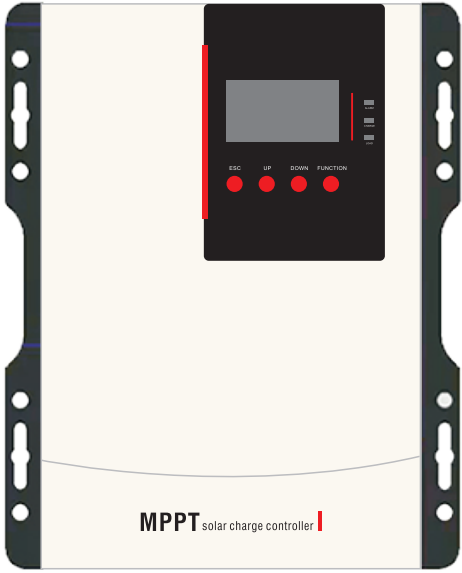


# User Manual of MPPT Solar Charging Controller



## 6. 技术参数

参数xxxxxV	40415	60415	80415	100415	120415	40825	60825	80825	100825
系统额定电压	12/24/36/48VDC或自定义								
控制器工作电压范围	12~64V								
铅酸蓄电池类型	免维护(默认)/胶体/液体/自定义								
锂电池类型	磷酸铁锂/三元锂/自定义								
额定充电电流	40A	60A	80A	100A	120A	40A	60A	80A	100A
额定充电功率	540W/12V 1080W/24V 1620W/36V 2160W/48V	800W/12V 1600W/24V 2400W/36V 3200W/48V	1040W/12V 2080W/24V 3120W/36V 4160W/48V	1300W/12V 2600W/24V 3900W/36V 5200W/48V	1560W/12V 3120W/24V 4680W/36V 6240W/48V	4160W/96V	6240W/96V	8320W/96V	10400W/96V
光伏组件最大开路电压	150V(最低温度条件下) 138V (25℃条件下)								
最大功率	20~150VDC								
点工作电压范围	36~150VDC								
跟踪效率	≥99.5%								
最大转换效率	97.5%								
温度补偿系数	-3mV/°C/2V								
静态损耗	350mA/12V;170mA/24V;85mA/48V; 700mA/12V;350mA/24V;175mA/48V; 12/24V模式下可开启								
直流负载输出电压	40A								
直流负载额定输出电流	40A								
直流负载输出控制方式	常开常闭模式/时控模式/光控模式								
保护功能	PV输入防反接保护、蓄电池输入反接保护、蓄电池过充保护、蓄电池欠压保护、蓄电池过温保护、机器过温保护								
散热方式	风冷								
通信方式	RS485								
液晶背光时间	默认60S,可设置背光模式								
环境参数									
工作环境温度范围	-20℃~+50℃								
储存温度范围	-40℃~+70℃								
相对湿度范围	0~90%RH								
机械参数									
参数	40415F	60415F	80415F	100415F	120415F	40825F	60825F	80825F	100825F
外形尺寸	219*260*110mm 7AWG/10mm <sup>2</sup>	219*260*110mm 6AWG/16mm <sup>2</sup>	275*348*109mm 4AWG/25mm <sup>2</sup>	275*348*109mm 2AWG/35mm <sup>2</sup>	275*348*109mm 2AWG/35mm <sup>2</sup>	219*260*110mm 7AWG/10mm <sup>2</sup>	219*260*110mm 6AWG/16mm <sup>2</sup>	275*348*109mm 4AWG/25mm <sup>2</sup>	275*348*109mm 2AWG/35mm <sup>2</sup>
推荐接线	2.8kg	2.8kg	4.6kg	5.2kg	5.2kg	2.8kg	2.8kg	4.6kg	5.2kg
净重									



Important safety instructions (This manual contains important information about the safe installation and operation of the solar charge controller. Please keep this manual for future reference.)

This manual contains all the safety, installation and operation instructions of the series solar charge controller (hereinafter referred to as “controller”):

- ◇ This manual contains important information about the safe installation and operation of the solar charge controller. Please keep this manual for future reference.
- ◇ Mount the controller indoors only. Prevent exposure to the elements and do not allow any contact with water.
- ◇ Please install the controller in a well ventilated place to ensure adequate heat dissipation from the controller's heat sink.
- ◇ It is recommended that safety and circuit breakers be connected to the input, load and battery terminals to prevent the danger of electric shock in use.
- ◇ Power connections must remain tight to avoid potential dangers and excessive heating from a loose connection.
- ◇ If the display is not displayed normal at the first time, please cut off the fuse or circuit breaker immediately and check the line if it is connected correctly.
- ◇ When the controller is in the normal charging mode, please DO NOT disconnect the battery otherwise the DC load would be damaged.

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## 5.2 故障排除

故障现象	故障	解决方法
当光照强烈，充电指示灯没有长亮，无充电电流	光伏阵列连线开路	请检测光伏阵列两端接线是否正确，接触是否可靠。
正常接线，控制器不能正常工作	蓄电池电压小于11V	测量蓄电池两端的电压，至少11V才能开启控制器。
控制器红灯闪亮，LCD显示代码0X33	光伏阵列极性反接或光伏阵列输入开路电压超额	检测光伏阵列输入两端极性是否连接正确，测量光伏阵列两端电压是否在规定范围内。
控制器红灯闪亮，LCD显示代码0X37	蓄电池过放	①当电量充足后自动恢复负载输出； ②其他方式补充蓄电池电量。
无充电，控制器红灯长亮，LCD闪烁代码0X52	机内温度传感器故障	检测机内温度传感器插头是否松动。
无充电，控制器红灯长亮，LCD闪烁代码0X53	机内温度过高故障	待机内温度冷却到安全温度点时，恢复正常充电。
无充电，控制器红灯长亮，LCD闪烁代码0X54	蓄电池超温	待蓄电池冷却到55℃以下时，恢复正常充电。
无充电，控制器红灯长亮，LCD闪烁代码0X56	蓄电池超压	测量蓄电池两端的电压是否过高并断开光伏阵列的连线。
控制器红灯长亮，LCD闪烁代码0X55	直流负载输出锁死	请检测直流用电器功率是否超额或用电器内部出现短路故障。

## 5.3 系统维护



- 为了保持最佳的长久的工作性能，建议每年进行两次以下项目检查
- 确认控制器周围的气流不会被阻挡，清除散热风扇出风口上的污垢或碎屑。
  - 检查所有裸露的导线是不是因日晒，与周围其他物体摩擦、干朽、昆虫或鼠类破坏等导致绝缘层受损。必要时需维修或更换导线。
  - 检查所有的接线端子，查看是否有腐蚀、绝缘损坏、高温或燃烧变色等迹象，拧紧端子螺丝。
  - 检查是否有污垢，昆虫筑巢和腐蚀现象，按要求清理。
  - 若避雷器已失效，及时更换失效的避雷器以防止造成控制器甚至用户其他设备的雷击损坏。



警告：触电危险！进行上述操作时务必须确保控制器所有电源已断开，然后再进行相应检查或操作！

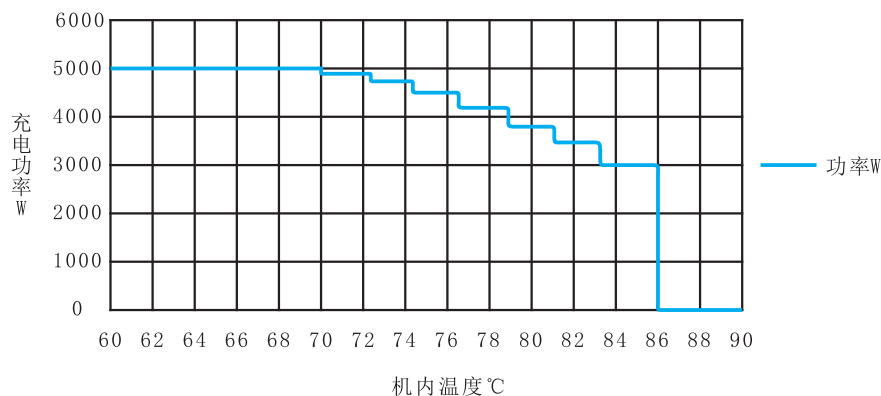
## 5. 保护功能、故障排除、及系统维护

### 5.1 保护功能

保护功能	说明
PV限流限功率保护	当光伏阵列充电电流或功率超过PV额定电流或功率时，将会以额定电流或功率进行充电。
PV短路保护	当PV不充电时，光伏阵列出现短路时，不会损坏控制器。
	 警告：PV在充电过程中禁止短路，否则会损坏控制器。
PV反接保护	当光伏阵列极性反接时，设备不会损坏，显示报故障，修正后可继续工作。
夜间防反充保护	夜间由于蓄电池电压大于PV组件的电压，防止蓄电池通过PV组件放电。
蓄电池反接保护	当蓄电池极性反接时，设备不会损坏。
蓄电池超压保护	当蓄电池电压达到超压断开电压点，将自动停止对蓄电池充电，防止蓄电池因过度充电而损坏。
蓄电池过放保护	当蓄电池电压达到欠压断开电压点，将自动停止对蓄电池放电，防止蓄电池因过度放电而损坏。
	 注意：当直流负载输出接有负载放电时，才会有此保护功能。
蓄电池过热保护	控制器通过外接温度传感器检测蓄电池温度，当蓄电池温度超过60℃时停止工作，低于55℃时恢复工作。
设备过热保护①	控制器通过内部温度传感器检测控制器机内温度。当机内温度超过85℃时将停止工作，低于70℃时恢复工作。
TVS高压浪涌保护	本控制器内部电路设计有瞬态抑制二极管TVS元器件，但只能对能量较小的高压浪涌脉冲进行保护，如果控制器应用于雷电频繁区域，建议外部安装避雷器。

①当机内温度为70℃时，开启充电降功率模式，每升高2℃，分别降低充电功率5%、10%、20%、30%、40%、50%、70%、90%，当温度达到85℃以上时，立即停止充电。当机内温度不大于65℃恢复最大功率追踪充电。

例如100415F 48V系统



## 1. MPPT Controller General Information

### 1.1 Overview

Controller based on multiphase synchronous rectification technology (MSRT) and advanced MPPT control algorithm, has the features of high response speed, high reliability, and high industrial standard. MSRT can guarantee very high conversion efficiency in any charge power, which sharply improves the energy efficiency of solar system; Advanced MPPT control algorithm minimize the maximum power point loss rate and loss time, to ensure the tracking efficiency, corresponding speed as well as high conversion efficiency under high or low power, so that in any situation, products can rapidly track the maximum power point (MPP) of PV array to obtain the maximum energy of the panel. The limitation function of the charging power and current, and automatic power reduction function fully ensure the stability when works with oversize PV modules and operate under high temperature environment.

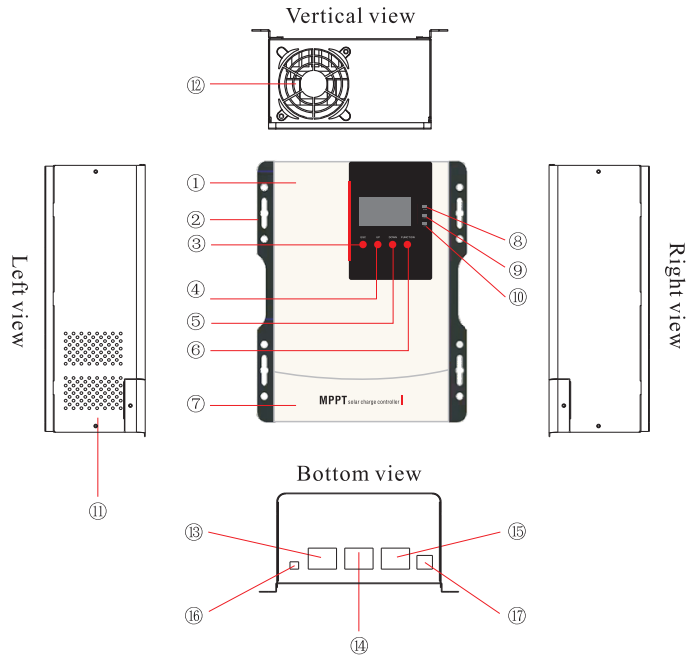
With the adaptive three-stage charging mode based on digital control circuit, controllers can effectively prolong the life-cycle of battery and significantly improve the system performance. All-around electronic protections, including overcharging, over discharging, and PV reverse polarity protection, effectively ensure the safer and more reliable operation of the solar system for a longer service time.

#### Features:

- ◆ Advanced MPPT technology & ultra-fast tracking speed, with tracking efficiency no less than 99.5%.
- ◆ Maximum DC/DC transfer efficiency is as high as 98.5%, full load efficiency is up to 97%.
- ◆ Advanced MPPT control algorithm will minimize the MPP loss rate and loss time.
- ◆ The accuracy of the recognition and tracking at the highest point of multiple-peaks MPP.
- ◆ The wider range of MPP operating voltage.
- ◆ Auto control system to limit the charging power & current go over the rated value.
- ◆ Support the lead-acid and lithium batteries.
- ◆ It has a settable battery temperature compensation function.
- ◆ Real-time energy recording and statistical function.
- ◆ Automatic over-temperature power reduction function.
- ◆ It has the protection function of photovoltaic panel input reverse connection and battery reverse connection.



## 1.2 Characteristics

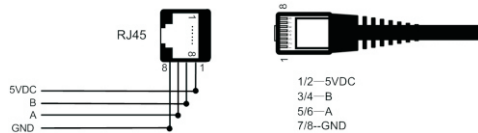


Item	Name	Item	Name
1	Cabinet	10	Load LED indicator
2	Mounting hole	11	Cooling vent
3	Return button	12	Fan vent
4	Page up button	13	PV terminals
5	Page down button	14	Battery terminals
6	Function button	15	Load terminals
7	Terminal cover	16	Temperature sensor
8	Alarm LED indicator	17	RS485 port
9	Charging LED indicator		/

- (1) Connect the remote temperature sensor and detect the temperature of the battery.  
The sampling distance needs to be less than or equal to 20 meters.

**⚠ Note:** When the controller is not connected to the remote temperature sensor or the temperature sensor is damaged, the system will charge or discharge the battery by default at 25°C without temperature compensation.

- (2) When the communication interface is connected to a peripheral



- (3) 充电电流

操作步骤：进入高级设置页面，第三项充电电流，按一下“FUNCTION”键后字体闪烁，然后通过上下翻页键选择所需充电电流大小百分比，再按一下“FUNCTION”键确认即可。

- (4) 终止电压

操作步骤：进入高级设置页面，第四项终止电压，按一下“FUNCTION”键后字体闪烁，然后通过上下翻页键选择所需的直流负载输出欠压保护电压值，再按一下“FUNCTION”键确认即可。

- (5) 强充电压

操作步骤：进入高级设置页面，第四项强充电压，按一下“FUNCTION”键后字体闪烁，然后通过上下翻页键选择所需的“自定义”强充电压值，再按一下“FUNCTION”键确认即可。

- (6) 浮充电压

操作步骤：进入高级设置页面，第五项浮充电压，按一下“FUNCTION”键后字体闪烁，然后通过上下翻页键选择所需的“自定义”浮充电压值，再按一下“FUNCTION”键确认即可。

- (7) 直流负载输出开启时间

操作步骤：进入高级设置页面，第六项直流负载输出时间，按一下“FUNCTION”键后字体闪烁，然后通过上下翻页键选择所需的时间段来控制直流负载输出的开启/关闭，再按一下“FUNCTION”键确认即可。

- (8) 恢复出厂设置

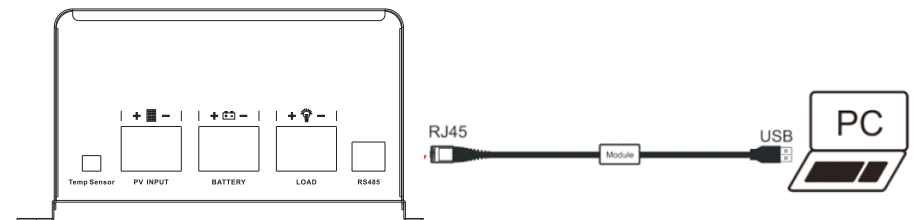
操作步骤：进入高级设置页面，第七项恢复出厂设置，按一下“FUNCTION”键后字体闪烁，然后通过上下翻页键选择是否需要重置参数，再按一下“FUNCTION”键确认即可。

### 通信设置

- 上位机设置

操作步骤：通过通信线连接PC端，在上位机中设置控制器参数。

#### 1. 连接方式



#### 4.5 锂电池模式的操作使用

**⚠ 注意：**锂电池系统电压不能设置为自动识别自适应，当需要接入锂电池使用时，系统电压需要设置为当前接入的锂电池的工作电压。

#### 操作步骤

- 步骤1: 电池输入端接入锂电池包，同时按下“ESC”+“FUNCTION”键三秒，输入密码进入高级设置模式，设置选择锂电池的类型  
 步骤2: 设置当前的系统电压。(例如：锂电池包为磷酸铁锂16串则系统电压设置为48V)  
 步骤3: 根据当前锂电池包的电池容量设置充电电流的大小一般约为容量的0.5-0.7C  
 步骤4: 断开电源再重新接上

操作步骤：进入高级设置页面，第一项蓄电池类型选择，按一下“FUNCTION”键后字体闪烁，然后通过上下翻页键选择所需的电池类型，再按一下“FUNCTION”键确认即可。

## ② 蓄电池的控制电压参数

### ◆ 蓄电池参数

电压参数均为25°C/12V系统参数，24V系统参数X2、36V系统参数X3、48V系统参数X4、96V系统参数X8

电压控制参数	VRLA Batter	GEL battery	Flooded battery	Customizing
超压断开电压	15.9V	15.7V	16.1V	9~17V
充电限制电压	15.4V	15.2V	15.6V	9~17V
超压断开恢复电压	15.4V	15.2V	15.6V	9~17V
强充电电压	14.4V	14.2V	14.6V	9~17V
浮充电压	13.6V	13.6V	13.6V	9~17V
升压恢复电压	13V	13V	13V	9~17V
低压断开恢复电压	11.5V	11.5V	11.5V	9~17V
欠压报警恢复电压	11.5V	11.5V	11.5V	9~17V
欠压报警电压	11.4V	11.4V	11.4V	9~17V
欠压断开电压	11V	11V	11V	9~17V
强充电持续时间	120 min	120 min	120 min	120 min

1. 当选择默认蓄电池类型时，蓄电池电压控制参数是默认不可更改的；如果要更改蓄电池电压控制参数，只能选择对应“自定义”类型。

2. “自定义”必须遵循的逻辑

- ▶ 强充电电压 > 浮充电压
- ▶ 低压断开恢复电压 > 低压断开电压

### ◆ 锂电池参数

电压参数均为25°C/12V系统参数，24V系统参数X2、36V系统参数X3、48V系统参数X4、96V系统参数X8。

电压控制参数	磷酸铁锂	三元锂	自定义
过压断开电压	16.1V	14.1V	9~17V
充电限制电压	15.6V	13.6V	9~17V
过压断开恢复电压	15.6V	13.6V	9~17V
强充电电压	14.6V	12.6V	9~17V
浮充电压	14.6V	12.6V	9~17V
升压恢复电压	13V	12V	9~17V
低压断开恢复电压	11.5V	9.5V	9~17V
欠压报警恢复电压	11.5V	9.5V	9~17V
欠压报警电压	11.4V	9.4V	9~17V
欠压断开电压	11V	9V	9~17V



警告：锂电池参数可以设置，但设置必须参照锂电池保护板的电压参数进行对应参数的设置，锂电池充电过程中必须接有锂电池保护板且锂电池保护板的精度要求不大于0.2V。否则系统出现异常将不承担任何责任！

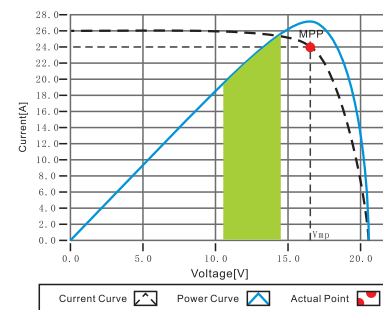
## (2) 系统电压

操作步骤：进入高级设置页面，第二项系统电压，按一下“FUNCTION”键后字体闪烁，然后通过上下翻页键选择所需的模式，再按一下“FUNCTION”键确认即可。

## 1.3 Maximum Power Point Tracking Technology

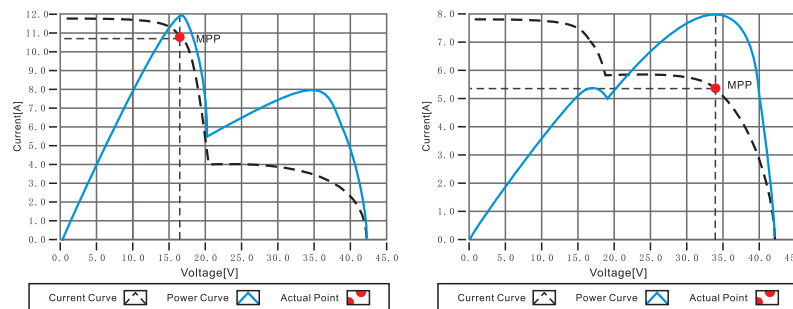
Due to the nonlinear output of a solar panel or solar array, there is a maximum energy point (Max Power Point, or MPP) on the output curve at which the solar panel achieves its highest efficiency. Traditional solar charge controllers with switch charging PWM technology cannot track this highest efficiency point of a solar panel, so most of the time they work with reduced efficiency and do not extract the full energy available from the solar panel.

The below figure is the maximum power point curve of a solar panel. The shaded area is the charging range of a standard PWM controller. The MPPT technology of this controller can shift the point on the curve to the higher current, and raise the efficiency by 20%-60% compared to a standard PWM controller. (The efficiency may be different due to the working environment.)



Maximum Power Point Curve

In practice, due to shading from clouds, trees, snow etc, a solar panel might have multiple MPP points, but in reality there is only one true Maximum Power Point (see below examples):

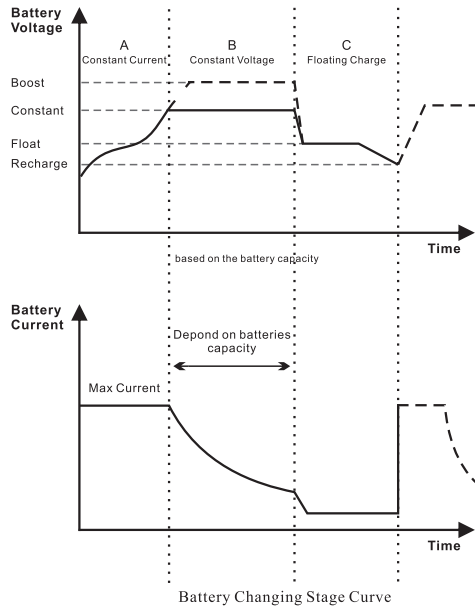


Curves with multiple MPP points

If there are multiple MPPT points, if there is no good algorithm, it will lead to work on the unreal MPPT point. This solar charge controller has a special MPPT technology that can handle multiple MPPT points and track the true MPPT point quickly and accurately, improving the system efficiency and avoiding energy waste.

## 1.4 Battery Charging Stage

The controller have 3 stages charge mode, Constant Current Charging (Bulk Charging), Constant Voltage Charging (CV) and Floating Charging (CF) for rapid, efficient, and safe battery charging.



### a) Battery Changing Stage Curve

In this stage, the battery voltage has not yet reached the constant voltage point (Equalize or Boost Voltage) and the controller operates in a constant current mode, delivering its maximum current to the batteries (MPPT charging).

### b) Constant Voltage Charging: CV (Constant and Boost Charging)

When the battery voltage reaches the constant voltage set point, the controller will start to operate in constant voltage charging mode, this process the charging current will drop gradually.

### c) Floating Charging: CF

After the constant voltage stage, the controller will reduce charging current to maintaining the battery voltage on the Floating Voltage set point. Charging the battery with a smaller current and voltage on Floating Voltage stage, while maintaining full battery storage capacity.

In Floating charging stage, loads are able to obtain almost all power from solar panel. If loads exceed the power, the controller will no longer be able to maintain battery voltage in Floating charging stage. If the battery voltage remains below the Recharge Voltage, the system will leave Floating charging stage and return to Bulk charging stage.

## (2) 故障警告指示

故障指示灯	显示代码	说明
闪亮	0X33	PV输入电压过高
闪亮	0X34	蓄电池温度高
闪亮	0X35	机内温度高
闪亮	0X36	蓄电池电压低
闪亮	0X37	蓄电池电压非常低
闪亮	0X38	直流负载输出过载
长亮	0X52	机内温度传感器故障
长亮	0X53	机内温度过高
长亮	0X54	蓄电池温度过高
长亮	0X55	直流负载输出封锁
长亮	0X56	蓄电池电压过充

## 4.4 设置操作

### 基础设置

#### (1) 语言转换设置

操作步骤：长按“FUNCTION”键三秒，进入快速设置页面，第一项语言显示，按一下“FUNCTION”键后字体闪烁，然后通过上下翻页键选择所需的语言显示，再按一下“FUNCTION”键确认即可。

#### (2) LCD显示屏背光设置

操作步骤：长按“FUNCTION”键三秒，进入快速设置页面，第二项背光模式，按一下“FUNCTION”键后字体闪烁，然后通过上下翻页键选择所需的模式设置，再按一下“FUNCTION”键确认即可。

#### (3) 系统时间设置

操作步骤：长按“FUNCTION”键三秒，进入快速设置页面，第三项系统时间，按一下“FUNCTION”键后字体闪烁，然后通过上下翻页键选择所需的时间段，再按一下“FUNCTION”键确认即可。

#### (4) 直流负载输出模式设置

操作步骤：长按“FUNCTION”键三秒，进入快速设置页面，第四项直流输出模式，按一下“FUNCTION”键后字体闪烁，然后通过上下翻页键选择所需的模式设置，再按一下“FUNCTION”键确认即可。

### 高级设置

注意：进入高级设置需同时按下“ESC”+“FUNCTION”键三秒后进入密码输入界面，密码默认为“↓↓↓↑↑”，通过上下翻页键选择↑或者↓，然后通过“FUNCTION”键确认选择，最后密码输入完毕后选择是否确认后，再按下“FUNCTION”键即可进入设置模式。

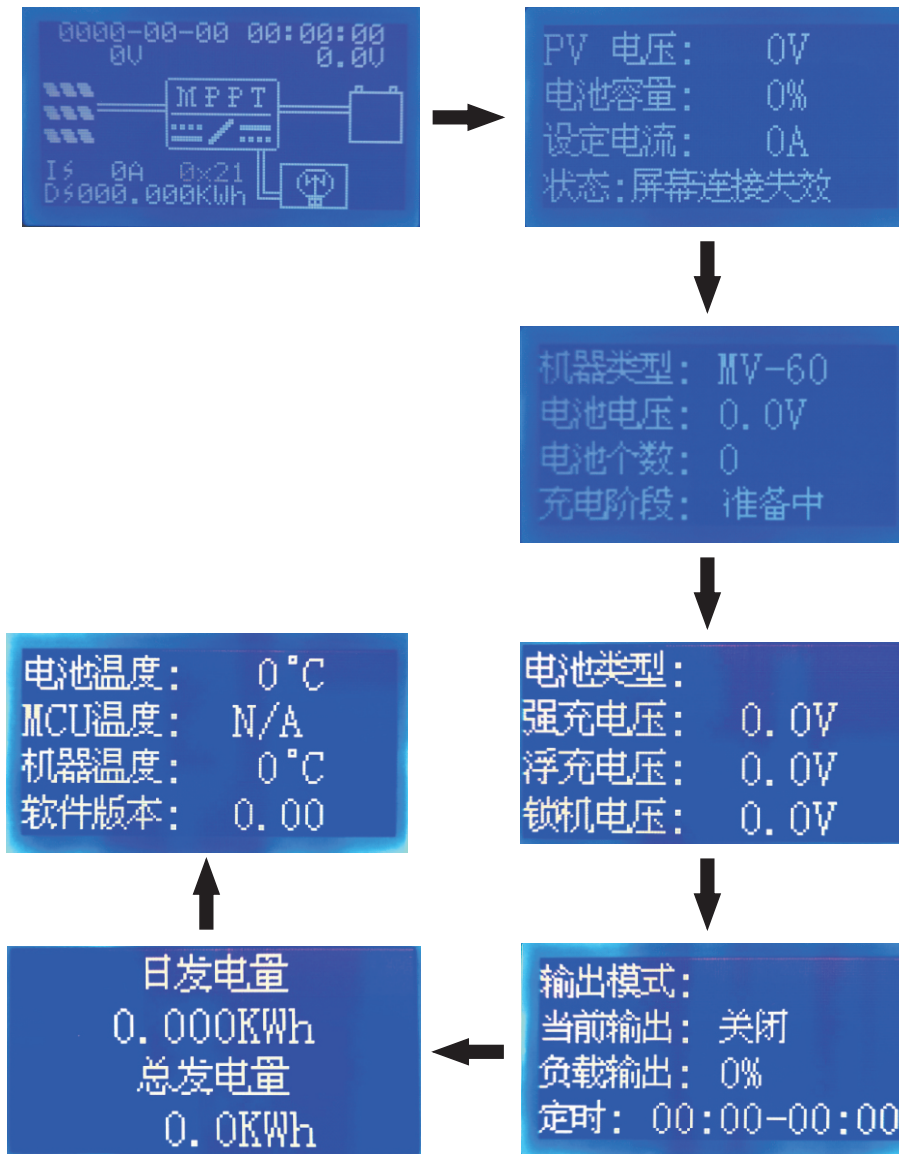
#### (1) 蓄电池类型

##### ① 控制器支持的蓄电池类型



蓄电池	免维护密封电池（默认）	锂电池	磷酸铁锂
	胶体电池		三元锂
	液体电池		自定义
	自定义		

### 4.3 LCD显示

(1) 浏览界面



### 1.5 Accessories(optional)

1	Remote Temperature Sensor(RTS300R47K)		Acquisition of battery temperature for undertaking temperature compensation of control parameters, the standard length of the cable is 3m (length can be customized). The RTS300R47K connects to the port ④ on the controller. NOTE: The temperature sensor short-circuited or damaged, the controller will be charged or discharged at the default temperature 25°C.
2	USB to RS485 cable		USB to RS485 converter is used to monitor each controller using Solar Station PC software. The length of cable is 1.5m.

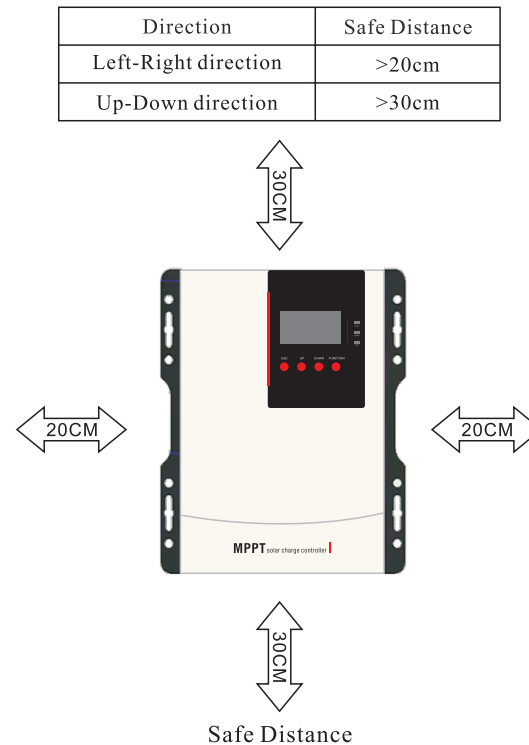
## 2. Installation Instructions

### 2.1 Selecting the Mounting Location

The position should be taken into consideration of the weight and size of the controller. The ambient temperature of the position should be within the range of -20°C ~50°C. A good ventilation environment should be maintained in the position. Install position should avoid direct sunlight

### 2.2 Safe Distance

Refer to the following safety clearance to ensure that other equipment or objects are not within this range to ensure that there is sufficient space for heat dissipation.

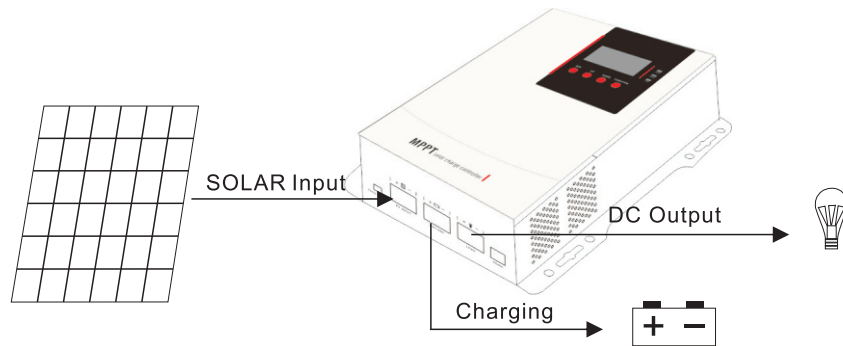


### 2.3 Precautions for controller installation

- ◆ Be very careful when installing the battery. For the installation of the open lead-acid battery, you should wear protective glasses. Once the battery acid is contacted, please rinse with clean water in time.
- ◆ Avoid placing metal objects near the battery to prevent the battery from short-circuiting.
- ◆ Acid gas may be generated when the battery is charged. Ensure that the environment is well ventilated.
- ◆ Virtual connection points and corroded wires may cause great heat to melt the wire insulation, burn surrounding materials, and even cause fire. Therefore, make sure that the connectors are tightened and the wires are best fixed with ties to avoid moving applications. When the wire shakes, the connector loosens.
- ◆ Only lead-acid batteries and lithium batteries within the control range of this controller can be charged.
- ◆ The system connection line is selected according to the current density not greater than  $5A/mm^2$ .

## 3. MPPT Controller Connection

### 3.1 Connection of the PV Power System



### 3.2 Serial connection (string) of PV modules

(1) The number of photovoltaic modules connected in series

As the core component of PV system, controller could be suitable for various types of PV modules and maximize converting solar energy into electrical energy. According to the open circuit voltage ( $V_{oc}$ ) and the maximum power point voltage ( $V_{mp}$ ) of the MPPT controller, the series number of different types PV modules can be calculated.

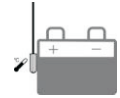
The following table is provided for general guidance only:

**40415 | 60415 | 80415 | 100415F:**

System Voltage	36cell $V_{oc} < 23V$		48cell $V_{oc} < 31V$		54cell $V_{oc} < 34V$		60cell $V_{oc} < 38V$	
	Max	Best	Max	Best	Max	Best	Max	Best
12V	4	2	2	1	2	1	2	1
24V	6	3	4	2	4	2	3	2
48V	6	5	4	3	4	3	3	3

### (2) 选配件的连接使用

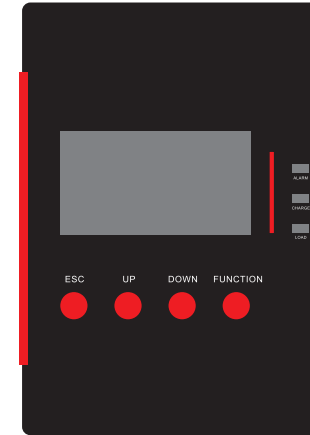
- 连接远程温度传感器线（型号：RTS300R47K）将远程温度传感器线连接到接口⑩，另一端接近蓄电池。



**注意：控制器在未连接远程温度传感器的情况下，会默认25℃对蓄电池充电或放电，无温度补偿。**

- 连接与RS485通讯的选配件，具体详见选配件清单。

## 4. 控制器的操作



### 4.1 指示灯

指示灯	颜色	状态	说明
ALARM	红色	闪亮	报警信号
	红色	长亮	故障信号
CHARGE	绿色	闪亮	无充电/待机状态
	绿色	长亮	充电过程中
LOAD	黄色	长亮	负载输出功能开启

注：故障指示灯详见章节4.3“故障警告指示”

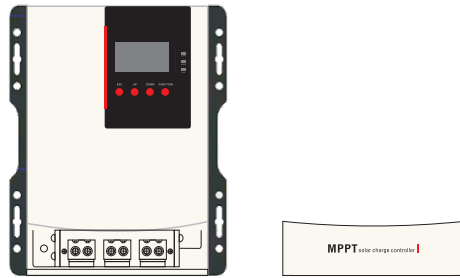
### 4.2 按键

模式	图标	备注说明
返回	ESC	轻按ESC键可以返回到主机界面浏览
上翻页	UP	轻按UP键可以进行上翻页浏览或在设置模式时执行选择功能
下翻页	DOWN	轻按DOWN键可以进行下翻页浏览或在设置模式时执行选择功能
功能确认键	FUNCTION	轻按FUNCTION键当出现闪烁字体时表示可以进行设置操作，设置完毕后再轻按FUNCTION键确认设置参数
长按“FUNCTION”3秒		进入快速设置页面
长按“ESC”+“FUNCTION”3秒		进入高级设置页面

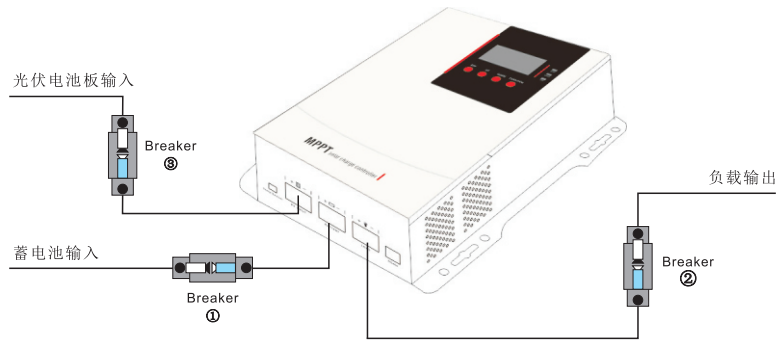


### 3.5 控制器的接线安装

本系列的控制器,接线时需要把接线的盖板打开,如下图所示,按相应位置接线完成后,再盖回去同时锁紧;



#### (1) 基本使用连接



请确保控制器安装正确!

开启过程: 步骤1:先打开蓄电池连接的断路器①, 确保控制器与蓄电池连接后(控制器LCD将会显示内容), 设置好电池类型;

步骤2: 如果需要DC输出控制负载, 那么先设置输出控制模式, 然后再打开DC输出断路器②;

步骤3: 然后再连接打开太阳能板PV输入的断路器③, 如果PV输入的电压在控制器的充电工作范围内, 那么控制器将进入充电状态;

关闭过程: 依次断开断路器③②①



#### 警告:

1. 若系统需要连接逆变器, 请将逆变器直接与蓄电池连接, 切勿与控制器的负载端连接;
2. 当控制器处于正常充电状态, 切勿断开蓄电池连接, 否则可能损坏控制器, 因此造成的控制器损坏将不在保修范围内。

System Voltage	72cell Voc<46V		96cell Voc<62V		Thin-Film Module Voc>80V
	Max	Best	Max	Best	
12V	2	1	1	1	1
24V	3	2	2	1	1
48V	3	2	2	2	1

**NOTE:** The above parameter values are given under Standard Test Conditions (STC): irradiance 1000W/m<sup>2</sup>, Module Temperature 25°C, Air Mass 1.5.)

#### 40825|60825|80825|100825F:

System Voltage	36cell Voc<23V		48cell Voc<31V		54cell Voc<34V		60cell Voc<38V	
	Max	Best	Max	Best	Max	Best	Max	Best
96V	10	8	6	5	6	5	6	4

System Voltage	72cell Voc<46V		96cell Voc<62V		Thin-Film Module Voc>80V
	Max	Best	Max	Best	
96V	4	4	3	3	2

**NOTE:** The above parameter values are given under Standard Test Conditions (STC): irradiance 1000W/m<sup>2</sup>, Module Temperature 25°C, Air Mass 1.5.)

### 3.3 PV Array Input Total Power

This MPPT controller has a limiting function of charging current, the charging current will be limited within rated range. Therefore, the controller will charge the battery with the rated charging power even if the input power at the PV exceeds. Such as: for 12V Solar System with 30A controller, no matter the input power of the solar panel is greater than the rated number, the charging current will not be more than 30A. The actual operation power of the PV array conforms to the conditions below:

- 1) PV power less or equal to controller rated power, the maximum power of the controller is equal to the actual power of the PV array.
- 2) If the PV array actual power is more than the controller nominal rated power, the controller will reduce the PV array power and charge the battery at its nominal rated power.

According to the "sunshine time curve", if the power of the photovoltaic array exceeds the rated charging power of the controller, the charging time with the rated power will be extended, so more energy can be obtained to charge the battery. However, in practical applications, the maximum power of the photovoltaic array must not exceed 2 times the controller's customer-specified charging power; if it is checked that the photovoltaic array power exceeds the controller's rated charging power too much, not only the photovoltaic modules will be wasted, but also due to the influence of ambient temperature. The open circuit voltage of the array increases, which increases the probability of damage to the controller. Therefore, a reasonable configuration of the system is particularly important. For the maximum power of the PV array recommended by this controller, please refer to the following table:

Model	Rated charging current	Rated charging power	Maximum PV array power	Maximum PV open circuit voltage
40415F	40A	540W/12V 1080W/24V 1620W/36V 2160W/48V	1080W/12V 2160W/24V 3240W/36V 4320W/48V	150V (最低温度) 138V (25℃)
60415F	60A	800W/12V 1600W/24V 2400W/36V 3200W/48V	1600W/12V 3200W/24V 4800W/36V 6400W/48V	
80415F	80A	1080W/12V 2160W/24V 3240W/36V 4320W/48V	2160W/12V 4320W/24V 6480W/36V 8640W/48V	
100415F	100A	1300W/12V 2600W/24V 3900W/36V 5200W/48V	2600W/12V 5200W/24V 7800W/36V 10400W/48V	
120415F	120A	1560W/12V 3120W/24V 4680W/36V 6240W/48V	3120W/12V 6240W/24V 9360W/36V 12480W/48V	
40825F	40A	4160W/96V	8320W/96V	250V (最低温度) 225V (25℃)
60825F	60A	6240W/96V	12480W/96V	
80825F	80A	8320W/96V	16640W/96V	
100825F	100A	10400W/96V	20800W/96V	

### 3.4 Model of wires and breaker

☞ The installation of inverter must strictly follow the local electrical requirements.

The output current of solar panels will be effected by the model of solar panel cell, connection setting and the light intensity,so the minimum wire size is design according to the short circuit current of solar panels.Please check the short circuit current on the manual book of solar panel. (The short circuit current will not change when the solar panels serial connect.The total short circuit current are the sum of each solar panel group when parallel connect.)The short circuit current of solar panel can not over the maximum input current of the solar charge controller. For the convenient of turning on and off,also for the safety, we suggest you to install a breaker. Kindly choose right breaker and wires according to below chart.

Model	PV maximum input Current	PV end max Wire diameter	Rated charging current	Battery wire diameter	Circuit breaker specifications
40415F 40825F	40A	7AWG/10mm <sup>2</sup>	40A	7AWG/10mm <sup>2</sup>	60A
60415F 60825F	60A	6AWG/16mm <sup>2</sup>	60A	6AWG/16mm <sup>2</sup>	80A
80415F 80825F	80A	4AWG/25mm <sup>2</sup>	80A	4AWG/25mm <sup>2</sup>	100A
100415F 100825F	100A	2AWG/35mm <sup>2</sup>	100A	2AWG/35mm <sup>2</sup>	120A
120415F	100A	2AWG/35mm <sup>2</sup>	120A	2AWG/35mm <sup>2</sup>	150A

型号	额定充电电流	额定充电功率	最大光伏阵列功率	最大PV开路电压
40415F	40A	540W/12V 1080W/24V 1620W/36V 2160W/48V	1080W/12V 2160W/24V 3240W/36V 4320W/48V	150V (最低温度) 138V (25℃)
60415F	60A	800W/12V 1600W/24V 2400W/36V 3200W/48V	1600W/12V 3200W/24V 4800W/36V 6400W/48V	
80415F	80A	1080W/12V 2160W/24V 3240W/36V 4320W/48V	2160W/12V 4320W/24V 6480W/36V 8640W/48V	
100415F	100A	1300W/12V 2600W/24V 3900W/36V 5200W/48V	2600W/12V 5200W/24V 7800W/36V 10400W/48V	
120415F	120A	1560W/12V 3120W/24V 4680W/36V 6240W/48V	3120W/12V 6240W/24V 9360W/36V 12480W/48V	
40825F	40A	4160W/96V	8320W/96V	250V (最低温度) 225V (25℃)
60825F	60A	6240W/96V	12480W/96V	
80825F	80A	8320W/96V	16640W/96V	
100825F	100A	10400W/96V	20800W/96V	

### 3.4 电缆和断路器/空气开关的规格

☞ 接线和安装方式必须遵循国家和当地的电气规格要求！

由于光伏阵列的输出电流受光伏组件的类型、连接方式和光照角度影响，因此光伏阵列的最小线径根据光伏阵列的短路电流来计算。请参考光伏组件规格书中的短路电流值（光伏组件串联时短路电流不变；并联时短路电流为所有并联组件的短路电流之和）。阵列的短路电流不能超过控制器PV最大输入电流。为方便开关机及安全性，建议安装断路器/空气开关。具体请参考下表线材和断路器规格选型。

型号	PV最大输入电流	PV端最大线径	额定充电电流	蓄电池线径	断路器规格
40415F 40825F	40A	7AWG/10mm <sup>2</sup>	40A	7AWG/10mm <sup>2</sup>	60A
60415F 60825F	60A	6AWG/16mm <sup>2</sup>	60A	6AWG/16mm <sup>2</sup>	80A
80415F 80825F	80A	4AWG/25mm <sup>2</sup>	80A	4AWG/25mm <sup>2</sup>	100A
100415F 100825F	100A	2AWG/35mm <sup>2</sup>	100A	2AWG/35mm <sup>2</sup>	120A
120415F	100A	2AWG/35mm <sup>2</sup>	120A	2AWG/35mm <sup>2</sup>	150A



系统电压	72cell Voc<46V		96cell Voc<62V		薄膜 Voc>80V
	最大	最佳	最大	最佳	
12V	2	1	1	1	1
24V	3	2	2	1	1
48V	3	2	2	2	1

注：以上的参数值都是在标准测试条件下（STC：标准测试条件25℃，大气质量AM1.5，1000W/m<sup>2</sup>）计算的。

#### 40825 | 60825 | 80825 | 100825F:

系统电压	36cell Voc<23V		48cell Voc<31V		54cell Voc<34V		60cell Voc<38V	
	最大	最佳	最大	最佳	最大	最佳	最大	最佳
96V	10	8	6	5	6	5	6	4

系统电压	72cell Voc<46V		96cell Voc<62V		薄膜 Voc>80V
	最大	最佳	最大	最佳	
96V	4	4	3	3	2

注：以上的参数值都是在标准测试条件下（STC：标准测试条件25℃，大气质量AM1.5，1000W/m<sup>2</sup>）计算的。

### 3.3 光伏阵列最大功率

本MPPT控制器具有充电电流限制功能，即控制器可以限制充电电流在控制器的额定充电电流范围内，控制器最大能够获得不大于控制器额定充电功率的功率，因此即使控制器PV端输入的功率超过控制器额定充电功率，控制器都会按照控制器额定充电功率给蓄电池充电。光伏阵列实际运行功率符合以下条件：

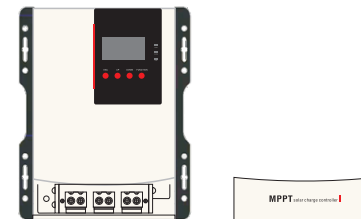
1) 当光伏阵列实际功率≤控制器额定充电功率，控制器在光伏阵列最大功率点工作。

2) 当光伏阵列实际运行功率>控制器额定充电功率，控制器按照控制器额定充电功率工作，但光伏阵列可能不会工作在最大功率点上

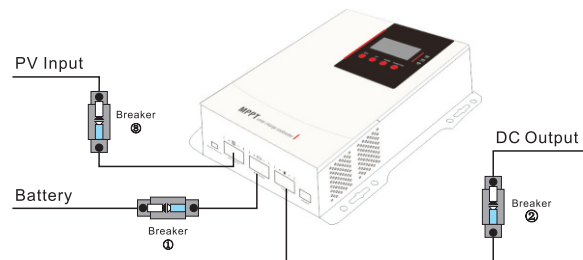
根据“日照时间曲线”，如果光伏阵列的功率超过控制器额定充电功率，那以额定功率的充电时间将会延长，因此能够获取更多的能量给蓄电池充电。但是在实际应用中，光伏阵列最大功率不得超过控制器额定充电功率的2倍；如查光伏阵列功率超过控制器额定充电功率过多，不仅造成光伏组件浪费，而且由于环境温度的影响导致光伏阵列的开路电压增大，使得控制器损坏的几率增大。因此合理配置系统尤为重要，此控制器推荐光伏阵列最大功率请参考下表：

### 3.5 Controller opening and closing steps

Before you connect the wire, please open the product case. After done it, please close and locked them, it is helpful to protect the connection port.



#### (1) Basic wiring




Make sure that the controller is installed and connected correctly!

**Opening process:** Step 1: open the circuit breaker ① on the battery side, make sure that the controller is connected with the battery (the LCD of the controller will display the content), and set the battery type.

Step 2: if you need to use the DC load output, then set the output control mode first, and then open the DC output circuit breaker ②.

Step 3: open the circuit breaker ③ on the input side of the solar panel PV, if the PV input voltage is in the charge range of the controller, then the controller will enter the charging state.

**Closing process:** turn off the circuit breaker in turn: ③②①

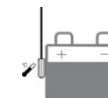


**Caution:**

1. If the system needs to connect to the inverter, please connect the inverter to the battery directly, but DO NOT connect to the load terminal of the controller.
2. When the controller is in the normal charge state, do not disconnect the battery connection, otherwise the Controller may be damaged. Therefore, the damage to the controller will not be within the warranty.

#### (2) Connect accessories

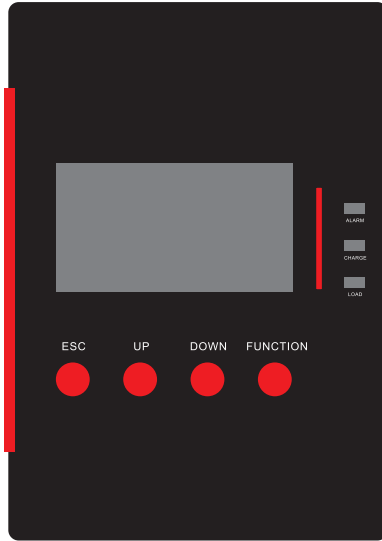
• Connect the remote temperature sensor cable (Model: RTS300R47K)  
Connect the remote temperature sensor cable to the interface ⑩ and place the other end close to the battery.



**CAUTION:** If the remote temperature sensor is not connected to the controller, the default setting for battery charging or discharging temperature is 25 °C without temperature compensation.

• Connect the accessories for RS485 communication, refer to the accessories list.

## 4. Controller Operation



### 4.1 Indicator Lights

Indicator Lights	Color	Status	Instructions
ALARM	RED	Blink	Alarm
	RED	Bright	Fault
CHARGE	GREEN	Blink	No Charging/Standby
	GREEN	Bright	Charging
LOAD	YELLOW	Bright	Load Output Function Open

Note: Please refer to the chapter 4.3 "Alarming instructions"

### 4.2 Buttons

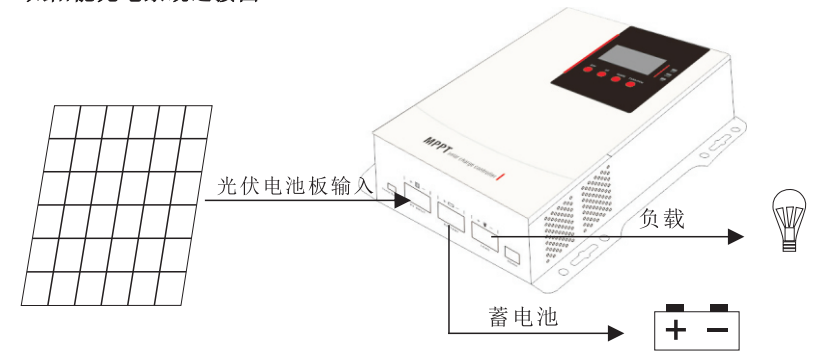
Mode	Icons	Instructions
Back	ESC	Tap ESC Button to return to the host interface to browse
Up	UP	Tap the UP button to browse the page up or perform a selection function in the setting mode
Down	DOWN	Tap the DOWN button to scroll down the page or perform a selection function in the setting mode
Function confirmation	FUNCTION	Lightly press the FUNCTION button when the flashing font appears, it means that the setting operation can be change. After the setting, tap FUNCTION button to confirm the setting.
Press and hold "FUNCTION" for 3 seconds		Enter the quick setting page
Press and hold "ESC"+"FUNCTION" for 3 seconds		Enter the advanced settings page

## 2.3 安装注意事项

- ◆ 安装蓄电池时要非常小心，对于开口铅酸蓄电池的安装应戴上防护镜一旦接触到蓄电池酸液时，请及时用清水冲洗。
- ◆ 蓄电池附近避免放置金属物件，防止蓄电池发生短路。
- ◆ 蓄电池充电时可能产生酸性气体，确保环境周围通风良好。
- ◆ 虚接的连接点和腐蚀的电线可能造成极大的发热融化电线绝缘层，燃烧周围的材料，甚至引起火灾，所以要保证连接头都拧紧，电线最好用扎带都固定好，避免移动应用时电线摇晃而造成连接头松散。
- ◆ 只能符合本控制器控制范围的铅酸蓄电池充电。
- ◆ 系统连接线按照不大于5A/mm<sup>2</sup>的电流密度进行选取。

## 3. 控制器连接

### 3.1 太阳能充电系统连接图



### 3.2 光伏阵列的要求



#### (1) 光伏组件串联数量

由于市场上的光伏组件类型各不相同，控制器作为光伏系统中的核心部件，能够适合各种类型的光伏组件并能够最大化的太阳能转化为电能尤为重要，因此根据MPPT控制器的开路电压(Voc)和最大功率点电压(VMPP)可以计算出适合不同类型的光伏组件串联数量，以下是光伏组件串联数量表格，仅供参考：

#### 40415 | 60415 | 80415 | 100415F:

系统电压	36cell Voc<23V		48cell Voc<31V		54cell Voc<34V		60cell Voc<38V	
	最大	最佳	最大	最佳	最大	最佳	最大	最佳
12V	4	2	2	1	2	1	2	1
24V	6	3	4	2	4	2	3	2
48V	6	5	4	3	4	3	3	3

### 1.5 选配件

1	远程温度传感器 RTS300R47K		采集蓄电池温度数据从而精确地进行充放电参数的温度补偿，线长标配为3米（也可根据用户需要定制），RTS300R47K通过接口进行连接。 注意：控制器在未连接远程温度传感器或者温度传感器损坏的情况下会默认25℃对蓄电池进行充电或放电，无温度补偿。
2	USB转RS485通讯线		用于连接控制器通讯接口（RJ45接口）与PC机USB接口的专用线缆，线长标配为1.5米（也可根据用户需要定制）通过专用监控软件可对控制器进行实时监控和固件升级操作。

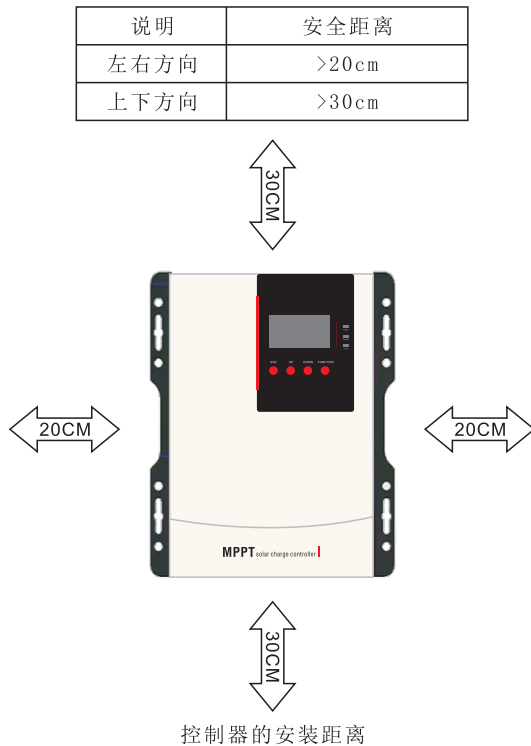
### 2. 控制器安装

#### 2.1 安装位置的选择

- 安装位置需考虑到控制器的重量和尺寸；
- 安装位置环境温度需满足在 -20℃~50℃ 范围内；
- 安装位置需保持良好的通风环境；
- 安装位置应避免阳光直射。

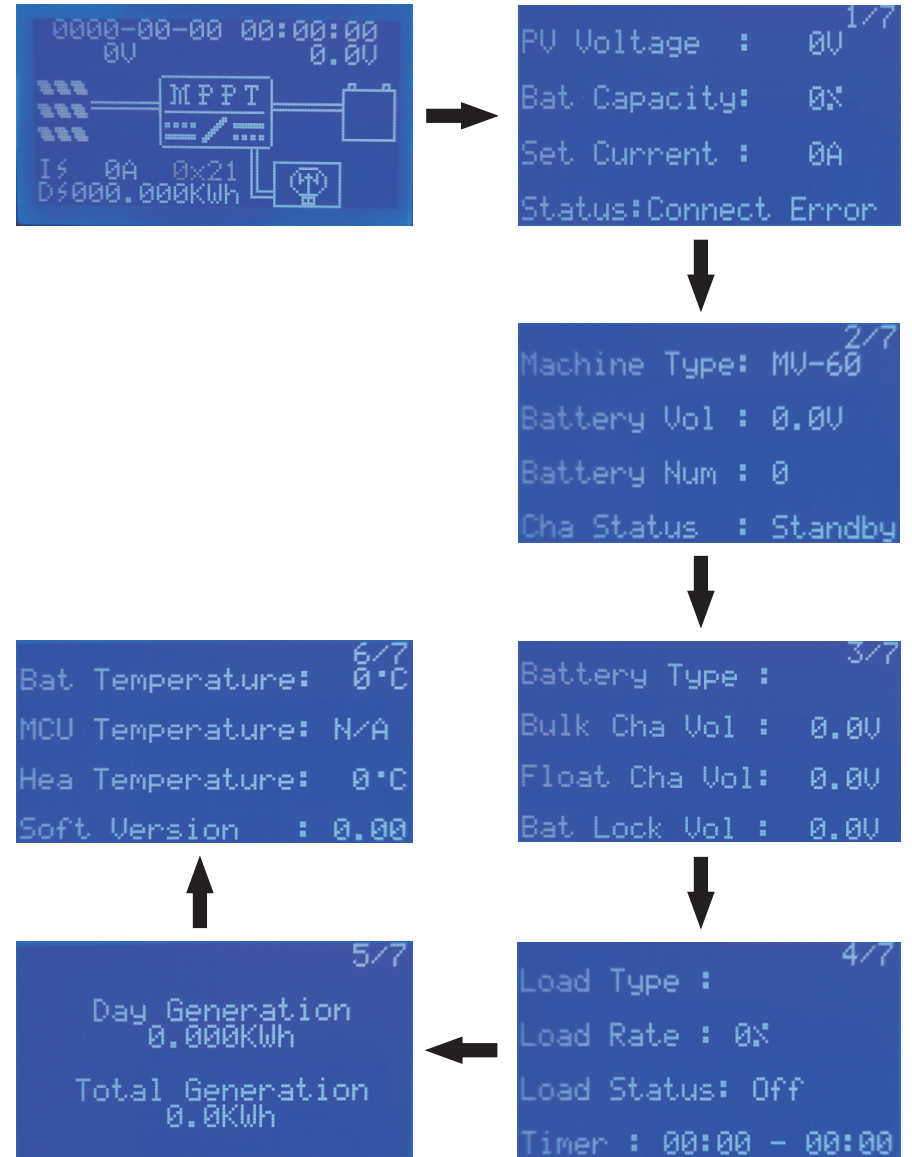
#### 2.2 安全距离

遵守下列安全间隙，确保其它设备或物体不在这个范围之内，以确保有足够的散热空间。



### 4.3 LCD display

#### (1) Browsing interfaces



(2) Fault alarm display

Fault LED indicator	Code	Descriptions
Flash	0X33	PV input over voltage
Flash	0X34	Battery over heat
Flash	0X35	Overheating inside the controller
Flash	0X36	Battery low voltage
Flash	0X37	Battery extreme-lower voltage
Flash	0X38	DC Loads overloaded
Light on	0X52	Temperature sensor fault
Light on	0X53	Overheating inside of controller
Light on	0X54	Battery overheating
Light on	0X55	DC Loads output locked
Light on	0X56	Battery overcharged

4.4 Operation settings

Basic settings

(1) Language setting

Setting steps: Press and hold "FUNCTION" for 3 seconds into setting pages. At first line is for language setting, press "FUNCTION" then the Language will flashing, then press UP and DOWN buttons to choose the language you want. At last, press "FUNCTION" again to confirm and save the setting.

(2) LCD screen light setting

Setting steps: Press and hold "FUNCTION" for 3 seconds into setting pages. At second line is for screen light setting, press "FUNCTION" then the light setting will flashing, then press UP and DOWN buttons to choose the light mode you want. At last, press "FUNCTION" again to confirm and save the setting.

(3) System time setting

Setting steps: Press and hold "FUNCTION" for 3 seconds into setting pages. At third line is for time setting, press "FUNCTION" then the time setting will flashing, then press UP and DOWN buttons to choose the time you want. At last, press "FUNCTION" again to confirm and save the setting.

(4) DC load output mode settings

Setting steps: Press and hold "FUNCTION" for 3 seconds into setting pages. At fourth line is for time setting, press "FUNCTION" then the time setting will flashing, then we using UP and DOWN buttons to choose the time you want. At last, press "FUNCTION" again to confirm and save the setting.

Advanced settings

Note: To enter the advanced settings, you need to press the "ESC" + "FUNCTION" buttons at the same time for three seconds to enter the password input interface. The password defaults to "↓↓↓↑↑", select ↑ or ↓ by the page up and down button, and then press "FUNCTION" button to confirm the selection, after the final password is entered, choose whether to confirm, and then press the "FUNCTION" button to enter the setting mode.

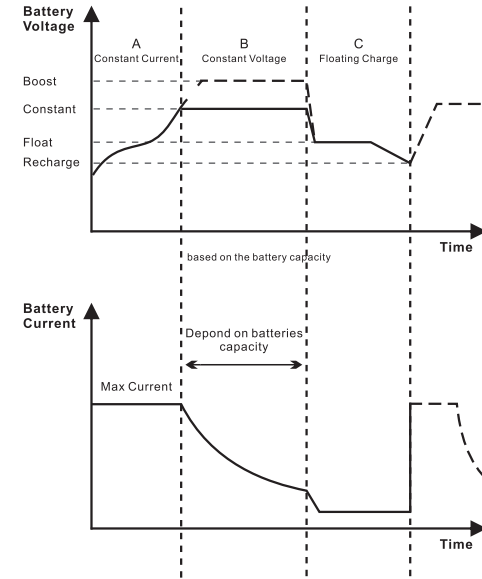
(1) Battery type

① The type of batteries supported by the MPPT charge controller

Battery	VRLA Battery (by default)	Lithium battery	Lithium iron phosphate
	GEL battery		Ternary lithium
	Flooded battery		Customizing
	Customizing		

1.4 蓄电池充电阶段

控制器具有三段式充电方式，分别为恒流充电CC（快速）、恒压充电CV和浮充充电CF；通过这几个快速、高效和安全的电池充电方式，系统可以有效延长蓄电池的使用寿命。



蓄电池充电阶段示意

a) 恒流充电CC(快速充电)

在快速充电阶段，蓄电池电压尚未达到充满电压的设定值（即均衡/提升电压），控制器会进行MPPT充电，将提供最大的太阳能电量给蓄电池充电。当蓄电池电压达到预设值之后，将进行维持充电。

b) 恒压充电CV(均衡充电和提升充电)

当蓄电池电压达到维持电压的设定值时，控制器将会进行恒定电压充电，此过程充电电流也会随着时间逐步下降。

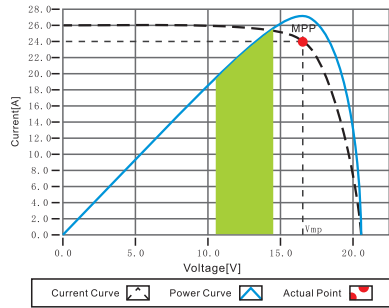
c) 浮充充电CF

持续充电阶段之后，控制器将通过减小充电电流以降低蓄电池电压，并让蓄电池电压维持在浮充充电电压设定值。浮充阶段对蓄电池进行较小的充电，保证蓄电池维持在充满状态。在浮充阶段，负载可以获得将近全部的太阳能电量。若负载超过了太阳能所能提供的电量，控制器将无法将蓄电池电压维持在浮充阶段。当蓄电池电压低至提升恢复充电设定值时，系统将退出浮充充电阶段，重新进入恒流充电阶段。

### 1.3 最大功率点追踪技术

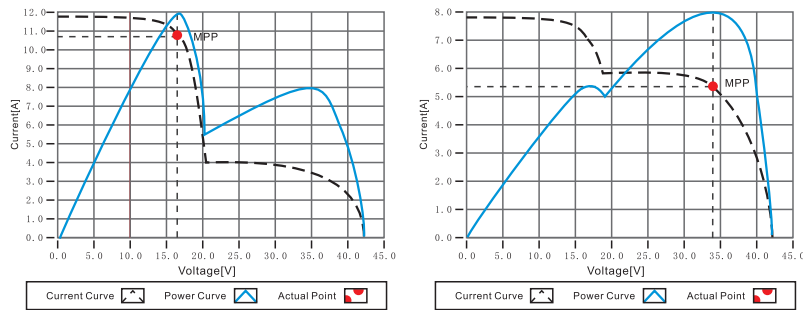
由于太阳能阵列的非线性，在其功率曲线上存在一个阵列的最大能量输出点（最大功率点），本系列控制器具有MPPT控制技术，可以时刻追踪到阵列的最大功率点以获取最大的能量为蓄电池充电，而传统控制器（开关充电技术和PWM充电技术）无法维持在此点对蓄电池进行充电，因此也无法获取到电池板的最大能量；

如下图所示，为我公司产品的最大功率点跟踪曲线，其中阴影部分为传统控制器的工作范围，从图中可以明显的判断出MPPT算法可以有效的提升太阳能阵列的利用率。根据测试对比，我公司的MPPT控制器比PWM控制器可以提升太阳能阵列20%~60%的利用效率：（根据不同的使用环境背景，效率有所变化）



最大功率点跟踪曲线

在实际应用过程中，由于云层、树枝或者积雪的遮挡，可能会导致阵列出现多个MPPT点，但在这些MPPT点中只有唯一一个是实际的最大功率点，如下图所示：



最大功率点跟踪双峰图

当出现多个MPPT点之后，如果MPPT算法处理不当，就会导致工作在非MPPT点上，这种情况下转换效率低，我司设计的控制器最大功率点跟踪算法，能够快速并准确的跟踪到实际的MPP点，提高阵列能量的利用率，避免资源的浪费。

Setting steps: Enter the advanced setting page, select the first battery type, press the "FUNCTION" key and the font will flash, then use the page up and down keys to select the desired battery type, and then press the "FUNCTION" key to confirm.

#### ② Control voltage parameters of battery

##### ◆ Battery parameters

Voltage parameters are 25°C/12V system parameters, 24V system parameters X2, 36V system parameters X3, 48V system parameters X4, 96V system parameters X8

Voltage control parameters	VRLA Battery	GEL battery	Flooded battery	Customizing
Overvoltage disconnect voltage	15.9V	15.7V	16.1V	9~17V
Charging limited voltage	15.4V	15.2V	15.6V	9~17V
Overvoltage disconnection recovery voltage	15.4V	15.2V	15.6V	9~17V
Strong charging voltage	14.4V	14.2V	14.6V	9~17V
Float charge voltage	13.6V	13.6V	13.6V	9~17V
Boost recovery voltage	13V	13V	13V	9~17V
Low voltage disconnect recovery voltage	11.5V	11.5V	11.5V	9~17V
Undervoltage alarm recovery voltage	11.5V	11.5V	11.5V	9~17V
Undervoltage alarm voltage	11.4V	11.4V	11.4V	9~17V
Undervoltage disconnect voltage	11V	11V	11V	9~17V
Strong charge duration time	120 min	120 min	120 min	120 min

1. When the default battery type is selected, the battery voltage control parameters cannot be changed by default; if you want to change the battery voltage control parameters, you can only select the corresponding "Customizing" type.

2. "Customizing" must follow the logic

- ▶ Strong charge voltage > Float charge voltage
- ▶ Low voltage disconnect recovery voltage > Low voltage break voltage

##### ◆ Lithium battery parameters

The voltage parameters are all 25°C/12V system parameters, 24V system parameters x2, 48V system parameters x4, 96V system parameters x8.

Voltage control parameters	Lithium iron phosphate	Ternary lithium	Customizing
Overvoltage disconnect voltage	16.1V	14.1V	9~17V
Charging limited voltage	15.6V	13.6V	9~17V
Overvoltage disconnection recovery voltage	15.6V	13.6V	9~17V
Strong charging voltage	14.6V	12.6V	9~17V
Float charge voltage	14.6V	12.6V	9~17V
Boost recovery voltage	13V	12V	9~17V
Low voltage disconnect recovery voltage	11.5V	9.5V	9~17V
Undervoltage alarm recovery voltage	11.5V	9.5V	9~17V
Undervoltage alarm voltage	11.4V	9.4V	9~17V
Undervoltage disconnect voltage	11V	9V	9~17V



Warning: The lithium battery parameters can be set, but the setting must refer to the voltage parameters of the lithium battery protection board to set the corresponding parameters. The lithium battery protection board must be connected during the lithium battery charging process and the accuracy of the lithium battery protection board must not exceed 0.2V. Otherwise, the system will not be responsible for any abnormality!

#### (2) System voltage

Setting steps: Enter the advanced settings page, the second system voltage, press the "FUNCTION" button after the font flashes, and then by turning the page up and down button to select the desired mode, and then press the "FUNCTION" button to confirm it.



### (3) Charging current

Setting steps: Enter the advanced settings page, the third charging current, press the "FUNCTION" button after the font flashes, and then by turning the page up and down button to select the desired percentage of the charging current size, and then press the "FUNCTION" button to confirm.

### (4) Cut-off voltage

Setting steps: Enter the advanced settings page, the fourth cut-off voltage, press the "FUNCTION" button after the font flashes, and then through the page-turning button to select the desired DC load output undervolt protection voltage value, and then press the "FUNCTION" button to confirm.

### (5) Strong charging voltage

Setting steps: Enter the advanced settings page, the fourth strong charging voltage, press the "FUNCTION" button after the font flashes, and then through the page-turning button to select the required "customizing" strong charging voltage value, and then press the "FUNCTION" button to confirm it.

### (6) Floating charging voltage

Setting steps: Enter the advanced settings page, the fifth floating charging voltage, press the "FUNCTION" button after the font flashes, and then by turning the page up and down button to select the required "customizing" floating charging voltage value, and then press the "FUNCTION" button to confirm.

### (7) DC load output on time

Setting steps: Enter the advanced settings page, the sixth DC load output time, press the "FUNCTION" button after the font flashes, and then by turning the page up and down button to select the required time period to control the DC load output on/off, and then press the "FUNCTION" button to confirm.

### (8) Restore factory settings

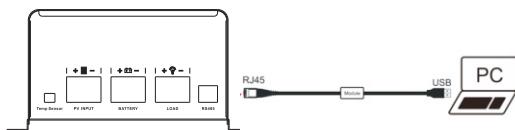
Setting steps: Enter the advanced settings page, the seventh item to restore factory settings, press the "FUNCTION" button after the font flashes, and then by turning the page up and down button to choose whether to reset the parameters, and then press the "FUNCTION" button to confirm.

### ☞ Communication settings

#### • Host settings

Setting steps: Connect the PC terminal via a communication line and set the controller parameters in the host.

#### 1. Connection method



## 4.5 Operation and use of lithium battery mode



Note: The lithium battery system voltage cannot be set to auto-recognition and self-adaptation. When a lithium battery needs to be inserted for use, the system voltage needs to be set to the working voltage of the currently received lithium battery.

### ☞ Operation steps:

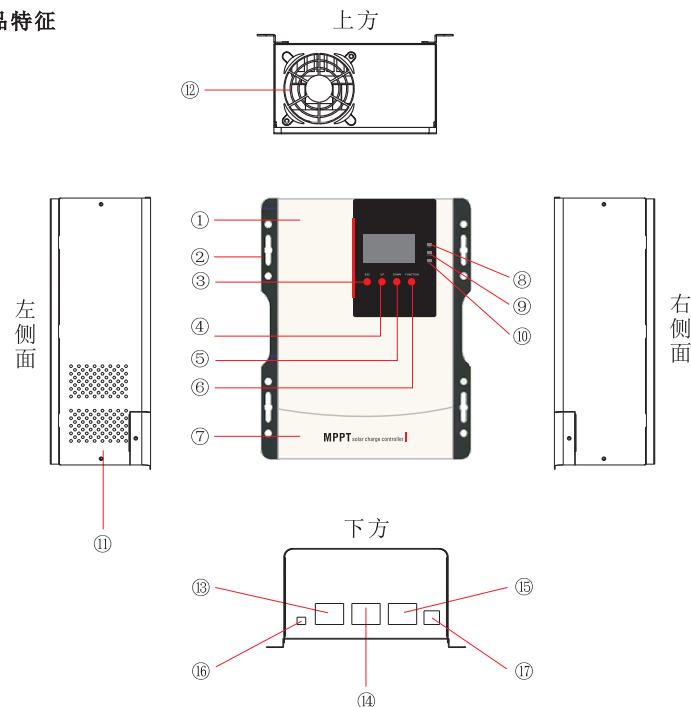
Step 1: Connect the battery input terminal to the lithium battery pack, press the "ESC" + "FUNCTION" buttons for three seconds at the same time, enter the password to enter the advanced setting mode, set and select the type of lithium battery.

Step 2: Set the current system voltage. (For example: if the lithium battery pack is lithium iron phosphate 16 strings, the system voltage is set to 48V).

Step 3: Set the charging current according to the battery capacity of the current lithium battery pack, generally about 0.5~0.7C of the capacity.

Step 4: Cut off the power and connect it again.

## 1.2 产品特征



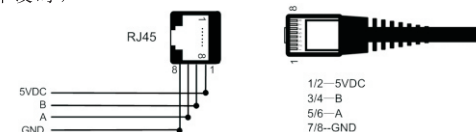
序号	名称	序号	名称
1	机壳	10	负载指示灯
2	挂耳	11	散热通风口
3	返回键	12	风扇通风口
4	上翻页键	13	光伏阵列接口
5	下翻页键	14	蓄电池接线口
6	功能键	15	负载接线口
7	接线端子盖	16	远程温度传感器接口
8	警告指示灯	17	RS485通讯接口
9	充电指示灯		/

(1) 连接远程温度传感器，检测蓄电池的温度，采样距离≤20米。



注意：控制器在未连接远程温度传感器或者温度传感器损坏的情况下，会默认25℃对蓄电池进行充电或放电，无温度补偿。

(2) 通讯接口连接外设时，



## 1. MPPT控制器基本资料

### 1.1 产品概述及特点

产品基于多相同步整流技术及先进的MPPT控制算法，具有响应速度快，高可靠性和高工业化标准等特点。多相同步整流技术可保证在任何充电功率环境下都具有极高的转换效率，大幅提高太阳能系统的能量利用率；先进MPPT控制算法，将最大功率点丢失率及丢失时间最小化，保证了最大功率点跟踪效率、响应速度及大小功率段高的电源转换效率，可在任何环境下均能快速追踪到光伏阵列的最大功率点，获取太阳能电池板的最大能量。在全工作温度范围内以额定功率运行，并具有过温充电自动将功率功能；具有额定充电电流、功率的双重自动限制功能，充分确保了产品在过温运行及接入超额光伏组件以及高温下运行时的系统稳定性。



太阳能控制器具有数字电路控制的自适应式三阶段充电模式，有效延长蓄电池的寿命，改善系统性能；具有过充、PV反接等保护功能，有效地保证太阳能供电系统更安全、更稳定、更长久运行。

#### 特点：

- ◆ 优异的MPPT最大功率点跟踪技术，跟踪效率不小于99.5%。
- ◆ 独特的电路设计使在高低功率段均具有高的DC/DC转换效率，最高可达98.5%且满载效率为97%。
- ◆ 先进的MPPT控制算法，确保最大功率点丢失率及丢失时间最小化。
- ◆ 多波峰最大功率点的准确识别跟踪。
- ◆ 更宽范围的最大功率点运行电压，提高光伏组件利用率。
- ◆ 额定充电功率&充电电流双重自动限制功能。
- ◆ 支持免维护，胶体、液体、锂电等多种电池类型。
- ◆ 具有可设置的蓄电池温度补偿功能。
- ◆ 具有实时电量统计及记录功能。
- ◆ 具有高温充电自动降功率功能。
- ◆ 具有光伏电池板输入反接及蓄电池反接保护功能。

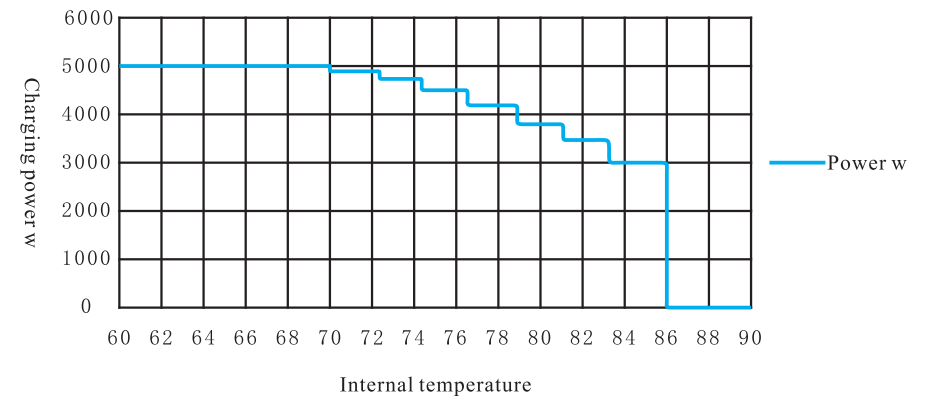
## 5. Protection, Troubleshooting, System maintenance

### 5.1 Protections

Protections	Descriptions
PV current limiting power protection	When the photovoltaic array charging current or power exceeds the pv rated current or power, it will be charged with the rated current or power.
PV short circuit protection	When the PV is not charging, the controller will not be damaged when the PV array is short-circuited.
	 Warning: PV is forbidden to short circuit during charging, otherwise the controller will be damaged.
PV reverse connection protection	When the polarity of the photovoltaic array is reversed, the equipment will not be damaged, the display will report a fault, and it can continue to work after correction.
Anti-recharge protection at night	At night, since the battery voltage is greater than the voltage of the PV module, the battery is prevented from discharging through the PV module.
Battery reverse connection protection	When the battery polarity is reversed, the equipment will not be damaged.
Battery overvoltage protection	When the battery voltage reaches the overvoltage disconnect voltage point, it will automatically stop charging the battery to prevent damage to the battery due to overcharging.
Battery over-discharge protection	When the battery voltage reaches the undervoltage disconnection voltage point, it will automatically stop discharging the battery to prevent the battery from being damaged by over-discharge.
	 Note: This protection function will only be available when the DC load output is connected to a load discharge.
Battery overheat protection	The controller detects the battery temperature through an external temperature sensor, and stops working when the battery temperature exceeds 60°C, and resumes operation when the battery temperature falls below 55°C.
Equipment overheating protection①	The controller detects the internal temperature of the controller through an internal temperature sensor. When the temperature inside the machine exceeds 85°C, it will stop working, and resume working when it is below 70°C.
TVS high voltage surge protection	The internal circuit of this controller is designed with transient suppression diode TVS components, but it can only protect the high-voltage surge pulse with low energy. If the controller is used in areas with frequent lightning, it is recommended to install an external lightning arrester.

- ① When the internal temperature of the machine is 70°C, turn on the charging power reduction mode. For every 2°C increase, the charging power will be reduced by 5%, 10%, 20%, 30%, 40%, 50%, 70%, 90%. When the temperature reaches 85°C or higher, stop charging immediately. When the internal temperature is not more than 65°C, the maximum power tracking charge will be resumed.

E.g. 100415F 48V system





## 5.2 Troubleshooting

Descriptions	Failures	Solutions
When the sunlight is strong, the charging indicator does not stay on and there is no charging current	PV array connection is open	Please check whether the wiring at both ends of the photovoltaic array is correct and whether the contact is reliable.
Normal wiring, but the controller cannot work normally	The battery voltage is less than 11V	Measure the voltage across the battery, at least 11V to turn on the controller.
The red light of the controller is flashing, and the LCD display code is 0X33	PV array polarity is reversed or PV array input open circuit voltage exceeds the limit	Check whether the polarity of the two ends of the photovoltaic array input is connected correctly, and measure whether the voltage across the photovoltaic array is within the specified range.
The red light of the controller is flashing, and the LCD display code is 0X37	The battery is over discharge	①Automatically restore load output when the power is sufficient; ②Supply the battery power in other ways.
No charging, the controller red light is on, LCD flashing code 0X52	Internal temperature sensor failure	Check whether the temperature sensor plug in the machine is loose.
No charging, the controller red light is on, LCD flashing code 0X53	The high internal temperature causes fault	When the temperature in standby cools to a safe temperature, resume normal charging.
No charging, the controller red light is on, LCD flashing code 0X54	The battery overheated	When the battery cools to below 55°C, resume normal charging.
No charging, the controller red light is on, LCD flashing code 0X56	The battery overvoltage	Measure whether the voltage across the battery is too high and disconnect the wiring of the photovoltaic array.
Controller red light is on, LCD flashing code 0X55	DC load output lock down	Please check whether the power of the DC appliance is excessive or there is a short-circuit fault inside the appliance.

## 5.3 System maintenance

In order to maintain the best long-term working performance, we recommend to check the following items twice a year

- Make sure that the airflow around the controller is not blocked, and remove the dirt or debris from the air outlet of the cooling fan.
- Check whether all exposed wires are damaged due to sunlight, friction with other surrounding objects, dry rot, insect or rodent damage, etc. If necessary, the wire needs to be repaired or replaced.
- Check all the wiring terminals to see if there are signs of corrosion, insulation damage, high temperature or burning discoloration, and tighten the terminal screws.
- Check for dirt, insect nesting and corrosion, and clean up as required.
- If the lightning arrester has failed, replace the failed arrester in time to prevent lightning damage to the controller and even other user equipment.



**WARNING:** Beware of electric shock! When performing the above operations, make sure that all power to the controller has been disconnected, and then perform corresponding inspections or operations!

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重要的安全说明（请保留本手册以备日后查用，安装使用之前请仔细阅读手册中的所有说明和注意事项）

手册中包含了本系列太阳能控制器(下文简称为“控制器”)所有的安全、安装以及操作说明:

- ◇安装使用之前请仔细阅读手册中的所有说明和注意事项;
- ◇请安装在室内，避免元器件暴露，并防止控制器内部有水进入；
- ◇请将控制器安装在通风良好的地方，工作时使控制器更有效地散热；
- ◇建议在输入端、负载端和电池端接入保险，防止使用中出現电击危险。切勿将本产品放置在潮湿、雨淋、暴晒、严重灰尘、震动、腐蚀及强烈电磁干扰的环境中；
- ◇安装之后检查所有的线路连接是否牢固，避免由于虚接造成工作异常，发生灾难性意外；
- ◇初次使用如果显示屏没有显示，请立即切断电池供电再检查线路是否连接正确；
- ◇当控制器处于正常充电状态，切勿断开蓄电池连接，否则可能损坏控制器。

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## 6. Technical parameters

Parameter xxxxF	40415	60415	80415	100415	120415	40825	60825	80825	100825
System rated voltage	12/24/36/48VDC or self-identification								
Controller operating voltage range	12~64V								
Lead-acid battery type	Maintenance-free (default)/colloid/liquid/custom								
Lithium battery type	Lithium Iron Phosphate/Ternary Lithium/Lithium/Custom								
Rated charging current	40A	60A	80A	100A	120A	40A	60A	80A	100A
Rated charging power	540W/12V 1080W/24V 1620W/36V 2160W/48V	800W/12V 1600W/24V 2400W/36V 3200W/48V	1040W/12V 2080W/24V 3120W/36V 4160W/48V	1300W/12V 2600W/24V 3900W/36V 5200W/48V	1560W/12V 3120W/24V 4680W/36V 6240W/48V	4160W/96V	6240W/96V	8320W/96V	10400W/96V
Maximum open circuit voltage of photovoltaic modules	150V (under the lowest temperature condition) 138V (under 25 °C condition) 250V (under the lowest temperature condition) 225V (under 25 °C)								
Maximum power point operating voltage range	12V system 24V system 36V system 48V system								
Tracking efficiency	20~150VDC 36~150VDC 48~150VDC 64~150VDC								
Maximum conversion efficiency coefficient	≥99.5%								
Static loss	97.5%								
DC load output voltage	-3mV/°C/2V								
DC load rated output current	350mA/12V;170mA/24V;85mA/48V; 700mA/12V;350mA/24V;175mA/48V; Can be turned on in 12/24V mode								
DC load output control	40A								
Protective function	Normally open normally closed mode/time control mode/light control mode PV input reverse connection protection, battery input reverse connection protection, battery overcharge protection, battery undervoltage protection, battery over temperature protection, machine over temperature protection								
Cooling method	Wind cooling								
LCD backlight time	RS485								
Environmental parameters	Default 60S, backlight mode can be set								
Working environment temperature range	-20 °C ~ +50 °C								
Storage temperature range	-40 °C ~ +70 °C								
Relative humidity range	0 ~ 90%RH								
Mechanical parameters									
parameter	40415F	60415F	80415F	100415F	120415F	40825F	60825F	80825F	100825F
Dimensions	219*260*110mm	219*260*110mm	275*348*109mm	275*348*109mm	275*348*109mm	219*260*110mm	219*260*110mm	275*348*109mm	275*348*109mm
Recommended wiring	7AWG/10mm²	6AWG/16mm²	4AWG/25mm²	2AWG/35mm²	2AWG/35mm²	7AWG/16mm²	6AWG/16mm²	4AWG/25mm²	2AWG/35mm²
net weight	2.8kg	2.8kg	4.6kg	5.2kg	5.2kg	2.8kg	2.8kg	4.6kg	5.2kg

## MPPT 太阳能控制器使用手册

