

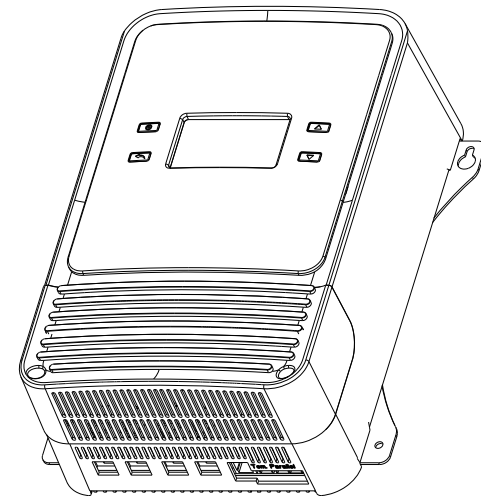
MPPT Solar Charge Controller

Negative Grounded Buck- APP Operation

M4880F/M48100F



User Manual



Download APP on Apple Store / Google Play Store

*We may modify these specifications without prior notice.

1. Warnings and Tools Icon Chart

Icons	Name	Description
	High Voltage	High voltage device. Installation should be performed by an electrician.
	High Temperature	This device will produce heat. Mount device away from other items.
	Environmental Hazard	Electronic Equipment. Do not put in landfill.
	Wire Cutter	A wire cutter is needed for cutting and stripping prior wires to connect.
	Multi-meter	A multi-meter is needed for testing equipment and verifying polarity of cables.
	Anti-static Glove	Anti-static gloves are recommended to prevent controller damage caused by static electricity.
	Electrical Tape	Electrical tape is recommended to safely insulate spliced or bare wires.
	Screwdriver	A common size screwdriver is needed to attach wires to the controller.

2. Safety Tips

- During the installation of the controller, please pay attention to the safety of the electricity when using electric tools.
- If the Voc voltage of PV exceeds the safety voltage of human body, the controller must be installed by professionals with relevant qualifications.
- There may be sparks during the wiring, be sure to pay attention to fire safety. The installations in flammable and explosive places are prohibited.
- Short-circuit of batteries are prohibited. Set the parameters according to the actual battery specifications.
- Set the parameters according to the actual battery specifications.
- For the fan-cooling device, please make sure to install it in a place where no foreign matter can enter the inside of the machine.
- Avoid insects from entering the device.
- Be sure to install the controller out of the reach of infants and young children.
- Ensure that the installations are firm and reliable.
- Please select cables with corresponding specifications according to the controller model no. and actual current.
- Lithium batteries are forbidden to be reversed, and the activation process may be dangerous.

Solar Input Current	20A	40A	60A	80A	100A
Wire Cross Section Area (mm ²)	4	8	12	16	20
Wire AWG	11	8	6	5	4

3. Product Features

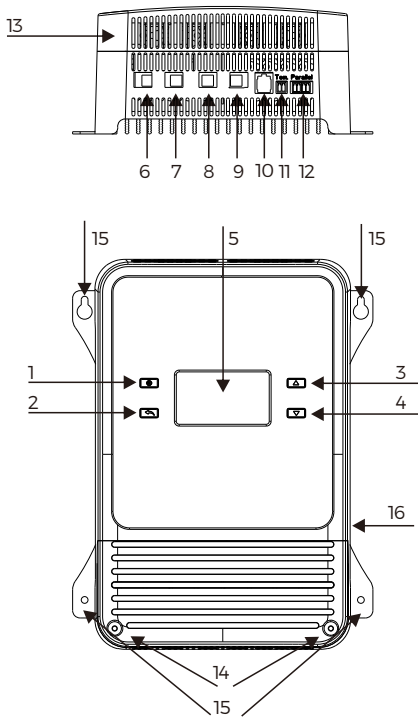
Dear users, thank you for choosing this product. This product is a negative grounded buck MPPT charging controller. The PV input adopts MPPT digital charging method, and the running status and related parameters can be displayed on the on-board screen or an external screen (optional accessory). It also supports Bluetooth app for online modification and viewing of controller parameters, as well as viewing the current status or history. It is widely used in small-scale power generation and energy storage systems, and has the following remarkable features:

Buck MPPT charging method,negative grounded design,optional Bluetooth.

- The combination of multiple MPPT algorithms ensures maximum power charging under complex weather conditions.
- Multi-peak detection, to avoid running at low-power peaks when there are multiple peaks.
- When the PV input exceeds the rated power (and less than 1.25 times), the controller maintains the rated power operation (limit operation).
- Three-stage Charging: according to the characteristics of the battery, it has the modes of equalized charging, boost charging, and float charging (lithium batteries only have boost charging).
- It supports Sealed (SEL), GEL, Flooded (FLD), Lithium battery (LI) and User-defined (USE) types of batteries, and it can also be conveniently selected through pressing keys, external screen (optional) and APP.
- Liquid crystal display: through an LCD screen, users can check the system's operating status and set some parameters.
- In the case of non-charging, the controller works in low power consumption mode and consumes less power.
- In non-lithium battery mode, it supports 12V/24V/36V/48V automatic identification, and the lithium battery requires the user to set the system voltage.
- Reverse connection protection: battery polarity reverse protection and PV polarity reverse protection.
- Support RS485 communication mode, adopt Modbus communication protocol (support customer customized protocol and communication media).
- Supports up to 9 machines in parallel, users can expand product capacity by connecting data lines in parallel use.
- Historical data: the system retains 300 days of historical data (charging capacity, maximum charging power, maximum battery voltage, and minimum battery voltage number of days ago).

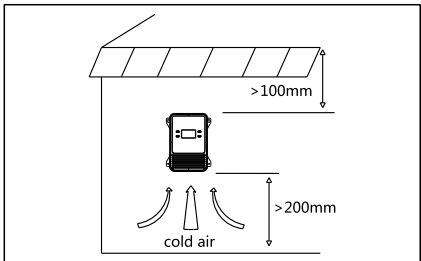
- Accumulated data: accumulative charging capacity, number of running days.
- Industrial grade design: it can be used in various harsh environments. Over-temperature protection: when the controller is over-temperature, the system will automatically reduce the charging power. If the external environment is over-temperature, the charging will be turned off.
- Over-temperature protection: when the controller is over-temperature, the system will automatically reduce the charging power. If the external environment is over-temperature, the charging will be turned off.
- More comprehensive electronic protection function: battery and solar panel reverse connection protection, over-voltage protection, PV over-voltage protection, etc.
- Support mobile APP monitoring, you can check and modify the controller information (users can download the APP through the IOS or Android system application store).

4. Product Appearance



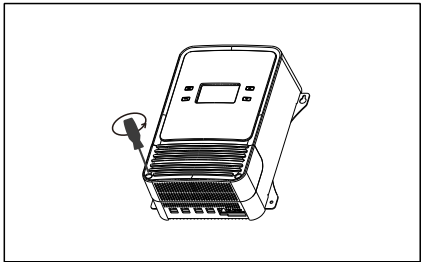
#	Description
1	Setting
2	Return
3	Plus
4	Minus
5	LCD Screen
6	PV Positive Pole
7	PV Negative Pole
8	BAT Positive Pole
9	BAT Negative Pole
10	RS485 Communication Port
11	External Temperature Port
12	Parallel Wired Port
13	End Cover
14	End Cover Installation Hole
15	Installation Hole
16	Grounded

5. Mounting Instruction



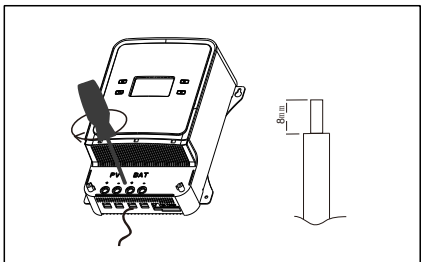
Step 1: Site Selection

The installation environment should be dry and well-ventilated. It is best to have no obstructions in all directions, as shown in the figure. The product has a high power output, which generates a large amount of heat, so please reserve enough space for heat dissipation.



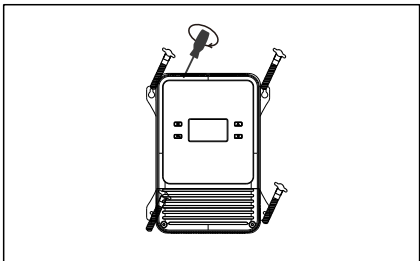
Step 3: Remove the End Cover

The screws are hidden design, so the end cover needs to be removed for wiring. Use a cross or flathead screwdriver to loosen the screws counterclockwise. There are two screws in total. After removing them, set them aside. Once the wires are connected, the end cover should be reinstalled.



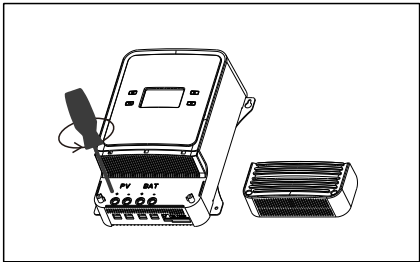
Step 5: Wiring

Prepare the wiring, including the PV positive and negative, battery positive and negative, optional communication, temperature control or parallel connection. Strip the corresponding wires and insert them into the appropriate ports. Tighten the screws clockwise in sequence. It is recommended to install circuit breakers for both PV and batteries.



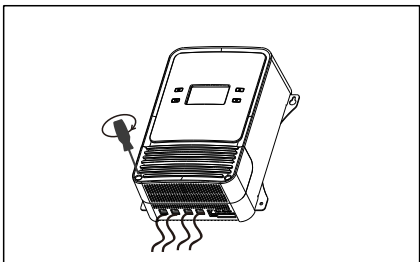
Step 2: Fixed

Due to the external design, the installation method is relatively flexible, and users can choose self-tapping screws or other screws. Firm installation is required to prevent loosening.



Step 4: Loosen the Screws

Place the end cover aside and use a flat or cross-head screwdriver to unscrew all the wiring screws in a counterclockwise direction until there is resistance.

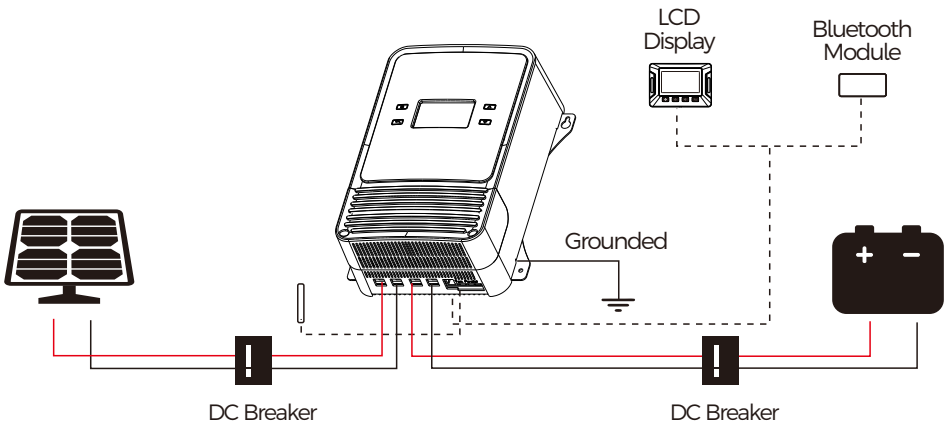


Step 6: Replace the End Cover

Reinstall the screws that were removed in a clockwise direction.

Current	80A	100A
Air Circuit Breaker	100A	125A

6. Wire Connection Sequences



During installation of your MPPT controller, please follow the order of connection below:

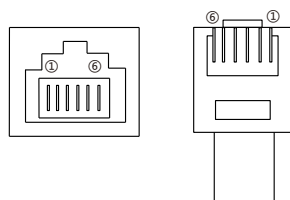
Step 1: Connect the battery, and it is recommended to choose the suitable wires according to the actual situation.

Step 2: Connect the solar panel or other DC input sources.

Note: When connecting the wires, first use a screwdriver to loosen the terminal counterclockwise, insert the prepared wire, and then tighten it clockwise again.

7. RS485(RJ12), the protocol supports Modbus-RTU16

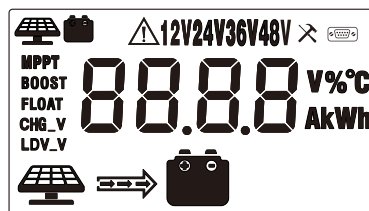
Data baud rate: 9600 bps
Data bits: 8 bits
Parity check bit: None
Stop bit: 1 bit



RS485 PIN (RJ12)					
PIN-1	PIN-2	PIN-3	PIN-4	PIN-5	PIN-6
VDD	VDD	GND	GND	D-	D+

*Supports 3.3V power supply with a supply current of 20mA.
For detailed reference, please check the Modbus protocol.

8. LCD Display Interface Overview



Display Section	Display Layout
Charge Status	 
Charge & Set Mode	MPPT BOOST FLOAT CHG_V LDV_V
Parameter	88.8.8
Unit	V%℃ AkWh
Active Functions	  

Status Icon	Indication	Status	Description
CHG_V	Voltage Setting (Only for Li and User)	On	Setting Charge Voltage
		Off	Charge Voltage Has Been Set
LDV_V	Over Discharge Volt Settings (Only for Li and User)	On	Setting Discharge Voltage
		Off	Discharge Voltage Has Been Set
12V24V36V48V	System Volt	One of 12V/ 24V/36V/48V ON	Current System Voltage
	Warning	On	System failure occur
		Off	No System failure
	Setting	On	Setting Mode
		Off	View Mode
	communication	On	In the Modbus communication
		Off	No communication
	Solar Icon	Steady On	Daylight Detected
		Off	No Daylight Detected
		Fast Flash	Solar System Over Voltage
	Battery Icon	Steady On	Battery Connected and Functional
		Off	No Battery Connection
		Fast Flash	Over Voltage
		Slow Flash	Battery Over-Discharged or Reverse Connection

* There is no charge mode displayed in the controller screen when it's in equalize charge mode.

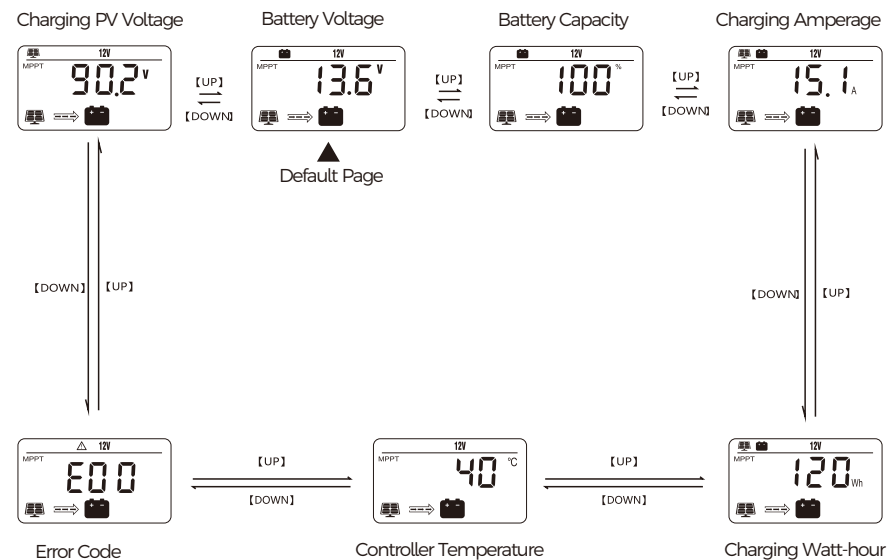
9. Key Functionality Chart

Function Key	System Mode	Input	Input Function
	View Mode	Long Press	Enter SET mode
	View Mode	Short Press	View Previous Page
	View Mode	Short Press	View Next Page
	View Mode	Short Press	---

Function Key	System Mode	Input	Input Function
	SET Mode	Long Press	Save Data & Exit SET Mode
		Short Press	Next Setting Item
	SET Mode	Short Press	Increase Parameter Value
	SET Mode	Short Press	Decrease Parameter Value
	SET Mode	Short Press	Exit SET Mode Without Saving

10. Introduction to the menu and settings

LCD Screen Display Cycle

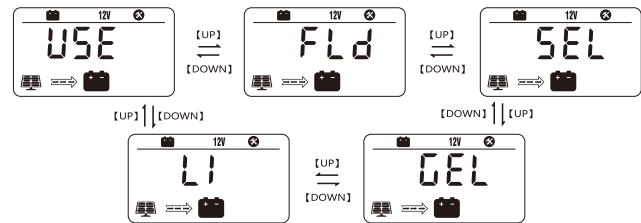


The battery voltage view will be displayed by default. Use the up and down arrow keys to cycle through different views. The battery voltage view will resume upon 30 seconds of inactivity. The error code view will be displayed when an error is detected. The backlight in the screen will be on for 20 seconds with any button operation.

11. Key Functionality Chart

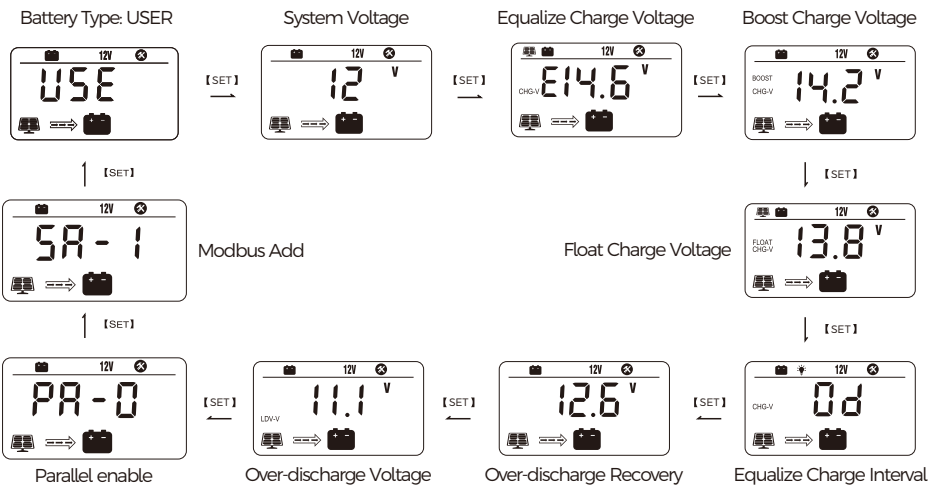
Setting Battery Mode

Enter SET mode by long pressing the SET key in any view page other than Load Mode.
Use the up and down arrow keys to select battery mode, then long press SET key to save.

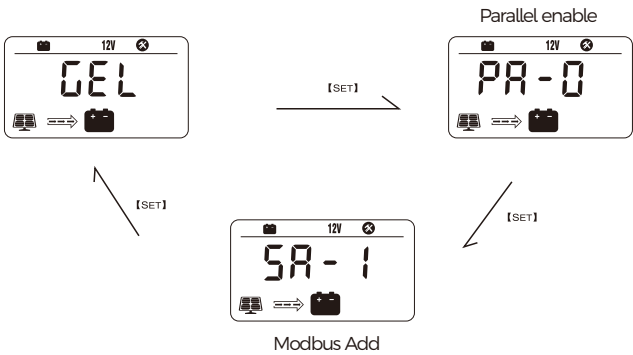


Abbreviations	Battery Types	Description
FLD	Flooded Battery	Auto-recognition with default parameters set for each type of batteries.
SEL	Sealed/AGM Battery	
GEL	Gel Battery	
LI	Lithium Battery	Some parameters can be customized.
USE	Advanced User Mode	Most parameters can be customized.

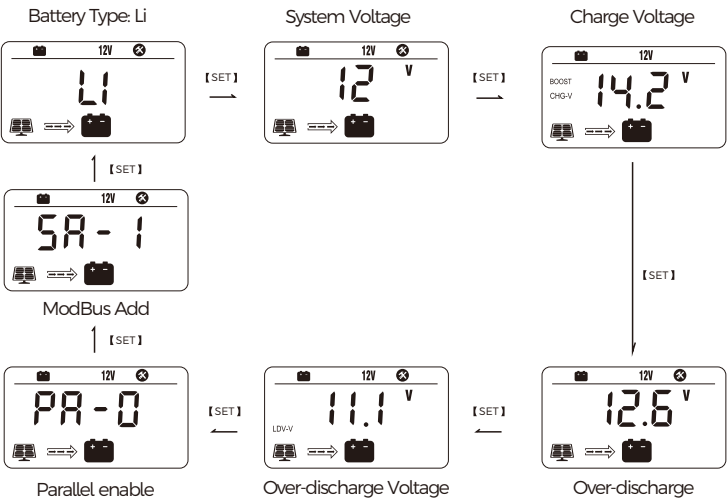
For Battery Type: USER



For Battery Type: GEL/FLD/SEL



For Battery Type: Li



12. Error Code Chart

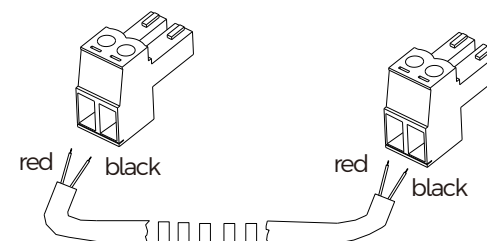
Code	Error	Description & Quick Troubleshoot
E00	No Error	No action needed.
E01	Battery Over-discharged	Battery voltage is too low.
E02	Battery Over-voltage	Battery voltage has exceeded controller limit. Check battery bank voltage for compatibility with controller.
E06	Overheating	Controller exceeds ambient temperature limit. Ensure the controller is placed in a well-ventilated cool, dry place.
E07	Environmental Overtemperature	The environment temperature sampled by external temperature probe is too high.
E10	Solar Over-voltage	Solar array voltage exceeds controller rated input voltage. Decrease the voltage of solar panels connected to the controller.
E13	Solar Reverse Polarity	Solar array input wires connected with reverse polarity. Disconnect and re-connect with correct wire polarity.
E14	Battery Reverse Polarity	Battery connection wires connected with reverse polarity. Disconnect and re-connect with correct wire polarity.

*Please contact professions for technical support on additional troubleshooting.

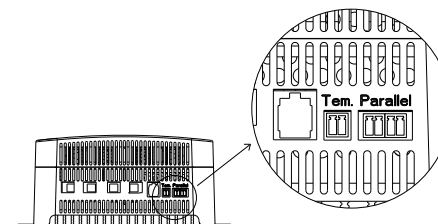
13. Parallel Settings

The controller supports up to 9 parallel operations. During the process of parallel operation, the user needs to manually activate the parallel switch and set the parallel machine address, which is the same as the Modbus address.

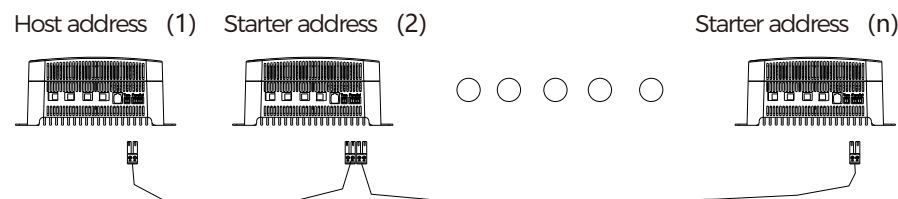
1. The parallel connection cables are ready as shown in the picture. Please make sure that the wire sequence is consistent



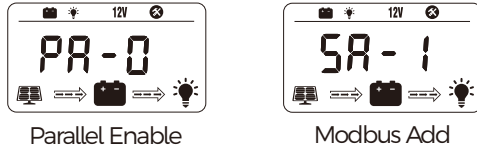
2. The parallel ports are as follows



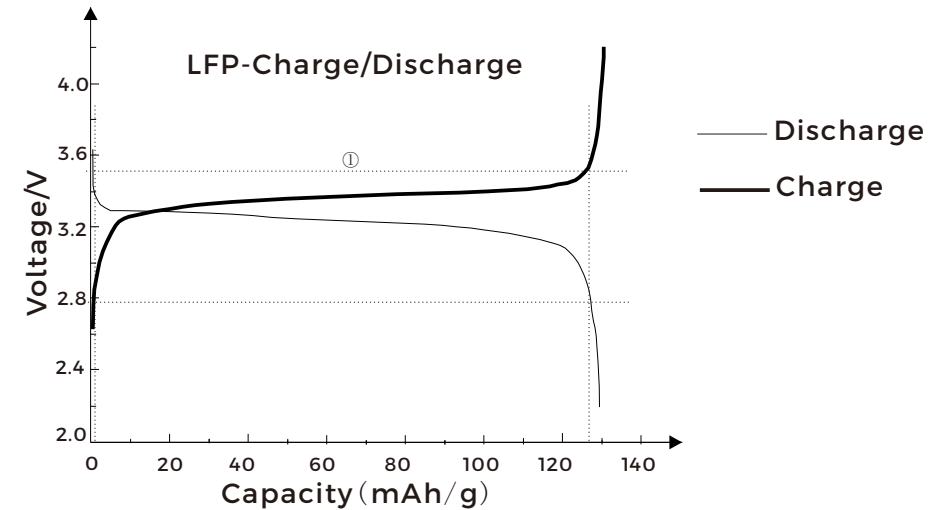
3. The parallel connection is as shown in the diagram below (n must be less than 10).



Parallel Software Settings



1. Parallel operation enabled, by switching between PA-0 and PA-1, PA-1 starts the parallel function, otherwise the parallel function is turned off.
2. After activating the the parallel function function, users also needs to set the master and slave machines. SA-1 represents the host with address 1, and the range can be set from SA-1 to SA-9. 2-9 represents the modbus address of the starter machine as 1-9, and the corresponding modbus communication address should also be adjusted accordingly.



14. Lithium Battery Setting

Note: The charging voltage of lithium batteries cannot be set based on the theoretical voltage parameters value of the battery, because the charging voltage and overcharging voltage of the battery manufacturer are the same. For example, for a 12V system, the theoretical charging voltage is 12.6V, if it is actually set to 12.6V, it may cause the battery BMS/protection board to activate and protect the battery.

The charge and discharge characteristic curve of Lithium iron phosphate is shown in the figure below, which is a single 18650.

The area enclosed by the dotted lines 1-4 is the battery capacity. As shown in the figure, under the condition of charging with 3.55V and discharging with 2.8V, the battery capacity accounts for more than 95%. Therefore, it is recommended that customers set the charging settings according to the table parameters.

Recommended Charging Parameter Table for 3.7V Ternary Lithium Batteries

System Voltage (series number)	Charging Voltage	Overcharge Protection Voltage	Overcharge Recovery Voltage	Over-discharge Recovery Voltage	Over-discharge Voltage
Single String	4V	4.2V	3.9V	3.3V	3.1V
12V (3 in series)	12V	12.6V	11.7V	9.9V	9.3V
24V (7 in series)	28V	29.4V	27.3V	23.1V	21.7V
36V (9 in series)	36V	37.8V	35.1V	29.7V	27.9V
48V (12 in series)	48V	50.4V	46.8V	39.6V	37.2V

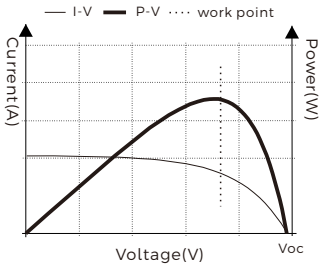
Recommended Charging Parameters Table for Lithium Iron Phosphate Batteries

System Voltage (series number)	Charging Voltage	Overcharge Protection Voltage	Overcharge Recovery Voltage	Over- discharge Recovery Voltage	Over- discharge Voltage
Single String	3.55V	3.65V	3.4V	3V	2.8V
12V (4 in series)	14.2V	14.6V	13.6V	12.6V	11.1V
24V (8 in series)	28.4V	29.2V	27.2V	25.2V	22.2V
36V (12 in series)	42.6V	43.8V	40.8V	37.8V	33.3V
48V (16 in series)	56.8V	58.4V	54.4V	50.4V	44.4V

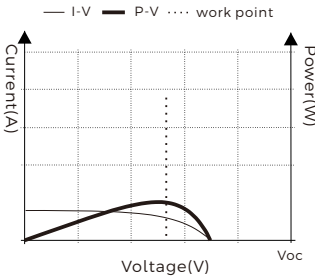
Note: "Overcharge Protection Voltage" and "Overcharge Recovery Voltage" in the table above refer to typical parameters in the BMS or battery protection board and are for reference only. The "Charging Voltage" corresponds to the Boost charging voltage of the controller, the "Over-discharge Recovery Voltage" corresponds to the over-discharge recovery of the controller, and the "Over-discharge Voltage" corresponds to the over-discharge voltage of the controller.

15. MPPT Introduction

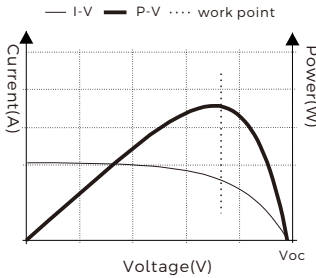
MPPT is the abbreviation for Maximum Power Point Tracking. Due to the following characteristics of photovoltaic curves, when using photovoltaic energy for charging, it is hoped that the following Work Points can be traced.



121 The photovoltaic power generation is particularly affected by external factors, so selecting the appropriate installation location and angle is particularly important.

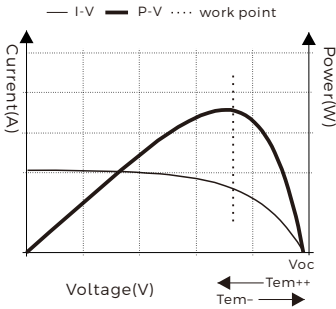


Weak Light



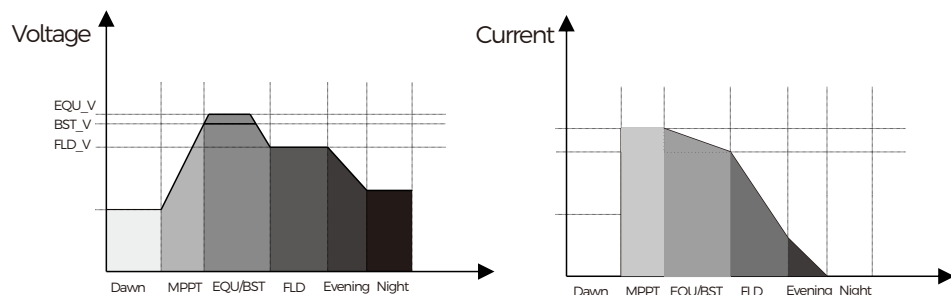
Strong Light

122 Photo voltaics are more sensitive to temperature changes, as shown in the figure below (the higher the temperature, the lower the open circuit voltage Voc, and the total output power changes relatively little).

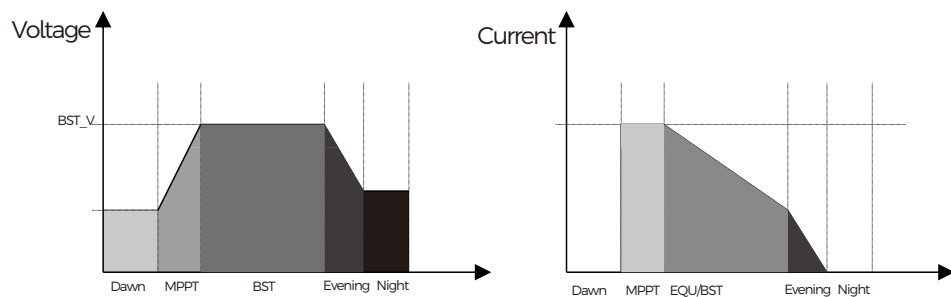


16. Introduction of lead acid and lithium battery charging

16.1 Lead-acid three-stage charging



16.2 Lithium battery charging



17. Technical Parameters

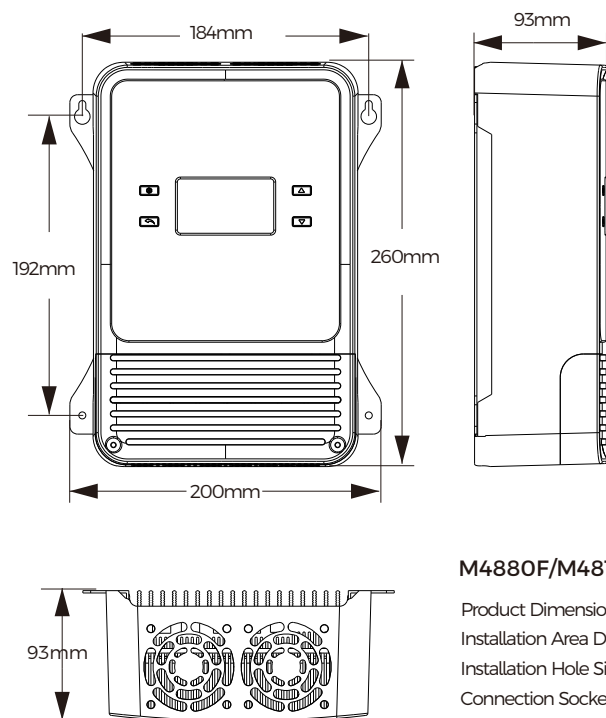
The variable "n" is adopted as a multiplying factor when calculating parameter voltages, the rule for "n" is listed as: if battery system voltage is 12V, n=1; 24V, n=2; 36V, n=3; 48V, n=4.

For example, the equalize charge voltage for a 12V FLD (Flooded) battery bank is $14.8V \times 1 = 14.8V$. The equalizing charge voltage for a 24V FLD (Flooded) battery bank is $14.8V \times 2 = 29.6V$.

Parameter	Value				
Model No.	M4880F			M48100F	
System Wiring Grounded	Negative Grounded				
Battery System Voltage	12V/24V/36V/48V Auto (FLD/GEL/SEL/USE) Manual (LI/USE)				
No-load Loss	12ma(12V), 10ma(24V), 8ma(36V), 6ma(48V)				
Max Solar Input Voltage	<150Voc				
Rated Solar Charge Current	80A			100A	
Max Solar Input Power	1200W/12V; 2400W/24V 3600W/36V; 4800W/48V			1500W/12V; 3000W/24V 4500W/36V; 6000W/48V	
Operating Temperature	-25°C ~ +45°C				
Fan-onTemperature	> 45°C				
Storage Temperature	-40°C ~ +80°C				
IP Protection	IP32				
Net Weight	2.0 kg			2.0 kg	
Communication Port	RS485(RJ12) + BT (Optional)				
Support Parallel	Support parallel (up to 9 units)				
Operating Altitude	≤3000 meters				
Controller Dimension(mm)	260*200*93				
Parameter	Battery Parameters				
Battery Types	FLD	SEL	GEL(default)	USE(adjustable)	LI (adjustable)
Equalize Charge Voltage	14.8V*n	14.6V*n	--	--	--
Boost Charge Voltage	14.6V*n	14.4V*n	14.2V*n	Default: GEL	Default: 14.2V*n
Float Charge Voltage	13.8V*n			Default: GEL	--
Boost Charge Recovery Voltage	13.2V*n			Default: GEL	--
Over-discharge Recovery Voltage	--			--	--
Over-discharge Voltage	--			--	--
AutoTemperature Compensation	-3mV/2V/°C			Default: GEL	--

Accessory List	Package Status
External Temperature Sensor	Yes
External LCD Display Screen	No
Inbuilt Bluetooth	No
Installation Guide Board	No
User Manual	Yes

18. Product Dimension



M4880F/M48100F Model

Product Dimension: 260*200*93mm
 Installation Area Dimension: 192*184mm
 Installation Hole Size: $\phi 5\text{mm}$ & $\phi 10\text{mm}$
 Connection Socket Size: 10*10mm