

OPTI-Solar

SC-SM series

Solar Charge Controller

5A/10A/15A/20A

User Manual

Solar charge controller

Dear Clients,

Thanks for selecting the SC-SM(-Z) series solar controller. Please take your time to read this user manual, this will help you to make full use of many advantages the controller can provide your solar system. This manual gives important recommendations for installing, programing, using and so on. Read it carefully please.

1. Description

Smart-R series intelligent solar controller is programmable and especially for solar street light system.

It comes with a number of outstanding features, such as:

- 12/24V automatic recognition
- IP68 · Strong and durable aluminum case
- External temperature sensor, automatic temperature compensation
- Four-stage PWM charge method
- Full automatic electronic protect function

2. Safety instructions and waiver of liability

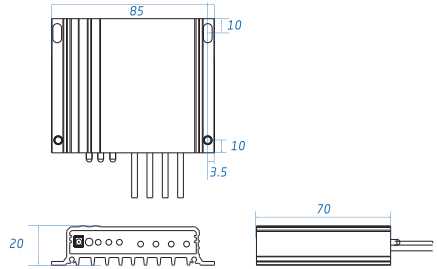
2.1 Safety

- ① The solar charge controller may only be used in PV systems in accordance with this user manual and the specifications of other modules manufacturers. No energy source other than a solar generator may be connected to the solar charge controller.
- ② Batteries store a large amount of energy, never short circuit a battery under all circumstances. We strongly recommend connecting a fuse directly to the battery to protect any short circuit at the battery wiring.
- ③ Batteries can produce flammable gases. Avoid making sparks, using fire or any naked flame. Make sure that the battery room is ventilated.
- ④ Avoid 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.
- ⑤ Keep children away from batteries and the charge controller.

2.2 Liability Exclusion

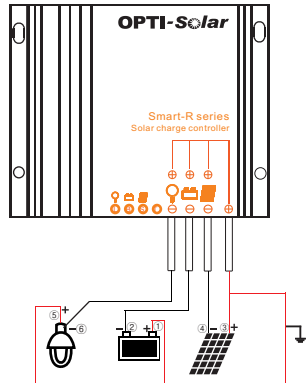
The manufacturer shall not be liable for damages, especially on the battery, caused by use other than as intended or as mentioned in this manual or if the recommendations of the battery manufacturer are neglected. The manufacturer shall not be liable if there has been service or repair carried out by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

3. Dimensions



4. Installation

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



- To avoid any voltage on the wires, first connect the wire to the controller, then to the battery, panel or load.
- Make sure the wire length between battery and controller is as short as possible.
- Recommended minimum wire size:
SC-05SM(-Z): 1.5mm²; SC-10SM(-Z): 2.5mm²; SC-15/20SM(-Z): 4mm².
- Be aware that the positive terminals are connected together and therefore have the same electrical potential. If any grounding is required, always do this on the positive wires.
- Connecting capacitive load may trigger short circuit protection.



Remark: If the device is used in a vehicle which has the battery negative on the chassis, loads connected to the controller must not have an electric connection to the car body, otherwise the Low Voltage disconnect and electronic fuse functions of the controller are short circuited.

5. Starting up the controller

5.1 Self Test

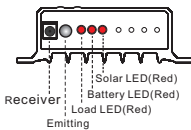
As soon as the controller is supplied with battery, it starts a self test routine. Then the display changes to normal operation.

5.2 System Voltage

The controller adjusts itself automatically to 12V or 24V system voltage. As soon as the battery voltage at the time of start-up is within 10V to 16V, the controller implies a 12V system, else if the battery voltage is within 20V to 30V, the controller implies a 24V system.

If the battery voltage is not within the normal operating rang(ca.10 to 16V or ca.20 to 30V)at start-up, a status display according to the section "6.2 Faults & Alarms".

6. LED indications and Faults & Alarms



6.1 LED Display Explanation

LED	Status	Function
Solar LED (Red)	Slow flash(1s on/1s off)	Floot charging
	Flash(0.4s/0.4s)	Boost charging
	Fast flash(0.1s/0.1s)	Equal charging
	On	Over temperature
Battery LED (Red)	On	Normal operation
	Slow flash(1s/1s)	LVD
	Fast flash(0.1s/0.1s)	Over voltage
Load LED (Red)	On	Discharge
	Slow flash(1s/1s)	Over current
	Fast flash(0.1s/0.1s)	Short circuit
All red LED	Slow flash(1s/1s)	Does not recognize the system voltage
	Lighted together(1s)	Controller start-up
	Off	No battery connected

6.2 Faults & Alarms

Faults	Status	Reason	Remedy
Loads are not supplied	LVD	Battery is low	Load will reconnect as soon as battery is recharged.
	Over current/ Short circuit	Load is over current or short circuit	Switch off all loads. Remove short circuit. Controller will switch on load automatically after max 1 minute.
	Over temp.	The controller's temperature is too high.	After the temperature reduces, the load opens automatically
Battery voltage is too high	Over voltage	Battery voltage too high (>15.5V/31V)	Check if other sources overcharge the battery. If not, controller is damaged.
		Battery wires or battery fuse damaged, battery has high resistance	Check battery wires, fuse and battery.
Does not recognize the system voltage	All red LED flashes slowly	The battery voltage is not within the normal operating range at start-up.	Charge or discharge the battery to make the voltage within the normal range.
Battery is empty after a short time	LVD	Battery has low capacity	Change battery
Battery is not being charged during the day	The solar LED is off	Solar array faulty or wrong polarity	Remove faulty connection or reverse polarity

7. Safety Features

	Solar terminal	Battery terminal	Load terminal
Reverse polarity	Protected *1	Protected *1	Protected *2
Short circuit	Protected	Protected *3	Switches off immediately
Over current	—	—	Switches off with delay
Reverse Current	Protected	—	—
Over voltage	Max.55V *4	Max.40V	—
Under voltage	—	—	Switches off
Over temp.	Disconnect the load if the temperature reaches the set value.		

*1 Controller can not protect itself in a 24V system when polarity of battery or solar is reversed.

*2 Controller can protect itself, but loads might be damaged.

*3 Battery must be protected by fuse, or battery will be permanently damaged.

*4 The solar panel voltage should not exceed this limit for a long time as voltage protection is done by a varistor.



Warning: The combination of different error conditions may cause damage to the controller.

Always remove the error before you continue connecting the controller.

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8. Technical Data

Model	SC-05SM(-Z)	SC-10SM(-Z)	SC-15SM(-Z)	SC-20SM(-Z)
Nominal voltage	12 V / 24 V automatic recognition			
Max. solar current or load current	5 A	10 A	15A	20A
Charging Algorithm	4-step (fast, boost, equal, float)			
Equalization Function	Yes			
Load disconnect voltage	Yes			
Load reconnect voltage	Yes			
Day/Night threshold	3.0~8.0V(12 V)/6.0~16.0V(24 V)			
Temperature Compensation	Yes			
Max. solar voltage	55V			
Over voltage protection	15.5V/31.0V			
Cable length	120mm/80mm			
Dimensions /Weight	85 x 70 x 20 mm / 200g			
Wire size	SC-05SM(-Z): 1.5mm ² ;SC-10 SM(-Z): 2.5mm ² ; SC-15/20SM(-Z): 4mm ²			
Typical power consumption	8mA			
Ambient temp.	-40°C ~ +60°C			
Case protection	IP68			
Max altitude	4000 m			