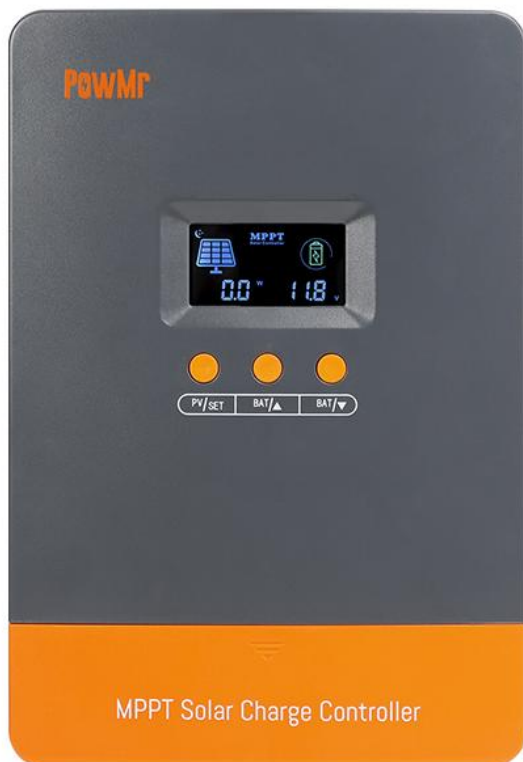


Product Type

POW-M80-PRO

POW-M100-PRO



# POWMr

SOLAR CHARGE CONTROLLER

User Manual

# Important Safety Instructions

**WARNING: Carefully read and adhere to all safety instructions.**

- Before installing and operating the controller, please read the user manual thoroughly and keep it for future reference.
- The installation or operation of the controller should only be performed by individuals who have received proper training and supervision.
  - a. Anyone lacking the necessary knowledge, experience, or capabilities for the safe installation and operation requirements.
  - b. Individuals (including children) who may have physical, sensory, or intellectual impairments that could affect the safe installation and operation.

## Controller Installation and Operation

- a. This controller product does not have user-serviceable components; do not disassemble or attempt to repair the controller yourself.
- b. Install the controller in a well-ventilated environment with adequate clearance around it.
- c. Install the controller on non-combustible walls and ensure there are no flammable materials nearby; it is normal for the controller to generate heat during operation.
- d. Place the controller in an environment that is protected from direct sunlight, rain, humidity, and dust, and keep it away from any flammable liquids or gases. The controller is for indoor use only.
- e. Do not install or operate the controller on top of, directly above, or in an enclosed space above batteries, as batteries emit explosive gases.
- f. Do not place any objects on top of the controller.

## Battery Installation and Charging

- a. Install and charge batteries in well-ventilated or exhaust-ventilated environments.
- b. Ensure there are no open flames in the vicinity of the batteries, as batteries emit explosive gases.
- c. Battery acid is corrosive; if battery acid comes into contact with the skin, rinse immediately with clean water.

- d. Do not charge non-rechargeable batteries. Do not charge lithium batteries when the temperature is below 0°C. Charging frozen batteries is prohibited.
- e. Ensure that the equipment is properly configured for the type of battery connected to it.

### DC Battery Connections

- a. Ensure that the DC system is fully off/powering down by disconnecting all cables and/or new ports from the battery/DC system.
- b. Use flexible, multi-strand copper cables with an appropriate cross-sectional area, and connect them to matching fuses or circuit breakers.
- c. Connecting the photovoltaic array to the controller is prohibited until the battery is connected first.

### Controller Configuration

- a. Refer to the battery manufacturer's guide and specifications to ensure the battery is suitable for the controller and confirm the recommended charging settings.
- b. Integrated charging modes include adaptive charging logic, which is suitable for most battery types.

## Declaration

**Under the following circumstances, our company reserves the right not to assume any quality warranty responsibilities:**

- Damage caused by improper transportation.
- Damage resulting from incorrect storage, installation, or usage.
- Damage caused by non-professionals or untrained personnel installing and operating the equipment.
- Damage resulting from non-compliance with the instructions and safety warnings in this document.
- Damage caused by operation in environments that do not meet the requirements specified in this document.
- Damage due to operation beyond the parameter ranges specified in applicable technical specifications.
- Damage resulting from unauthorized disassembly, product alteration, or software code modification.
- Damage caused by abnormal natural conditions (force majeure), such as lightning, earthquakes, fires, storms, etc.
- Any damage resulting from failure to adhere to local standards and regulations during the installation and operation processes.
- Products outside the warranty period.

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# 1 Product Introduction

Welcome to the POW-M80 and POW-M100 series solar controllers, representing cutting-edge innovation in the field of solar technology. Designed to deliver outstanding performance and reliability to your solar system, our meticulously crafted controllers feature advanced CNC technology, an LCD screen, and user-friendly button design, expanding configuration capabilities for real-time monitoring of operational data and system status. Additionally, the controllers support Maximum Power Point Tracking (MPPT) battery charging mode, maximizing energy utilization efficiency.

The POW-M80 and POW-M100 series solar controllers are designed to meet the diverse needs of various solar systems, whether in standalone systems or other applications. They automatically control the battery charging and discharging processes, optimizing these processes to extend battery life while enhancing overall system performance. The controllers come equipped with self-diagnostic and electronic protection functions, effectively preventing damage during installation errors or system failures, ensuring system reliability and stability.

Our POW-M80 and POW-M100 series solar controllers offer expanded customization options for a quicker and smoother solar system configuration process. Whether you are building an independent solar system or expanding a solar energy project, these controllers will be your indispensable partner. With their compact size, lightweight design, and a combination of air-cooling and natural heat dissipation technology using aluminum alloy backplates, they further enhance operational safety, stability, and versatility across various scenarios. The parallel operation feature allows users to effortlessly expand the scale of their solar energy sources.

The POW-M80 and POW-M100 series solar controllers provide a high current charging function of up to 80A or 100A, ensuring efficient capture and storage of energy for your solar system. Whether seeking an efficient, sustainable, and secure energy management solution or providing solid support for future energy needs, these controllers are your ideal choice. We are committed to advancing solar technology, offering excellent products and services to support your solar system construction.

## 1.1 Features

- **Integrated Charging Presets**

Integrated charging modes include adaptive charging logic, suitable for most battery types such as flooded lead-acid batteries, gel-sealed lead-acid batteries, and lithium batteries. Specific charging parameters for each battery type can be found in Section 3.5.

- **Versatile Application**

Compatible with 12V/24V/36V/48V system voltages.

- **High-Current Charge Controller**

Supports 80A/100A high-current charging, ideal for larger-scale solar energy storage systems.

- **Multi-Stage Charging Algorithm**

The multi-stage charging algorithm is designed to optimize each charging cycle. After the batteries are fully charged, it maintains battery capacity by applying preset charging parameters in specific charging stages.

- **Maximum Power Point Tracking (MPPT) Technology**

MPPT technology tracks the maximum power point voltage ( $V_{mp}$ ) of the array as it varies with weather conditions, ensuring the collection of maximum power from the array throughout the day.

- **High-Efficiency Charging**

Innovative MPPT technology with a tracking efficiency of up to 99.9% and a peak conversion efficiency of up to 97%, reducing power consumption, minimizing heat generation, and lowering operating temperatures.

- **Supports Up to 12 Units in Parallel**

The parallel operation function allows for easy expansion of the solar panel configuration and energy storage capacity limits, thus increasing the scale of energy storage. For detailed parallel operation guidelines, refer to Section 7.

- **Adaptive Boost Charging**

During the initial charging phase, adaptive boost charging monitors battery response and automatically determines the duration of the boost stage for each independent charging cycle, ensuring that the battery is fully charged at any discharge level or capacity while avoiding overcharging during the boost charging stage (extends battery life).

- **Durable and Secure**

- a. Photovoltaic input overcurrent
- b. Photovoltaic array short circuit
- c. Reversed photovoltaic polarity
- d. Overvoltage protection for batteries
- e. Overdischarge protection for batteries
- f. Over-temperature protection

- **External Temperature Probe Configuration**

Enhance precision in battery temperature monitoring by configuring an external temperature probe. This ensures accurate temperature compensation for optimal system performance.

- **Forced Air Cooling**

Built-in cooling fan for forced heat dissipation, improving overall device operational efficiency.

- **Lithium Battery Activation**

Compatible with lithium batteries. When the battery type parameter is set to lithium batteries, the charging cycle will be adjusted to accommodate the needs of lithium battery charging. Additionally, when connected lithium batteries are in a protected state, the controller will activate the lithium batteries with the energy from the solar panels, with current not exceeding the lithium battery protection voltage and current range.

**Warning:** Do not charge lithium batteries when the temperature is below 0°C.

## 1.2 Product Appearance



1	LCD Display Screen	5	Temperature Probe Port
2	Function Keys	6	Parallel Communication Port
3	Photovoltaic Input Interface	7	Port Cover Plate
4	Battery Interface	8	Heat Dissipation Vent

## 2 Installation and Wiring

### 2.1 Unpacking and Inspection

Before unpacking, inspect the packaging for any signs of damage. After unpacking, check the contents to ensure nothing is damaged or missing. Inside the package, you will find the following items:

- Controller
- User Manual
- Installation screws
- Parallel connector
- External temperature sensor

### 2.2 Choosing the Installation Location

Before installation, several aspects should be considered to determine or provide a suitable and safe installation location:



Install the controller in a space with good natural ventilation/exhaust.



Avoid direct sunlight.



Ensure there is ample clearance around the controller. The minimum clearance at the top, bottom, and both sides of the controller is 75mm.



Install the controller on a non-combustible wall and ensure there are no flammable materials nearby; an increase in temperature during controller operation is a normal occurrence.



Install the controller in an environment that avoids direct sunlight, rain, humidity, and dust, and keep it away from any flammable liquids or gases. The controller is for indoor use only.



Do not install or operate the controller on top of, directly above, or in an enclosed space above batteries, as batteries emit explosive gases.



When running multiple controllers in parallel, ensure they are installed at the same horizontal height, with a minimum spacing of 200mm between controllers.

### 2.3 Wiring Precautions

1. Installation and wiring work should be carried out by a certified electrician.
2. Wiring should follow the sequence of Battery > PV Input.
3. To avoid short-circuits and polarity reversal, pay attention to connecting the positive (+) cable to the device's positive (+) terminal and the negative (-) cable to the device's negative (-) terminal.
4. Loose and/or incomplete connections can lead to cable or terminal overheating. Therefore, tighten all cables to minimize transition resistance, using cable sizes appropriate for the specific circuit's current rating.

### 2.4 Installation and Wiring Guidelines

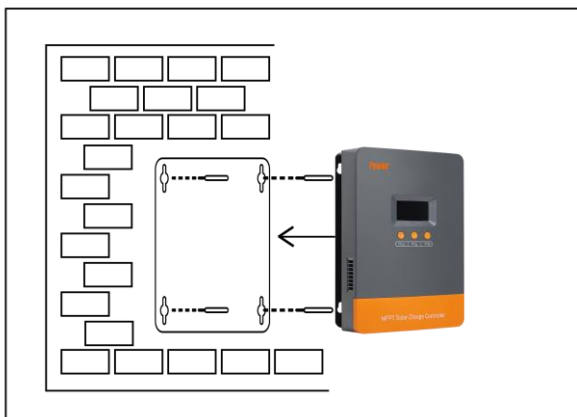
Please refer to the following steps to complete the installation and wiring of the controller. Alternatively, scan the QR code on the right to access the operating guide.



#### NOTE

- For parallel connection wiring, please refer to Chapter 7.

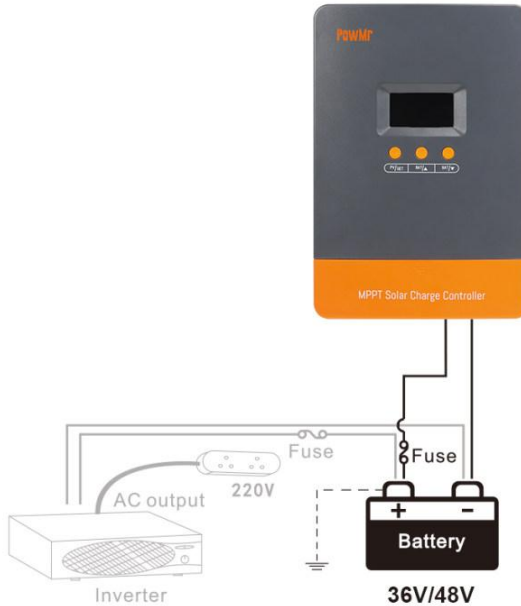
**Step 1.** Install the controller vertically with its ports facing downward, securing it to the wall through the four mounting holes using screws. For ease of installation, it is recommended to use two upper screws for initial "hanging" of the device, followed by the addition of two lower screws, and then fully tighten all four screws.



**Step 2. Battery Wiring:** Connect the battery to the controller using cables.

#### ATTENTION

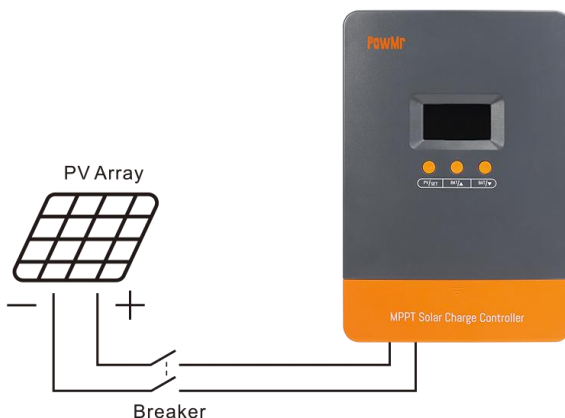
- If an inverter connection is required, please refer to the diagram below.



#### NOTE

- All wiring work must be carried out by professionals.
- For safe operation and proper application, circuit breakers of the appropriate specifications must be installed on the cables connected to the controller, and ensure that the connections are tight.
- Ensure that all circuit breakers are in the off position before completing all wiring.
- Connect the positive cable terminal to the positive terminal port, and the negative cable terminal to the negative terminal port.
- The above notes also apply to the PV ports.

**Step 3. PV Wiring:** Connect the photovoltaic array to the controller using cables.



**Step 4. Temperature Probe Connection:** Connect the temperature probe wire to the controller and securely fix the probe end to the battery using insulation tape.



**Step 5. Pre-Startup Check:** Refer to the wiring diagram below. If all connections are accurate, and all wiring is securely connected, close the circuit breakers in the order of Battery and PV Input circuitry.

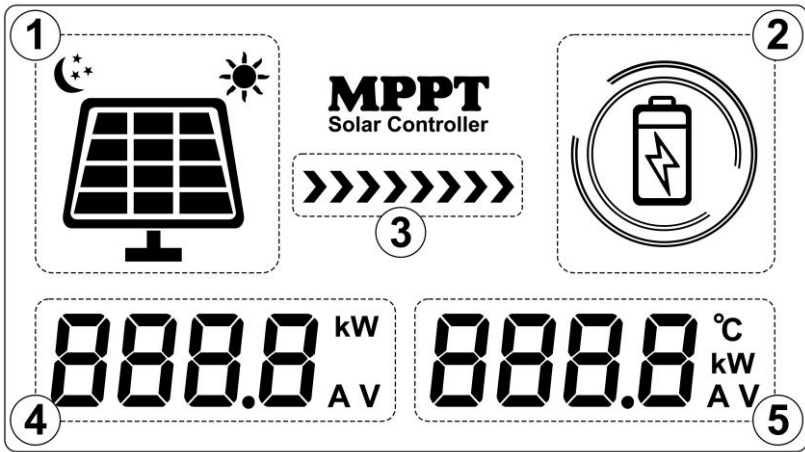
**WARNING: Risk of Electric Shock!**

- Before wiring, ensure that all power sources are turned off and follow the relevant inspection and operation procedures.

## 3 Operation Guide

### 3.1 Operation Interface Overview

#### ◇ Display Interface



No.	Function
①	Day/Night Indicator Icon, indicating the presence of photovoltaic input
②	Battery Remaining Capacity Indicator
③	Charging in Progress Indicator
④	Photovoltaic Input Voltage/Power/Operating Mode/Fault Codes
⑤	Current Battery Voltage/Charging Current/Device Temperature/Battery Calibration Voltage/Parallel Communication Code/Battery Type/Boost Charging Voltage/Float Charging Voltage/MPP Tracking Return Voltage

✧ **Button Functions**



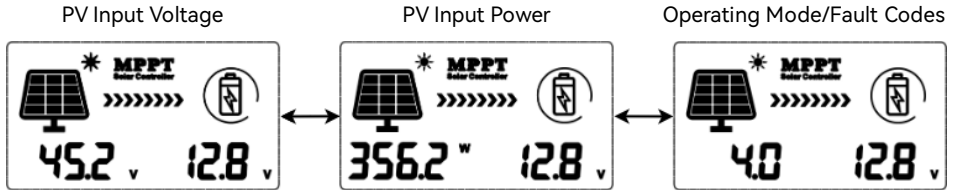
Button	Description	
<b>PV/SET</b>	Browsing Mode	Switch photovoltaic input parameters
	Setup Mode	Confirm settings
<b>BAT/▲</b>	Browsing Mode	Short Press: Switch battery parameters, move to the next item Long Press: Enter battery parameter settings
	Setup Mode	Increase value/return to the previous item and move to the next
<b>BAT/▼</b>	Browsing Mode	Switch battery parameters, return to the previous item
	Setup Mode	Decrease value/return to the previous item
	Long press to restore factory settings.	

**Note:**

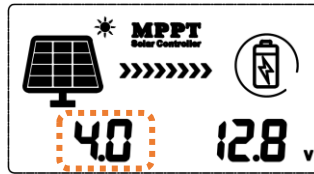
1. Due to the controller's limitation to battery parameters, the "Setup Mode" in the table above refers specifically to the setting mode for battery parameters.
2. When long pressing **BAT/▲** and **BAT/▼**, please disconnect the PV input to ensure that the settings are made while the battery is not charging.

### 3.2 Overview of Photovoltaic Parameters

A short press of the **PV/SET** key will result in the following data switching on the left side of the display page:



#### ◇ Operating Modes

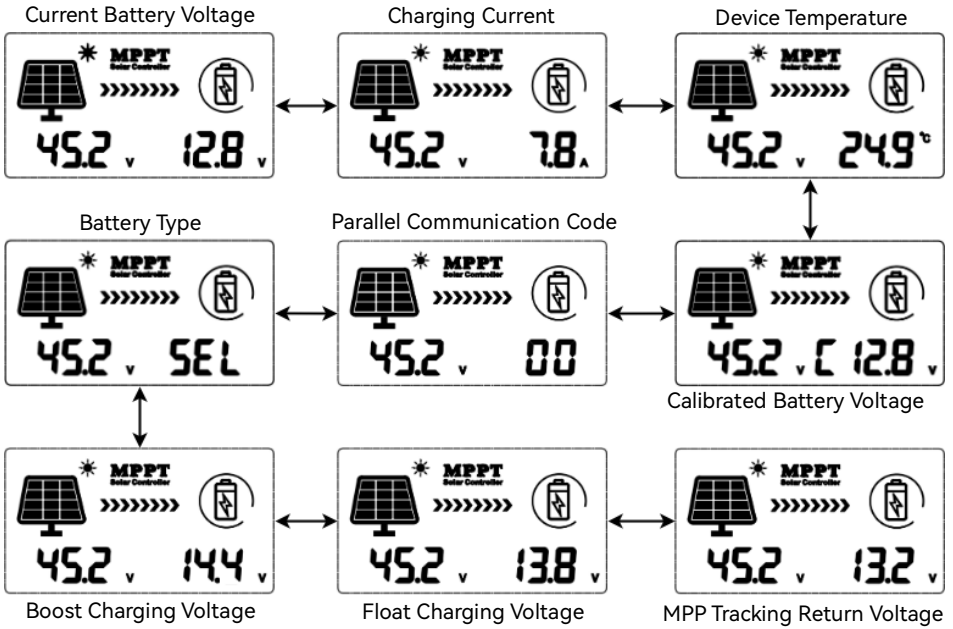


Mode Code	Description
3.0	Night Mode, not charging
4.0	Fast Charging Mode (MPPT Mode)
7.0	Boost Charging Mode
8.0	Float Charging Mode

**Note:** In the event of a fault, the Operating Mode section will display a fault code. Please refer to Section 4.2 for details.

### 3.3 Overview of Battery Parameters

In browsing mode, use the **BAT/▲** and **BAT/▼** keys to scroll through battery parameters. When switching to the parameter that needs adjustment, long-press the **BAT/▲** key to enter the parameter setting mode. Once in the specified parameter setting, use the **BAT/▲** and **BAT/▼** keys to adjust the numerical values or toggle between options. Finally, press the **PV/SET** key to confirm the settings.



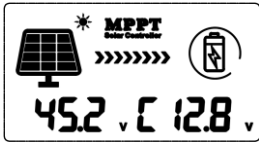
### 3.4 Battery Parameter Settings

#### NOTE

- Before long pressing **BAT/▲** to set the battery parameters, please switch off the PV input to ensure that the battery is not in a charging state.

The following are configurable settings for battery-related parameters.

#### Calibrated Battery Voltage

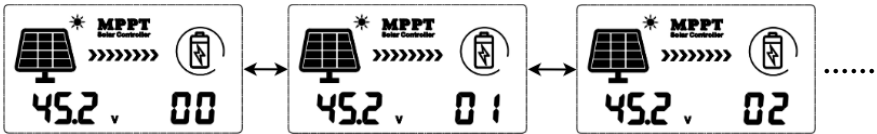


When there is a difference between the battery voltage monitored by the controller and the value measured by a multimeter, the battery voltage can be calibrated using this setting.

Long-press the **BAT/▲** key to enter the setting program. Adjust the numerical value using the **BAT/▲** and **BAT/▼** keys, then press the **PV/SET** key to save and confirm.

#### Parallel Communication Code Setting

In parallel operation mode, each controller must have a defined communication code. If not operating in parallel, there is no need to configure this program.

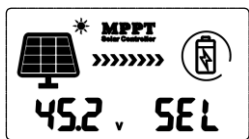


The host is determined by the controller with the smallest communication code. During parallel operation, if the host encounters an issue, the system will automatically designate the controller with the next code as the new host. For instance, if the host with code 01 experiences a malfunction, the system will redefine controller 02 as the new host.

Assuming six controllers are operating in parallel, and the communication codes for the six devices are sequentially defined as one of the numbers from 01 to 06 (with each device having a unique communication code, and no repetition of communication codes among the devices).

Possible Scenarios	Code	01	02	03	04	05	06
	Scenario 1: Normal operation		Master	Slave	Slave	Slave	Slave
Scenario 2: No. 01 failure		Fault	Master	Slave	Slave	Slave	Slave
Scenario 3: No. 03 failure		Master	Slave	Fault	Slave	Slave	Slave
Scenario 4: No. 01 & 02 failures		Fault	Fault	Master	Slave	Slave	Slave

### Battery Type Setting

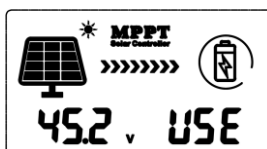


Please refer to the table below and choose the battery type based on the connected batteries:

Order	Display	Battery Type
1	SEL	Sealed Lead-Acid Battery
2	GEL	Gel Sealed Lead-Acid Battery
3	FLd	Flooded Lead-Acid Battery
4	L04	4-Cell LiFePO4 Battery
5	L07	7-Cell LiFePO4 Battery
6	L08	8-Cell LiFePO4 Battery
7	L15	15-Cell LiFePO4 Battery
8	L16	16-Cell LiFePO4 Battery
9	N03	3-Series Lithium-Ion Battery
10	N06	6-Series Lithium-Ion Battery
11	N07	7-Series Lithium-Ion Battery
12	N13	13-Series Lithium-Ion Battery
13	N14	14-Series Lithium-Ion Battery
14	USE	User-defined

Long-press the **BAT/▲** key to enter the setup program. Use the **BAT/▲** and **BAT/▼** keys to toggle through the battery type options. Finally, press the **PV/SET** key to save and confirm.

#### Custom Configuration of Charging Voltage



#### NOTE

- If the battery type is selected as "USE" (User-defined mode), then the five charging parameters in the diagram below can be manually set.
- If "USE" is not selected, there is no need to manually set charging parameters. The controller will charge based on preset values for the corresponding battery type. Refer to Chapter 3.5 for charging preset values.

Nominal System Voltage

Boost Charging Voltage

Float Charging Voltage

MPP Tracking Return Voltage

Setting Item	Setting Range
Nominal System Voltage	12V/24V/36V/48V (optional)
Boost Charging Voltage	9.0~17.0V
Float Charging Voltage	9.0~17.0V
MPP Tracking Return Voltage	9.0~17.0V

#### Setting Steps:

- Step 1.** Use the **BAT/▲** and **BAT/▼** keys to select the parameter you want to set.
- Step 2.** Long-press the **BAT/▲** key to enter the setting mode for the selected parameter.
- Step 3.** Use the **BAT/▲** and **BAT/▼** keys to adjust the voltage value.
- Step 4.** Press the **PV/SET** key to confirm and save.

#### NOTE

- The above parameters are applicable to 12V batteries. When the connected battery voltage is 24V/36V/48V, the range values are 2/3/4 times the specified range, respectively. The LCD screen only displays voltage values for 12V batteries.

#### ➤ Logic for setting custom battery voltage parameters:

Maximum Charging Voltage > Boost Charging Voltage > Float Charging Voltage > MPP Tracking Return Voltage

### 3.5 Default Parameters for Different Battery Types

◆ For Lead-acid Batteries and User-defined Batteries:

Battery Type Parameters	FLd	GEL	SEL	USE
Boost Charging Voltage	14.6V	14.2V	14.4V	9.0~17.0V
Float Charging Voltage	13.8V	13.8V	13.8V	9.0~17.0V
MPP Tracking Return Voltage	13.2V	13.2V	13.2V	9.0~17.0V

◆ For Lithium-Ion Batteries:

Battery Type Parameters	N03	N06	N07	N13	N14
Boost Charging Voltage	12.5V	25.0V	29.2V	54.2V	58.3V
Float Charging Voltage	12.2V	24.4V	28.5V	52.9V	56.9V
MPP Tracking Return Voltage	11.7V	23.4V	27.3V	50.7V	54.6V

◆ For LiFePO4 Batteries:

Battery Type Parameters	L04	L07	L08	L15	L16
Boost Charging Voltage	14.5V	25.4V	29.0V	54.4V	58.0V
Float Charging Voltage	13.8V	24.1V	27.6V	51.8V	55.2V
MPP Tracking Return Voltage	13.2V	23.1V	26.4V	49.5V	52.8V

## 4 Protection

### 4.1 Protection Function

Protection	Explanation
Photovoltaic Array Short Circuit	In the event of a short circuit in the photovoltaic array, the controller will cease charging. Resolving the short circuit fault will restore normal operation.
Photovoltaic Input Overcurrent	The controller limits the battery charging current to the maximum rated value. Consequently, an overcurrent photovoltaic array will be unable to operate at peak power.
Photovoltaic Polarity Reversal	If the photovoltaic wiring is reversed, the controller will not operate. Correct the connection to restore controller functionality.
Battery Polarity Reversal	If the battery wiring is reversed, the controller will not operate. Correct the connection to restore normal controller operation.
Overtemperature	When the controller's heatsink temperature exceeds 59.5°C, it will automatically start reducing the charging current. If the temperature exceeds 80°C, the controller will shut down automatically.

## 4.2 Troubleshooting

When a fault occurs, the controller will display a fault code to assist you in finding a solution.

Fault Code	Possible Causes	Solutions
18	Low input photovoltaic voltage	Increase the number of solar panels or connect them in series to raise the photovoltaic input voltage.
60	Overtemperature protection	Allow the device to cool below the recovery temperature to resume normal charging and discharging.
63	High battery voltage	Measure and confirm if the battery voltage exceeds the rated voltage. If so, close the photovoltaic array circuit breaker.
65	Low battery voltage	Charge the battery until the voltage exceeds the undervoltage termination voltage. Refer to "3.5 Default Parameters for Different Battery Types" for specific values.
71	High input photovoltaic voltage	Reduce the number of connected photovoltaic arrays to lower the photovoltaic input.
73	Overcharging current	Alternatively, modify the series and parallel connection to decrease voltage or current values.

## 5 Maintenance

We recommend conducting the following checks and maintenance at least twice a year to ensure optimal performance:

1. Ensure the controller is securely mounted in a clean and dry environment.
2. Ensure proper airflow around the controller and clean any dust or debris from the heat sinks.
3. Inspect all exposed wires for insulation damage, such as severe sun exposure, friction wear, dryness, insect or rodent damage. Repair or replace any damaged wires as necessary.
4. Tighten all terminals and check for loose, broken, or burnt cable connections.
5. Confirm that all system components are properly grounded.
6. Ensure all terminals are free from corrosion, insulation damage, high temperatures, or signs of burning/discoloration, and tighten terminal screws.
7. Check for dirt, nesting insects, and corrosion. If present, clean promptly.

**WARNING: Risk of electric shock!**

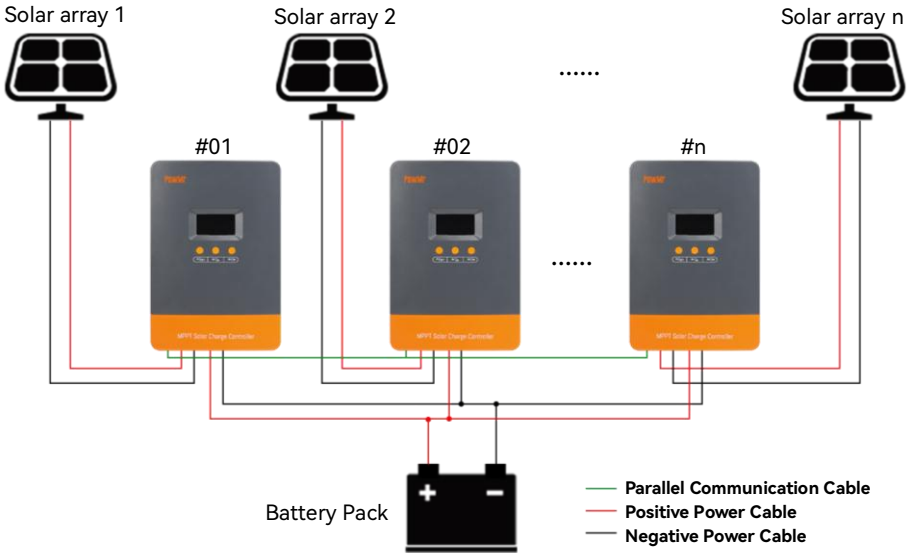
- Before performing the above operations, ensure that all power sources are turned off and then follow the relevant check and operation guidelines.

## 6 Specification Parameters

Models	80A	100A
<b>Solar Input Specification</b>		
<b>Maximum Input Power:</b>		
For 12V System	960W	1200W
For 24V System	1920W	2400W
For 36V System	2880W	3600W
For 48V System	3840W	4800W
<b>Input Voltage Range:</b>		
For 12V System	20V~80V	
For 24V System	37V~105V	
For 36V System	50V~160V	
For 48V System	72V~160V	
<b>Battery Charging Specification</b>		
Charging Technology	MPPT	
Charging Algorithm	3 Stages	
Nominal System Voltage	12V/24V/36V/48V	
Battery Voltage Range	9~60V	
Rated Charging Current	80A	100A
Maximum Efficiency	≤98%	
MPPT Efficiency	>99%	
Temperature Compensation	-3mV/°C/2V (default)	
Self-Consumption	44mA/12V; 26mA/24V; 18mA/36V; 12mA/48V	
<b>Environment Specification</b>		
Operating Temperature Range	-35°C~+45°C	
Humidity Range	≤95%, Non-condensing	
Altitude	<3000m	
<b>General Specification</b>		
Protection Level	IP32	
Dimensions	260x180x75mm	315x195x80mm
Net Weight	2kg	2.7kg

## 7 Parallel Operation Guide

### Parallel Operation Schematic



#### Main Modules:

➤ Controller

The controller device is designed for both standalone and parallel operation. In parallel operation, communication between controllers is achieved through communication lines. Parallel controllers should be installed at the same horizontal level.

➤ Solar Array

Each controller must be connected to a separate solar array. One solar array cannot be simultaneously connected to more than one controller. The input power connected to each controller should not exceed the rated input power of a single controller.

➤ Battery Bank

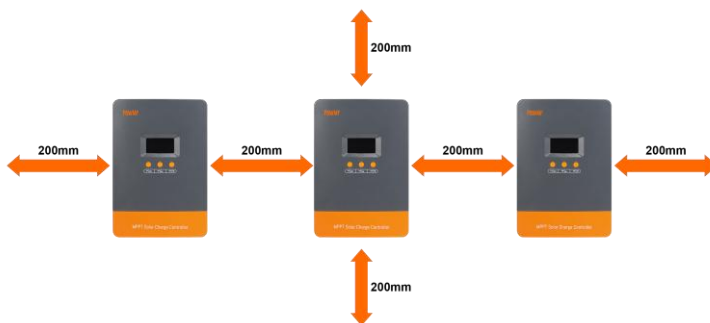
Parallel controllers are connected to the same battery bank.

## Parallel Installation and Wiring

✧ You can view the parallel operation guide by scanning the QR code in the upper right corner.



Step 1. Install parallel devices at the same height level with a minimum distance of approximately 200mm between devices.



Step 2. Connect communication cables.

Step 3. Connect all parallel controllers to the same battery bank.

Step 4. Connect each controller to its respective photovoltaic array.

Step 5. After completing the wiring, power on by closing the battery circuit breaker. Once powered on, set the master and slave configurations as defined in Section 3.4. Then, proceed to configure the entire parallel system through the master controller.

### WARNING

- To ensure the proper operation of the controllers, it is prohibited to use controllers of different brands or models in parallel.



# POWMr

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