

Battery Module User Manual

Product name: wall-mounted-battery module

AMW10240

Version: P1.0

This manual describes the instructions for using the wall/floor-mounted-battery module (AMW10240). Please read this manual before installing the batteries and follow the instructions carefully during installation. If there is any confusion, please contact the manufacturer immediately for advice and clarification.

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Chapter 1 Security Disclaimer

Users must read this chapter carefully and operate it according to the safety precautions required by this chapter before installing, using and repairing the battery. Our company will be responsible for nothing if it happens to any injuries and losses caused by improper operations.

| Attention |
|--|
| It may cause moderate injury or minor injury to human beings, or even damages to product because of the danger caused by failure to operate as requirements. |
| Danger |
| It may cause fire or serious personal injury, or even death because of the danger caused by failure to operate as requirements. |

Chapter 2 Precautions for Safe Use

We feel quite thankful that you choose **AMENSOLAR** products. In order to enable you to use and maintain it in a better way, please kind read this user manual carefully before use.

2.1. Unpacking Examination

- Please don't install the battery if it is found damage or lack of parts. Otherwise, it may be malfunction.
- Please don't install battery and connect with supplier in time if the packing list doesn't same as that of the real one.

2.2. Installation

- The battery is suggested installing by skilled worker or electrician. A skilled worker is defined as a people who had been trained and qualified electrician or had all of the following skills and experience:
 - ✧ Knowledge of the functional principles and operation of on-grid Energy Storage systems.
 - ✧ Knowledge of the dangers and risks associated with installing and using electrical devices and acceptable mitigation methods.
 - ✧ Knowledge of the installation of electrical devices
 - ✧ Knowledge of and adherence to this manual and all safety precautions and best practices.

- Please ensure that the power is cut off before wiring, otherwise, there will be a danger of electric shock or catching fire.
- The installed cables must be meet requirements, and the part of power distribution must comply with safety regulations.
- Please carry out the installation strictly in accordance with the installation steps in the following chapters, otherwise it will cause the damage to product.
- Please lift and put it down gently to avoid hurting feet or damage to product during transportation and installation.
- Please keep battery away from the flammable objects and heat sources.
- Please don't drop any sundries into battery during installation. Otherwise, it may cause system error.

2.3. Working

- Please don't directly plug or unplug the DC input socket or other sockets like the terminal block socket, input socket and output socket to avoid the danger of electric shock.
- Please don't directly open the battery shell to avoid the danger of electric shock.
- Please ensure that the battery will be work within the allowable range before operating to avoid damage to product.
- Please ensure that the battery is fully charged and the power is cut off if it is not used for a long time, avoid to the electricity power is empty due to long-term standing.
- Please charge the battery regularly and disconnect the switch after the charging is completed if the product is not used for a long time.

2.4. Maintenance and Overhaul

- Please ensure to disconnect the DC input, DC output and switch before disassembling the shell, to avoid the danger of electric shock.
- Please don't touch directly the exposed parts of circuit to avoid the danger of electric shock, as there is still residual electricity inside the battery even after the shell is disassembled.
- Please ask the professional personnel to perform the maintenance and overhaul.
- Please don't disassemble the battery by yourself. Otherwise, it may cause product damage and personal injury.

2.5. Transportation

Please avoid strong vibration, falling and bumping during transportation. Don't place the package upside down. Don't lose any accessories and user manual when unpacking package or transporting battery.

Please be careful of your security and avoid hurting yourself in transportation.

2.6. Others

- Please don't modify the system by yourself to avoid happening serious accidents.
- Please immediately cut off the switch and input/output cables if it happens to abnormal conditions inside the system.

2.7. Response to Emergency Situations

The battery is designed with multiple safety strategies to prevent hazards resulting from failures. However, we cannot guarantee their absolute safety for uncertain situations.

2.7.1 Leaking batteries

If the battery pack leaks electrolyte, avoid contact with the leaking liquid or gas. Electrolyte is corrosive and contact may cause skin irritation and chemical burns. If one is exposed to the leaked substance, do these actions:

Inhalation: Evacuate the contaminated area, and seek medical attention immediately.

Eyes contact: Rinse eyes with flowing water for 15 minutes, and seek medical attention immediately.

Skin contact: Wash the affected area thoroughly with soap and water, and seek medical attention immediately.

Ingestion: Induce vomiting as soon as possible, and seek medical attention immediately.

2.7.2 Fire

In case of a fire, make sure that an ABC or carbon dioxide extinguisher is nearby and does not use water to extinguish the fire.

WARNING

The battery pack may catch fire when heated above 130°C.

If a fire breaks out where the battery is installed, do these actions:

1. Extinguish the fire before the battery catches fire.
2. If the battery has caught fire, do not try to extinguish the fire. Evacuate people immediately.

WARNING

If the battery catches fire, it will produce poisonous gases. Do not approach.

2.7.3 Wet battery

If the battery is wet or submerged in water, do not try to access it. Contact your distributor for technical assistance.

2.7.4 Damaged battery

If the battery is damaged, please contact your distributor for help as soon as possible, because a damaged battery is dangerous and must be handled with extreme caution. A damaged battery is not suitable for use and may pose a danger to people or property. If the battery seems to be damaged, return it to your distributor.

CAUTION

A damaged battery might export electrolyte or flammable gas, so contact for advice and information immediately.

2.8. Scrap Battery

For scrap battery(-ies), please treat with local laws or regulations to recycle or scrap.

Chapter 3 Products

The wall/floor-mounted-battery module (AMW10240) is one of the new energy storage products that can be used to support reliable power for various devices and systems. It is especially suitable for high power, limited installation space, restricted load bearing and long cycle life application scenarios. AMW10240 has a built-in BMS battery management system that manages and monitors battery information including voltage, current and temperature. In addition, the BMS can balance the charge and discharge of the battery to extend the cycle life. Multiple batteries can be connected in parallel to expand capacity and power paralleling for greater capacity and longer power support time requirements.

3.1. Characteristic introduction

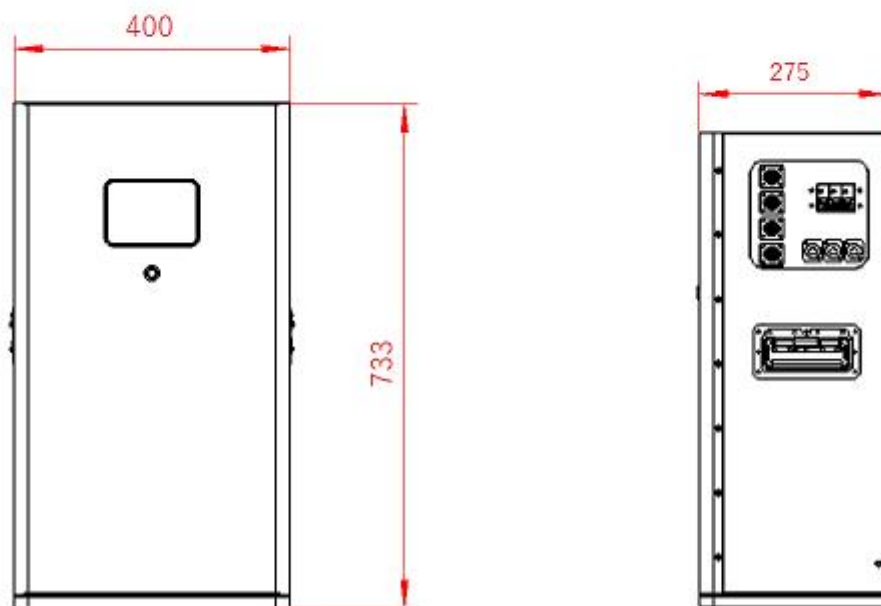
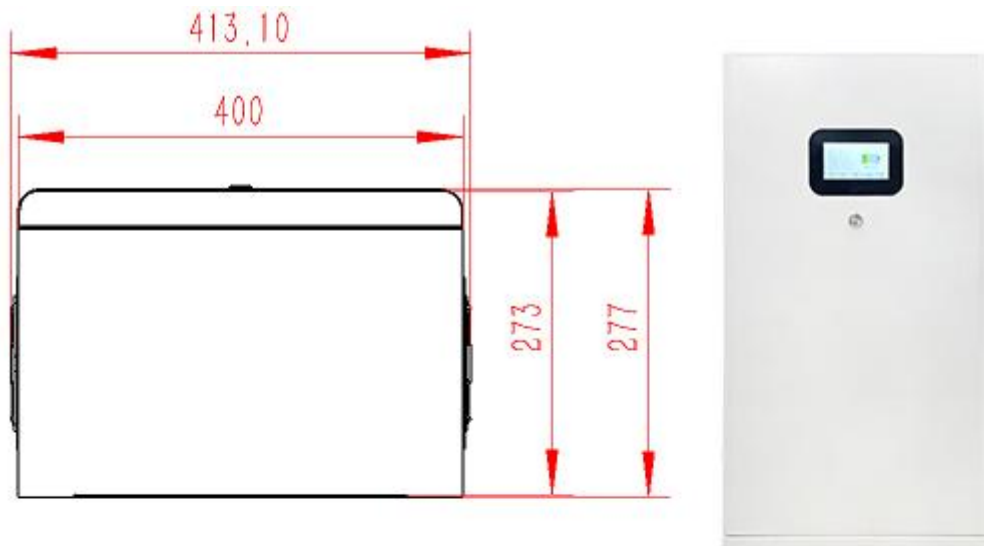
- Battery module using lithium iron phosphate cells, compared with the same size lead-acid battery weight reduced by 40%;
- Exterior wall-mounted structure, which allows the module to be wall-mounted, easy and flexible to maintain, and highly versatile;
- Battery module housing with insulated painted metal sheet metal;
- High-power quick-plug connector for the power output input of the battery module, supporting hot-swapping;
- Battery modules can support up to 16 groups for parallel use, not for series use
- Low self-discharge of the battery module, no memory effect, more excellent performance of shallow charging and discharging;

3.2. Function Introduction

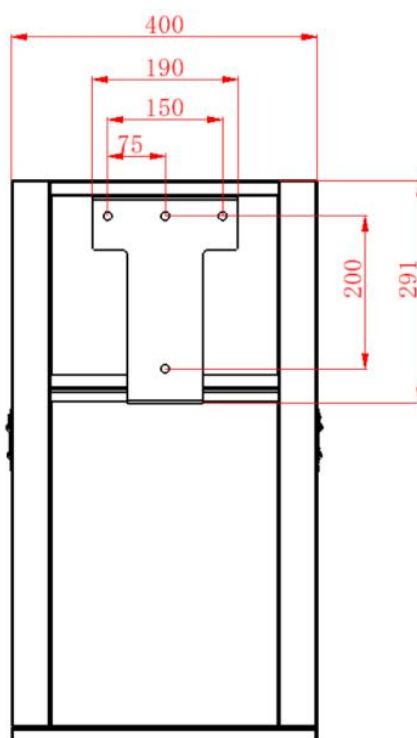
- ✓ ARM low-power processors;
- ✓ Use of professional battery management chips;
- ✓ Support for current-limited charging mode (up to 10A);
- ✓ Support for CAN/RS485 communication;
- ✓ Built-in 4-channel temperature acquisition;
- ✓ Support high and low temperature overcharge and overdischarge protection;
- ✓ Support for battery equalization functions;

- ✓ Support for SOC calculation and calibration;
- ✓ Support two levels of overcurrent protection;
- ✓ Support for output short-circuit protection;
- ✓ Support for reverse polarity protection;
- ✓ Multiple automatic fault detection (sampling, MOS, battery failure)

3.3. Specification parameters



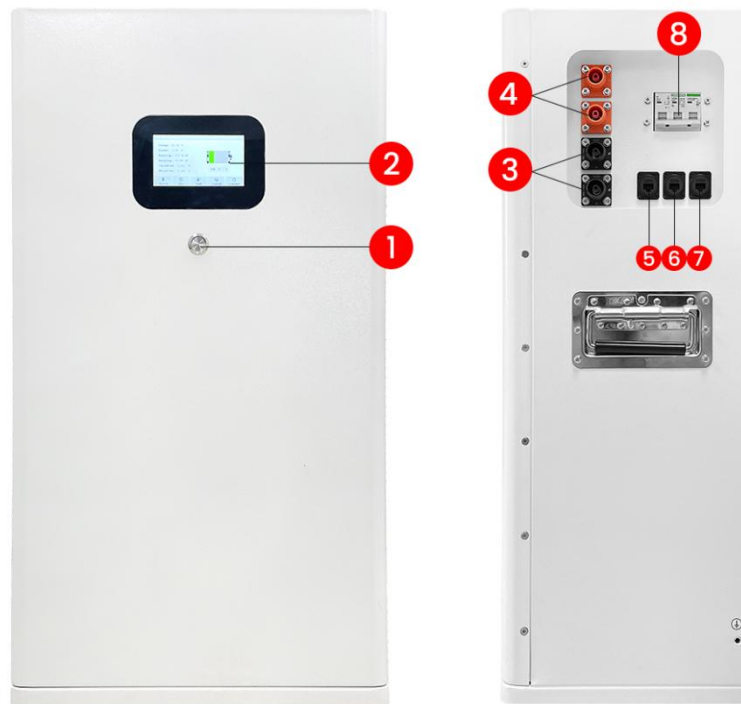
Battery module size diagram



Mounting bracket size

| | |
|---|---|
| Product Model | AMW10240 |
| Battery voltage rating | 51.2V |
| Operating voltage range | 44.8V to 58.4V |
| Support floating charge voltage | 55V \pm 1V |
| Battery Capacity | 200Ah |
| Battery power | 10.24KWh |
| Internal resistance | \leq 50m Ω |
| Rated discharge current/maximum allowable discharge current | 100A/200A |
| Rated charging current/maximum allowable charging current | 100A/200A |
| Battery operating ambient temperature range | Charge 0 $^{\circ}$ C \sim +55 $^{\circ}$ C Discharge -10 $^{\circ}$ C \sim +50 $^{\circ}$ C |
| Recommended working environment temperature | +10 $^{\circ}$ C \sim +30 $^{\circ}$ C |
| Storage temperature specification | 0-25 $^{\circ}$ C/12 months |
| Battery module size (W*D*H mm) | Bare machine: 277*400*735mm (case) |
| Weight | 85 \pm 1KG |
| Housing | Metal housing with insulation coating |
| Cooling method | Natural cooling |
| Display method | Display |
| Communication method | CAN/RS485 |

3.4. Interface Definition



| | | | |
|---|-----------------|---|---------------------|
| ❶ | Start button | ❺ | CAN/RS485 interface |
| ❷ | Touch screen | ❻ | RS485 interface |
| ❸ | Output negative | ❼ | RS485 interface |
| ❹ | Output positive | ❽ | Air switch |

Load terminal (B+/B-)

Power terminals: Two pairs of terminals of the same function are used with cold-pressure terminal blocks RNB22-8, one connected to the device and the other connected in parallel to other battery modules for capacity increase. For each single module, each terminal can perform charging and discharging functions.

Power Switch

Power switch: turns on/off the entire battery pack status.

Screen

Display: Display the parameters of the battery module.

(1) Main menu page

After power-up/sleep activation, the BMS internal data will be displayed, as shown below:

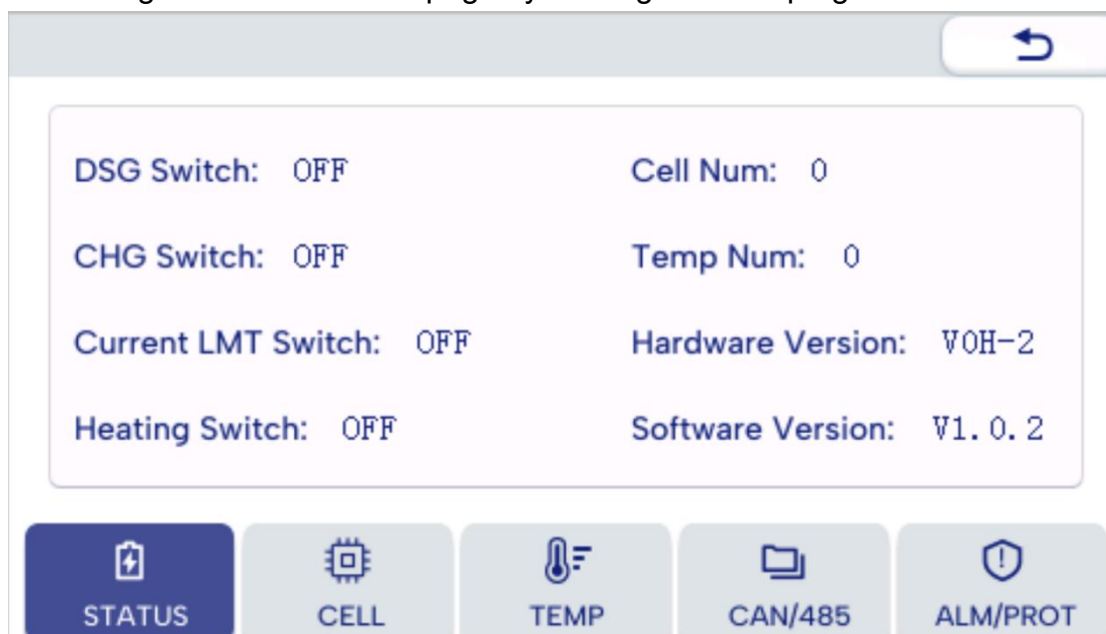
You can click the icon below to switch pages.



(2) Status monitoring page

After clicking STATUS, the page appears as follows:

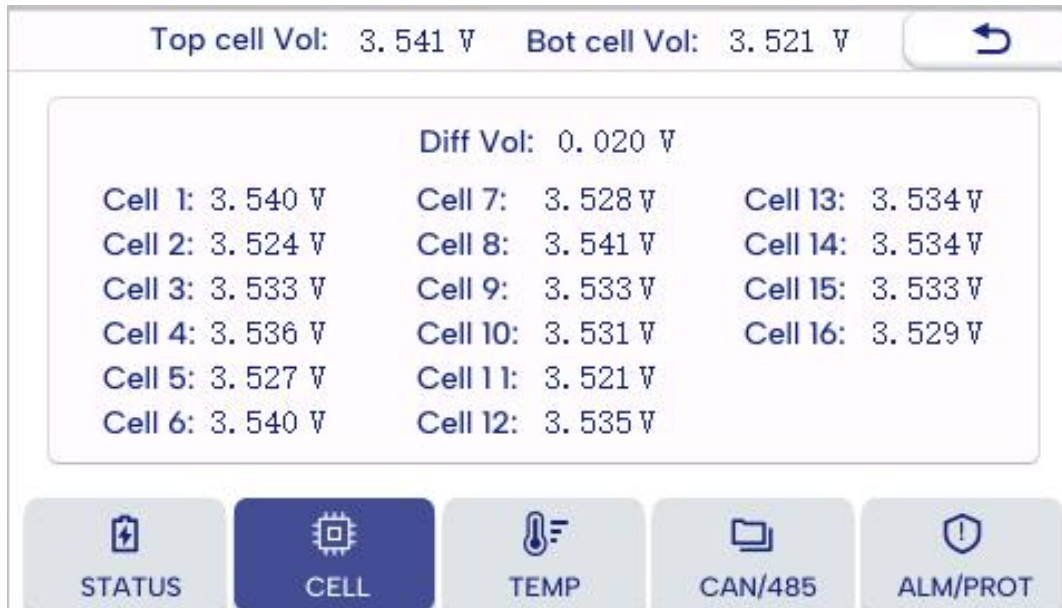
You can go back to the main page by clicking on the top right corner.



(3) Battery parameter acquisition page

After clicking on the CELL, it will enter the "Battery Parameter Acquisition" page, as shown in the following figure:

You can go back to the main page by clicking on the top right corner.



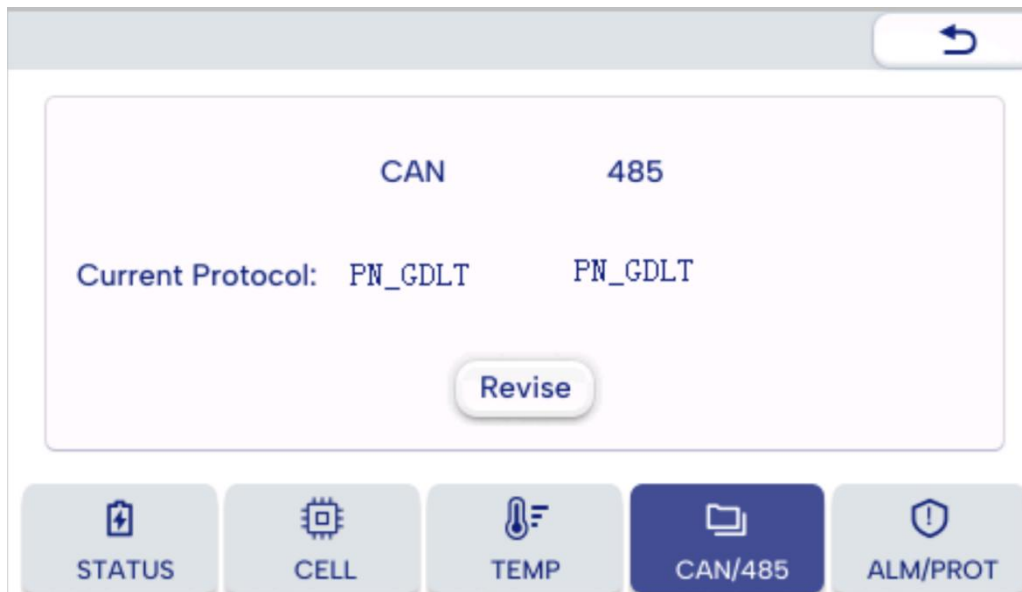
(4) Temperature monitoring page

Click TEMP to enter the temperature monitoring page, the display screen is as follows:



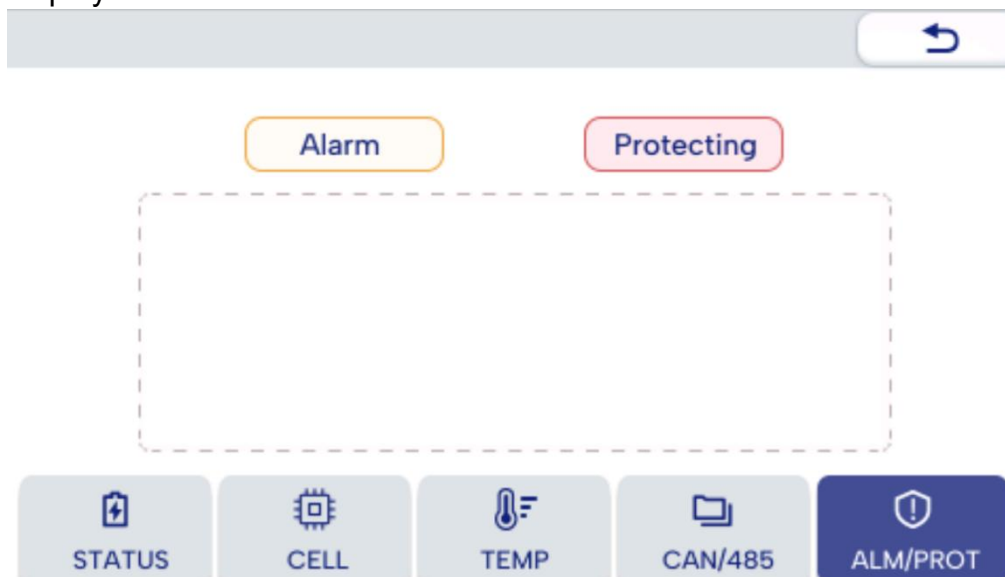
(5) Communication selection page

Click CAN/485 to enter the communication selection page, the display screen is as follows:



(6) Alarm information page

Click ALM/PROT to enter the alarm information monitoring page, the screen is displayed as follows:



RS485/CAN interface

RS485/CAN communication interface: (RJ45 port) Communication according to RS485/CAN protocol.

| RS485/CAN - using 8P8C vertical RJ45 socket | | | |
|---|---------------------------|-------------|---------------------------|
| RJ45 Pinout | Definition Description | RJ45 Pinout | Definition Description |
| 1,8 | RS485-B | 4 | CANH |
| 2,7 | RS485-A | 5 | CANL |
| 3 | GND | 6 | GND |



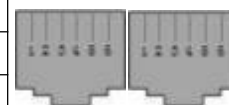
RS485/CAN interface definition

RS485 interface

RS485 communication interface: (RJ45 port) communicate according to RS485 protocol, read battery information, also can be used for multiple groups of lithium

batteries for parallel communication.

| RS485-using 8P8C vertical RJ45 socket | | RS485-using 8P8C vertical RJ45 socket | |
|---------------------------------------|------------------------|---------------------------------------|------------------------|
| RJ45 Pinout | Definition Description | RJ45 Pinout | Definition Description |
| 1,8 | RS485-B1 | 9,16 | RS485-B2 |
| 2,7 | RS485-A1 | 10,15 | RS485-A2 |
| 3,6 | GND | 11,14 | GND |
| 4,5 | Internal communication | 12,13 | Internal communication |



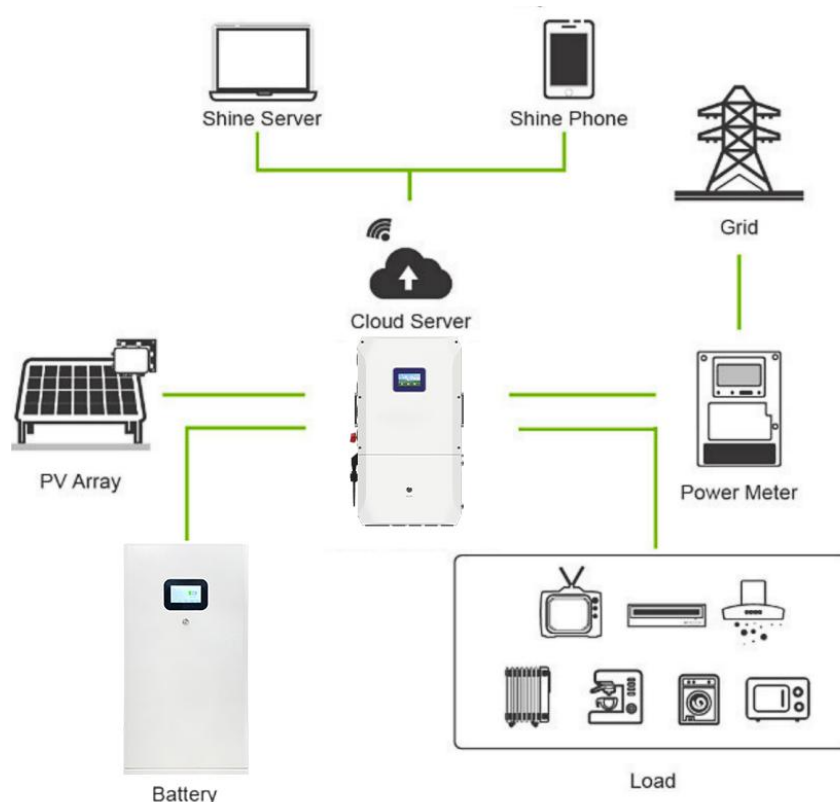
RS485 parallel communication interface definition

BMS Functionality

| | |
|-------------------------------|-------------------------------------|
| Protection and alarms | Management and monitoring |
| End of charge/discharge | Battery Balance |
| Charging overvoltage | Smart charging mode |
| Charge/discharge overcurrent | Charging current limit |
| High/low temperature | Calculation of capacity reservation |
| Short Circuit | Administrator Monitoring |
| Reverse power cord connection | Operation log |

Chapter 4 Battery Module Safe Handling Guide

4.1. System topology diagram



4.2. Marking

Rechargeable Li-ion Battery

Model: AMW10240

Date of manufacture

Amensolar ESS Co., Ltd

| | |
|--------------------------|------------|
| Rated capacity | 200Ah |
| Total Energy | 10.24Kwh |
| Operating Voltage Range | 44.8~58.4V |
| Max Discharging Current | 200A |
| Efficiency | > 90% |
| Charging Temperature: | 0~55℃ |
| Discharging Temperature: | -10~50℃ |
| IP Rating: | IP52 |
| Nominal Voltage | 51.2Vd.c. |

Battery designation as specified in IFpP56/175/206/[16S]M/-10+50/95



CAUTION

- Do not disconnect, disassemble or repair by yourself
- Do not drop. Deform, impact, cut or spearing with a sharp object.
- Do not place near open flame or incinerate
- Do not sit or put heavy thing on battery
- Keep away from moisture or liquid
- Keep out of reach of children, animals or insects

Emergency Situations

If leaking, fire, wet or damaged, switch off the breaker and do away from the Battery.

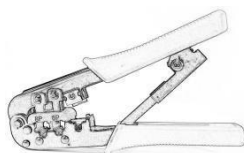
Do not touch the leaking liquid. Do not use water. Sand or dry power extinguisher is usable

4.3. Tools

To install the battery pack, you may need these tools:



Phillips screwdriver



Cable Crimper



Voltmeter

NOTE: Use a properly insulated tool to prevent accidental electric shock or short circuit. If insulated tools are not available, cover the entire exposed metal surface of the available tools, except their tips, with insulating tape.

4.4. Security

It is recommended that the following safety equipment be worn when handling battery packs



Insulation gloves



Goggles



Safety shoes

4.5. Attachment List

| Name | Specification | Quantity |
|---------------------|---------------|----------|
| Expansion screws | M10*120mm | 4 |
| Ground cable set | 2.5mm*2m | 1 |
| Hanging rings | M8 | 2 |
| Anchor pulley set | GD-60F | 4 |
| Communication cable | 2M | 1 |
| Power cable | 50mm*2m | 2 |
| Wall-mounted racks | 287*190mm | 1 |
| User manual | AMW10240 | 1 |
| Packing list | AMW10240 | 1 |
| Warranty Card | AMW10240 | 1 |

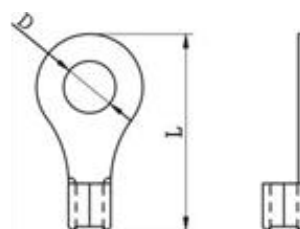
Chapter 5 Product Installation Instructions

5.1. Connection Instructions

Note: For safe operation and regulatory compliance, a separate DC overcurrent protector or disconnect device is required for battery installation. In some applications, a disconnect device may not be required, but an overcurrent protection device is still required. Refer to the table below for typical amperage for the required fuse or breaker size.

Warning! All wiring must be done by qualified personnel.

Warning! Using the proper cables for battery connections is important for safe and efficient system operation. To reduce the risk of injury, use the appropriate recommended cable and terminal sizes below.



Recommended battery cable and terminal sizes.

| Battery Capacity | Cable Size | Ring terminals | | |
|------------------|------------|-----------------------|--------|-------|
| | | Cable mm ² | Size | |
| | | | D (mm) | L(mm) |
| 200Ah | 1/0AWG | 50 | 8.4 | 33.5 |

5.2. Installation conditions

Please ensure that the installation location meets the following conditions:

- The area is completely waterproof.
- The floor is flat.
- No flammable and explosive materials.
- The ambient temperature is within the range of 0°C to 55°C.
- Temperature and humidity are maintained at a stable level.
- There is very little dust and dirt in the area.

5.3. Installation Instructions

Caution

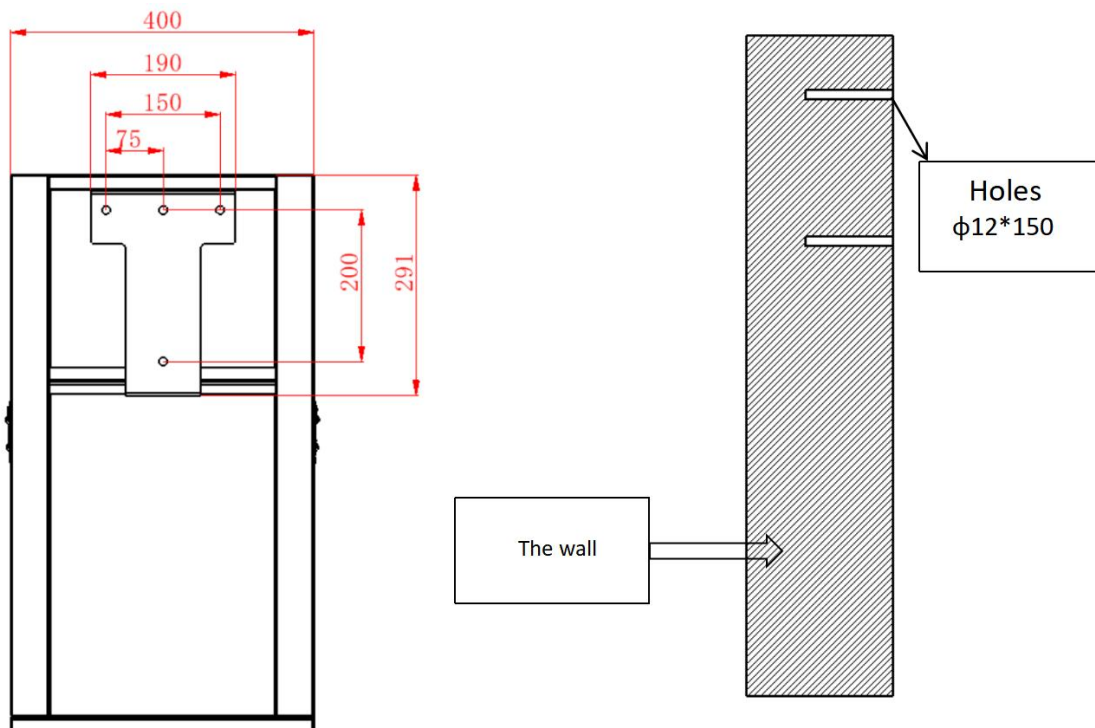


If the ambient temperature is outside the operating range, the battery pack will stop working to protect itself. The optimal temperature range for battery pack operation is 0°C to 50°C. Frequent exposure to harsh temperatures may degrade the performance and life of the battery pack.

A. Wall-mounted installation

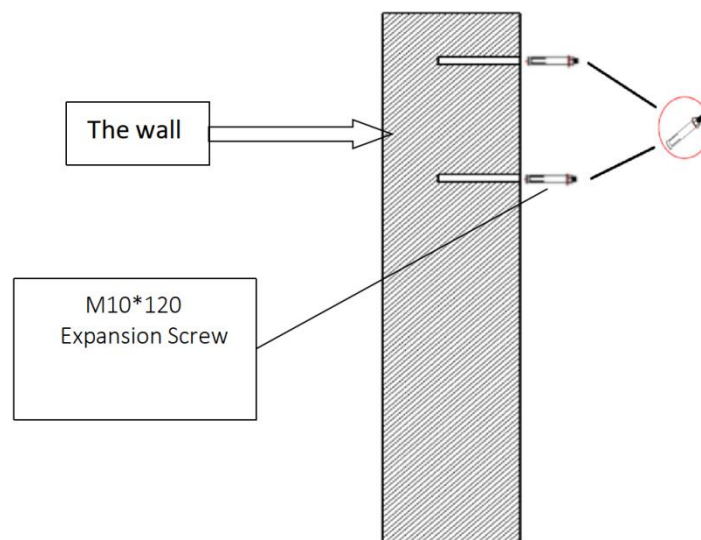
1. Select 4 points on the wall and drill with $\phi 12 \times 150$ hammer drill.
2. Insert the M10*120 expansion screw into the drilled hole.
3. Place the wall-mounted bracket on the M10*120 expansion screw and secure it.
4. The battery module is then mounted on a wall-mounted bracket.
5. Connect the battery module ground cable.
6. Connect the battery communication cable to the inverter.
7. Connect the power cable to the inverter.

Set up 4 points on the wall and use $\phi 12 \times 150$ impact drill to make holes.

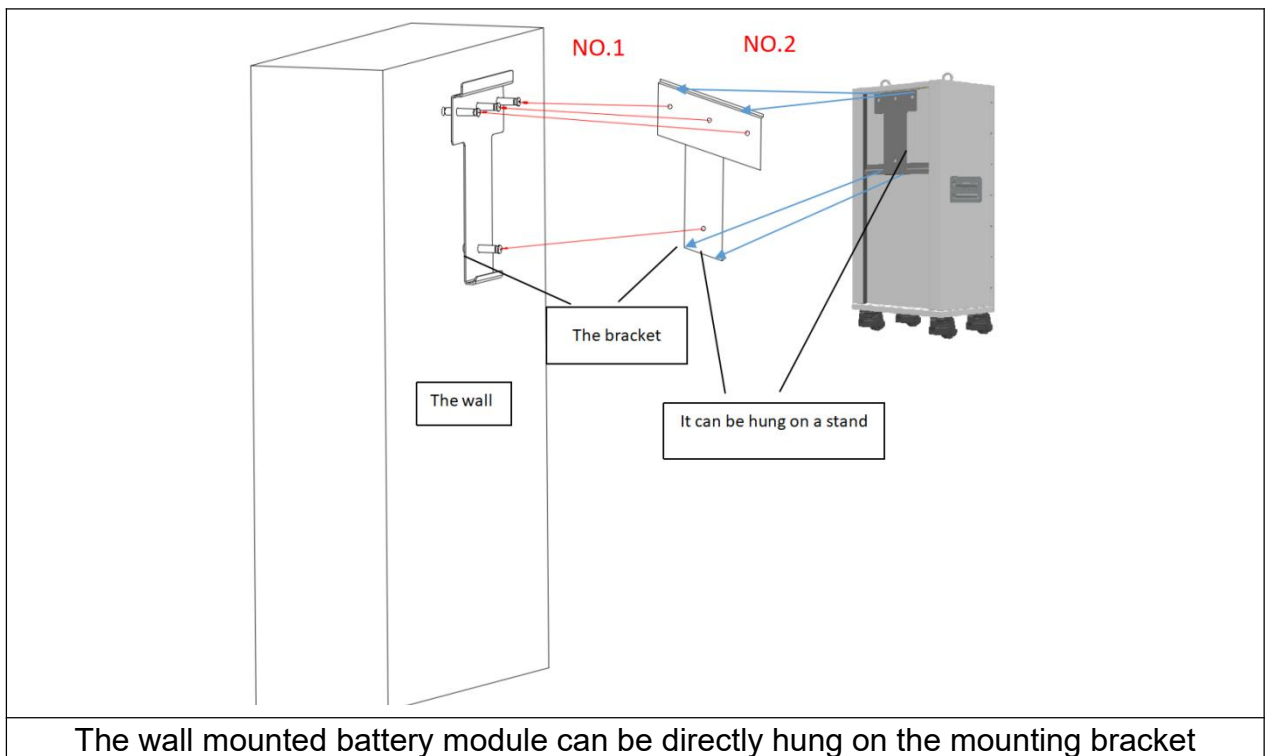


Mounting bracket size drawing

Put the M10*120 expansion screws into the drilled holes

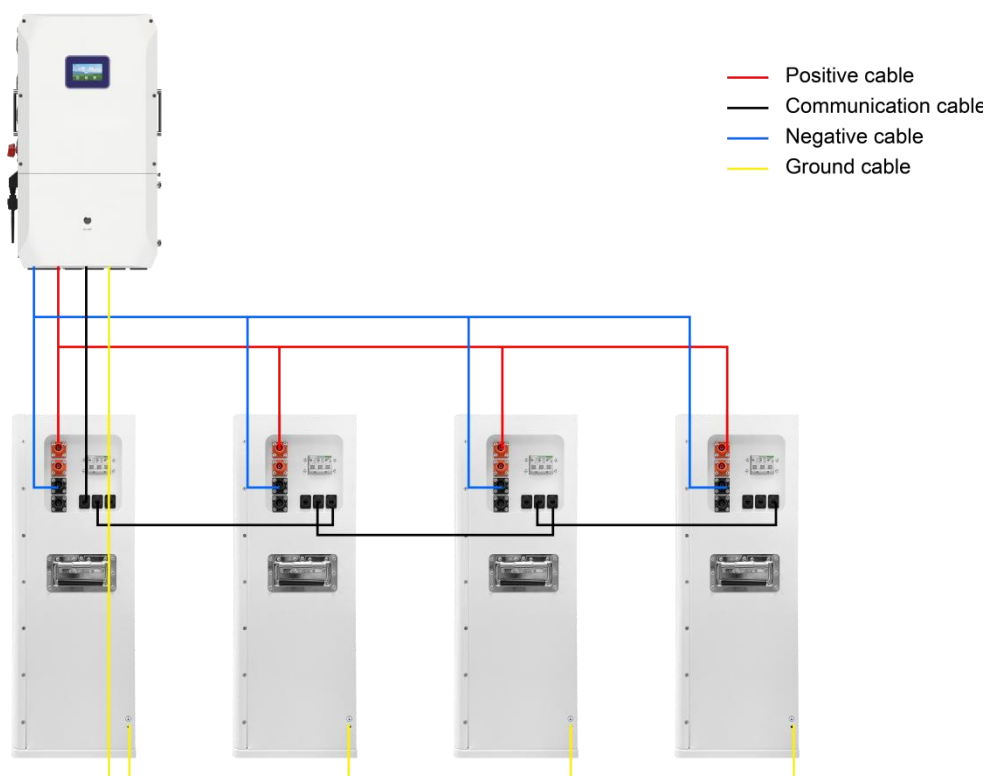


Place the wall-mounted rack on the M10*120 expansion screw and fix it



B. Parallel installation

Normal parallel mode as shown in the following figure



Note: If all battery displays are on, this means that the battery system is good and working properly.

Chapter 6 Safety Precautions



Warning

6.1. Precautions before installation

- 1) After opening the box, please check the product and packing list first, if the product is damaged or missing parts, please contact your local retailer;
- (2) Before installation, be sure to cut off the power to the grid and ensure that the battery is in the off state;
- 3) Wiring must be correct, do not make mistakes with positive and negative cables, and ensure that there is no short circuit with external equipment;
- (4) prohibit the direct connection of batteries and AC power;
- 5) the embedded BMS in the battery is designed for 48VDC, please do not connect the battery in series;
- 6) the battery system must be well grounded and its resistance must be less than 1Ω ;
- 7) Please ensure that the electrical parameters of the battery system are compatible with the relevant equipment;
- 8) Keep the battery away from water and fire.

6.2. Precautions for the use process

- 1) If the battery system needs to be moved or repaired, the power must be disconnected and the battery completely shut down;
- 2) It is strictly forbidden to connect the battery with different types of batteries.
- 3) It is strictly forbidden to work the battery with faulty or incompatible inverters;
- 4) Battery disassembly is strictly prohibited (QC tags are removed or damaged);
- 5) In the event of a fire, only dry powder fire extinguishers may be used, and the use of liquid fire extinguishers is prohibited;
- 6) Do not open, repair or disassemble the battery except by personnel authorized by the manufacturer or distributor. We assume no responsibility for any consequences or liability associated with violations of safe practices or violations of design, manufacturing and equipment safety standards.



Reminder

- 1) Please read the user manual (in the attachment) carefully;
- (2) If the battery is stored for a long time, it needs to be charged every six months, and the SOC should be no less than 80%;
- 3) The battery needs to be recharged within 12 hours after it has been completely discharged;
- 4) Do not expose cables to the elements;
- 5) All battery terminals must be disconnected for maintenance purposes;
- 6) If there is any abnormality, please contact the supplier within 24 hours.
- 7) Direct or indirect damages caused by the above items are not covered by the warranty.

Chapter 7 Troubleshooting

7.1. Troubleshooting steps

- 1) Whether the battery can be turned on;
- 2) If the battery is on, check that the red light is off, flashing or on;
- 3) If the red light is off, check if the battery can be charged/discharged.

7.2. Fault Identification

The battery cannot be turned on, and none of the lights light up or flicker after the power is turned on.

If the external battery switch is on, the status light is flashing, the external power supply voltage is 48V or more, and the battery still does not turn on, please contact your dealer.

The battery can be turned on, but the red light is on and cannot be charged or discharged. If the red light is on, the system is not working properly, please check the following values:

Temperature: Above 56°C or below -20°C, the battery cannot work.

Solution: Move the battery to a normal operating temperature range of -10°C to 50°C.

Current: If the current is greater than 200A, the battery protection will open.

Solution: Check if the current is too high, if it is, change the setting on the power side.

High voltage: If the charging voltage exceeds 57.6V, the battery protection will turn on.

Solution: Check if the voltage is too high, if so, change the setting on the power side.

Low Voltage: When the battery is discharged to 44.8V or lower, the battery protection will be turned on. Solution: Charge the battery for a period of time, and the red light will turn off.

In addition to the above four points, if you still can not find the fault, please turn off the battery and repair.

7.3. Charging Troubleshooting

- 1) Cannot be charged:

Disconnect the power cord, measure the voltage on the power side, if the voltage is 53~54V, restart the battery, connect the power cord and try again, if it still doesn't work, turn off the battery and contact the dealer.

- 2) Unable to discharge:

Disconnect the power cord and measure the voltage on the battery side, if it is lower than 44.8V, please charge the battery; if the voltage is higher than 48V and still cannot be discharged, please turn off the battery and contact your dealer.

Chapter 8 Emergencies

8.1. Battery leakage

If the battery pack leaks electrolyte, avoid contact with the leaking liquid or gas. In case of contact with the leaking substance, the following measures should be taken immediately.

Inhalation: Evacuate the contaminated area and seek medical attention.

Contact with eyes: Flush eyes with running water for 15 minutes and seek medical attention. Contact with skin: Wash affected area thoroughly with soap and water and seek medical attention.

Ingestion: Induce vomiting and seek medical attention.

8.2. Fire

Do not use water! Use only dry powder extinguishers; if possible, move the battery pack to a safe area before it catches fire.

8.3. Immersion

If the battery pack gets wet or submerged in water, do not let anyone touch it, then contact the manufacturer or an authorized distributor for technical support.

8.4. Battery damage

Damaged batteries are dangerous and must be handled with the utmost care. They are unfit for use and may pose a danger to persons or property. If a battery pack appears to be damaged, pack it in its original container and return it to the manufacturer or authorized distributor.