# Solar Charge Controller
# with Programmable Street-Light Function

# User Manual
# (English)

# Solar Charge Controller with Programmable Street-Light Function

Thank you for selecting this Smart solar charge controller product. Although Smart is very simple to use,please take the time to read this operators manual and become familiar with the controller. This will help you to make full use of many advantages, the Smart can provide your solar lighting system.

## Description

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

- Case protection: IP67 protection
- Dimming function:30%~70% of rated power adjustable
- Digital Unit to configure Smart charge controller via UART
- External temperature probe measuring the ambient temperature is more accurate
- 6 modes for solar street light system
- Suitable for LiFePO4 Rechargeable Battery
- 24V fixed system voltage
- Standard UART interface

## Installation

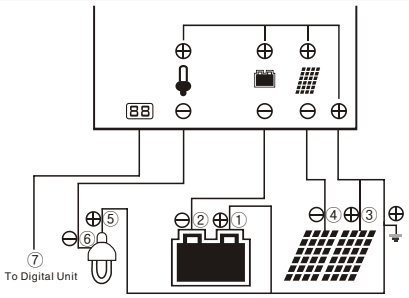
The following diagrams provide an overview of the connections and the proper order.

Caution:
1.To avoid any voltage on the wires, first connect the wire to the controller, then to the battery, panel or load.
Recommended minimum wire size:
SM05-LF: 1.5 mm2; SM10-LF: 2.5 mm2;
SM15/20-LF: 4 mm2.

2.Make sure the wire length between battery and controller is as short as possible.
Be aware that the positive terminal of Smart are connected together and therefore have the same electrical potential. If any grounding is required, always do this on the positive wires.

3.when installed the controller,please press the test button to activate the controller.

4.Connecting capacitive load may trigger short circuit protection.




## LED indications Faults & Alarms

LED Display Explanation:

| LED | Display | Status |
|---|---|---|
| Green | Blink | Battery connected, day detected (0.4second on, 0.4 second off) |
| | Lighted | Battery connected, night detected |
| RED | Off | No faults detected |
| | Slow blink | Dimming(2 seconds on, 0.5second off) |
| RED Green | Off | No battery connected |
| | Lighted together (1second) | Controller start-up |

Faults & Alarms

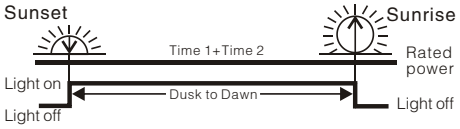
| Faults | Display | Reason | Remedy |
|---|---|---|---|
| Loads are not supplied | Red LED on | Battery is low | Load will reconnect as soon as battery is recharged. |
| | Red LED slow blink | Over current/Short circuit of loads/ Over temp | Switch off all loads. Remove short circuit. Controller will switch on load automatically after max 1 minute.After the temperature reduces,the load opens automatically |
| | Red LED fast blink | Battery voltage too high(>31.2V) | 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. |
| Battery is empty after a short time | Red LED on | Battery has low capacity | Change battery |
| Battery is not being charged during the day | Green LED on | Solar array faulty or wrong polarity | Remove faulty connection /reverse polarity |

## Street-Light Function

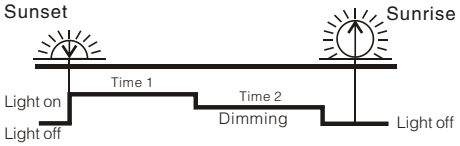
The Smart controller comes with a sophisticated Street-light function. It has dimming function.

There are 6 modes available:
1.Single time and Dusk to Dawn mode(Figure①)
2.Double time mode 1(Figure② )
3.Double time mode 2(Figure③ )
4.Double time mode 3(Figure④)
5.Double time mode 4 (Figure⑤)
6.Double time mode 5(Figure⑥)

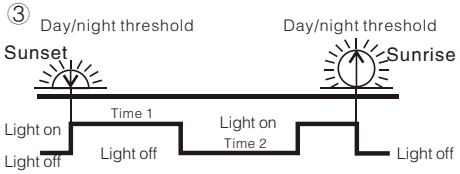
① Day/night threshold Day/night threshold



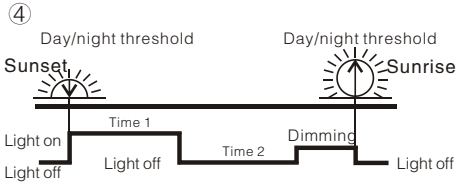

② Day/night threshold Day/night threshold



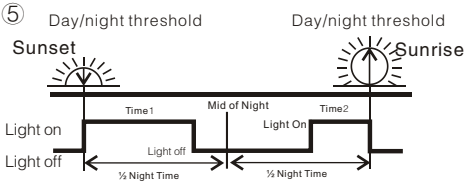

③ Day/night threshold Day/night threshold



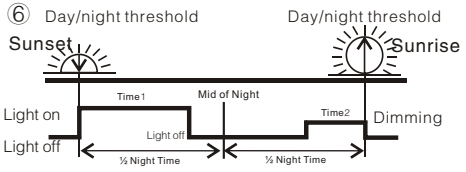

④ Day/night threshold Day/night threshold




⑤ Day/night threshold Day/night threshold




⑥ Day/night threshold Day/night threshold




"Middle of night" is detected automatically as the midpoint between dusk and dawn, no setting of a clock is required. It may take several days until the controller has "learned" the middle of the night precisely. "Middle of night" may be different from 12:00 midnight depending on your location.

The controller recognizes day and night based on the solar array open circuit voltage (only functional in street-light mode).This day/night threshold can be modified according to local light conditions and the solar array used.

Attention:
1.Dimming function can not be guaranteed to match with all the LED drivers, consult the vendor for details.
2. It will take effect in next day if the mode of controller is changed via Digital Unit.

## 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 | N/A | N/A | Switches off with delay |
| Reverse Current | Protected | N/A | N/A |
| Over voltage | Max. 55V (4) | Max. 40V | N/A |
| Under voltage | N/A | N/A | Switches off |
| Over temp | switches off the load if the temperature reaches a high level | | |

(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!

## Low Voltage Disconnect and Reconnect

Low voltage disconnect voltage(LVD) :21.0V
Low voltage reconnect voltage(LVR): 23.0V

If the controller goes into low voltage protection,it will restore only when the battery being recharged and the voltage reaching the reconnect voltage.

## Default Settings

You can configure Smart charge controller with Digital Unit (DU-II). See DU-II manual for details.

| SM-LF | Default Settings |
|---|---|
| Load control mode | Dusk to Dawn mode |
| Low voltage disconnect | 21.0V |
| Low voltage reconnect | 23.0V |
| Battery type | LiFePO4 |
| Day/night threshold | 6.0V |

## 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.

## Technical Data

| Model | SM05-LF | SM10-LF | SM15-LF | SM20-LF |
|---|---|---|---|---|
| Nominal voltage | 24V fixed | | | |
| Max solar current or load current | 5 A | 10 A | 15A | 20A |
| Over charge voltage | 29.2 V | | | |
| Over charge release voltage | 28.0 V | | | |
| Load disconnect voltage | 21.0 V | | | |
| Load reconnect voltage | 23.0 V | | | |
| Lighting hours | 0~18 Hours | | | |
| Day/Night threshold | 6.0V~15.0V | | | |
| Battery type | LiFePO4 | | | |
| Max solar voltage | 55 V | | | |
| Max battery voltage | 40 V | | | |
| Dimming | 30…70% of rated power | | | |
| Cable length | 120mm/80mm | | | |
| Over voltage protection | 31.2 V | | | |
| Dimensions /Weight | 85 x 70 x 20 mm / 200g | | 85 x 85 x 20mm/210g | |
| Wire size | SM05-LF: 1.5 mm2; SM10-LF: 2.5 mm2; SM15/SM20-LF: 4 mm2 | | | |
| Typical power consumption | Lower than 15mA | | | |
| Ambient temp. | -40℃ ~ +60℃ | | | |
| Case protection | IP67 | | | |
| Max altitude | 4000 m | | | |