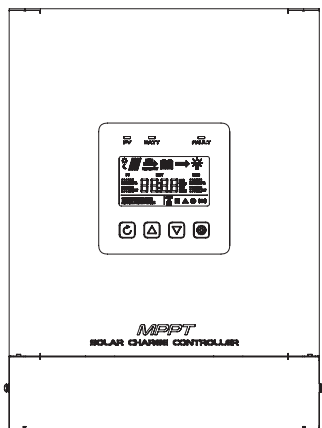


MU Series MPPT Solar Charge Controller 12/24/48 V, 80 A



User Manual

User Manual_MU Series_V1.0_QI
CE, RoHS, ISO9001:2015
Subject to change without notice!

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Dear Users,

Thank you very much for choosing our MU Series solar controller.

This manual contains important instructions on installation, operation, and parameter settings of the controller. Please read it carefully before using the product.

1. Overview

The new generation of MU series controllers is a product developed according to the latest technical standards, representing the latest level of industrial technology development.

This product has many outstanding features:

- Various tracking algorithms are combined to accurately track the maximum power point in an extremely short time.
- Innovative Maximum Power Point Tracking(MPPT)technology, tracking efficiency > 99.9 %.
- Full digital control technology, charge conversion efficiency up to 98 %.
- The LCD screen dynamically displays the operating data and working status of the device.
- Automatic identification of 12/24/48 V system voltage.
- Equipped with a real-time power statistics and recording function.
- External temperature sensor for more accurate temperature compensation and improved battery service life.
- Built-in over-temperature protection mechanism: when the temperature exceeds the set value, the charging current is derated to reduce the temperature rise of the controller and avoid high-temperature damage to the controller.
- Dual automatic limiting function for rated charging current and charging power.
- Compatible with Liquid, GEL, AGM and Lithium batteries.
- 4-stage charging for lead acid batteries: MPPT, Boost, Equalization, Float.
- Optional IoT wireless communication, Bluetooth communication, or RS485 communication functions.
- Bluetooth communication supports a mobile phone APP, enabling wireless monitoring of the solar charge controller.
- Utilizes a high-performance, ultra-low-power dedicated Bluetooth chip.
- Adopts Bluetooth 4.2 and BLE technology, with a communication range of up to 8 m.
- IoT wireless communication enables remote connection of the controller via IoT/GPRS, eliminating the need for networking and providing convenience and efficiency.
- IoT wireless communication enables remote monitoring and real-time control of the system via WeChat Mini Program and PC.
- IoT wireless communication supports statistics and display of charge/discharge capacity grouped by project and by month.
- Uses the standard Modbus communication protocol based on the RS-485 communication bus, maximizing satisfaction of communication requirements in various applications.
- Comprehensive automatic electronic protection functions.

2. Safety Instructions and Liability Waiver

2.1 Safety Instructions



Indicates a hazardous operation. Safety precautions must be taken before proceeding.



Indicates a destructive operation. Please follow the correct safety procedures.



Indicates suggestions and tips for the operator.



Since the operating voltage of this controller exceeds the human safety voltage, please read this manual carefully and complete safety operation training before operating the controller. The following symbols are used in this manual to indicate potential hazards or to highlight important safety instructions. Please pay attention when these symbols appear.



The controller contains no user-serviceable parts inside. Do not disassemble or attempt to repair the controller.



Install the controller in a well-ventilated location, as the heat sink temperature will be very high during operation.



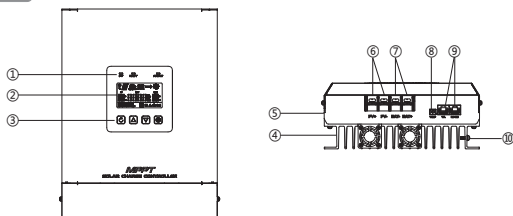
Keep children away from the battery and the charge controller.

2.2 Liability Waiver

The manufacturer shall not be liable for damages, especially on the battery, caused by use other than as intended or as mentioned in this manual or if the recommendations of the battery manufacturer are neglected. The manufacturer shall not be liable if there has been service or repair carried out by any unauthorized person, unusual use, wrong installation, or bad system design.

3. Structure & Accessories

3.1 Structure



No.	Name	No.	Name
①	LED Indicator	⑥	Solar Module Interface
②	LCD Screen	⑦	Battery Interface
③	Key	⑧	External Temperature Sensor Interface
④	Heat Sink Base Plate	⑨	RS485 and TTL Communication Interface
⑤	Sheet Metal Upper Cover	⑩	Grounding Screw

3.2 External Temperature Sensor

The external temperature sensor can measure the battery temperature and use this data for highly accurate temperature compensation. The controller is equipped with a temperature sensor with a length of 80 mm. If a longer temperature sensor is required, a remote temperature sensor with a standard length of 3 m (customizable) must be purchased separately. The temperature sensor is connected via interface ⑧.



(1).The connection is polarity-independent.

(2).If the external temperature sensor is not connected or is damaged, the controller will default to 25 °C for charging.

(3). If the controller and the battery are not located in the same room, an external temperature sensor must be installed to measure the battery temperature.

3.3 RS485 Communication

The controller is equipped with an RS485 port featuring an RJ45 interface. The RJ45 interface definitions are as follows:

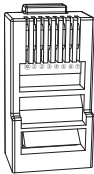
Pin.No.	Definition
①	NC
②	B+
③	NC
④	RS485-A
⑤	RS485-B
⑥	GND
⑦	NC



Please contact our sales personnel to obtain the latest version of the solar controller communication protocol.

3.4 TTL Communication

- (1).Default baud rate: 9600 bps; Parity: None; Data bits: 8 bits; Stop bits: 1 bit.
- (2).Communication power output specifications: (12 V $\pm$ 3 V) / 100 mA.

	Pin.No.	Definition
	①	NC
	②	VCC Communication Power Output
	③	NC
	④	NC
	⑤	GND
	⑥	RX
	⑦	TX

3.5 IoT Module (Optional)

The IoT wireless communication module features the following:

- (1).Enables remote connection of the controller via GPRS, eliminating the need for network construction and simplifying deployment.
- (2).Supports multiple operation methods, allowing remote monitoring and real-time control of the system via WeChat Mini Program or PC.
- (3).Provides real-time monitoring of system parameters and device status, including solar panel voltage and current, battery voltage and current, and load output voltage and current, and supports automatic real-time fault alarms.

3.6 Bluetooth Communication Module(Optional)

3.6.1 Bluetooth Communication Module Description

Two options are available for the Bluetooth module: a built-in Bluetooth module and an external Bluetooth module connected via the RJ45 interface.

The Bluetooth communication module adopts a high-performance, ultra-low-power dedicated Bluetooth chip, supports Bluetooth 4.2 and BLE technology, and offers a communication distance of up to 8 m.

A controller equipped with Bluetooth communication allows users to set operating parameters and view the real-time operating status of the device via a mobile APP, enabling wireless monitoring of the solar controller.

3.6.2 Application Installation

For Android: Search for "SolarLife Pro" on Google Play to download and install. You can also scan the QR code, or visit the following URL through your mobile browser to download and install:<http://fir.yepaiapp.com/97bucnx4>.

For iOS: Search for "SolarLife Pro" on the App Store to download and install.

For detailed instructions and setup methods, please refer to the "Bluetooth APP User Manual."

Android APP :



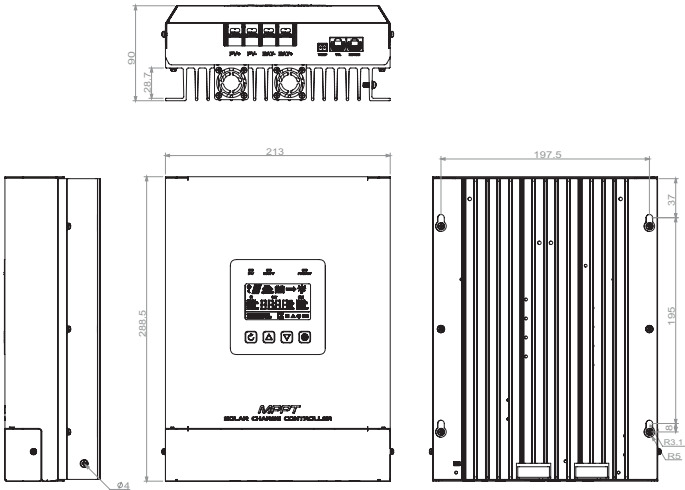
iOS APP :



 In this manual, the  icon indicates that this function is only supported by solar controllers equipped with a Bluetooth communication module.

4.Dimensions(Unit:mm)

4.1 MU8415



5. Installation



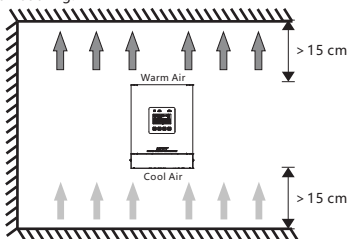
Read all instructions and precautions in this manual before installation!

5.1 Safety Precautions

- ① The solar controller can only be used in solar photovoltaic systems. During installation and use, the technical parameters provided in this manual and by the component manufacturers must be followed. No energy source other than solar modules may be connected to the controller.
- ② The battery stores a large amount of energy. Never short-circuit the battery. It is recommended to install a slow-blow fuse on the battery according to the rated current of the controller.
- ③ The battery may generate flammable gas. Keep the battery away from sparks, fire, or unprotected flames, and ensure that the battery storage area is well ventilated.
- ④ Do not touch or short-circuit wires or terminals, as voltages up to twice the battery voltage may be present at certain terminals or wires. When operation is required, keep your hands dry, use insulated tools, and stand on a dry surface.
- ⑤ Before installing or adjusting the controller wiring, be sure to disconnect the PV array wiring and the fuse or circuit breaker near the battery terminals.
- ⑥ After installation, check that all wiring connections are secure to avoid the danger of heat buildup caused by loose connections.

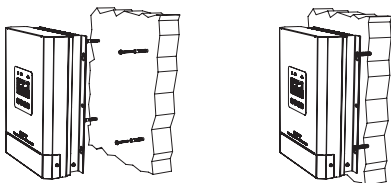
5.2 Installation Site Requirements

Do not install the controller in locations exposed to direct sunlight, high temperatures, moisture, or other heat sources. Protect the controller from dust and moisture. The controller shall be mounted vertically on a non-flammable surface. Ensure adequate airflow through the controller's heat sink, and leave at least 15 cm of clearance above and below the controller to allow natural convection cooling.



5.3 Mount the Controller

First, drill holes at appropriate positions according to the mounting hole diagram and secure four screws (M4). Then, align the mounting holes of the controller with the pre-installed screws and hang the controller in place. Make sure the cable connection end faces downward.



5.4 Installation and Wiring

To protect the battery, it is strongly recommended to install a fuse at the battery terminals to provide short-circuit protection. Solar modules can still generate a relatively high voltage even under poor lighting conditions. Therefore, during installation, take measures to prevent the solar modules from being exposed to light. Do not touch uninsulated connectors. Use only insulated tools and select appropriate cables (recommended wire size: 4 AWG / 25 mm²). Follow the steps below for wiring:

Step 1: Connect Optional Accessories:

- 1) Connect the external temperature sensor: Connect the external temperature sensor to interface, and place the other end close to the battery.
- 2) Connect optional accessories: RS485 or IoT communication.

Step 2: Connect the Battery

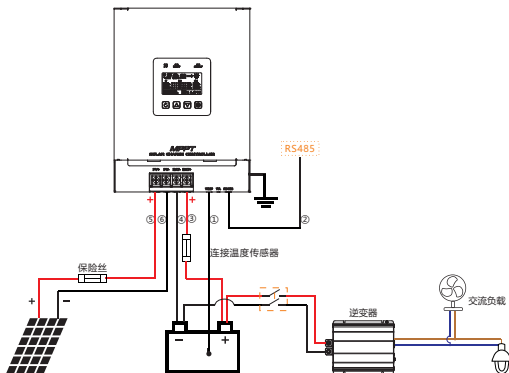
Connect the battery cables to the two middle terminals of the controller with correct polarity (the battery icon is marked on the controller). If the polarity is correct, the LCD screen on the controller will start to display.

Step 3: Connect the Solar Module

Make sure the solar module is not exposed to light and that it does not exceed the maximum allowable input power and maximum solar terminal voltage. Connect the solar module to the terminals on the left side of the controller with correct polarity (the solar module icon is marked on the controller).

Step 4: Final Work

Tighten all wiring terminals, clear any debris around the controller, and maintain at least 15 cm of heat dissipation clearance.





High Voltage Hazard! Solar modules may generate a very high open-circuit voltage. Disconnect the circuit breaker or fuse before wiring, and exercise caution during wiring.



Explosion Hazard! Short-circuiting the positive and negative terminals of the battery or the wires connected to them may cause a fire or explosion. Exercise extreme caution during operation.



1. If no external temperature sensor is connected, the controller displays an internal temperature of 25 °C.

2. AC loads must be connected via a DC/AC inverter.

3. If an inverter is connected to the system, it must be connected directly to the battery terminals. Connecting it to the battery output terminals of the controller is prohibited.

5.5 Grounding

The enclosure is provided with a grounding hole (or grounding stud). Please ground the enclosure.



For common-negative systems (such as RV applications), it is recommended to use the common-negative version of the controller. If a common-positive device is used in a common-negative system with the positive terminal grounded, the controller may be damaged.

6. Display and Settings

6.1 Key Description



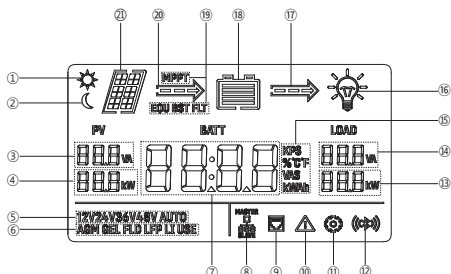
Icon	Description
	【Short Press】 Return to the previous menu/Cancel the current modification
	【Short Press/Long Press】 Page Up / Increase the setting value
	【Short Press/Long Press】 Page Down/Decrease the setting value
	【Long Press】 Enter/Exit Parameter Settings 【Short Press】 Modify and Confirm Parameters

6.2 Indicator Description



LED	Status	Function
Green (Solar Panel)	ON	PV voltage > light control threshold voltage, but not charging
	Fast Flash(0.1 s/0.1 s)	MPPT charging
	Flash(0.5 s/0.5 s)	Boost Charge or Equalize Charge
	Slow Flash(0.5 s/2 s)	Float Charge
Yellow (Battery)	ON	Battery Level Normal
	Fast Flash(0.1 s/0.1 s)	Low Voltage Protection
	Slow Flash(0.5 s/2 s)	Low Battery Level
	OFF	Overvoltage Protection
Red (Alarm)	ON	System Alarm
	OFF	System Normal

6.3 LCD Display



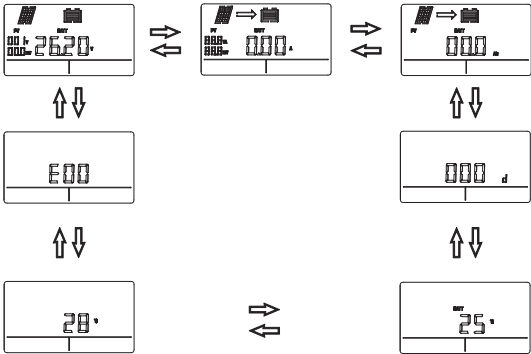
No.	Description	No.	Description
①	Daytime Indicator Icon	⑫	Bluetooth Indicator
②	Night Indicator Icon	⑬	Load Power *
③	Solar Panel Current / Voltage	⑭	Load Voltage / Current *
④	Solar Panel Power	⑮	Unit Symbol
⑤	System Voltage	⑯	Load Indicator *
⑥	Battery Type	⑰	Load On/Off Status Indicator *
⑦	Battery Voltage / Current	⑱	Battery
⑧	Parallel Communication *	⑲	Charging Stage
⑨	Communication Indicator	⑳	Charging Status
⑩	System Alarm	㉑	Solar Panel
⑪	Parameter Settings	/	/

***Due to differences in model functions, some icons may not be displayed on this unit.**

6.3.1 Interface Auto-Cycle Display Content



6.3.2 Press the “Δ▽” Up/Down keys to browse the display content on the interface.



6.4 Voltage Default Parameter

Battery type	AGM	GEL	FLD	LFP	LI	LI USE	USE
OVD	16.0 V	16.0 V	16.0 V	16.0 V	BCV+2 V	BCV+2 V	BCV+2 V
OVR	15.0 V	15.0 V	15.0 V	15.0 V	BCV+1 V	BCV+1 V	BCV+1 V
Equalization	14.6 V	/	14.8 V	/	/	/	14.0-15.0 V
BCV	14.4 V	14.2 V	14.6 V	14.4 V	12.5 V	9.0-17.0 V	14.0-14.8 V
BVR	13.2 V	13.2 V	13.2 V	13.2 V	11.7 V	9.0-17.0 V	13.2 V
Float	13.8 V	13.8 V	13.8 V	/	/	/	13.0-14.5 V
LVD	11.1 V	11.1 V	11.1 V	11.1 V	9.6 V	9.0-17.0 V	10.8-11.8 V
LVR	12.6 V	12.6 V	12.6 V	12.6 V	11.1 V	9.0-17.0 V	11.4-12.8 V
Remarks	The battery voltage parameters above are all based on a 12 V system. For 24 V / 48 V systems, multiply by 2 / 4 automatically.						

-  For lithium batteries, the voltage difference between the boost charge voltage and the boost voltage reconnect voltage ranges from 0.2 V to 1.5 V, and the parameter must not exceed this range.
-  The control accuracy of the lithium battery protection board installed in the system shall be ≤ 0.2 V. If the deviation of the protection board exceeds 0.2 V, the manufacturer shall not be liable for any system abnormalities caused thereby.

6.5 Parameter Settings Table

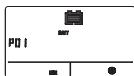
No.	Function	Setting Range	Default
P01	Battery Type	AGM/GEL/FLD/LFP/LI/USE/LI USE	AGM
P02	System Voltage	12/24/48/AUTO	AUTO
P03	Equalization	14.0-15.0 V	For USE Only
P04	Boost Charging Voltage	14.0-14.8 V(USE);9.0-17.0 V(LI USE)	For USE and LI USE
P05	Float Charge Voltage	13.0-14.5 V	For USE Only
P06	Boost Voltage Reconnect Voltage	9.0-17.0 V	For LI USE
P07	Low Voltage Protection	10.8-11.8 V(USE);9.0-17.0 V(LI USE)	For USE and LI USE
P08	Low Voltage Recovery	11.4-12.8 V(USE);9.0-17.0 V(LI USE)	For USE and LI USE
P09	Charging Current	0-Rated Current, 0: No Charging	Rated Current
P10	Full Charge Setting	0-10 A, 0: Function Off	0
P18	Temperature Unit	°C Celsius / °F Fahrenheit	°C
P22	System Restart	F01	Function Key

※ The battery voltage parameters above are all based on a 12 V system. For 24 V / 48 V systems, multiply by 2 / 4 automatically.

6.6 Parameter Settings

Long press the "⊗" setting key for 3 s to enter the setting interface. At this time, the "⊗" icon is displayed in the lower right corner of the LCD screen. Short press the "⊗" setting key to enter parameter setting mode. Press the "Δ▽" page key to increase/decrease parameters. Short press the "⊗" setting key to confirm the parameter. Long press the "⊗" setting key again to exit parameter setting.

6.6.1 Battery Type(P01)



When the LCD screen displays P01, the battery type can be set. Options include AGM/GEL/FLD/LFP/LI/USE/LI USE(Default battery type: AGM).

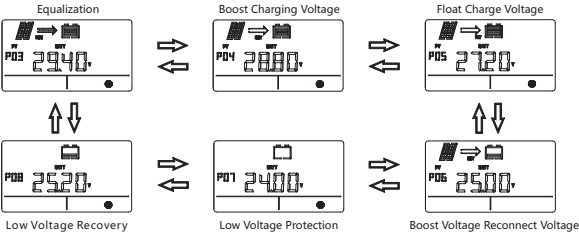
6.6.2 System Voltage(P02)



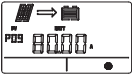
When the LCD screen displays P02, the system voltage can be set. Options include 12 V/24 V/48 V/AUTO(Default system voltage: AUTO).

6.6.3 Equalization/Boost Charging Voltage/Float Charge Voltage/Boost Voltage Reconnect Voltage/Low Voltage Protection/Low Voltage Recovery(P03-P08)

The settings for P03-P08 are configurable only when the battery type is set to "USE" or "LI USE". They cannot be configured for other battery types.



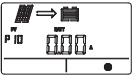
6.6.4 Charging Current(P09)



When the LCD screen displays P09, the charging current can be set.

- ①When set to 0, the controller stops charging.
- ②Charging current display: set any value from 1 to the rated charging current.

6.6.5 Full Charge Setting(P10)

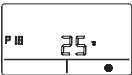


When the LCD screen displays P10, the full charge setting can be configured for the controller.

- ①When set to 0, this function is disabled.
- ②When charging is enabled: select an appropriate current value between 1 and 10 A.

Full charge condition: For lithium batteries, after the battery has been in constant-voltage charging and the constant-voltage charging time reaches the set time, charging stops when the charging current is less than the set value. Recovery charging condition: When the battery voltage is lower than the boost voltage reconnect voltage, charging resumes.

6.6.6 Temperature Unit(P18)



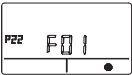
Celsius (°C)



Fahrenheit (°F)

When the LCD screen displays P18, the controller temperature unit can be set. Only two units are available: Celsius(°C) and Fahrenheit(°F). Default temperature unit: Celsius(°C).

6.6.7 System Restart(P22)



When the LCD screen displays P22, short press the "⊗" setting key. The LCD screen will display "F01". Short press the "⊗" setting key again, and the controller will restart.

7. Protection Functions and Troubleshooting

7.1 Protection

■ PV Over Current

If the charging power exceeds the rated power of the controller, the controller will charge at the rated power and will not operate at the maximum power point during charging.

■ PV Short Circuit

When PV is not charging and a short circuit occurs at the solar terminal, the controller will not be damaged.



Short circuits are prohibited during PV charging; otherwise, the controller will be damaged.

■ PV Overvoltage

When charging the battery, if the solar terminal voltage exceeds the PV protection voltage, the controller will shut down charging and enter the overvoltage protection status.

■ Reverse Polarity of the Solar Panel

If the solar panel polarity is reversed, the controller will not be damaged. After the wiring error is corrected, the controller will operate normally.

■ Reverse Polarity of the Battery

If the battery polarity is reversed, the controller will not be damaged. After the wiring error is corrected, the controller will operate normally.

■ Battery Overvoltage

If the battery is charged by another energy source, when the battery voltage (non-lithium battery) exceeds 15.8 V/ 31.3 V/ 62.3 V (for lithium batteries, the overvoltage protection voltage plus 0.2 V), the controller will shut down charging and enter the overvoltage protection status.

■ Low Battery Voltage

When the battery voltage reaches the set low voltage protection point, the controller will automatically stop discharging and enter the low voltage protection status to prevent the battery from being damaged by over-discharge.

■ Controller Over-Temperature Protection

The controller detects its internal temperature through an internal sensor. When the internal temperature exceeds the set value, the charging current decreases linearly with temperature, thereby reducing the temperature rise of the controller and preventing damage caused by high temperature. When the internal temperature exceeds the set over-temperature protection threshold, the controller stops working and resumes operation after the temperature drops.

■ External Temperature Sensor Damaged

If the external temperature sensor is damaged or not connected, the controller will default to 25 °C for charging to prevent overcharging from damaging the battery.

7.2 Troubleshooting

Icon	Reason	Description	Troubleshooting
E03	Low voltage	The yellow indicator flashes, the red indicator stays on, the fault icon flashes, and the LCD screen displays E03.	When the battery voltage rises to the low voltage reconnect voltage, the low voltage protection is released and the load output is restored.
E04	Over voltage	The red indicator stays on, the fault icon flashes, and the LCD screen displays E04.	Check whether any other energy source is charging the battery, and confirm that the battery parameters are set correctly. If the fault recurs, contact the manufacturer's after-sales service for inspection.
E05	Over-temperature	The red indicator stays on, the fault icon flashes, and the LCD screen displays E05.	Check for nearby heat sources and ventilation conditions. The controller will operate normally after the temperature drops.
E06	PV Terminal Overvoltage	The red indicator stays on, the fault icon flashes, and the LCD screen displays E06.	Use a multimeter to measure the voltage at the controller's PV terminal and check whether it exceeds the PV voltage point.
E15	Charging Overvoltage / Overcurrent / Reverse Current Protection, etc.	The red indicator stays on, the fault icon flashes, and the LCD screen displays E15.	Check whether the controller's PV terminal is overvoltage, whether the battery terminal is overvoltage, and whether a device with excessive startup current is connected to the battery terminal. After the abnormality is cleared, the device will recover automatically.

7.3 Maintenance

To ensure the controller maintains optimal performance over the long term, it is recommended to perform the following checks regularly:

- Confirm that the airflow around the controller is not blocked, and remove any dirt or debris from the heat sink.
- If any abnormal fault or error message is found, corrective measures should be taken promptly.
- Check the wiring terminals for signs of corrosion, insulation damage, high temperature, or burning/discoloration, as well as enclosure deformation, and repair or replace them promptly.
- If any exposed, damaged, or deteriorated wires are found, repair or replace them promptly.
- If dirt, nesting insects, or corrosion are found, clean them up promptly.



Electric Shock Hazard!

Before performing the above operations, make sure that all power sources to the controller have been disconnected, and then carry out the corresponding checks or operations. Non-professionals must not operate the equipment without authorization.

8. Technical Data

	Item	MU8415
Battery Parameters	Max Charging Current	80 A
	System Voltage	12/24/48 V automatic recognition
	Battery Type	GEL, AGM, FLD, Lithium(Default: AGM)
	Max voltage On Battery Terminal	65 V
	Temperature Compensation	-4.17 mV/K per cell(Boost, Equalization), -3.33 mV/K per cell(Float)
Panel Parameters	Max Voltage On PV Terminal	170 V ^{*1}
	Max Input Power	1040 W/2080 W/4160 W
	MPPT Tracking Range	(Battery Voltage+2.0 V)-Voc*0.9 ^{*2}
	PV Overvoltage Point	173 V
System Parameters	Max Tracking Efficiency	>99.9 %
	Max Charge Conversion Efficiency	98 %
	Dimensions	288.5*213*90 mm
	Net Weight	4.9 kg
	Self Consumption	15-70 mA
	Communication	RS485(RJ45 interface)
	Optional	IoT、Bluetooth(Internal/External)
	Grounding	Enclosure Grounding
	Ambient Temperature	-20~ +45 °C
	Ambient Humidity	≤95 %RH,Non-Condensing
	Storage Temperature	-25~ +70 °C
	Protection Degree	IP32

*1.This value represents the maximum allowable open-circuit voltage at the solar terminal at the lowest ambient temperature.

*2.Voc refers to the open-circuit voltage of the solar panel.

*3.The values before and after the slash apply to 12 V/24 V/48 V systems respectively.

9.MPPT and Charging Instructions

9.1 MPPT charging introduction

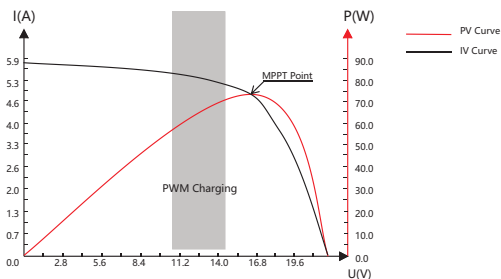


Figure 9-1 Solar Panel Output Characteristic Curve

MPPT, the full name of which is "Maximum Power Point Tracking", is an advanced charging method. The MPPT controller can detect the power generation of the solar panel in real time and track the maximum power point voltage and current, so that the system can charge the battery at the highest efficiency. Compared with the traditional PWM controller, the MPPT controller can utilize the maximum power of the panel and thus provide a larger charging current. Generally speaking, MPPT can improve the energy utilization rate by 15 % to 20 % compared with the PWM controller.

9.2 Four-Stage Charging Method for Lead-Acid Batteries

Battery type: AGM/GEL/FLD.

As shown in Figure 9-2, the lead-acid battery is charged in the following stages: MPPT charge, constant voltage charge (Equalization charge/Boost charge/Float charge).

The constant voltage charging stage is divided into three stages: Equalization charge, Boost charge and Float charge:

- **MPPT Charge:** When the battery voltage does not reach the target constant voltage value, the controller will carry out MPPT charging. When the battery voltage reaches the constant voltage value, the MPPT charging will automatically exit and enter the constant voltage charging (Equalization charge/Boost charge/Float charge).
- **Boost Charge:** When the battery has recharged to the Boost voltage setpoint, the controller will charge at a constant voltage, and the charging current will gradually decrease over time. This process will be maintained for 120 minutes before switching to a floating charge.
- **Equalization Charge:** Certain types of batteries benefit from periodic equalizing charge, which can stir the electrolyte, balance battery voltage and complete chemical reaction. Equalizing charge increases the battery voltage, higher than the standard complement voltage, which gasifies the battery electrolyte.

※ If the controller detects that the battery voltage is too low, it will automatically start Equalization charging for 120 minutes, and then switch to Float charging.

※ Equalization charging and Boost charging will not be repeated during a single full charge cycle to prevent excessive gas emission or battery overheating.



Risk of explosion!

Equalizing flooded battery can produce explosive gases. Therefore, the battery box must be adequately ventilated.

- **Float Charge:** After Boost charging or Equalization charging ends, the controller will reduce the charging current to lower the battery voltage and maintain it at the Float charging voltage. During the Float charging stage, the controller charges the battery with a very weak current to keep the battery in a fully charged state. In the Float stage, the load can obtain nearly all of the solar power. If the load draws more power than the solar energy provides, the controller will be unable to keep the battery in the Float stage. When the battery voltage drops below the charge recovery voltage, the controller will exit the Float stage and re-enter the Boost charging stage.

9.3 Lithium battery charging mode

The battery type can be selected as LiFePO4(LFP)/NCM/Custom Lithium(USE/LI USE).

As shown in Figure 9-3, the charging stages of a lithium battery include MPPT charging/Boost

- **MPPT charging stage:** When the battery voltage has not reached the Boost charging voltage, the controller will charge MPPT. When the battery voltage reaches the Boost
- **charging voltage, the MPPT charging will automatically exit and enter the constant voltage**
- charging.**

Boost Charging Stage: When the lithium battery is in the Boost charging stage and the battery voltage reaches the Boost charging voltage, the controller performs Boost charging. Meanwhile, the charging current gradually decreases over time. This process lasts for 60 minutes, after which charging stops. When the battery voltage reaches the Boost voltage reconnect voltage, the next charging cycle begins.

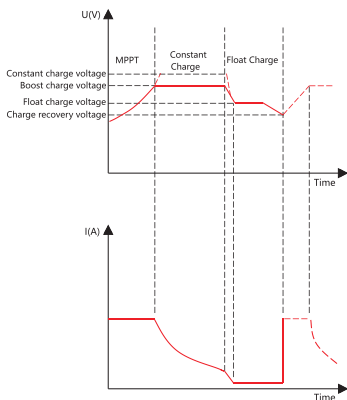


Figure 9-2 Lead-Acid Battery Charging Curve

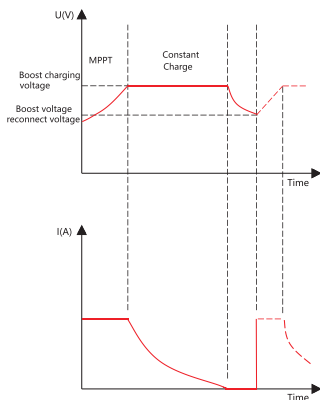


Figure 9-3 Lithium Battery Charging Curve