SMR-MPPT series
Solar charge controller
(Bluetooth communication)
12/24V，40A
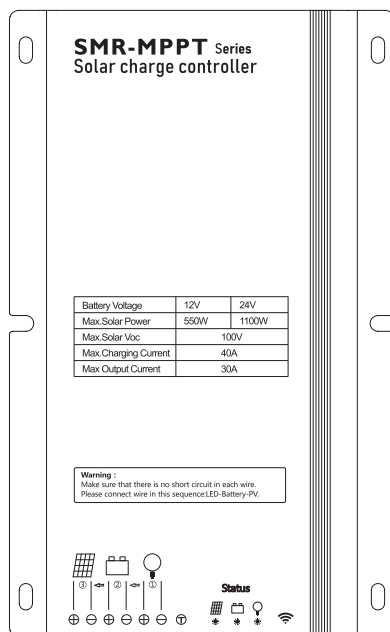
SMR-MPPT Series
Solar charge controller

Battery Voltage	12V	24V
Max.Solar Power	550W	1100W
Max.Solar Voc	100V	
Max.Charging Current	40A	
Max Output Current	30A	

Warning :
Make sure that there is no short circuit in each wire.
Please connect wire in this sequence:LED-Battery-PV.

③ ② ①

Status

User Manual

Dear Clients,

Thanks for selecting the SMR-MPPT series solar controller!Please take the time to read this user manual, this will help you to take advantage of controller's new features.This manual gives important recommendations for installing, programming, using and so on. Read this user manual in full before installing or connecting the solar controller.
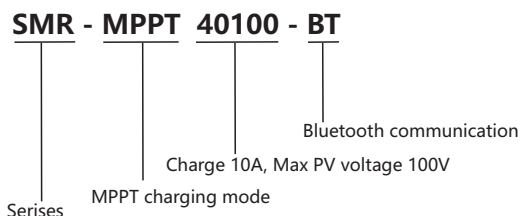
1. Product overview

SMR-MPPT series solar controller, designed for the use of solar energy systems intelligent programming MPPT controller.The charging efficiency is about 20% higher than the traditional PWM controller, which can drop the cost of the whole system.
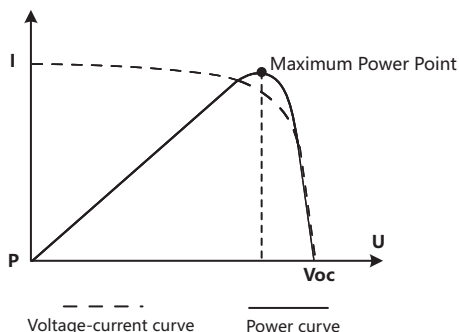
1.1 Product features

- Innovative Maximum Power Point Tracking(MPPT) technology, tracking efficiency >99.9%.
- High charge conversion efficiency up to 97.2% .
- Monitoring of the running status and parameters.
- Dual automatic limit function for rated charging current and charging power.
- Clear and easy to understand charging and discharging, fault indication.
- Suitable for Gel, Liquid, AGM and Lithium battery.
- External temperature sensor with automatic temperature compensation.
- Automatic over-temperature power reduction function .
- Four stage charging: MPPT, boost, equalization, float.
- When BMS power off because of LVD, it can activate the system automatically.
- 0℃ Charging Protection(Lithium).
- Equipped with buttons and digital tubes for quick setting of controller parameters.
- The communication interface provides external power supply.
- Waterproof IP67, Strong and durable aluminum case.
- Perfect EMC & thermal design.
- Full automatic electronic protect function

1.2 Product naming rules

SMR - MPPT 40100 - BT

Bluetooth communication

Charge 10A, Max PV voltage 100V

MPPT charging mode

Serises

2. Instructions

2.1 MPPT charging introduction

Maximum Power Point

Voltage-current curve   Power curve

MPPT, the full name of "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 voltage current value (VI), so that the system can charge the battery at the highest efficiency. Compared with the traditional PWM controller, the MPPT controller can play the maximum power of the panel, so it can provide a larger charging current, generally speaking, MPPT can improve the energy utilization rate of 15% to 20% than the PWM controller.

2.2 MPPT-Four Chargeing Stage

Battery type: AGM/GEL/LIQ.
As shown in Figure 2-2, 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 balanced charging, which takes 120 minutes, and then switch to float charging.**
※ **Balanced charging and strong charging are not repeated during a single full charge process to avoid excessive gas release or battery overheating.**

⚡ **WARNING: Risk of explosion!**
Equalizing flooded battery can produce explosive gases, so well ventilation of battery box is necessary.

■ **Float Charge**
After the Boost voltage stage, the controller will reduce the battery voltage to Float voltage setpoint. When the battery is fully recharged, there will be no more chemical reactions and all the charge current transmits into heat and gas at this time. Then the controller reduces the voltage to the floating stage, charging with a smaller voltage and current. It will reduce the temperature of battery and prevent the gassing, also charging the battery slightly at the same time. The purpose of Float stage is to offset the power consumption caused by self consumption and small loads in the whole system, while maintaining full battery storage capacity.
In Float stage, loads can continue to draw power from the battery. In the event that the system load(s) exceed the solar charge current, the controller will no longer be able to maintain the battery at the Float setpoint. Should the battery voltage remains below the boost reconnect charging voltage, the controller will exit Float stage and return to Bulk charging.

2.3 Lithium battery charging mode

Battery types are available in four and eight series lithium iron phosphate.
As shown in Figure 2-3, the lithium battery charging stage includes: MPPT charging/constant voltage charging.

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

■ **Constant voltage charging stage:** the lithium battery is in the constant voltage charging stage, when the battery voltage reaches the overcharge protection voltage, the controller will carry out constant voltage charging, and the charging current will gradually decline over time, this process will remain for 60 minutes, and then stop charging, and re-enter the next charging cycle when the battery voltage reaches the overcharge recovery voltage.
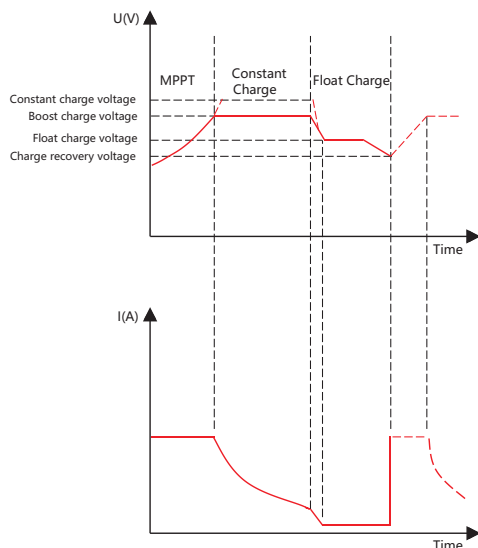
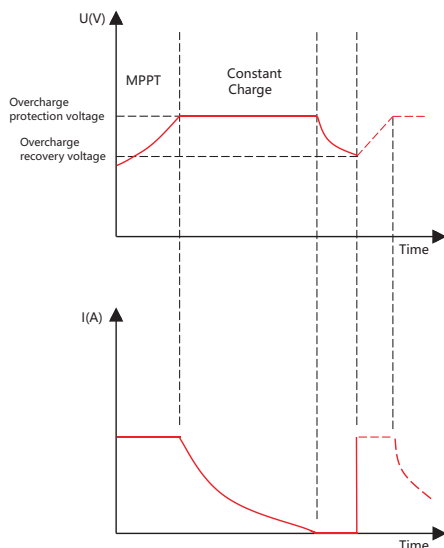Figure 2-2 Lead-acid battery charging curve

Figure 2-3 Lithium battery charging curve

3. Safty Instruction and Waiver of Liability

3.1 Safety

①The solar charge controller may only be used in PV systems in accordance with this user manual and the specs of other module manufacturers. No energy source other than solar gen. may be connected to the solar charge controller.

②Batteries store a large amount of energy, never short circuit a bat. under all circumstances. We strongly recommend connecting a fuse directly to the battery to protect any short circuit at the bat. wiring.

③Batteries can produce flammable gases. Avoid making sparks, fire or any naked flame. Make sure that the bat. room is ventilated.

④Avoid touching or short circuiting wires or terminals. Be aware that the voltages on special terminals or wires can be as much as twice the battery voltage. Use isolated tools, stand on dry ground, and keep your hands dry.

⑤Keep children away from batteries and the charge controller.

3.2 Liability Exclusion

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.
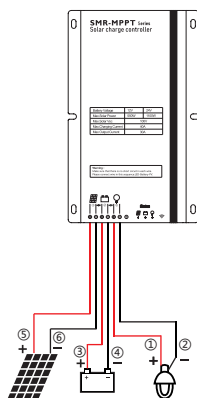
4. Dimensions（Unit：mm）

SMR-MPPT40100-BT
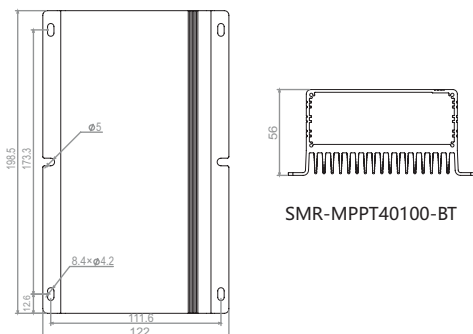
5. Installation

5.1 Electrical connection diagram

The following diagrams provide an overview of the connections and the proper order.

5.2 Wiring steps

①First, Connect the load first with corresponding red(positive) and black (negative) cables, then seal them with tape.

②Connect the battery with corresponding positive and negative cables, load will be on.

③Connect panel with the corresponding red(positive) and black(negative) cables, the controller begins charging.

④Confirm the LED display status, please refer to the "**10.2 Faults and Alarms**" to identify the reason.

■ Make sure the wire length between battery and controller is as short as possible.

■ Recommended Wire size: 2.5mm²

6. Bluetooth and APP installation

6.1 Bluetooth

The controller has Bluetooth communication function, the Bluetooth module of the controller can be connected to mobile phone after installing APP.
For detailed operation, please read the "Bluetooth APP instructions " . App on mobile phone can view the real-time working state of the controller and set parameters, including device and battery parameters.
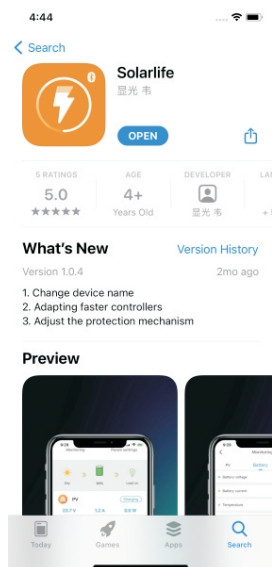
6.2 App installation

Search for "SolarLifeBT" in Google play or "Solarlife" in Apple store and download and install it.
For detailed instruction and settings, please read the Bluetooth APP user manual.
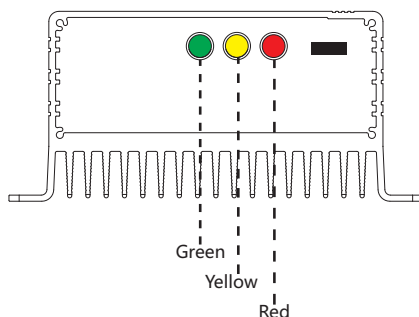
Andriod APP：
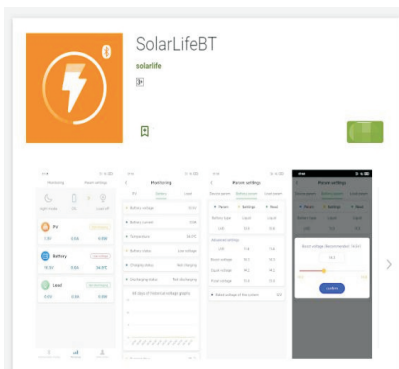
iOS APP：

7. LED indicators, Faults & Alarms

Green
Yellow
Red

7.1 Controller LED light status indication

LED	Status	Function
Green LED	On	Solar panel is correctly connected, but not charged
	Fast flash(0.1s on/0.1s off)	MPPT charging
	Flash(0.5s on/0.5s off)	Boost or Equalization charging(GEL,Liquid,AGM)
	Slow flash(0.5s on/2s off)	Float Charging
Yellow LED	On	Battery is normal
	Slow flash(0.5 on/2s off)	Battery voltage is low
	Fast flash(0.1 on/0.1s off)	Low voltage protection
	Off	Over voltage protection
Red LED	Off	Work normal
	On	The load has been turned off
	Flash(0.2s on/0.5s off)	Over temperature protection
	Fast flash(0.1s on/0.1s off)	Short circuit or Over current protection

*If the controller is in multiple protection states at the same time, the priority order of displaying fault information is: short circuit protection -->overcurrent protection -->low voltage protection -->overvoltage protection -->over temperature protection.

8. Factory default Settings

The default parameters of the controller are as follows:

| Num	Name	Setting data
1	Battery	GEL
2	LVD	11.2V
3	LVR	12.0V
4	Equal	14.8V
5	Boost	14.5V
6	Float	13.7V
7	0℃ Chg	Yes
8	Work mode	24H(Normally open mode)
9	D/N Thr	5.0V
10	D/N Dly	0min
11	Power supply priority	b(Battery priority)

9. Operation mode

MPPT-DC series controller with advanced load control function. The modes of lighting can be based on customer needs.

9.1 Dusk to Dawn(D2D)
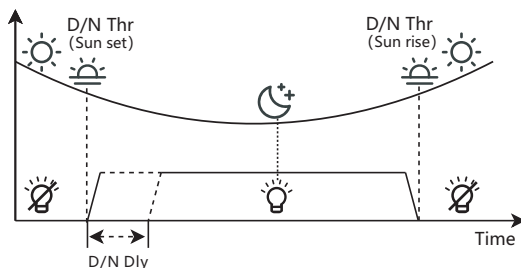
When the solar voltage is lower than the light control point voltage, the load opens until the light control point closes in the early morning of the next day.

9.2 Normally open mode(24H)
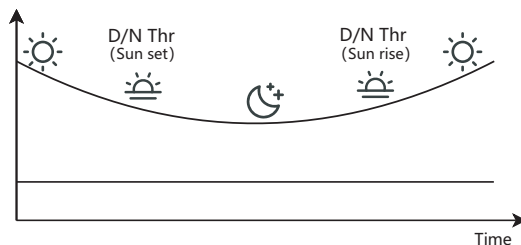
When the load of the controller is set to normally open mode and not in a protected state, the load will be turned on for 24 hours.

10. LVD, LVR, Threshold, Dimming

10.1.1 Overcharge Protection(Lithium)/Strong Charging Voltage(Other battery types)
①Lithium:
Overcharge protection voltage setting range:10V~32V(default:14.4V)
※ **The default high voltage protection voltage is overcharge protection voltage+0.2V.**
②GEL,Liquid,AGM:
Strong charging voltage setting range:14~14.8V/28~29.6V(default:14.5V)
※ **The default high voltage protection voltage is 15.3/30.3V.**
10.1.2 Overcharge Recovery(Lithium)/Charging Recovery(Other battery types)
①Lithium:
Overcharge recovery voltage setting range:9.2V~31.8V(default:14.0V)
※ **The default high voltage recovery voltage is the overcharge protection voltage.**
②GEL,Liquid,AGM:
The charging recovery voltage setting range:12.5V/25.0V
※: **The default high voltage recovery voltage is 15.0/30.0V.**

10.2.1 Low Voltage Protection(LVD)
①Lithium:
Low voltage protectio setting range:9.0V~30.0V(default:10.8V)
②GEL,Liquid,AGM:
Low voltage protectio setting range:10.8~11.8V/21.6~23.6V(default:11.2V)
10.2.2 Low Voltage Recovery(LVR)
①Lithium:
Low voltage recovery setting range:9.6V~31.0V(default:11.8V)
②GEL,Liquid,AGM:
Low voltage recovery setting range:11.4~12.8V/22.8~25.6V(default:12.0V)
※ The low voltage recovery voltage should be at least 0.6/1.2V higher than the low voltage protection voltage.
10.3 Day/Night Threshold and Day/Night Delay

The controller recognizes day and night based on the solar array open circuit voltage. This day/night threshold can be modified according to local light conditions and the solar array used.

Day/Night threshold setting range: 3.0~20.0V.

In the evening, when the solar array open circuit voltage reaches the setting day/night threshold, you can adjust the day/night delay time to make the load turn on a little later.

Day/Night delay time setting range: 0~30min.

11. Faults & Alarms

Fault	Status	Reason	Remedy
Load are not powered	low voltage protection	Battery capacity is low	Load will be reconnected when battery is recharged
	Overcurrent,short protection circuit	Loads are over current or short circuit	Switch off all loads, remove short circuit,load will be reconnected after 1 minute automatically
	Over temperature protection	Controller temperature is too high	Load reconnects after temperature reduces
High battery voltage	Over voltage protection	High battery voltage>(CVT+0.2V)	Check if other sources overcharge the battery.If not,controller is damaged
		Battery wires or damaged battery fuse battery has high resistance	Check battery wires,fuse and battery.
Unable to recognize the system voltage	The red, yellow, and green lights flash at the same time	The battery voltage is out of the normal range during startup	Charge or discharge the battery to keep the battery voltage within the normal operating range
	The yellow and blue lights flash at the same time	The system voltage identified by the battery end and the mains end is inconsistent	The battery terminal and the mains terminal use the same level of voltage, such as 12V (or 24V)
Battery is empty after a short time	Low voltage protection	Battery has low capacity	Change battery
Battery can't be charged	The green light stays on	PV panel fault or reverse connection	Check panels and connection wires

12. Technical Data

	Item	SMR-MPPT40100-BT
	System Voltage	12V/24V automatical recognization
	Max Charging Current	40A
	Battery Type	Lithium,Liquid,Gel,AGM(Programmable,default:Lithium)
Battery Parameters	Liquid, Gel and AGM	MPPT Charging Voltage	<14.5/29.0V @25℃
		Boost Voltage	14.5/29.0V @25℃
		Equalization Voltage	14.8/29.6V @25℃(Liquid,AGM)
		Float Voltage	13.7/27.4V @25℃
		Low Volt. Disconnect	10.8~11.8V/21.6~23.6V(Default:11.2/22.4V, Programmable)
		Reconnect Voltage	11.4~12.8V/22.8~25.6V(Default:12.2/24.4V, Programmable)
		Overcharge Protect	15.3/30.3V
		Temp. Compensation	-4.17mV/K per cell(Boost, Equalization),-3.33mV/K per cell(Float)
	Lithium	Charging Volt. target	10.0~32.0V(Default:14.4V)
		Charging Volt. recovery	9.2~31.8V(Default:14.0V)
		Low voltage disconnect	9.0~30.0V(Default:10.8V)
		Low voltage reconnect	9.6~31.0V(Default:11.8V)
		0℃ Charging protection	Yes, No, Slow(Lithium, default: Yes)
Panel Parameters	Max input power	550W/1100W
	Max volt on PV terminal	100V *1
	Dusk/Dawn detect volt.	3.0~20.0V(Programmable)
	Day/Night delay time	0~30min(Programmable)
	MPPT tracking range	(Battery Voltage +1.0V)~Voc*0.9 *2
Load	Output Current	30A
System Parameters	Max tracking efficiency	>99.9%
	Max charge conversion	97.5%
	Communication mode	Bluetooth
	Self consumption	6~25mA
	Dimensions	198.5*122*56mm
	Net weight	1780g
	Ambient temperature	-35~+60℃
	Ambient humidity	0~100%RH
	Protection degree	IP67

*1.This value represents the maximum voltage of the solar panel at the minimum operating ambient temperature.
*2.Voc means the open circuit voltage of the solar panel.
*3.Around oblique line value separately on behalf of 12V and 24V system's value.

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