

# User Manual

CE48100-W Battery



C H I S A G E



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## Cautions

Customers must abide by the operating specifications, and any installation, maintenance, and use of this product must strictly abide by the relevant safety regulations:

- It is forbidden to store or use at high temperatures, and it must be kept from heat sources. These environments above the safe temperature range will significantly decrease this product's performance and life and even cause serious consequences such as burning and explosion.
- It is forbidden to store and use in an environment with high static electricity or electromagnetic radiation. Otherwise, the electronic components in this product will be damaged, which may cause safety hazards
- Do not get wet or even immerse in water. Otherwise, it may cause an internal short circuit, function loss, or abnormal chemical reaction of the product and cause fire, smoke, explosion, etc.
- Suppose you find smoke, heat, discoloration or deformation, or any abnormal phenomenon during use, storage, transportation, and service. In that case, you should immediately contact the professional department to observe further and control the risk.
- Do not dispose of discarded products in fires or hot stoves. Waste batteries should be recovered and recycled by professional institutions or organizations.
- Professional technicians must operate the installation and maintenance of the battery system, and the user must strictly abide by the relevant safety regulations. It is strictly forbidden for non-professionals to install or repair the battery system and abuse it beyond the range.

## Abbreviation

|     |  |
|-----|--|
| ZX  | ZHEJIANG CHISAGE NEW ENERGY TECHNOLOGY CO., LTD. |
| BMS | Battery Management System                        |
| BOL | Begin of Life                                    |
| CAN | Controller Area Network                          |
| EOL | End of Life                                      |
| HV  | High Voltage                                     |
| LV  | Low Voltage                                      |
| OCV | Open Circuit Voltage                             |
| SOC | State of Charge                                  |

## Definition

|                                  |  |
|----------------------------------|--|
| Battery Cell                     | The minimum energy storage unit, a basic electrochemical energy storage device, consists of a positive electrode, a negative electrode, an electrolyte, a separator, and a casing, also known as a battery cell.   |
| Battery Module<br>(Battery PACK) | A power supply system composed of several battery modules, circuit equipment (protection circuit, cell management system, electrical and communication interfaces), thermal management devices, etc., is used to provide energy for electrical devices.  |
| Nominal Voltage                  | Indicates or identifies the appropriate voltage approximation for the cell or pack.  |
| Capacity                         | The amount of electricity that can be provided by a battery cell that is fully charged under specified conditions. Usually expressed in Ah.  |
| Energy Capacity                  | The energy can be provided by a fully charged battery cell or pack under specified conditions. Usually expressed in Wh or kWh.   |
| Nominal Capacity                 | At the beginning of life (BOL), the minimum capacity that a fully charged cell can be provided under specified conditions is when it is discharged at a rate of 1C (C-rate).   |
| Unit                             | <p>“V” (Volt): Electrical current unit;</p> <p>“A” (Ampere): Electrical current unit;</p> <p>“Ah” (Ampere-Hour): Electrical charge unit;</p> <p>“Wh” (Watt-Hour): Electrical energy unit;</p> <p>“Ω” (Ohm): Resistance unit;</p> <p>“°C” (Celsius degree): Temperature unit;</p> <p>“mm”(millimeter): Length unit;</p> <p>“s” (second): Time unit;</p> <p>“kg” (kilogram): Weight unit;</p> <p>“Hz” (Hertz): Frequency unit.</p> |

# 1. General Introduction

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## 1.1 Scope and Purpose

This product user manual only applies to the rechargeable lithium-ion battery products CE48100-W designed by Zhejiang Chisage New Energy Technology co., Ltd.

The user manual aims to introduce the CE48100-W product information and installation, operation, and maintenance guidelines. Include the battery pack and BMS specification, internal and external structure, LED indication, battery set, battery system diagram, and other cautions. The manual cannot include complete information about the BESS system.

The interpretation right of this specification belongs to Zhejiang Chisage New Energy Technology Co., Ltd.

## 1.2 Brief Introduction

CE48100-W is designed according to market requirements to meet the client's wall-mounted application requirement. In operation with the hybrid or off-grid inverter, you can charge the battery when PV or grid is available and discharge the battery when you need the backup power supply.

The battery can be paralleled to build a high-capacity hybrid system to satisfy the long-time energy storage demand.

## 1.3 Product Properties

CE48100-W product's anode materials are lithium iron phosphate, and battery cells are managed effectively by BMS with better performance, the systems features as below:

- Anode materials are lithium iron phosphate (LiFePO<sub>4</sub>), safer with a longer life span.
- Flexible configurations allow parallel multi-battery for longer standby time.
- Self-ventilation with lower system noise.
- With a wide range of temperatures for the working environment, 0°C~+50°C, circulation span, and discharging performance are well under high temperatures.
- Carries battery management system with better performance and possesses protection functions like over-discharge, over-charge, over-current, and abnormal temperature.
- Self-management on charging and discharging, single core balancing function.
- Support the most mainstream CAN and RS485 protocol

## 1.4 Nameplate














|   |   |   |   |   |   |
|---|---|---|---|---|---|
| Model: CE48100-W  |   |  |   |   |   |
| Description:  | Lithium Battery   |   |   |   |   |
| Total Energy:   | 5.12kWh   |   |   |   |   |
| Nominal Capacity:   | 100AH   |   |   |   |   |
| Voltage Range:  | 40 ~ 58.4Vd.c   |   |   |   |   |
| Nominal Voltage:  | 51.2Vd.c  |   |   |   |   |
| Max.Charge Voltage:   | 58.4V±0.5Vd.c   |   |   |   |   |
| Constant Current:   | 50A   |   |   |   |   |
| Operating Temperature:  | -20℃ ~ 55℃  |   |   |   |   |
| Protective Class:   | I   |   |   |   |   |
| Ingress Protection:   | IP 65   |   |   |   |   |
| Weight(Kg):   | 58  |   |   |   |   |
| Dimensions (mm):  | 630x430x191.5   |   |   |   |   |
| Company Name: ZHEJIANG CHISAGE NEW ENERGY TECHNOLOGY CO.,LTD                        |   |   |   |   |   |
| Add: NO.1828 FUQING SOUTH RD., PANHUO ST., YINZHOU ,NINGBO, ZHEJIANG, 315100 CHINA  |   |   |   |   |   |
| Tel: +86 150 5749 1826  |   | Email: info@chisagess.com   |   |   |   |
| Website: www.chisagess.com  |   |   |   |   |   |
|  |  |  |  |  |  |
|  |  |  |  |    |  |
| Made in China   |   |   |   |   |   |

Fig. 1-1 CE48100-W nameplate

## 2. Technical Specification

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### 2.1 Battery Specification

| No. | Item                                 | Specification  | Remark   |
|-----|--------------------------------------|--|--|
| 1   | Battery Cell Model                   | LFP100Ah   | Lithium Iron Phosphate                                       |
| 2   | Battery Module Model                 | 1P16S-100Ah  |  |
| 3   | Nominal Capacity                     | 100Ah  |  |
| 4   | Nominal Voltage                      | 51.2V  | Singe cell: 3.2V   |
| 5   | Operation Voltage Range              | 40V~58.4V  |  |
| 6   | Nominal Energy                       | 5.12kWh  |  |
| 7   | Operation Voltage                    | Charge Temperature :<br>0°C~55°C;<br>Discharge Temperature:<br>-20°C~55°C. |  |
| 8   | Storage Temperature                  | -20°C~50°C   | 25°C is necessary for<br>more than<br>three-month of storage |
| 9   | Working Humidity                     | 20~95%RH   |  |
| 10  | Standard Charge Current              | 0.5C   |  |
| 11  | Maximum Continuous Charge Current    | 0.5C   |  |
| 12  | Standard Discharge Current           | 0.5C   |  |
| 13  | Maximum Continuous Discharge Current | 0.5C   | (1C, 25±2°C)   |
| 14  | PACK Weight                          | About 58Kg   |  |
| 15  | Dimension                            | Length: 630 (±2) mm<br>Depth: 430 (±2) mm<br>Height: 191.5 (±2) mm         |  |



## 2.2 BMS Specification

| BMS Protection Parameter                |  |                      |
|---|--|----------------------|
| Function                                | Item                                     | Protection Parameter |
| Single Cell Alarm                       | Overvoltage alarm                        | 3.6±0.02V            |
|   | Overvoltage recovery                     | 3.5±0.02V            |
|   | Undervoltage alarm                       | 2.7±0.02V            |
|   | Undervoltage recovery                    | 3.0±0.02V            |
| Single Cell Protection                  | Overvoltage alarm                        | 3.65±0.02V           |
|   | Overvoltage recovery                     | 3.6±0.02V            |
|   | Undervoltage alarm                       | 2.5±0.02V            |
|   | Undervoltage delay                       | 3000ms               |
|   | Undervoltage recovery                    | 2.7±0.02V            |
| General Voltage Alarm                   | Overvoltage alarm                        | 57.6±0.05V           |
|   | Overvoltage delay                        | 3000ms               |
|   | Overvoltage recovery                     | 56±0.05V             |
|   | Undervoltage alarm                       | 43.2±0.05V           |
|   | Undervoltage delay                       | 3000ms               |
|   | Undervoltage recovery                    | 46.4±0.05V           |
| General Voltage Protection              | Overvoltage alarm                        | 58.4±0.05V           |
|   | Overvoltage delay                        | 3000ms               |
|   | Overvoltage recovery                     | 57.6±0.05V           |
|   | Undervoltage alarm                       | 40±0.05V             |
|   | Undervoltage delay                       | 3000ms               |
|   | Undervoltage recovery                    | 43.2±0.05V           |
| Cell temperature charging forbids alarm | High temperature charging alarm          | 47±2°C               |
|   | High temperature charging alarm recovery | 45±2°C               |
|   | Low temperature charging alarm           | 5±2°C                |

|   |  |                            |
|---|--|----------------------------|
|   | Low temperature charging alarm recovery          | $8\pm 2^{\circ}\text{C}$   |
| Cell temperature charging forbids protection    | High temperature charging protection             | $50\pm 2^{\circ}\text{C}$  |
|   | High temperature charging protection recovery    | $48\pm 2^{\circ}\text{C}$  |
|   | Low temperature charging protection              | $0\pm 2^{\circ}\text{C}$   |
|   | Low temperature charging protection recovery     | $5\pm 2^{\circ}\text{C}$   |
| Cell temperature discharging forbids alarm      | High temperature charging alarm                  | $52\pm 2^{\circ}\text{C}$  |
|   | High temperature discharging alarm recovery      | $50\pm 2^{\circ}\text{C}$  |
|   | Low temperature discharging alarm                | $-15\pm 2^{\circ}\text{C}$ |
|   | Low temperature discharging alarm recovery       | $-10\pm 2^{\circ}\text{C}$ |
| Cell temperature discharging forbids protection | High temperature discharging protection          | $55\pm 2^{\circ}\text{C}$  |
|   | High temperature discharging protection recovery | $52\pm 2^{\circ}\text{C}$  |
|   | Low temperature discharging protection           | $-20\pm 2^{\circ}\text{C}$ |
|   | Low temperature discharging protection recovery  | $-15\pm 2^{\circ}\text{C}$ |
| Charge overcurrent alarm                        | Charge overcurrent alarm                         | $60\pm 2\text{A}$          |
|   | Charge overcurrent alarm recovery                | $55\text{A}\pm 2\text{A}$  |
| Charge overcurrent protection                   | Charge overcurrent protection                    | $65\pm 2\text{A}$          |
|   | Charge overcurrent protection recovery           | $60\pm 2\text{A}$          |
| Discharge overcurrent alarm                     | Discharge overcurrent alarm                      | $60\pm 2\text{A}$          |

|                                  |   |   |
|----------------------------------|---|---|
|                                  | Discharge overcurrent alarm recovery      | 55A±2A  |
| Discharge overcurrent protection | Discharge overcurrent protection          | 65±2A   |
|                                  | Discharge overcurrent protection recovery | 60±2A   |
| SOC low alarm                    | SOC low alarm                             | 15%   |
|                                  | SOC low alarm recovery                    | 20%   |
| Short Protection                 | Short circuit protection current          | 400±100A  |
|                                  | Short circuit protection released         | <ol style="list-style-type: none"> <li>1. Detect valid current data.</li> <li>2. Re-check every 1min, and lock after three consecutive times</li> </ol> |

## 3. Product Overview

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### 3.1 Mechanical Structure

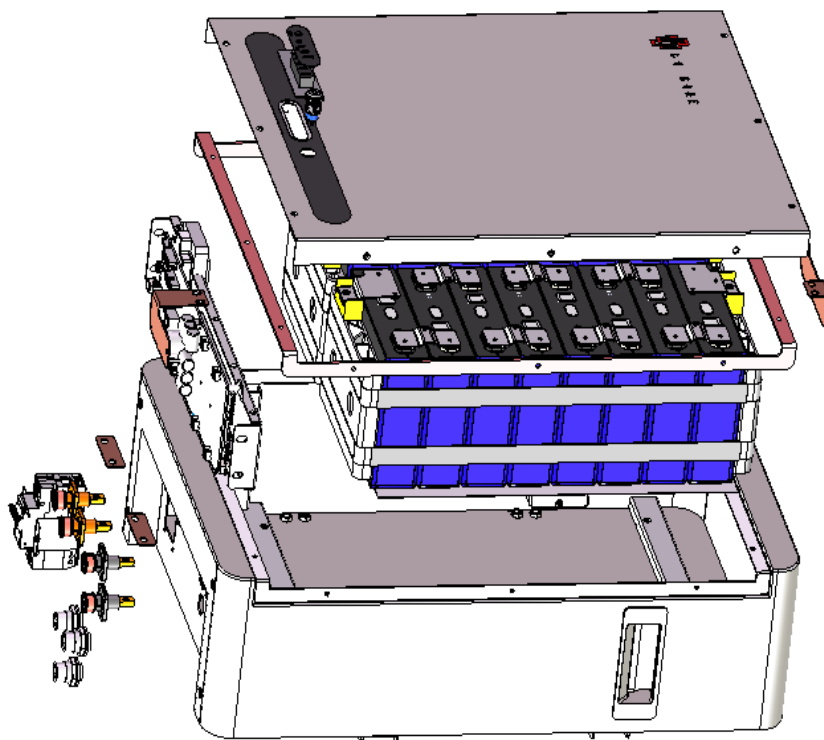


Fig. 3-1 CE48100-W PACK mechanical structure 1

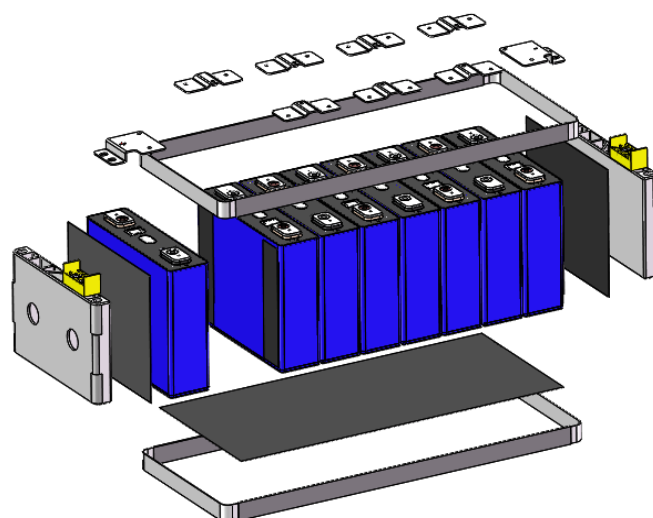


Fig. 3-2 CE48100-W PACK mechanical structure 2

## 3.2 Dimension

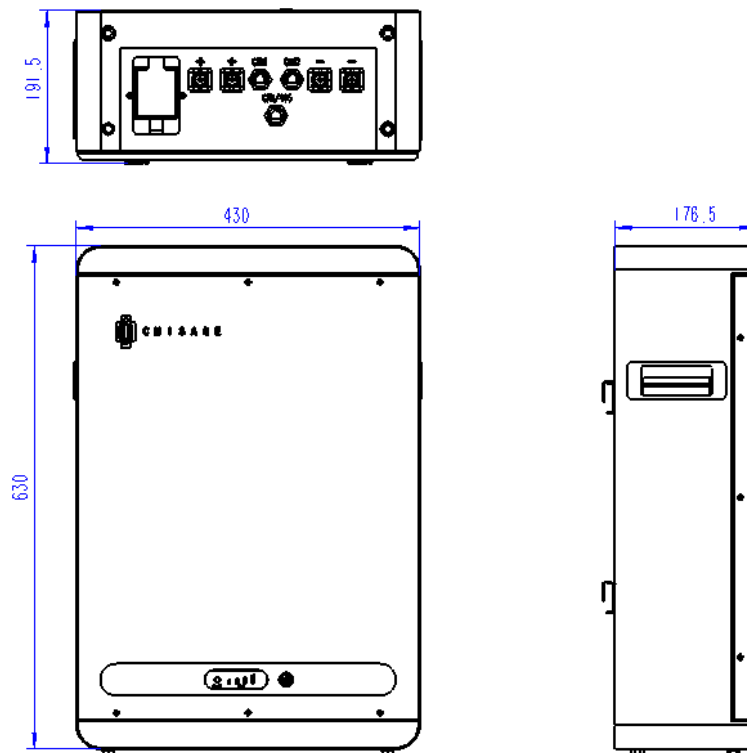


Fig. 3-3 CE48100-W PACK dimension drawing

## 3.3 Electrical Structure

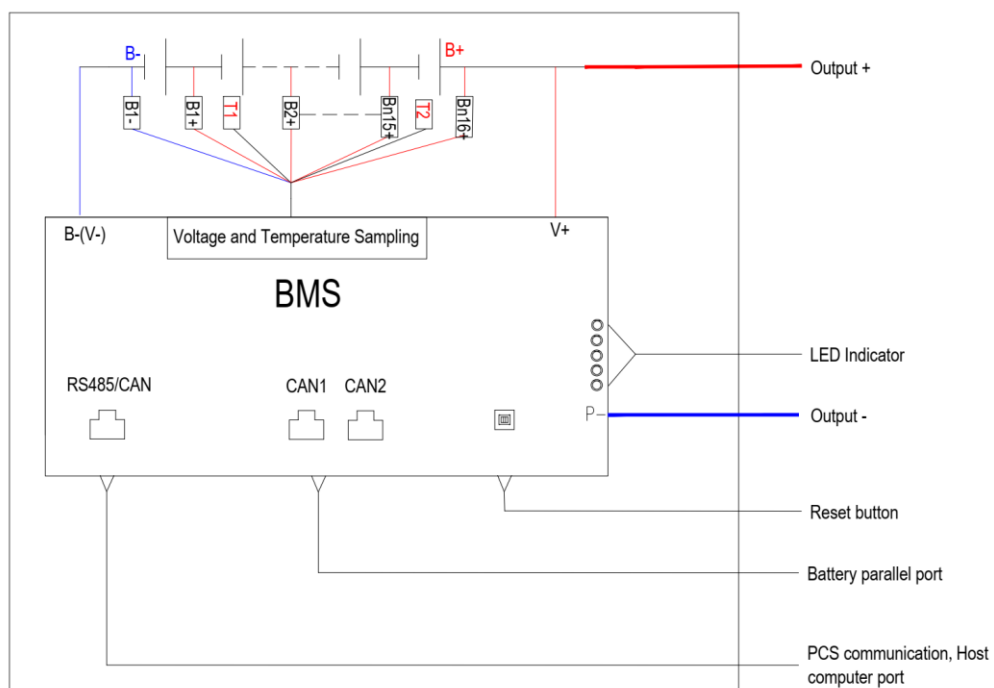


Fig. 3-4 CE48100-W PACK electrical structure

### 3.4 Interface Definition

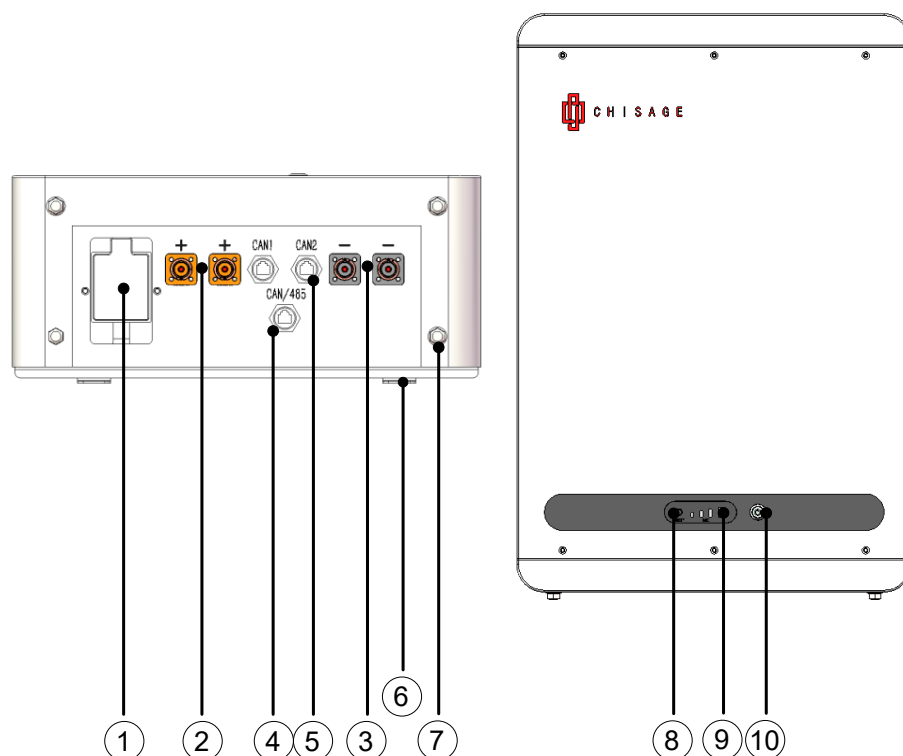
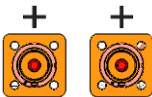
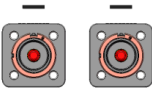




Fig. 3-5 CE48100-W PACK interface

| No. | Interface                              | Legend  | Description   | Remark   |
|-----|--|---|---|--|
| 1   | DC breaker                             | /   | 125A  |  |
| 2   | Battery power +                        |  | Battery positive terminal   |  |
| 3   | Battery power -                        |  | Battery negative terminal   |  |
| 4   | Host computer & BMS communication port |  | EMS/CAN/RS485:<br>PIN 1, 8: 485B<br>PIN 2, 7: 485A<br>PIN 3, 6: GND<br>PIN 4: CANH<br>PIN 5: CANL | The network cable adopts Category 5 double-shielded twisted pair cable, shielded crystal head RJ45 (8P8C), and the actual product shall prevail. |
| 5   | Parallel communication port            |  | CAN1:<br>PIN 4: CANH<br>PIN 5: CANL<br>PIN 1, 2, 3, 6, 7, 8: NC                                   | The network cable adopts Category 5 double-shielded twisted pair cable, shielded crystal head RJ45   |

|    |                                    |   |   |   |
|----|------------------------------------|---|---|---|
|    |                                    |   |   | (8P8C), and the actual product shall prevail. |
| 6  | Battery back bracket               | / | /   | Default for wall mounted application          |
| 7  | Floor mount feet installation hole | / | /   | Floor mount optional                          |
| 8  | Reset button                       | / | After the battery reaches the limit protection, it needs to be restarted by the Reset button. |   |
| 9  | Capacity LED                       | / | Please check clause 3.6   |   |
| 10 | ON/OFF Button                      | / | /   | /   |

### 3.5 State LED Indicate

| System State    | Running State  | Capacity LED       |   |   |   | Remark                                  |
|-----------------|--|--------------------|---|---|---|---|
|                 |  | ●                  | ● | ● | ● |   |
| Battery Off     | Sleep  | All OFF            |   |   |   |   |
| Battery Standby | Normal   | Check Capacity LED |   |   |   |   |
|                 | Alarm  |                    |   |   |   |   |
| Charge          | Normal   | Check Capacity LED |   |   |   |   |
|                 | Alarm  | Check Capacity LED |   |   |   | Overcharge protection ALM doesn't flash |
|                 | Over Voltage Protection                                  | All ON             |   |   |   |   |
|                 | Temperature, overcurrent, short circuit, fail protection | All OFF            |   |   |   |   |
| Discharge       | Normal   | Check Capacity LED |   |   |   |   |
|                 | Alarm  | Check Capacity LED |   |   |   |   |
|                 | Low Voltage Protection                                   | All OFF            |   |   |   |   |

|  |   |         |  |
|--|---|---------|--|
|  | Temperature,<br>overcurrent,<br>short circuit, fail<br>protection | All OFF |  |
|--|---|---------|--|

### 3.6 Capacity LED Indicate

| State             | Charge  |         |         |         | Discharge |     |     |     |
|-------------------|---------|---------|---------|---------|-----------|-----|-----|-----|
| Capacity<br>LED ● | L4●     | L3●     | L2●     | L1●     | L4●       | L3● | L2● | L1● |
| 0~25%             | OFF     | OFF     | OFF     | Flash 2 | OFF       | OFF | OFF | ON  |
| 25%~50%           | OFF     | OFF     | Flash 2 | ON      | OFF       | OFF | ON  | ON  |
| 50%~75%           | OFF     | Flash 2 | ON      | ON      | OFF       | ON  | ON  | ON  |
| 75%~100%          | Flash 2 | ON      | ON      | ON      | ON        | ON  | ON  | ON  |

### 3.7 LED Flash Mode

| Mode    | ON    | OFF   |
|---------|-------|-------|
| Flash 1 | 0.25S | 3.75S |
| Flash 2 | 0.5S  | 0.5S  |
| Flash 3 | 0.5S  | 1.5S  |
| Flash 4 | 0.35S | 0.3S  |

### 3.8 Parallel Setting

The lowest SN machine will be set as master inverter automatically.

## 4. Installation and Configuration

### 4.1 Preparations for installation

This system can only install by personnel who have been trained in the power supply system and have sufficient knowledge of the power system.

The local safety regulations listed below should always be followed during the installation.

- All circuits connected to this power system with an external voltage of less than 48V must meet the SELV requirements defined in the IEC60950 standard.
- If operating within the power system cabinet, make sure the power system is not charged. Battery devices should also be switched off.



- Distribution cable wiring should be reasonable and has protective measures to avoid touching these cables during the operation of power equipment.
- When installing the battery system, must wear the protective items below:



The isolation gloves



Safety goggles



Safety shoes

#### 4.1.1 Environmental requirements

- Working temperature: 0°C~+50°C
  - 1) Charging temperature range is 0°C ~+45°C;
  - 2) Discharging temperature range is -20°C ~+50°C;
- Relative humidity: 20% ~ 95%RH (No condensed water);
- Operating environment: Indoor or outdoor installation, sites avoid the sun, no corrosive gas. And the following conditions are met:
  - 1) Installation location should be away from the sea to avoid brine and high humidity environment;
  - 2) The ground is flat and level;
  - 3) There is no flammable explosive near to the installation places. The optimal ambient temperature is 15°C ~ 30°C;

#### 4.1.2 Tools

The following tools and meters that may be used for installation



Screwdriver (word, cross)



Inclined pliers



Wrench



Needle nose pliers



Wire stripper



Clamp meter



Insulating tape



Multimeters

#### 4.1.3 Technical Preparation




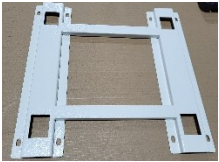




Devices connected directly to the battery can be user equipment, power supplies, or other

power supplies.

- Confirm whether the user equipment, the PV equipment or other power supply equipment has the DC standby interface, and measure whether the output voltage of the standby interface meets the requirements of the voltage range;
- Verify that the maximum discharge current capacity of the user equipment, the PV equipment or other power supplies, the DC standby interface, and the maximum discharge current shall be greater than the maximum charging current of the products;
- If the user equipment DC prepared interface maximum discharge capacity is less than the maximum charging current product, the user interface should have the power equipment of DC limiting function, prioritizing the normal work of user equipment.
- Firefighting equipment, such as portable dry powder fire extinguishers, should be provided near the equipment.
- An automatic fire fighting system shall be provided for the case where necessary. No flammable, explosive or other dangerous articles are placed beside the battery.

#### 4.1.4 Open the Package and Inspection

- When the equipment arrives at the installation site, loading and unloading should be carried out according to the rules and regulations, so as to prevent from being exposed to sun and rain.
- Before unpacking, the total number of packages shall be indicated according to the shipping list attached to each package, and the case shall be checked for good condition
- In the process of unpacking, handle with care and protect the surface coating of the object.
- Open the package, the professional installation person should read the technical documents, verify the list, according to the configuration table and packing list, and ensure objects are complete and intact. If the internal packaging is damaged, it must be inspected and recorded in detail.

|  |   |  |  |
|--|---|--|--|
|  <p>Battery x 1 pcs</p>     |  <p>User Manual x 1 pcs</p>          |  <p>Battery back bracket x 2 pcs</p> |  <p>Wall mounted bracket x 1 pcs</p>  |
|  <p>M8*10 screw x 8 pcs</p> |  <p>M6*50 expansion bolt x 8 pcs</p> |  <p>Battery cable (Optional)</p>     |  <p>Floor mounted feet (Optional)</p> |

## 4.2 Installation

### 4.2.1 Installation Step

- **Step 1:** Draw the screw hole positions on the wall;
- **Step 2:** Fixing the expansion bolt M6 into the hole on the wall, and fix the support bracket and battery wall back bracket on the wall with M6 bolts;
- **Step 3:** Fixing the battery back bracket on the battery by M8 screw;
- **Step 4:** Connect the battery power cable to the inverter;
- **Step 5:** Carry of hoist the battery to the installed battery on wall mounted bracker;
- **Step 6:** Connect the communication cable to the inverter;
- **Step 7:** Inverter parameter setting;
- **Step 8:** Close the battery breaker;
- **Step 9:** Turn on the battery and check the battery condition.

### 4.2.2 Connection Diagram

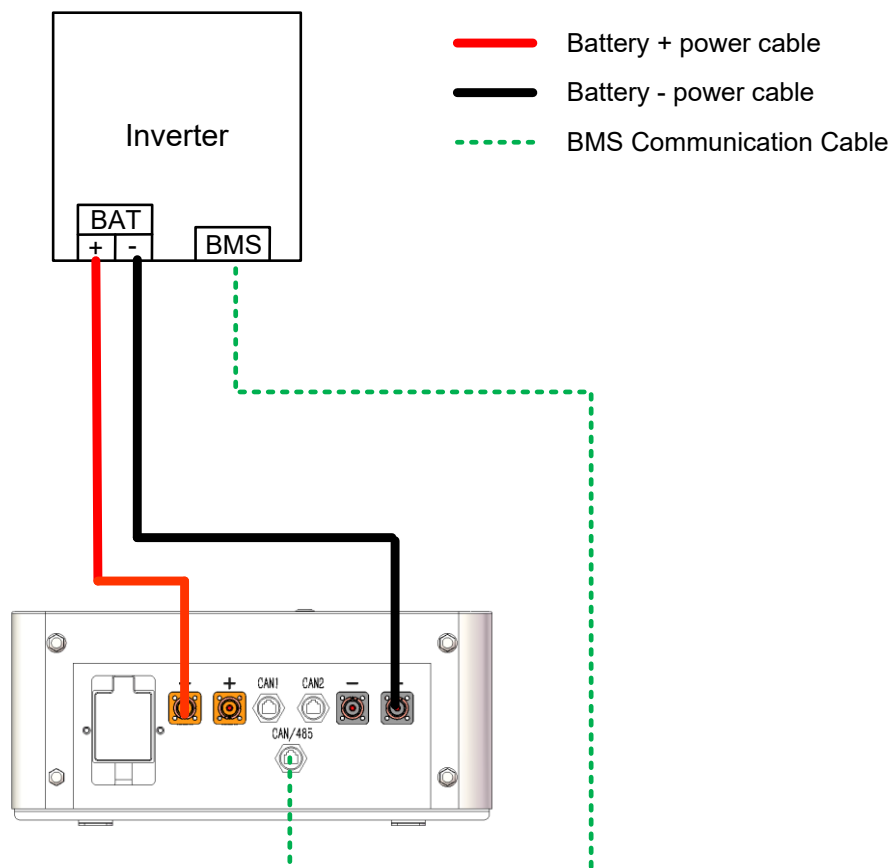


Fig. 4-1 Single CE48100-W PACK + single inverter diagram

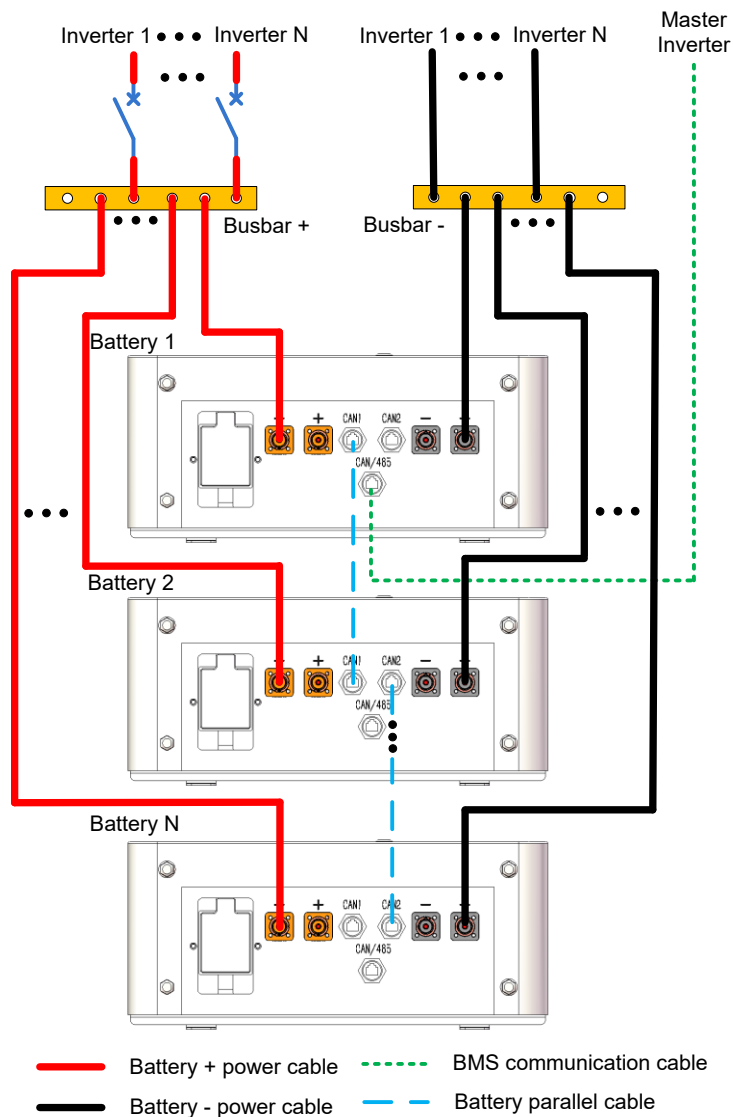


Fig. 4-2 Multi CE48100-W PACK + multi inverter diagram

Notes:

1. The breaker is recommended between the battery power output and inverter battery input terminal.

## 5. Transportation and Storage

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### 5.1 Transportation

During transportation, it should be protected from violent vibration, shock, sun exposure, and rain and must not be inverted to ensure that no short circuit occurs. In the process of loading and unloading, it should be handled with care to prevent falling, rolling, heavy pressure, and inversion.

### 5.2 Storage

Product storage requirements are as follows:

- When the battery PACK is long time stored, the battery should be charged to 60% SOC.
- Electrical box products should be stored in a dry and ventilated environment with a temperature not exceeding 50°C and relative humidity less than 80%. For inflammable and explosive items, avoid places with a lot of dust and metal powder, and avoid contact with acid or other corrosive gases;
- The storage location of electric box products should be protected from rain, moisture, and sun protection.
- Storage temperature: The storage temperature range is -10°C~35°C. If it is expected to be stored for more than 1 month and not more than 6 months, you should do a charge and discharge in advance and adjust the SOC to 20% to 50%. Zhejiang Chisage New Energy Technology Co., Ltd. will not be responsible for the loss of capacity or other losses if the storage SOC exceeds the range of 20-50% or the storage for more than 6 months without charge and discharge maintenance.







CHISAGE ESS



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