Smart™–CC series
Solar charge controller
Suitable for Lithium battery
(Constant Current, Buck)
10A 30W

User Manual

User Manual_Smart-CC series_MA
CE, Rohs, ISO9001:2015
Subject to change without notice!

Solar charge controller Smart-CC series User Manual

Dear Clients,

Thanks for selecting the **Smart™-CC** 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 it carefully in your own interest please.

1.Description of Function

Smart-CC series intelligent solar controller, is programmable and especially for buck mode LED solar street light system. It includes constant current driver function, which can make the cost of the whole system much lower.

It comes with some outstanding features, such as:

- Can output constant power, output power can be set.
- 5 stages time and dimming can be adjusted
- Can read parameters and running status
- Automatic temperature compensation(Liquid/GEL)
- Suitable for Gel, Liquid, AGM and Lithium battery
- Auto sleeping during transportation
- Low temperature charging protection
- When BMS power off because of LVD, it can activate the system automatically (Lithium)
- Charging target and recovery voltage can be set(Lithium)
- 0℃ Charging Protection(Lithium)
- Day/Night threshold can adjust automatically
- Remote Unit to configure, with LCD display
- IP67, Strong and durable aluminum case
- Full automatic electronic protect function

2.Safety instructions and waiver of liability

2.1 Safety

①The 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.

②Batteries 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.

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

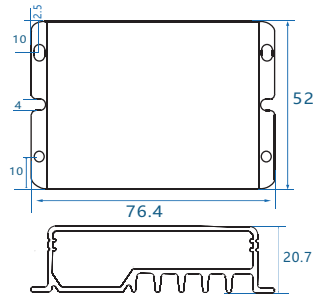
④Avoid touching or short circuiting wires or terminals. Be aware that the voltages on special terminals or wires can be as much as twice the battery voltage. Use isolated tools, stand on dry ground, and keep your hands dry.

⑤Keep children away from batteries and the charge controller.

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.

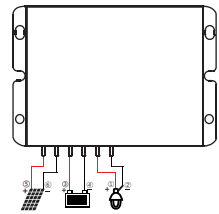
3.Dimensions



4.Installation

4.1 Connection sequence

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



1.Follow the chart, connect the load (positive pole and negative pole) with the corresponding brown and blue cables firstly, then seal them with tape.

2.Connect battery positive pole and negative pole to the corresponding red and black cables, the load will be on after 8s;

3.Connect the panel positive pole and negative pole to the corresponding red and black cables, the load will be off after 4s, and the controller begins to charge.

4.Confirm the LED display status: If the red LED is off and the green LED flashes or constantly light, it is normal; else it means fault, please refer to the **9.2 Faults and Alarms** to identify the reason.

- Make sure the length between battery and controller is as short as possible.
- Recommended minimum wire size: 2.5mm²;
- For easy installation and testing, in the first 5minutes, charging and discharging conversion requires only 8s. After 5 minutes, charging and discharging conversion takes time of 5 minutes.

4.2 Transportation mode(Load off)

4.2.1 Open circuit protection

If the controller is only connected with the battery, but not connected with solar and load, the controller will enter transportation mode after 5 minutes.

4.2.2 Press the "Test" key in factory mode

Press the "**Back**" and "**Backlight**" key at the same time more than 3s, the remote controller will work in factory mode.

Press the "**Test**" key in the factory mode, the remote controller displays "**Transport OK**" and will beep a long sound, the controller enters into transport mode.

If the controller enters transport mode, the red LED is flashing(0.2s/5s) and the remote control displays "Open CP".

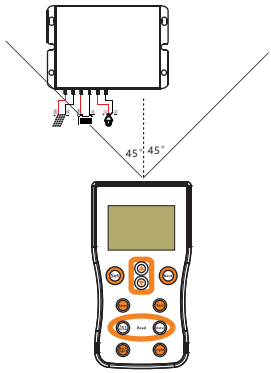
4.2.3 Exit the transportation mode

When the load is properly connected, press the test key or connect the solar more than 1s during daytime , the transport mode will terminate and the controller will work normally.

5.Remote control, Default setting

When Smart-CC series controller is connected to the system, you can setting the controller with S-Unit infrared remote controller, as shown below! Detailed setting operations, please read S-Unit User Manual.

Remark: Be sure to set only one Smart-CC unit at a time.



5.1 Test function

Press the "Test" key of S-Unit, the controller will turn on load for 1min. During daytime, the testing function can help users to verify correct installation or for system trouble shooting. 1min later the load will automatically turn off.

The relationship between "Test" key press times in the 1min and the output power of the controller is shown in the following table:

"Test" press times	Output power
1	Dimming1
2	Dimming2
3	Dimming3
4	Dimming4
5	Dimming5
6	End of test function

5.1 Read the parameters

Press the "Parameter" key of the S-Unit to read the setting parameters of the controller.

Num	Name	Factory Default
1	Time1	4H
2	Dim1	100%
3	Time2	0H
4	Dim2	100%
5	Time3	0H
6	Dim3	100%
7	Time4	0H
8	Dim4	0%
9	Time5	0H
10	Dim5	100%
11	D/N Thr	5.0V
12	D/N Dly	0min
13	Load I	0.3A *
14	Dim Auto	Yes
15	Dim V	12.2V
16	Dim %	8%
17	Battery	LI
18	CVT	12.6V
19	CVR	12.4V
20	LVD	9.0V
21	LVR	9.8V
22	0℃ Chg	Yes

***The load current setting value represents the discharge power.**
If the load current is set to 0.3A, the discharge power is set to 3W.
If the load current is set to 3.0A, the discharge power is set to 30W.

5.2 Read the running status

Press the "Status" key of the S-Unit to read the running status of the controller.

Num	Name	Name describe	Unit
	Status:	Charge	
1	Batt V	Battery voltage	V
2	Load I	Load current	A
3	Load V	Load voltage	V
4	PV V	PV voltage	V
5	PV I	PV current	A
6	Energy	Total generating capacity	AH
7	OD Times	Over discharge times	Times
8	FC Times	Fully charge times	Times
9	Day1-HV	A day ago highest voltage	V
10	Day1-LV	A day ago lowest voltage	V
11	Day2-HV	Two days ago highest voltage	V
12	Day2-LV	Two days ago lowest voltage	V
13	Day3-HV	Three days ago highest voltage	V
14	Day3-LV	Three days ago lowest voltage	V

6.Starting up the controller

6.1 Self Test

As soon as the controller is connected to battery, it starts self test. Then the display changes to normal operation.

6.2 Battery Type

The controller applies to Lithium, AGM, Liquid and Gel battery. It is your responsibility to check and ensure that these settings are correct for your battery, otherwise they must be amended.

SMR-DC is suitable for lithium battery when it is set to Lithium battery, the charging target voltage and charging recovery voltage can be set according to customer requirements.

The controller adjusts itself automatically to 12V or 24V system voltage when it is set to Gel, Liquid or AGM battery. If the battery voltage on start-up is 0V-15V then the controller infers a 12V system. If the battery voltage is 20V-30V the controller infers a 24V system.If the battery voltage is not within the normal operating rang at start-up, please refer to **Faults & Alarms**.

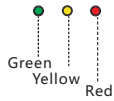
6.3 0℃ Charging Protection

"0℃ Chg" can be set to "Yes", "Slow" or "No".

When the controller detects that the ambient temperature is higher than 0℃, the charging function is normal. when the ambient temperature is low than 0℃, if the "0℃ Chg" is set to "Yes", the charging function is normal, else if the "0℃ Chg" is set to "slow", the max charging current is 20% of the rated current, else if the "0℃ Chg" is set to "No", the controller does not charge the battery.

The user can select the appropriate charging method.

7.LED indications



LED	Status	Function
Green LED	On	not charging
	Slow flash(0.5/2s)	Charging
Yellow LED	Off	Over voltage protection
	On	Battery is normal
	Slow flash(0.5/2s)	Battery voltage is low
	Fast flash(0.1/0.1s)	Low voltage protection
Red LED	Off	Work normal
	On	The output power is 0.
	Fast flash(0.1/0.1s)	Short circuit or Over current protection
	Flash(0.5/0.5s)	Over temperature protection
	Super slow flash (0.2s on/5s off)	Open circuit (transport mode) *1

*1.If the controller is in transport mode, the red LED is super slow flash(0.2s on/5s off), the green and yellow led is off.
*2.Detailed fault information can be read by S-Unit remote controller.

8.LVD, LVR, Threshold, Dimming

8.1Low Voltage Disconnect(LVD)

Low voltage disconnect setting range: 8.0~15.0V.

8.2Low Voltage Reconnect(LVR)

Low voltage reconnect setting range: 8.6~16.0V.

If the controller goes into low voltage disconnect, it will restore only when the battery being recharged to the recovery voltage.

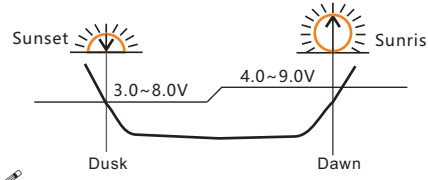
8.3 Day/Night Threshold, Day/Night Delay

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: 3.0~8.0V.

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.



1. Day/Night threshold voltage of load disconnect is 1V higher than the setting data, means the load will disconnect when the solar voltage at 4.0~9.0V.
2.The controller has an automatic day/night threshold adjustment function. If the lowest voltage of solar array is higher than the setting day/night threshold, the load has no output in first night, 24 hours later the controller can automatically adjust the day/night threshold to meet the requirements of lighting at night.

8.4 Dimming

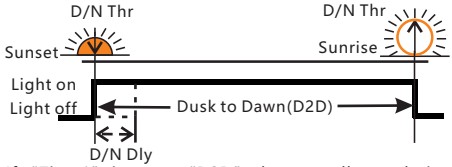
The "Dim Auto" item of S-Unit is set to "Yes", set "Dim V" and "Dim %" at the same time, press the "Send" key to set up the controller. when the battery voltage is lower than the voltage of "Dim V" , it starts to dimming automatically. Battery voltage reduces per 0.1V, load current decreased according to the set of "Dim %", the

1.If the controller is set to "Dim" or "Auto Dim" , the minimum output power can be as low as 0.3W.
2. Dimming voltage should not be greater than the voltage of "CVT" (Charging voltage target).
When the battery voltage is less than 76% of the "CVT" voltage and the lasting time is more than 15s, the output current of the controller is reduced to 0.3W.

9. Streetlight Function

Smart-CC series controller with advanced street light control function. The modes of lighting can be based on customer needs.

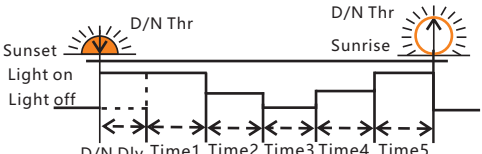
9.1 Dusk to Dawn (D2D)



If "Time1" is set to "D2D",the controller works in dusk to dawn mode.

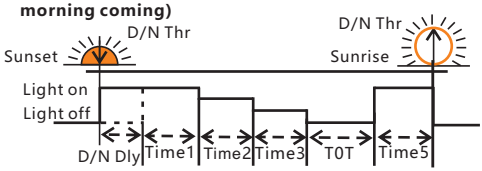
1.Smart-CC series controller is set to D2D mode, the corresponding dimming setting is still valid.
2. If "Time1" is set to D2D mode, "Time4" can not be set to T0T mode.

9.2 Five-stage Night Mode



You can set the Time 1-5 and Dim 1-5 with S-Unit.

9.3T0T mode(can set the load on time before morning coming)

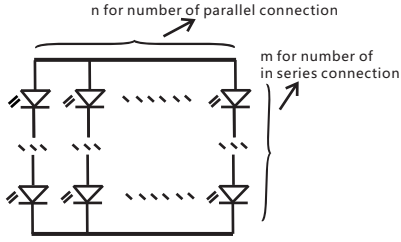


If "Time4" is set to "T0T", this mode is T0T mode.

* If Time4 is set to T0T mode, Time1 can not set to D2D mode.

10.Recommended connection of LED

Following connect ways is for the LED lights
(Vf: 2.9V~3.4V; I: 300mA, Power: 1W)



Output Voltage	Load Power	Recommendatory connect way
6V ~ (Vb - 1V)	1.5~30W	M=2~4 N=1~10

*Vb means the voltage of battery.

Note: If the power setting requirements exceed the power range of the controller, then the controller is unable to set successfully.

11.Safety Features and Faults & Alarms

11.1 Safety Features

	Solar terminal	Battery terminal	Load terminal
Reverse polarity	Protected	Protected	Protected
Short circuit	Protected*1	Protected *2	Switches off immediately
Over current	——	——	Switches off with delay
Reverse Current	Protected	——	——
Over voltage	Max.25V *3	Max. 20V	——
Low voltage	——	——	Switches off
Over temp.	If the temperature reaches the set value, the controller cuts off the load.		

*1.When the PV doesn't charge,the controller will not be damaged if short-circuit just happened in the PV array.
warning: It is forbidden to short-circuit the PV array during charging .Otherwise, the controller may be damaged.
*2. Battery must be protected by fuse, or battery will be permanently damaged.
*3. The solar panel voltage should not exceed this limit for a long time.

Warning: The combination of different error conditions may cause damage to the controller.
Always remove the error before you continue connecting the controller.

11.2Faults & Alarms

Fault	Status	Reason	Remedy
Loads are not powered	Low volt. protection	Battery capacity is low	Load will be reconnected when battery is recharged
	Overcurrent, short circuit protection	Loads are over current or short circuit	Switch off all loads, remove short circuit, load will be reconnected after 1 minute automatically
	Over temp. protection	Controller temp. is too high	Load reconnects after temp. reduces
High voltage at battery terminal	Over voltage protection	High battery voltage> 15.5/31.0V *	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	Low voltage protection	Battery has low capacity	Change battery
Battery can't be charged	Green LED is on	PV panel fault or reverse connection	Check panels and connection wires

* Lithium: Battery voltage > CVT+0.2V
Gel, Liquid and AGM: Battery voltage> 15.5/31.0V

12.Technical Data

	Item		SMR1006-CCN5M Li
Battery Parameters	System Voltage		12V
	Max Charging Current		10A
	Battery Type		GEL, Liquid, AGM and Lithium（Programmable）
	Max volt on Bat. Terminal		20V
	GEL, Liquid, AGM	Fast voltage	<14.5V (25℃)
		Boost voltage	14.5V (25℃)
		Equal voltage	14.8V (25℃)（Liquid）
		Float voltage	13.7V (25℃)
		Low voltage disconnect	10.8 ~11.8V(Programmable)
		Low voltage reconnect	11.4 ~ 12.8V(Programmable)
		Over charge protect	15.5V
		Temp compensation	-4.17mV/K per cell (Boost、Equalization)， -3.33mV/K per cell (Float)
	Lithium	Charging voltage target	10.0~17.0V(Programmable)
		Charging voltage recovery	8.5~16.8V(Programmable)
		Low voltage disconnect	8.0 ~15.0V(Programmable)
		Low voltage reconnect	8.6 ~ 16.0V(Programmable)
		0℃ Charging protection	Yes、No、Slow(Programmable)
Panel Parameters	Max volt on PV terminal		25V
	Dusk/Dawn detect volt.		3.0~8.0V(Programmable)
	Day/Night delay time		0~30min(Programmable)
Load Parameters	Output Power		1.5~30W(Programmable)
	Output Voltage		6V~(Battery voltage - 1V)
	Min power		0.3W（Dimming）
	Max LED driver efficiency		95%
	Dimming		0~100%(Programmable)
	Auto dimming		Yes、NO、365(Programmable)
	Voltage of start dimming		Lithium: 9.0 ~ Charging voltage target (Programmable) Gel, AGM and Liquid: 11.8 ~ 12.5V(Programmable)
	Dimming percentage		1~20%(Programmable)
	Max LED driver efficiency		95%
System Parameters	Self consumption		8mA
	Dimensions		76.4 x 52 x 20.7mm
	Weight		125g
	Wire size		2.5mm²
	Ambient temperature		-35~+60℃
	Ambient humidity		0~100%RH
	Protection degree		IP67
	Max Altitude		4000m