

Product Model

POW-M60-ULTRA



# 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.

## Warranty Services

**Dear Customer,**

Thank you for choosing the POW-M60 series solar controller.

Please carefully read this manual as it will help you maximize the many advantages the controller offers for your solar system.

This manual provides important recommendations regarding installation and usage. For your own benefit, please read and pay close attention to the safety advice within.

In accordance with the instructions, repair services may be provided to users for any damaged units resulting from incorrect installation, disassembly, or improper use of this product.

**Warranty Terms:**

- Within 30 days from the date of purchase, a malfunctioning controller will be replaced at no charge, provided that it has been used under normal circumstances and authorized by the company's technical personnel.
- Within 2 years from the date of purchase, a malfunctioning controller will be repaired at no charge.

**NOTE**

- Unauthorized disassembly voids the warranty.

## 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-M60 series solar controller. This controller represents advanced innovation in the field of solar technology and is designed to provide exceptional performance and reliability for your solar energy system. The controller is equipped with advanced CNC technology, an LCD display, automated operation, and a Maximum Power Point Tracking (MPPT) battery charging mode. Combined with advanced control technology, it significantly extends the lifespan of your batteries.

The POW-M60 series solar controller is designed to meet the diverse needs of various solar energy systems, whether in standalone systems or other application scenarios. It automatically controls the charging and discharging processes. By optimizing the controller's battery charging and discharging processes, it not only prolongs the battery's lifespan but also enhances the overall system's performance. The controller features self-diagnostic functions and electronic protection, effectively preventing damage to the controller or batteries during installation errors or system faults, ensuring system reliability and stability.

Our POW-M60 series solar controllers are suitable for a wide range of solar energy applications. We offer a user-friendly custom open-program configuration interface, making the configuration process of solar energy systems quicker and smoother. It also provides more possibilities for expanding solar energy systems. Whether you are setting up a small-scale residential standalone solar system or expanding your solar energy project, the POW-M60 series solar controller will be an indispensable partner.

By choosing the POW-M60 series solar controller, you will gain an efficient, sustainable, and secure energy management solution that provides strong support for future energy needs. We are committed to advancing solar technology and delivering outstanding products and services to you.

## 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 3.7.

- **Versatile Application**

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

- **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 98.1%, reducing power consumption, minimizing heat generation, and lowering operating temperatures.

- **Customizable Charging Current Limit**

Different types of batteries have varying requirements for charging current. Customizing the charging current limit ensures that the charge controller is compatible with multiple battery types. By setting a maximum charging current, you can prevent excessive charging rates, thereby reducing potential damage to the battery and extending its lifespan. The configurable range for the charging current is 2 to 60A.

- **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**

Precisely monitor battery temperature. When the battery temperature exceeds 65°C, charging is stopped, and when the battery temperature drops below 55°C, charging is resumed to protect the battery.

- **Forced Air Cooling & Heat Dissipation Backplate**

Features an internal cooling fan for forced air cooling and an external heat dissipation plate for natural heat dissipation, enhancing overall equipment efficiency.

- **One-Click Factory Reset**

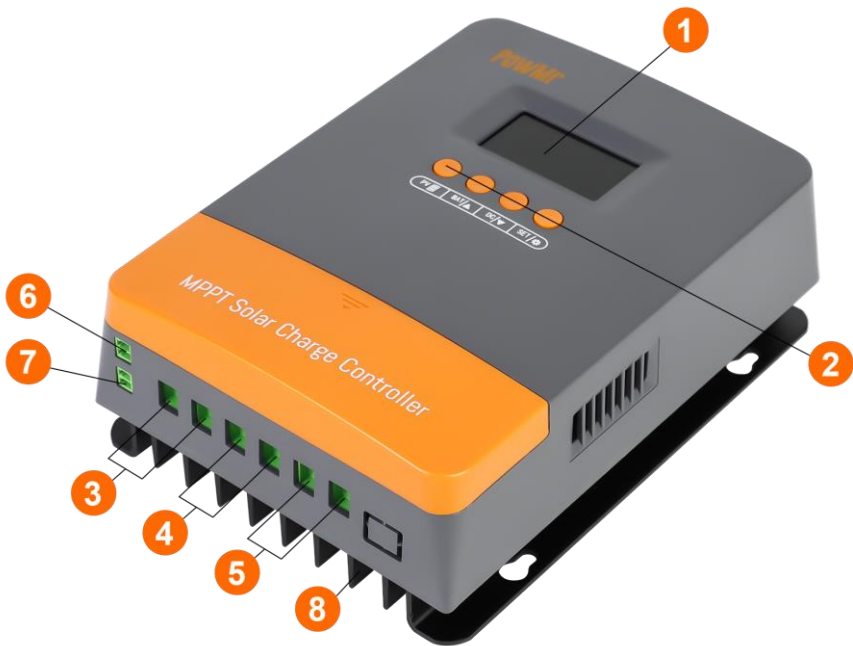
Long-press the "SET" button to reset the controller. All configurable settings will revert to their factory defaults after the reset.

- **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   | 5 | Load port                   |
| 2 | Function key  | 6 | Temperature probe port      |
| 3 | PV input port | 7 | Parallel communication port |
| 4 | Battery port  | 8 | Heat sink                   |

## 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 Guide card
- Installation screws
- Parallel Communication Cable
- Parallel Communication Terminal
- 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 75mm 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 > Load.
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.
5. Do not connect the inverter to the load terminal of the controller, as doing so may result in irreversible damage to the equipment. If it is necessary to connect the inverter, please follow the battery connection steps outlined in Section 2.4, as indicated in the wiring diagram.

## 2.4 Installation and Wiring Guidelines

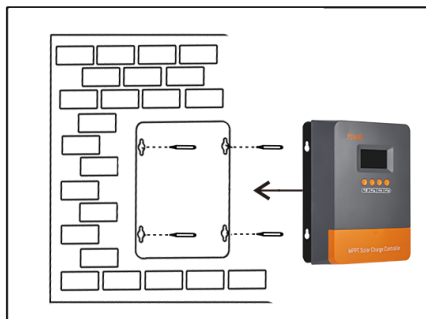
Please refer to the following steps to complete the installation and wiring of the controller. Alternatively, scan the QR code on the right to access the operating guide.



### NOTE

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

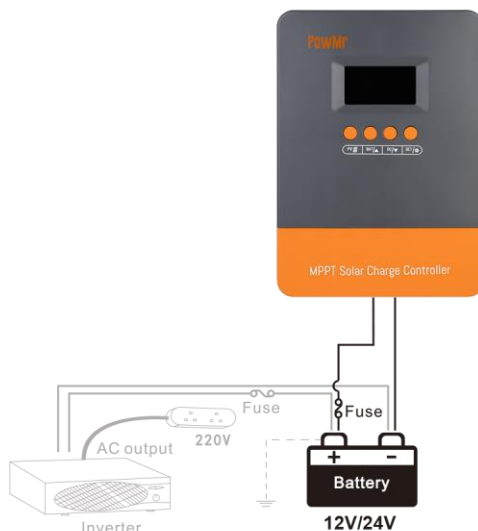
**Step 1.** Install the controller vertically with its ports facing downward, securing it to the wall through the four mounting holes using screws. For ease of installation, it is recommended to use two upper screws for initial "hanging" of the device, followed by the addition of two lower screws, and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



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

### Attention

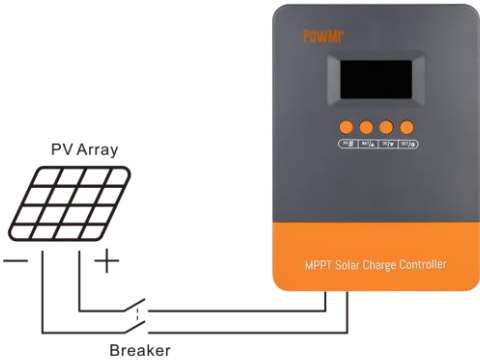
- Do not connect the inverter to the load terminal of the controller; otherwise, it may cause irreversible damage to the equipment. If it is necessary to connect the inverter, please refer to the diagram below.



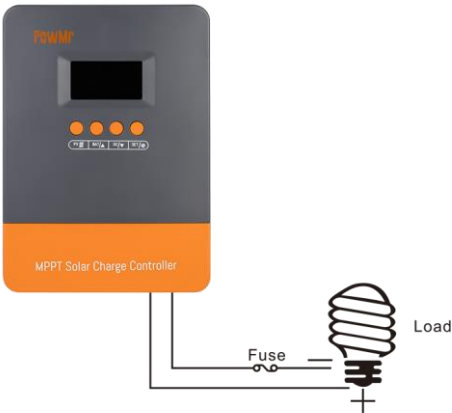
### NOTE

- 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 and DC output ports.

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



**Step 4. DC Output Wiring:** Connect the load to the controller using cables.



**Step 5. Temperature Probe Connection:** Connect the temperature probe wire to the controller and securely fix the probe end to the battery using insulation tape.



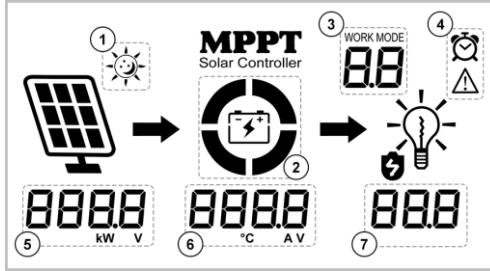
**Step 6. Pre-Startup Check:** Refer to the wiring diagram below. If all connections are accurate, and all wiring is securely connected, close the circuit breakers in the order of Battery, PV Input, and Load terminals.

**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 LCD Screen Icon Display



| No. | Description               |   |
|-----|---------------------------|---|
| ①   | Day/Night Indicator Icon  | Indicates whether photovoltaic input is currently present.  |
| ②   | Battery Level Icon        | Indicates the remaining battery capacity.   |
| ③   | Operation Mode/Error Code | Displays the current operation mode (see Section 3.3)/error code.   |
| ④   | Load Status Icon          | Indicates the periodic operating status and alarm status of the load (see Section 4.2).   |
| ⑤   | PV Input Information      | Shows the photovoltaic input voltage/power/total energy generated.  |
| ⑥   | Battery Information       | Displays the current battery voltage/charging current/device temperature/battery calibration voltage/parallel communication code/battery type/equalization charging voltage/float charging voltage/DC undervoltage recovery voltage/DC undervoltage cutoff voltage. |
| ⑦   | Load Operating Mode       | Indicates the load operation mode.  |



## 3.2 Key Introduction



| Function key | Description |   |
|--------------|-------------|---|
| PV /         | Browse Mode | Switch PV Input Parameters  |
| BAT /        | Browse Mode | Short press to toggle battery information (move to the next option)       |
|              |             | Long press to enter battery parameter settings                            |
| DC /         | Browse Mode | Short press to toggle battery information (return to the previous option) |
|              |             | Long press to enter load operation mode settings                          |
|              | Set Mode    | Increase Value  |
| SET /        | Short press | Confirm and Save Settings   |
|              | Long Press  | Restore Factory Settings  |

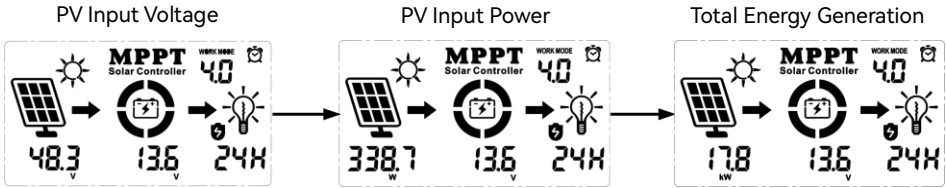
## 3.3 Operating Modes

| Interface Display | Code | Description                                     |
|-------------------|------|---|
| WORK MODE<br>3.0  | 3.0  | Night Mode, No Charging                         |
| WORK MODE<br>4.0  | 4.0  | MPPT Mode                                       |
| WORK MODE<br>7.0  | 7.0  | Boost Charging Mode (Constant Voltage Charging) |
| WORK MODE<br>8.0  | 8.0  | Float Charging Mode                             |

**Note:** In the event of a fault, the operation mode section will display the fault code. For details, please refer to section 4.2.

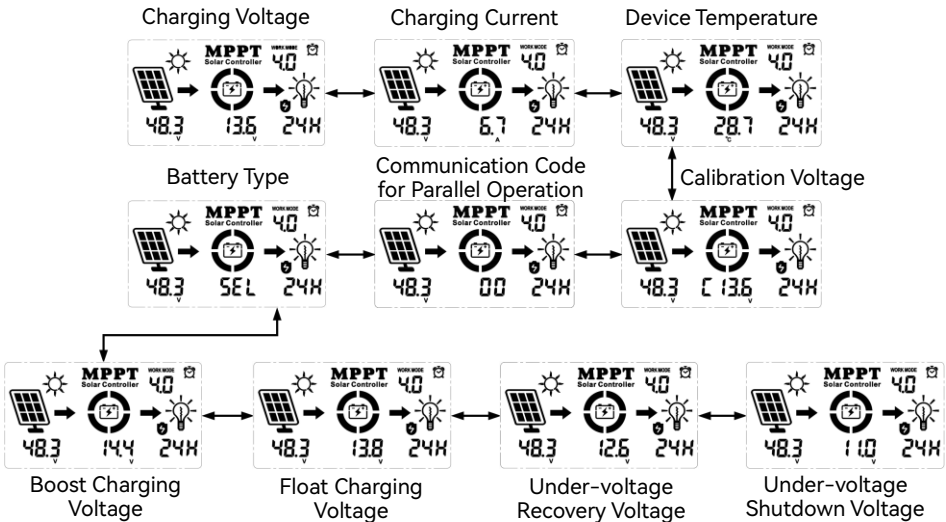
### 3.4 PV Parameters Overview

Press the **PV /** button briefly to switch the data displayed on the left side of the screen as follows:



### 3.5 Battery Parameters Overview

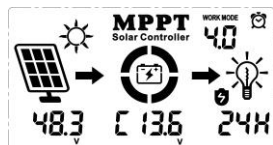
In browsing mode, use the **BAT/▲** and **DC/▼** buttons to scroll through the battery parameters. When you reach the parameter you wish to set, press and hold the **BAT/▲** button to enter the parameter setting mode. Once in the specific parameter's setting mode, adjust the values or scroll through options using the **BAT/▲** and **DC/▼** buttons, and press the **SET / \*** button to confirm the settings.



## 3.6 Battery Parameter Settings

The following are the configurable settings for battery-related parameters:

### Battery Calibration Voltage



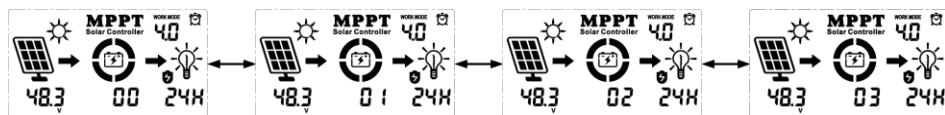
If there is a discrepancy between the battery voltage detected by the controller and the value measured with a multimeter, this setting can be used to calibrate the battery voltage.

Press and hold the **BAT/▲** button to enter the setting program, adjust the value using the **BAT/▲** and **DC/▼** buttons, and press the **SET / \*** button to save and confirm.

### Communication Code for Parallel Operation

#### Note:

- If parallel operation is not used, this setting does not need to be configured.



After completing the parallel wiring, use this setting to define the master and slave units.

The controller with the lowest communication code value will be the master. In a parallel operation, if the master fails, the system will automatically select the controller with the next highest communication code value as the new master. For example, if Master Unit 01 fails, the system will designate Unit 02 as the new master.

Assuming 6 controllers are operating in parallel, assign communication codes from 01 to 06 to each unit (each unit's communication code should be unique).

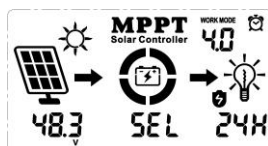
| Code                         | 01      | 02      | 03      | 04    | 05    | 06    |
|------------------------------|---------|---------|---------|-------|-------|-------|
| Possible Scenarios           |         |         |         |       |       |       |
| Scenario 1: Normal operation | Master  | Slave   | Slave   | Slave | Slave | Slave |
| Scenario 2: 01 fails         | Failure | Master  | Slave   | Slave | Slave | Slave |
| Scenario 3: 03 fails         | Master  | Slave   | Failure | Slave | Slave | Slave |
| Scenario 4: 01 and 02 fail   | Failure | Failure | Master  | Slave | Slave | Slave |

## NOTE

- Before setting the battery parameter, please turn off the photovoltaic input to ensure that the battery is not in a charging state.

## Battery Type Selection

Please select the battery type according to the connected battery by referring to the table below.

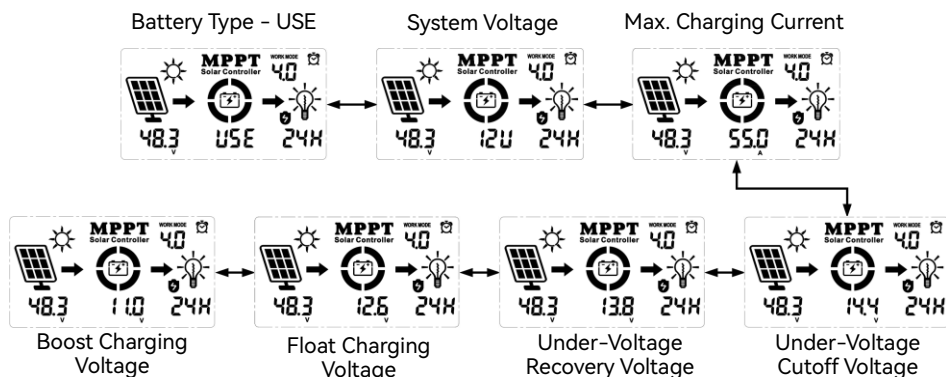


| Sequence | Display | Battery Type                           |
|----------|---------|--|
| 1        | SEL     | Lead-acid Battery (Default)            |
| 2        | GEL     | Gel Sealed Lead-acid Battery           |
| 3        | FLd     | Flooded Lead-acid Battery              |
| 4        | L04     | 4-Cell Lithium Iron Phosphate Battery  |
| 5        | L07     | 7-Cell Lithium Iron Phosphate Battery  |
| 6        | L08     | 8-Cell Lithium Iron Phosphate Battery  |
| 7        | L15     | 15-Cell Lithium Iron Phosphate Battery |
| 8        | L16     | 16-Cell Lithium Iron Phosphate Battery |
| 9        | N03     | 3-Cell Ternary Lithium Battery         |
| 10       | N06     | 6-Cell Ternary Lithium Battery         |
| 11       | N07     | 7-Cell Ternary Lithium Battery         |
| 12       | N13     | 13-Cell Ternary Lithium Battery        |
| 13       | N14     | 14-Cell Ternary Lithium Battery        |
| 14       | USE     | Custom Battery Type                    |

Press and hold the **BAT/▲** button to enter the setting program, use the **BAT/▲** and **DC/▼** buttons to select the battery type, and press the **SET / \*** button to save and confirm. If "User Defined" is selected, you can set the following battery parameters.

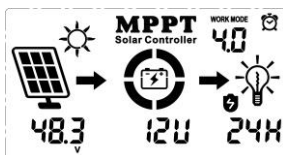
## Custom Charging Parameters

- If "USE" is selected for the battery type, the following 6 charging parameters can be manually set.
- If "USE" is not selected, manual setting of charging parameters is not required. The controller will charge according to the preset values for the selected battery type. For preset values, see Chapter 3.7.



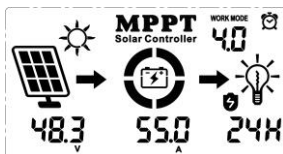
## System Voltage

Available options: 12V / 24V / 36V / 48V.



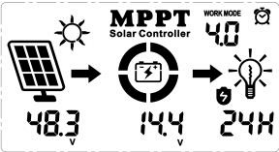
## Maximum Charging Current

The setting range is: 2~60A, with a step size of 1A.



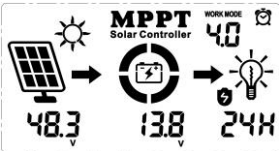
Boost Charging Voltage

The setting range is: 9.0~17.0V, with a step size of 0.1V.



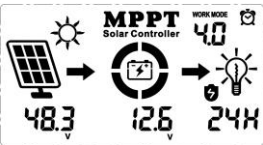
Float Charging Voltage

The setting range is: 9.0~17.0V, with a step size of 0.1V.



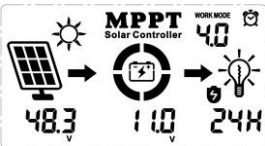
Under-Voltage Recovery Voltage

The setting range is: 9.0~17.0V, with a step size of 0.1V.



Under-Voltage Cutoff Voltage

The setting range is: 9.0~17.0V, with a step size of 0.1V.



### 3.7 Charging Voltage Parameters for Different Battery Types

◆ For Lead-Acid Batteries and User-Defined Batteries:

| Battery Type<br>Parameter      | 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 |
| Under Voltage Cutoff Voltage   | 11.0V | 11.0V | 11.0V | 9.0~17.0V |
| Under Voltage Recovery Voltage | 12.6V | 12.6V | 12.6V | 9.0~17.0V |

◆ For Ternary Lithium Batteries:

| Battery Type<br>Parameter      | 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 |
| Under Voltage Cutoff Voltage   | 8.4V  | 16.8V | 19.6V | 36.4V | 39.2V |
| Under Voltage Recovery Voltage | 9.0V  | 18.0V | 21.0V | 39.0V | 42.0V |

◆ For Lithium Iron Phosphate (LiFePO4) Batteries:

| Battery Type<br>Parameter      | 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 |
| Under Voltage Cutoff Voltage   | 11.2V | 19.6V | 22.4V | 42.0V | 44.8V |
| Under Voltage Recovery Voltage | 12.0V | 21.0V | 24.0V | 45.0V | 48.0V |

**Note:**

- The charging parameters for lead-acid batteries and user-defined batteries listed in the above table are for a 12V system voltage. For a 24V system voltage, these values should be multiplied by 2. If a lead-acid or user-defined battery with a 24V system voltage is connected, the actual charging voltage will be twice the value displayed on the screen.

### 3.8 Load Operation Mode Settings

To access the load operation mode settings, press and hold the **DC/▼** button. Then use the **BAT/▲** and **DC/▼** buttons to switch between options, and press the **SET / ✱** button to save and confirm.

| Mode Code | Description   |
|-----------|---|
| 00H       | Light Control Mode (Load output starts after sunset and stops at sunrise).  |
| 24H       | Immediate Load On (Press the <b>SET</b> button to immediately turn off the load output).                          |
| 01H~23H   | Adjust the duration of load activation (The value indicates the duration, e.g., 01H for 1 hour, 02H for 2 hours). |



## 4 Protection

### 4.1 Protection Function

| Protection                       | Description  |
|----------------------------------|--|
| Photovoltaic Input Overcurrent   | The controller limits the battery charging current to the maximum battery current rating. Consequently, an overcurrent from the photovoltaic array input will not allow it to operate at peak power.                     |
| Photovoltaic Array Short Circuit | When a short circuit occurs in the photovoltaic array, the controller will stop charging, and operation can be restored by eliminating the short circuit fault.  |
| Photovoltaic Polarity Reversal   | If the photovoltaic input wiring polarity is reversed, the controller will not operate, and it will not damage the controller. After proper reconnection, the controller will operate normally.                          |
| Battery Overvoltage              | When the battery voltage exceeds 15.5/31.0/46.5/62.0V, the controller will stop charging to protect the battery from overcharging damage. Please note that stopping the charging means the charging current is very low. |
| Battery Over-discharge           | When the battery voltage drops to the low-voltage disconnect setpoint, the controller will stop discharging to protect the battery from over-discharge damage.   |
| Over-temperature Protection      | When the temperature of the controller's heat sink exceeds 65°C, the controller will automatically begin to reduce the charging current. When the temperature exceeds 80°C, the controller will automatically shut down. |

## 4.2 Troubleshooting

| Fault Code | Description                         | Resolution   |
|------------|-------------------------------------|--|
| 18         | Photovoltaic Input Voltage Too Low  | Increase the photovoltaic array voltage by changing the series-parallel connection or adding more solar panels.          |
| 60         | Over-temperature Protection         | In case of over-temperature, the fan will start automatically to provide efficient forced cooling.                       |
| 63         | Battery Overvoltage                 | Charging will automatically stop, and it will resume when the battery voltage returns to normal levels.                  |
| 65         | Battery Undervoltage                | Discharging will automatically stop, and it will resume when the battery voltage rises to normal levels.                 |
| 71         | Photovoltaic Input Voltage Too High | Reduce the photovoltaic array voltage by changing the series-parallel connection or reducing the number of solar panels. |
| 73         | Overcharging Current                | Reduce the photovoltaic input power by decreasing the number of solar panels.  |

## 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.

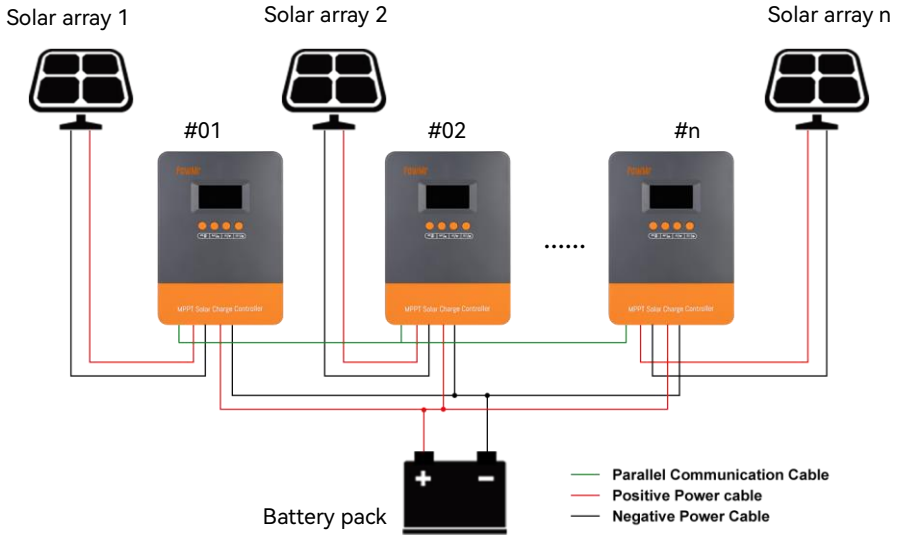
6 Specification Parameters

| Model                         | POW-M60-ULTRA        |
|-------------------------------|----------------------|
| Solar Input Parameters        |                      |
| Maximum Input Power:          |                      |
| For 12V System                | 720W                 |
| For 24V System                | 1440W                |
| For 36V System                | 2100W                |
| For 48V System                | 2800W                |
| Input Voltage Range:          |                      |
| For 12V System                | 20V~80V              |
| For 24V System                | 37V~105V             |
| For 36V System                | 50V~160V             |
| For 48V System                | 72V~160V             |
| Battery Charging Parameters   |                      |
| Charging Technology           | MPPT                 |
| Charging Algorithm            | 3 stages             |
| Battery Voltage Range         | 9~60V                |
| Rated Charging Current        | 60A                  |
| Maximum Efficiency            | ≥98.1%               |
| Solar Utilization Rate        | ≥99%                 |
| Self-consumption              | 0.7W-1.2W            |
| Load Terminal Output          |                      |
| Rated Output Current          | 25A                  |
| Max. Capacitive Load Capacity | 10000μF              |
| Environmental Parameters      |                      |
| Operating Temperature Range   | -35℃~+45℃            |
| Humidity Range                | ≤95%, non-condensing |
| Altitude                      | <3000m               |

| General Specification |                               |
|-----------------------|-------------------------------|
| Protection Level      | IP32                          |
| Dimensions            | 221x163x77mm /8.7x6.42x3.03in |
| Net Weight            | 1442g / 3.18lb                |

## 7 Parallel Operation Guide

### Parallel Operation Schematic



#### Main Modules:

##### ➤ Controller

The controller device is capable of standalone operation for individual units and can also support a maximum of 12 units in parallel operation. When operating in parallel, communication between the parallel controllers is achieved through communication lines. The parallel controllers are installed at the same horizontal height.

##### ➤ Solar Array

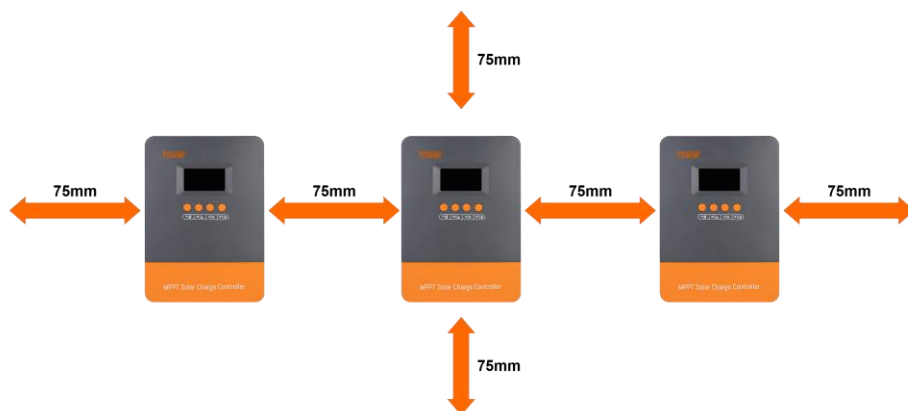
Each controller must be connected to a separate solar array. One solar array cannot be simultaneously connected to more than one controller. The input power connected to each controller should not exceed the rated input power of a single controller.

##### ➤ Battery Bank

Parallel controllers are connected to the same battery bank.

## Parallel Installation and Wiring

Step 1. Install parallel devices at the same height level with a minimum distance of approximately 75mm between devices.



Step 2. Connect communication lines.

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

Step 4. Then, individually connect each controller to its respective photovoltaic array.

Step 5. Finally, connect each controller to the DC load.

Step 6. Set the parallel communication code for each controller; refer to the parallel communication code settings described in Section 3.6.



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