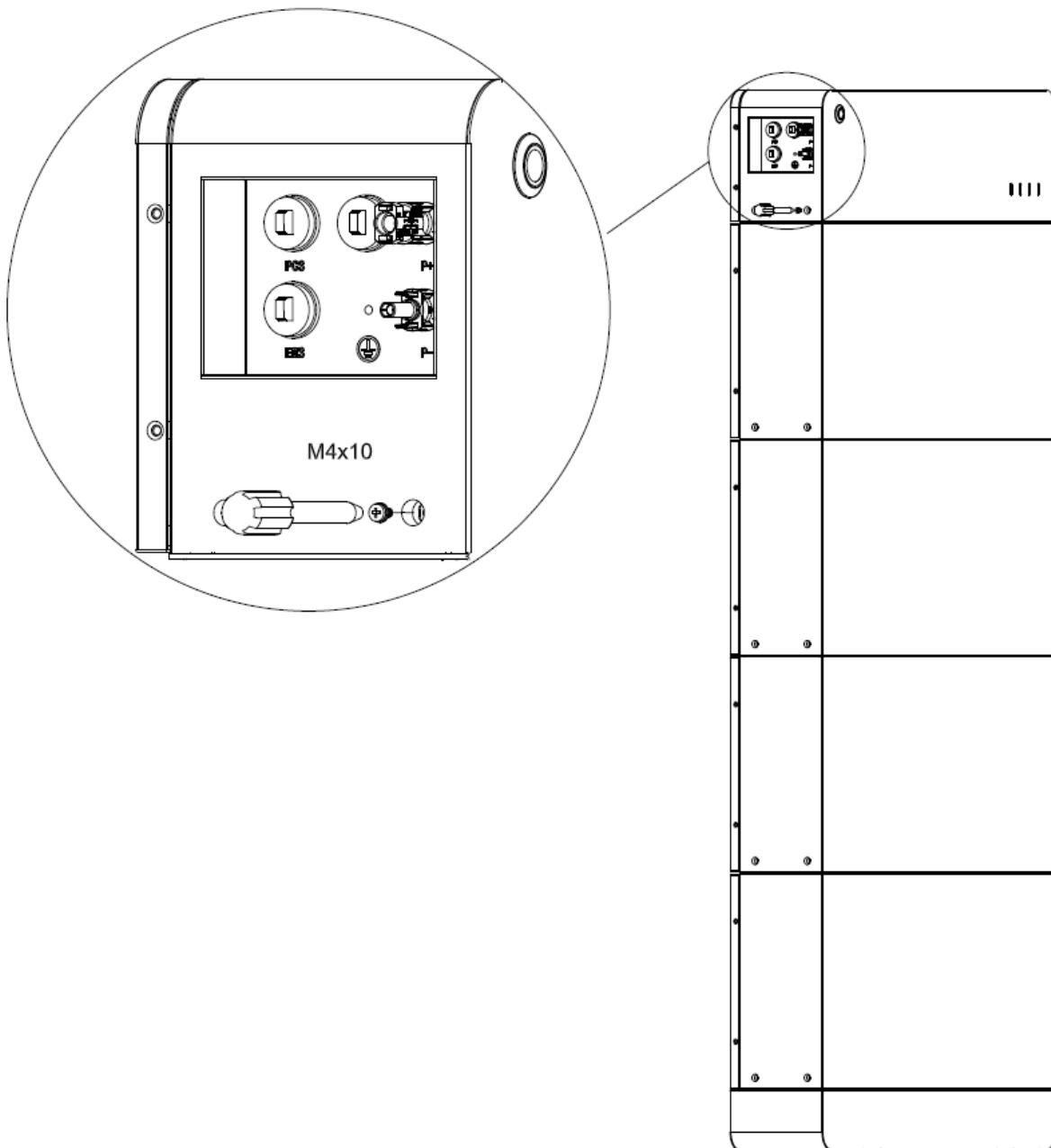


Figure 3-11 Installation of Power control module

NOTICE!



- When installing a battery extension module, screws must be installed on its left and right sides at first, the wall anchors must be locked on the wall with tapping screws, and then the next battery extension module can be installed.
 - In order to prevent damage caused by equipment toppling, the installation floor must be level and free of foreign objects.
-

5. Insert dust plugs into all the screw holes as showed, repeat this operation on the oppsite side till all the scew holes are plugged up.

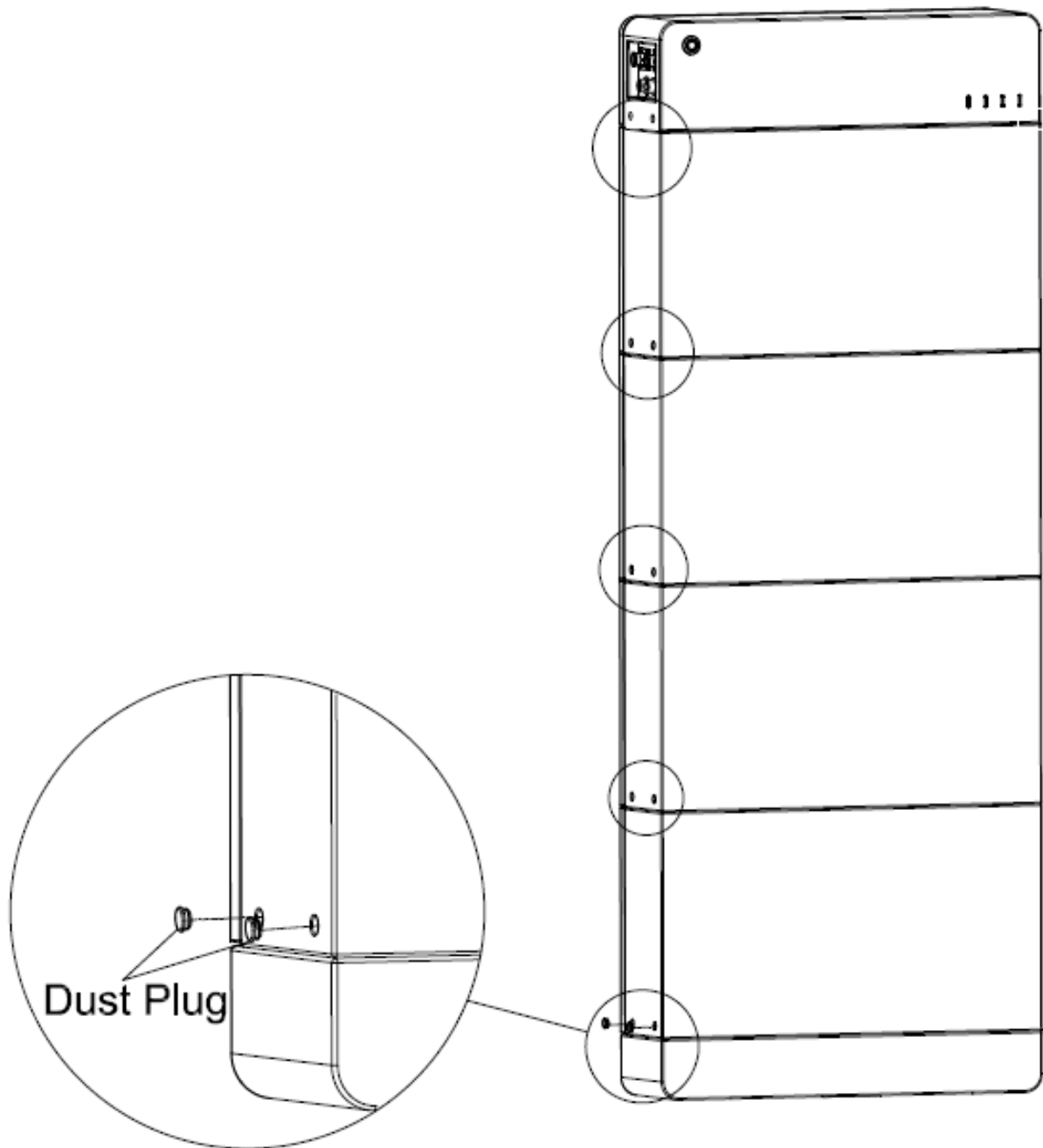


Figure 3-12 Insert dust plugs

3.5.2 Wall-bracket Installation

1. Make sure the installation position is level with a level ruler at first, and then mark the hole positions on the structure wall according to the dimensions of the wall bracket. Drill holes at the marked positions, knock external steel pipe of M12X100 expansion screws into wall, and then fix the wall bracket on the wall with M12X100 expansion screws.

Tools: marker, electric drill (with $\Phi 16\text{mm}$ drill bit), rubber mallet and #19 socket wrench.

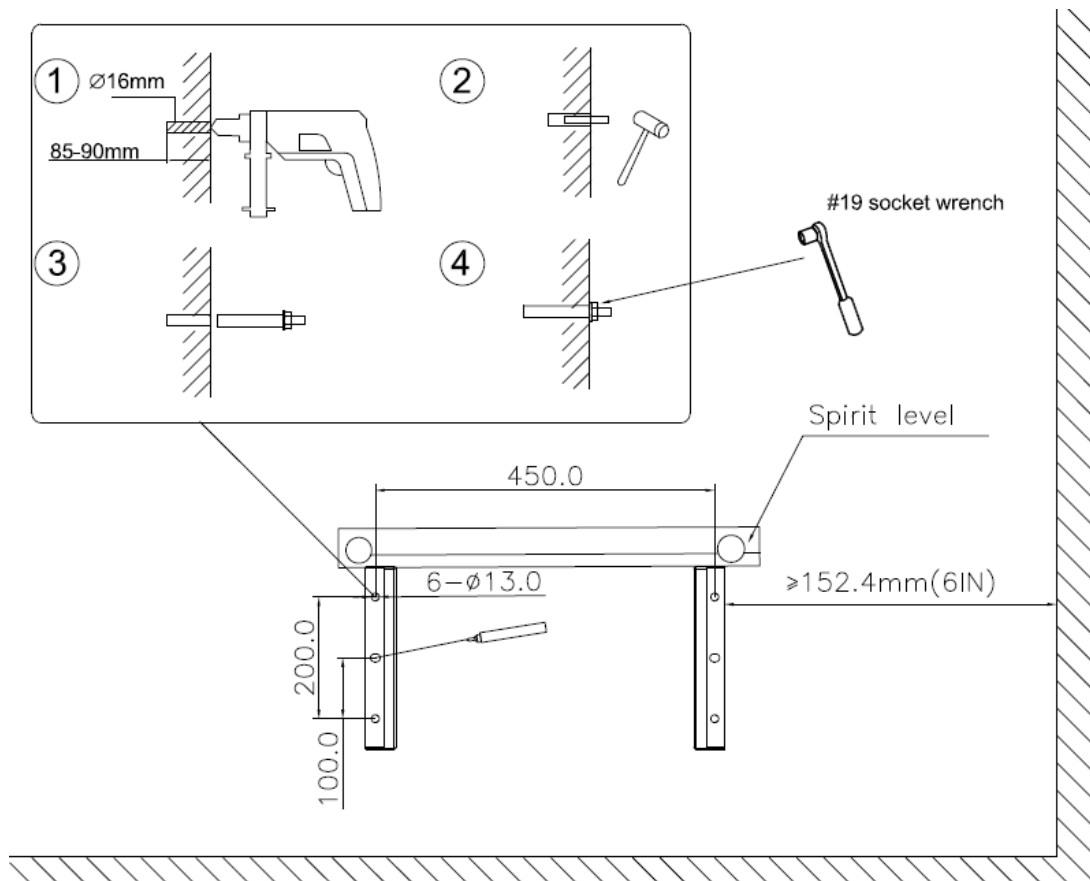


Figure 3-13 Mounting Hole Positions of Wall Bracket

2. Secure the base to the wall bracket.

Tools: M8x16 cross outer hexagon triple combination screw and #14 socket wrench.

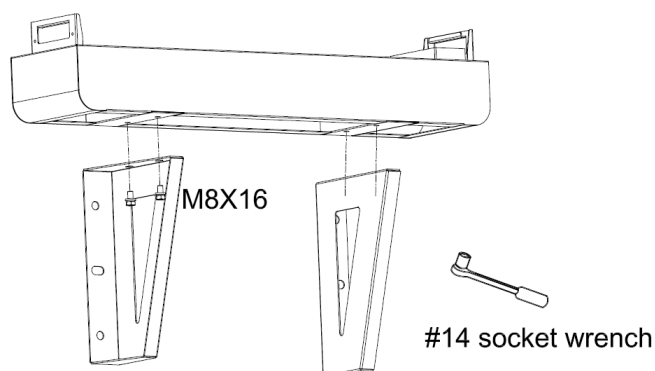


Figure 3-14 Fixing of Base to Wall Bracket

3. Finish all the subsequent steps by referring to the procedures of floor installation.

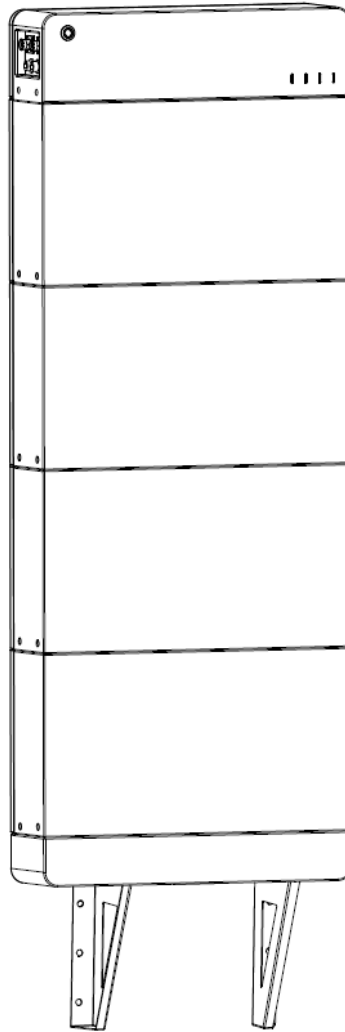


Figure 3-15 Installation finish drawing

Notice!



- The battery extension module weighs about 56 kg (≈124 lbs). Check the wall bracket again before hanging the battery unit to ensure that the wall bracket is firmly fixed on the support structure and locked with the base. Considering the weight of the machine, it is recommended that at least 2 people install it together (it is not recommended that the battery unit with 3 or more battery extension modules is installed with wall-bracket).
- When installing a battery extension module, screws must be installed on its left and right sides at first, the wall anchors must be locked on the wall with tapping screws, and then the next battery extension module can be installed.

4 Electrical Connection



CAUTION!

Cable connections must comply with national electrical standards and all other applicable codes or legal standards.

4.1 Cable specification

| Name | Type | Outer Diameter (mm) | Cross-sectional Area of Wire (mm ²) |
|-----------|--------------------------------------|---------------------|---|
| DC cable | Silicon wire, 600V, 6mm ² | 5-6 | 6 |
| GND cable | 10 AWG, yellow-green wire | / | 2.5 |
| COM cable | CAT5e shielded twisted pair | / | 0.5 |

Table 4-1 Cable Specifications

4.2 Tools and torques

| No. | Tool | Purpose | Torque |
|-----|-----------------|-------------------------|-------------|
| 1 | M4 screwdriver | Locking grounding cable | 1.4~1.8 N.m |
| 2 | Diagonal pliers | Cutting cables | - |
| 3 | Wire stripper | Stripping cables | - |
| 4 | Crimping pliers | Crimping terminals | - |

Table 4-2 Tools and Torques Required

4.3 External wiring ports

The external wiring ports of the energy storage battery unit is shown in the following figure:

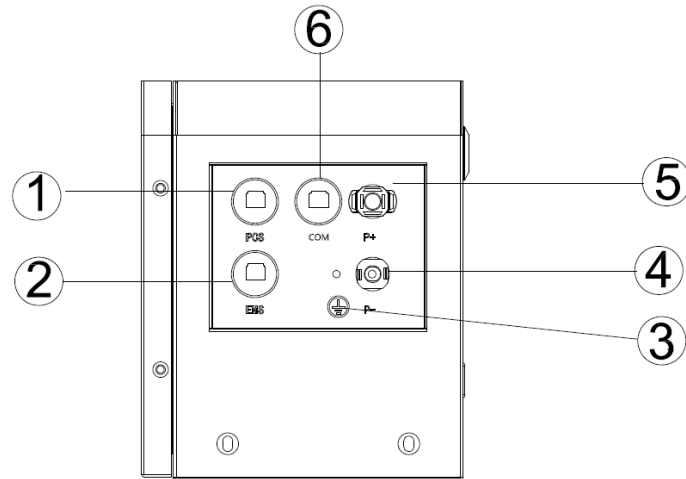


Figure 4-1 External Wiring Ports

| No. | Name | Function |
|-----|--|-------------------------------------|
| 1 | PCS communication port | Communicate with PCS |
| 2 | EMS communication port | Communicate with EMS |
| 3 | Grounding terminal | Connect to external Grounding point |
| 4 | DC output negative quick-plug terminal | Connect negative power cable |
| 5 | DC output positive quick-plug terminal | Connect positive power cable |
| 6 | Extension COM OUT | Extension communication |

Table 4-3 External Wiring Ports of Energy Storage Battery Unit

4.4 Wiring instructions



NOTICE

Read the technical data in Chapter 8 carefully before wiring.



DANGER!

Before making an electrical connection, ensure that the "circuit breaker" of the energy storage battery unit and all switches connected to the energy storage are in the "OFF" state.



WARNING!

- Equipment damage caused by incorrect wiring is not covered by the equipment warranty.
- The relevant operations of electrical connection must be carried out by professional electricians.
- Operators must wear protective gears when making electrical connections.

4.4.1 Grounding cable connection



DANGER!

Confirm that the protective grounding cable is reliably connected. Disconnection or looseness may cause electric shock.

Connect the grounding cable according to the following steps and the figure:

1. Connect the grounding point of the power control module to external grounding point with grounding cable..
2. After connecting the grounding cable, tighten the compression nut of the cable fastening head.

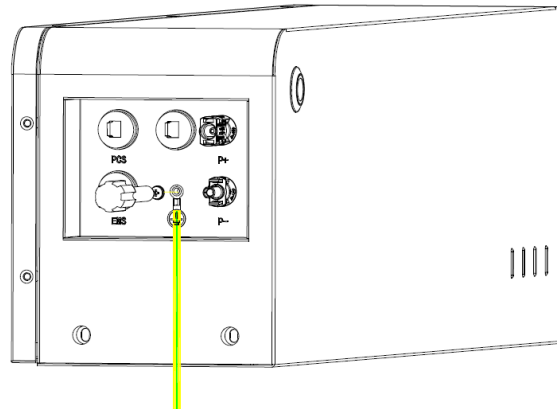


Figure 4-2 grounding



IMPORTANT!

After installing the grounding cable, apply silicone adhesive or paint on the outside of the grounding terminal for protection.

4.4.2 Communication line and Power line connection

NOTICE



- When arranging the signal cable, make sure to separate the routing of the signal cable from that of the power cable, and avoid large interference sources during routing, so as not to affect the communication due to signal interference.
- The length of DC input line and signal line between energy storage unit and inverter shall be $\leq 10\text{m}$.

There are two communication ports on the battery side, namely COM port and PCS port. The PCS port is used for communication with the inverter. The COM port is used for communication between battery extension modules when multiple energy storage battery units are connected in parallel, in which the COM port of one battery unit connects with the PCS port of its next cascade battery unit;

Connect communication cable and power line cable as showed below.

For more than one battery unit, turn DIP switch of any one battery unit to “O” as Master, then turn DIP switches of other battery units to “I” or “II” as Slave.

Note: Do not turn both DIP switches to “I” or “II”.

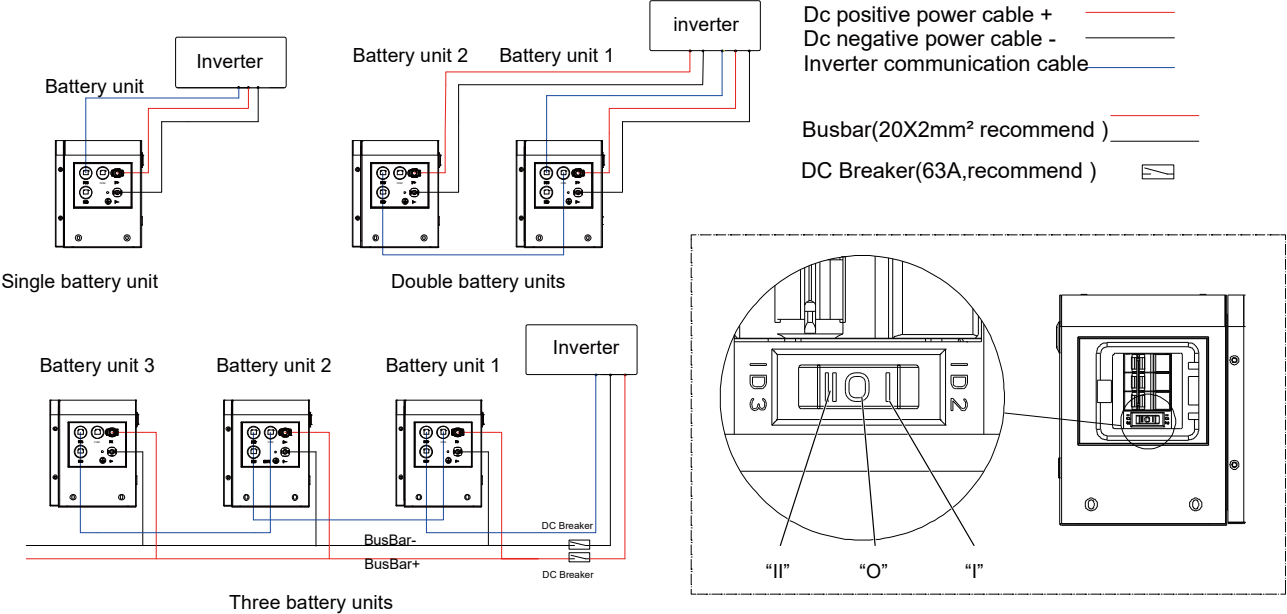


Figure 4-3 Communication and power line connection diagram

1. Insert communication cable to BMS port of inverter and PCS ports of battery unit as below.

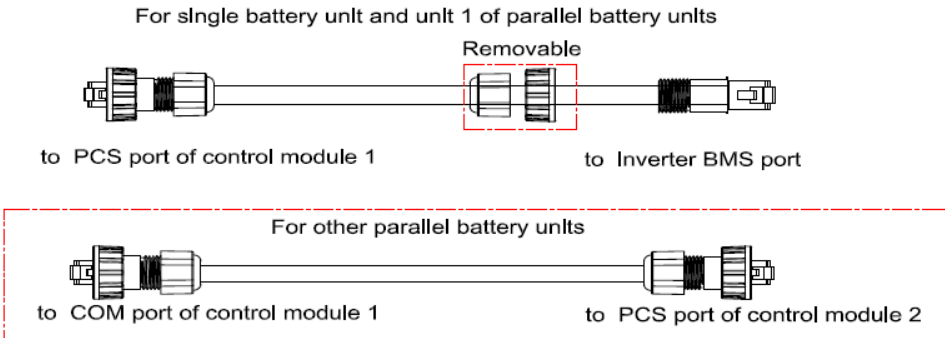


Figure 4-4 communication cable connection

2. Identify carefully cable stickers on Positive and Negative power output lines. Insert quick-plug connector (left) of cable into PV connector of inverter.

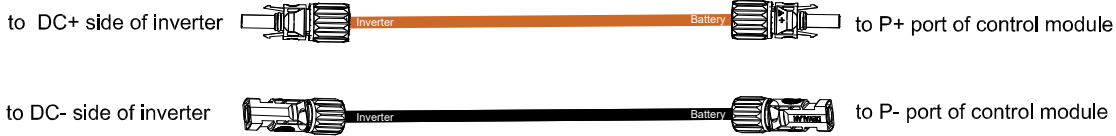


Figure 4-5 crimp OT terminal

3. Insert DC positive quick-plug connectors and DC negative quick-plug connectors of the power output line into the P+ port and P- port of power control module correctly.

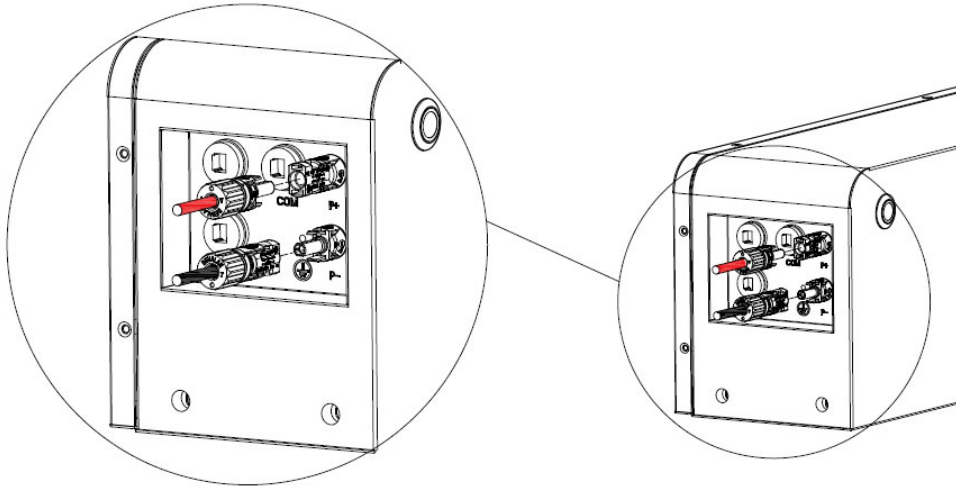


Figure 4-6 Insert power output line to power control module



NOTICE

Adjust cable length to ensure that the power output line does not generate significant tension on the connector, to prevent poor contact.

4. To disconnect the power output line, use removal tool to press indicated snap on the quick-plug connector, and pull out the connector with a slight force.

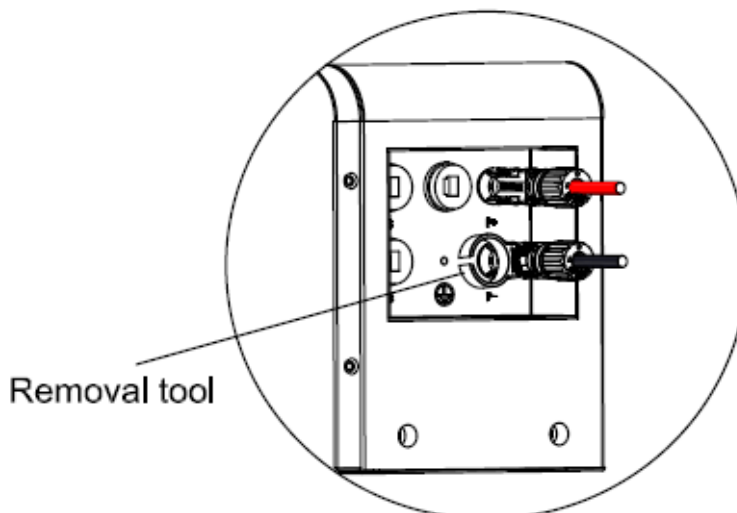


Figure 4-7 Unplugging Cable Connector

5 Trial Operation

WARNING!



Before trial operation, please follow the following guidelines to eliminate hidden dangers and ensure safety.

5.1 Installation check

Perform the following checks with reference to Section 3.5 Installation methods:

- Confirm that the support structure is firm and reliable.
- Confirm that all mounting screws have been tightened according to the specified torque.

5.2 Inspection items of cable

Perform the following inspections with reference to Section 4 Electrical

Connection connection:

- Confirm that all cables are connected firmly and reliably, and there is no wrong connection or missing connection.
- Confirm that all cables are placed properly and will not be damaged mechanically.
- Confirm whether the positive and negative polarities of the DC cable on the input side are correct.
- Confirm that the circuit breaker and all switches connected to the energy storage are in the "OFF" state.
- Confirm that the ground wire is connected correctly, firmly and reliably.
- Confirm that the installation space is reasonable, the environment is clean and tidy, and there is no construction residue.

5.3 Startup process

Before trial operation, the above inspection must be completed to confirm that there is no error, and then the inverter shall be put into trial operation according to the following steps.

5.3.1 General startup process

1. Close DC Breaker (if any) configured between inverter and battery unit.
2. Turn on the circuit breaker of power control module.
3. Turn on the inverter.
4. Power on the energy storage battery unit (Shortly press the ON/OFF button for 1 second).

5.3.2 Black start process

Black start means that after the whole power grid is shut down due to failure, the system is completely powered off and in a completely "black" state. At this time, through the start-up of the units with self-start capability in the system and the external power supply, the units without self-start capability are driven, and the recovery and power supply of the whole system are finally realized.

1. Close the circuit breaker on the DC side of the inverter and the DC breaker between the inverter and the battery unit.
2. Press the ON button for 1 second, observe the status lamp of the energy storage battery unit and check the operation state. After the inverter is started, the battery unit will operate normally.

5.4 Shutdown process

System power-off steps:

1. Turn off the inverter.
2. Power off the energy storage battery unit.
3. Turn off the circuit breaker of power control module.
4. Open DC breaker (if any) configured between inverter and battery unit.

6 Storage and Recharging

6.1 Battery storage requirements

During storage, the battery shall be placed correctly according to the identifiers of the packing box, and shall not be placed upside down or sideways.

When the battery packing boxes are stacked, the stacking requirements on the outer packaging shall be met.

1. The battery shall be handled with care. It is strictly prohibited to damage the battery.
2. Requirements for storage environment:
 - Ambient temperature: $-10^{\circ}\text{C}\sim 55^{\circ}\text{C}$, recommended storage temperature: $20^{\circ}\text{C}\sim 30^{\circ}\text{C}$.
 - Relative humidity: 5%RH~80%RH.
 - Dry, ventilated and clean.
 - Avoid contact with corrosive organic solvents, gases and other substances.
 - Avoid direct sunlight.
 - The distance from the heat source shall not be less than two meters.
3. During storage, the battery must be disconnected from the external connection. If there is an indicator on the battery panel, the indicator shall be off.
4. The warehouse keeper shall make monthly statistics on the battery storage, regularly report the battery inventory to the planning management team, and timely arrange recharging for batteries that have been stored for nearly 6 months.
5. When the stored batteries are shipped, the principle of FIFO (First in First out) should be followed.
6. After the battery production test is completed, it needs to be recharged to a minimum of 60% SOC before storage.

6.2 Recharging cycle and requirements

In principle, it is not recommended to store the battery for a long time. Long-term deep discharge will cause battery damage, so it shall be used in time. Stored batteries shall be recharged according to the following temperature and cycle requirements.

Table 6-1 Recharging Cycle

| Storage temperature range | Actual storage temperature | Recharging Cycle | Remarks |
|---------------------------|----------------------------|------------------|---|
| -10°C < T ≤ 45°C | T ≤ -10°C | Not allowed | Within the recharging cycle: <ul style="list-style-type: none"> No treatment is required, and it shall be used as soon as possible; Recharge in time when it's time to recharge; The total storage time shall not exceed the maintenance period. |
| | -10°C < T ≤ 45°C | 6 Months | |
| | 45°C < T | Not allowed | |

The requirements for recharging are as follows:

1. Before the battery is recharged, the appearance of the battery needs to be inspected, and only the qualified battery can be recharged. If the battery is deformed, damaged or leaking, it shall be scrapped directly, storage and recharging shall not be considered.
2. The storage time is calculated from the latest charging time marked on the recharging label on the battery external package. After the battery is recharged to the standard, the latest charging time and the next charging time (next charging time = latest charging time + recharging cycle) on the recharging label shall be updated.
3. When the batteries are during storage, the maximum allowable recharging time is 3. For example: recharging once every 6 months, with a maximum of

3 times allowed. It is recommended that the battery be scrapped if the maximum allowable period and times are exceeded.

Note:

- Long-term storage of lithium batteries will cause capacity loss. After lithium batteries are stored at the recommended storage temperature for 6 months, the irreversible capacity loss is generally 3%~8%. If the customer carries out the discharge test and acceptance according to the specification, there is a risk that the battery whose storage capacity is less than 100% of the rated capacity will fail the test.
- The after-sales service personnel must be contacted to complete the recharging operation.

6.3 Recharging operation

It can provide 5kW power to charge the battery through the supporting inverter, and support the simultaneous recharging of 1 recharge unit (support 2 battery extension modules under standard conditions, and support up to 4 battery extension modules. However, recharging over 2 battery extension modules is not recommended);

**NOTICE**

- The max. voltage of PV side is 1000V (overvoltage category: II);
 - The max. voltage of AC side is 400V (overvoltage category: III).
-

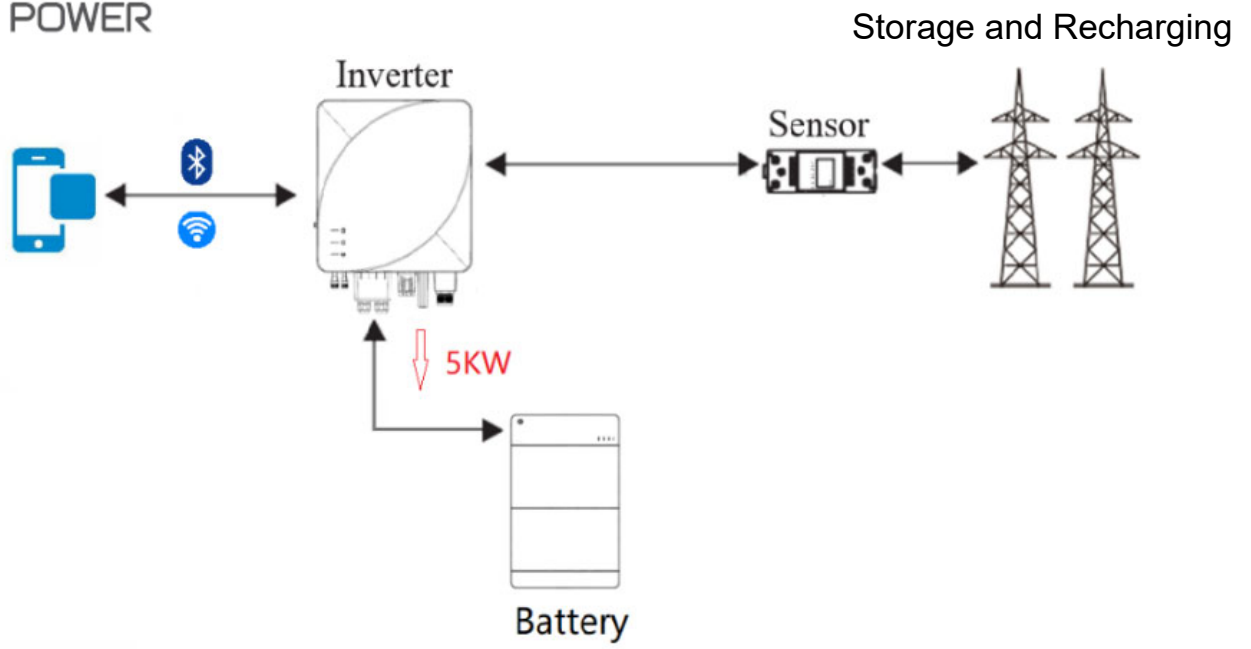


Figure 6-1 Single-phase Electricity Recharging Scenario

6.4 Battery power-on and commissioning steps

NOTICE!



- The charging process must be monitored by someone on site to prevent abnormal phenomena.
 - If abnormalities such as bulging and smoking occur during charging, stop charging immediately and scrap the battery directly.
 - The recharging operation must be carried out by professionals with trained skills.
 - After the energy storage switch is closed, power on the inverter. Refer to the quick guide of the corresponding model for the power-on steps of the inverter.
 - When SOC of the battery is 0%, the energy storage battery unit cannot be activated by long pressing the black start button, and the energy storage battery unit can only be started after the DC and AC of the inverter are powered on.
 - During recharging, SOC of the battery is recommended to be recharged to 60%.
-

The battery power-on and commissioning steps are as follows:

1. Close DC Breaker (if any) configured between inverter and battery unit.
2. Close the circuit breaker of power control module.
3. Turn on the inverter.
4. Power on the energy storage battery unit (Shortly press the ON/OFF button for 1 second).
5. Make use of inverter to discharge the energy storage battery unit with 0.5*charging rate until the battery reaches low voltage protection
6. Make use of inverter to charge the energy storage battery until the SOC of battery unit reaches 60%.
7. Power off the inverter and battery unit by referring to the section 5.4 shutdown process.

7 Maintenance and Replacement

WARNING!

- Before starting product maintenance, it is necessary to stop running the inverter and disconnect the AC circuit breaker connected to the power grid and the PV input connection on the DC side.
- During the operation of the energy storage battery unit, if only the circuit breaker of the energy storage battery unit is disconnected, the system cannot be completely powered off. At this time, the energy storage cannot be maintained.
- After the system is powered off, there is still residual electricity and heat in the chassis, which may cause electric shock or burns. Therefore, after the system is powered off for 5 minutes, wear protective gloves before operating the energy storage system. Ensure that all the indicators of the energy storage are off, and then the maintenance operation of the energy storage can be carried out.
- The maintenance instructions described in this manual are only applicable to qualified maintenance personnel.
- To reduce the risk of electric shock, do not carry out other maintenance operations other than those specified in this manual unless you are explicitly authorized and qualified for maintenance.



7.1 Maintenance precautions

You can use ladders to remove power control module or battery expansion unit if it's necessary, as shown below.

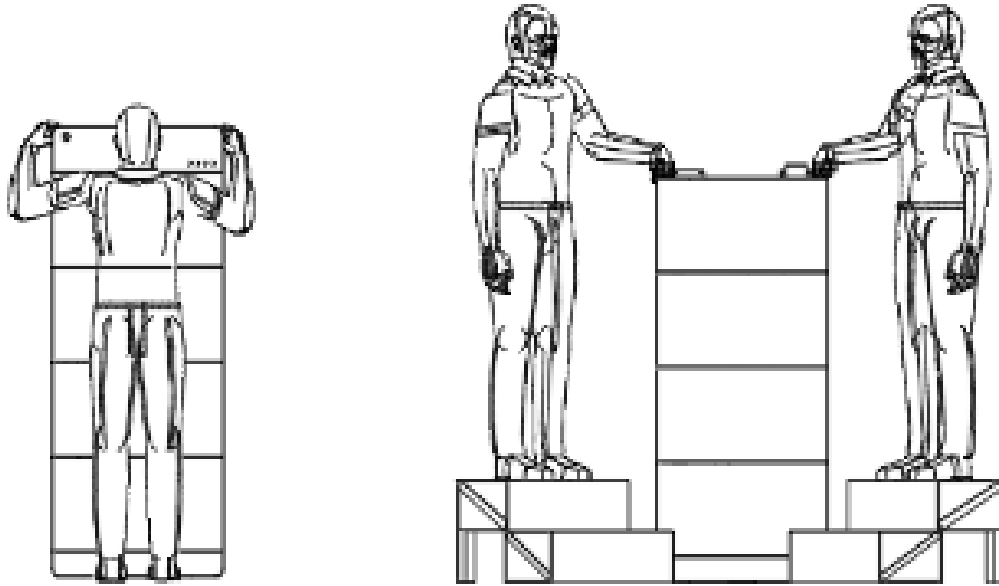


Fig. 7-1 Remove power control module or battery expansion unit.

Please follow the following precautions if you need to use ladders to remove power control module or battery expansion unit.

- Wooden or fiberglass stairs should be used when electric climbing operations may be involved.
- Before using the ladder, ensure that the ladder is in good condition and meets the required load weight. Overweight is prohibited.
- When using a ladder, the wide foot of the ladder should face down, and adopt protective measures at the bottom of the ladder to prevent slipping.
- The ladder should be placed in a stable place.
- Someone must hold the ladder when working.
- When climbing the ladder, keep your body steady and ensure that your weight does not deviate from the edge of the ladder, to ensure safety.

7.2 Maintenance items and cycle

To ensure the long-term good operation of the energy storage battery unit, it is recommended to carry out routine maintenance according to the table below.

| Contents | Inspection Method | Maintenance Cycle |
|----------------------------------|--|---|
| System cleaning | Regularly check whether the cooling fins are covered with dust and dirt. | Once half a year to once a year. |
| System operation state indicator | <ul style="list-style-type: none"> Observe whether the appearance of energy storage is damaged or deformed. Listen for any abnormal sounds during the operation of the energy storage. During energy storage operation, check whether the parameters of energy storage are set correctly. | Once half a year |
| Electrical connection | <ul style="list-style-type: none"> Check for fall-off or looseness of the cable connection. Check whether the cable is damaged, focusing on checking whether the skin of the cable in contact with the metal surface is cut. Check whether the unused DC input terminal, energy storage terminal, COM interface and waterproof cover are locked. | Half a year after the first commissioning, and once half a year to once a year thereafter |
| Grounding reliability | Check whether the ground cable is reliably grounded. | Half a year after the first commissioning, once every half a year to a year. |

Table 7-1 Maintenance List

7.3 Fault List

7.3.1 Troubleshooting of LED indicator

| LED Fault Status | Troubleshooting |
|---|--|
| All indicators are off. | <ol style="list-style-type: none"> 1. Turn the circuit breaker to the "OFF" position 2. Click the ON button and observe the indicator status |
| The operation state lamp is off or the alarm lamp is on | See Table 7-3 for troubleshooting |

Table 7-2 LED Indicator Fault

7.3.2 List of faults

When the energy storage battery unit fails, such as output short circuit, battery overvoltage, battery undervoltage, temperature too high, temperature too low, differential pressure too large, and internal fault of the machine, the energy storage battery unit will automatically stop.

Before contacting the after-sales service, you can quickly locate the cause of the fault according to the faults listed in Table 7-3 and Table 7-4, and handle it according to the recommended treatment. There are three main fault types: alarm, protection and fault, as shown in the following table.

Remote monitoring of battery status is achieved via inverter monitoring app.

| Faults | Causes | Troubleshooting |
|-------------------------|---|---|
| Alarm indicator flashes | Cell voltage is below the undervoltage protection threshold | <ol style="list-style-type: none"> 1. This alarm indicator reminds that battery is almost discharged, which can return to normal automatically after recharging. 2. If the battery is low for a long time, user should stop discharging and arrange for charging. |
| | Cell voltage exceeds over- | <ol style="list-style-type: none"> 1. This alarm indicator reminds that battery is fully charged, which can return to normal automatically. |

| | | |
|--------------------------------------|---|---|
| | voltage protection threshold | 2. If the battery is high for a long time, the user should stop charging and arrange for discharge. |
| | Battery temperature is higher than temperature protection upper limit | <p>1. This alarm indicator reminds that battery temperature is too high, which can return to normal automatically after temperature is normal.</p> <p>2. Users should check if there is heating source in the battery environment, and remove it if any;</p> <p>3. Check the inverter charging and discharging data to see if there are any faults in the inverter;</p> <p>4. If protection occurs multiple times, contact service personnel for maintenance and troubleshooting.</p> |
| | Battery temperature is lower than temperature protection lower limit | <p>1. This alarm indicator reminds that battery temperature is too low, which can return to normal automatically after temperature is normal.</p> <p>2. Check whether battery environment meets the installation requirements;</p> <p>3. If protection occurs many times, contact service personnel for maintenance and troubleshooting;</p> |
| Alarm indicator stays on and flashes | Shut down due to malfunctions | <p>1. This alarm indicator reminds that battery shuts down due to malfunctions, users can find the problem based on the number of flashes and the corresponding fault list in the user manual.</p> <p>2. Restart the unit to confirm if the fault phenomenon eliminates.</p> <p>3. If faults cannot be eliminated, user should stop using and contact service personnel to repair inverter and battery unit.</p> |

Table 7-3 Fault Information

| Code | Fault Type | Failure Causes |
|----------|--------------------------------|---|
| Flash 1 | Circuit breaker disconnection | Tripped level 3 overcurrent, relay sticking |
| Flash 2 | Voltage difference excessive | The difference between the highest and lowest battery voltage exceeds the set threshold |
| Flash 3 | Battery failure | There is a module dropout or the total pressure collected at both ends of the battery and the sum of all battery voltages exceeds the set threshold |
| Flash 4 | Slave failure | BSU (Battery Management System) fails |
| Flash 5 | Cell overvoltage | The highest cell voltage exceeds the set threshold |
| Flash 6 | Cell undervoltage | The lowest cell voltage exceeds the set threshold |
| Flash 7 | High temperature excessive | The highest temperature exceeds the set threshold |
| Flash 8 | Low temperature excessive | The lowest temperature exceeds the set threshold |
| Flash 9 | Overcurrent excessive | The current exceeds the set threshold |
| Flash 10 | PCS communication interruption | No communication with the PCS (Power System Communication), unable to effectively control and manage |
| Flash 11 | Output current too high | The current exceeds the system allowable value, potentially affecting the safe operation of equipment |
| Flash 12 | Insulation failure | There is a leakage between the battery and the shell, which may pose a safety hazard |
| Flash 13 | EEPROM failure | The storage chip of BMU (Battery Management Unit) fails, affecting the accuracy of data reading and processing |
| Flash 14 | Other failures | - |

Table 7-4 Fault Code list

8 Technical Data

| Model | CPS ESSR-05KH1 | CPS ESSR-10KH1 | CPS ESSR-15KH1 | CPS ESSR-20KH1 |
|----------------------------------|-------------------|-------------------|-------------------|-------------------|
| System Parameters | | | | |
| Power Control Module | CPS ECD500 | CPS ECD500 | CPS ECD500 | CPS ECD500 |
| Battery Extension Module | CPS EBM032050LF-H | CPS EBM032050LF-H | CPS EBM032050LF-H | CPS EBM032050LF-H |
| Rated Voltage (V) | 102.4 | 204.8 | 307.2 | 409.6 |
| Operating Voltage Range (V) | 89.6~115.2 | 179.2~230.4 | 268.8~345.6 | 358.4~460.8 |
| Max Charge/Discharge Current (A) | 40 | 40 | 40 | 40 |
| Peak Current (A) | 45 | 45 | 45 | 45 |
| Peak Time (S) | 10 | 10 | 10 | 10 |
| Max Power (kW) | 4.0 | 8.1 | 12.2 | 16.3 |

| | | | | |
|-------------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Rated Charge/Discharge Energy (kWh) | 5.12 | 10.24 | 15.36 | 20.48 |
| Useable Battery Energy (kWh) | 5.12 | 10.24 | 15.36 | 20.48 |
| DOD | 100% | 100% | 100% | 100% |
| Weight (kg) | 75 | 131 | 188 | 244 |
| Dimension (W*D*H, mm) | 770*178*680 | 770*178*1040 | 770*178*1400 | 770*178*1760 |
| Product Parallel Extension (kWh) | Up to 61.44kWh | Up to 61.44kWh | Up to 61.44kWh | Up to 61.44kWh |
| Operating Temperature (°C) | Charge&Discharge: -10~50 | Charge&Discharge: -10~50 | Charge&Discharge: -10~50 | Charge&Discharge: -10~50 |
| Working Humidity | 5~95% | 5~95% | 5~95% | 5~95% |
| Protection | IP65 | IP65 | IP65 | IP65 |
| EOL | 70% | 70% | 70% | 70% |
| Communication | CAN | CAN | CAN | CAN |

| | | | | |
|-------------------------------------|---|---|---|---|
| Certificates | IEC 62619, IEC 63056, IEC 62040-1, IEC 62477-1, CE EMC, VDE 2510-50, UKCA, UN38.3 | IEC 62619, IEC 63056, IEC 62040-1, IEC 62477-1, CE EMC, VDE 2510-50, UKCA, UN38.3 | IEC 62619, IEC 63056, IEC 62040-1, IEC 62477-1, CE EMC, VDE 2510-50, UKCA, UN38.3 | IEC 62619, IEC 63056, IEC 62040-1, IEC 62477-1, CE EMC, VDE 2510-50, UKCA, UN38.3 |
| Installation | Floor Mount & Wall Mount | Floor Mount & Wall Mount | Floor Mount & Wall Mount | Floor Mount & Wall Mount |
| Cooling | Natural | Natural | Natural | Natural |
| Altitude | ≤3000 | ≤3000 | ≤3000 | ≤3000 |
| Black Start Mode | Yes | Yes | Yes | Yes |
| Sleep Mode | Yes | Yes | Yes | Yes |
| Pack Fire Control | Optional | Optional | Optional | Optional |
| Battery Extension Module | | | | |
| Module | CPS EBM032050LF-H | | | |
| Rated Charge/Discharge Energy (kWh) | 5.12 | | | |
| Dimension | 770*178*410 | | | |

| | |
|----------------------------------|-------------|
| (W*D*H, mm) | |
| Weight | 56 kg |
| EOL (%) | 70 |
| Warranty (years) | 10 |
| Power Control Module | |
| Model | CPS ECD500 |
| Operating Voltage Range (V) | 80 ~ 500 |
| Max Charge/Discharge Current (A) | 40 |
| Dimension (W*D*H, mm) | 770*178*220 |
| Weight | 13 kg |

9 Quality Assurance

9.1 Immunity from liabilities

1. Exceed the quality assurance period of the product.
2. Cannot provide product serial number or the SN is not clear/complete.
3. Damage during transportation/storage/handling.
4. Misuse, abuse, intentional damage, negligence or accidental damage.
5. Improper commissioning, testing, operation, maintenance or installation performed by customer, including but not limited to:
 - Failure to meet safe operating environment or system requirements of external electrical parameters provided in written document;
 - Failure to operate the covered product in accordance with the product's operating manual or user guide;
 - Relocate and reinstall systems not in accordance with the requirements of Chint power;
 - Unsafe electrical or chemical environment or other similar kind of conditions;
 - Direct failure caused by wrong voltage or faulty power system;
 - Unauthorized disassembly of the products, or unauthorized modification of the product or provided soft-ware;
6. Entrust installation, maintenance personnel not designated by the CHINT to install, repair and disassemble the products;
7. Damages caused by ignoring the safety warnings in the manual or break the rules in relevant statutory safety regulations;
8. Damages caused by operating environment beyond the requirements of the product user manual or failure to commissioning, install, use and maintain the equipment according to the requirements of the product user manual.
9. Unforeseen disasters or irresistible accidents (including but not limited to acts of public enemies, acts of government agencies or domestic or foreign institutions,

vandalism, riots, fires, floods, typhoons, ex-plosions or other disasters, epidemic or quarantine restrictions, labor disturbances or labor shortages, accidents, cargo embargoes or any other events beyond the control of CHINT).

10. The lightning protection measures have not been implemented or are not in accordance with standards (Photovoltaic systems' lightning protection measures should comply with the relevant national and IEC standards; otherwise, it may result in damage to photovoltaic devices such as modules, inverters, distribution facilities, etc., due to lightning strikes).
11. Other circumstances that are not covered by the company's after-sales warranty agreement.
12. Equipment failure or software damage caused by using non-standard components/accessories, connection of incompatible configurations (such as batteries, etc.) or other brand products or accessories without permission, improper configuration selection/storage/use.

9.2 Quality terms

1. For products that fail during the warranty period, our company will repair or replace new products free of charge;
2. Customer shall present the invoice of the product and date of purchase. At the same time, the trademark on the product should be clearly visible, otherwise we have rights to refuse quality assurance.
3. The unqualified product under replacement should be returned to our company;
4. It is necessary to provide a reasonable time for the company to overhaul the equipment.

For more warranty terms, refer to the applicable standard warranty policy in place at time of purchase.

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