Smart™-DCLi series infrared induction Solar charge controller

Suitable for Lithium battery

(Constant Current, Boost)

10A 30W

User Manual

User Manual_Smart-DCLi series_JF
CE, Rohs, ISO9001:2015
Subject to change without notice!

Solar charge controller Smart-DCLi series User Manual

Dear Clients,

Thanks for selecting the **Smart™-DC** 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-DCLi series intelligent solar controller, is programmable and especially for boost mode LED solar street light system. It includes constant current driver function, which can make the cost of the whole system much lower.

- Can output constant current (output current can be set).
- Automatic power balance 365 mode, 365 days can be lit
- Human infrared induction.
- 5 stages time and dimming can be adjusted
- Sensitive time delay can be set range from 10~150s.
- Can read parameters and running status
- If battery voltage is low, it can be set to dimming
- Dimming start voltage and percentage can be set
- Auto sleeping during transportation
- Low temperature charging protection
- When BMS power off because of LVD, it can activate the system automatically
- Charging target voltage and recovery voltage can be set
- Day/Night threshold can adjust automatically
- Remote Unit to configure, with LCD display
- IP65, Suitable for a variety of external applications
- Full automatic electronic protect function

2.Safety instructions and waiver of liability

2.1 Safety

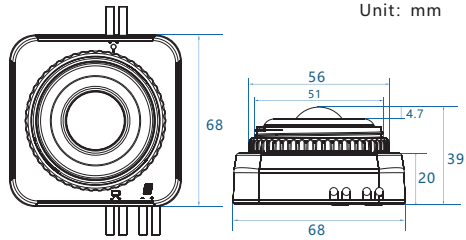
①The solar charge controller may only be used in PV systems in accordance with this user manual and the specifications of other modules manufacturers. No energy source other than a solar generator may be connected to the solar charge controller.
②Batteries store a large amount of energy, never short 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

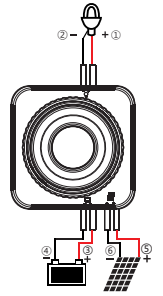
Unit: mm



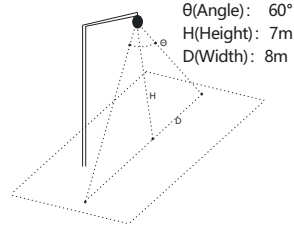
4.Installation

4.1 Connection sequence

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



Sensitive scope



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(or green) cables, the load will be off after 8s, and the controller begins to charge.
4.Confirm the LED display status: If the red LED is super slow flashes(2.5s on/2.5s off), it is normal; else if the red LED is fast flashes, it means fault, please refer to the **10.2Faults 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.

Infrared sensor range will change with temperature, light conditions and so on, subject to the actual measurement.

4.2 Transportation mode

The controller is generally integrated with the lithium battery in the lithium battery pack for transport, if the controller works normal during transport, it will waste of energy and increase the transport risk. If the controller is set to transport mode, the load has no output, then the power consumption is reduced by about 60%, to avoid lithium battery voltage too low.

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 transport mode

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

Press the "**Test**" key in the transport 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 will slow flash(0.2s on/5s off) , the green and yellow led will be off and the remote control displays "Open CP".

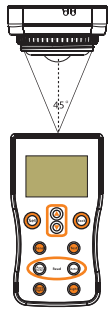
4.2.3 Exit the transportation mode

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

5.Remote controller, Default setting

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

Remark: Be sure to set only one Smart-DCLi 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

5.2 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	365
15	Battery	LI
16	CVT	12.6V
17	CVR	12.4V
18	LVD	9.0V
19	LVR	9.8V
20	0℃ Chg	Yes
21	DelayOff	10s
22	Dim NP	10%

5.3 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 Battery Type

Smart-DCLi series controller applies to Lithium rechargeable battery. The charging target and charging recovery voltage can be set according to customer requirements.

6.2 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.

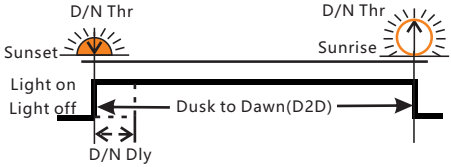
7. Streetlight Function

For controllers with infrared sensing function, if work mode is set to " Five-stage Night Mode" Or " T0T mode" , "DelayOff" and "Dim NP" work in "Time3" and "Time4" period.

"DelayOff" setting range: 10~150s.

"Dim NP" setting range: 0~100%.

7.1 Dusk to Dawn (D2D, no induction function)

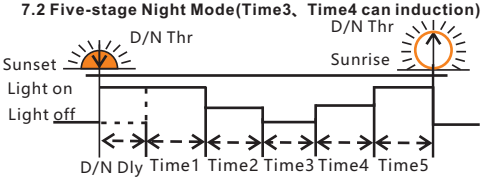


If "Time1" is set to "D2D" ,the controller works in dusk to dawn mode.

1.MPPT-DC controller is set to D2D mode, the corresponding dimming setting is still valid.

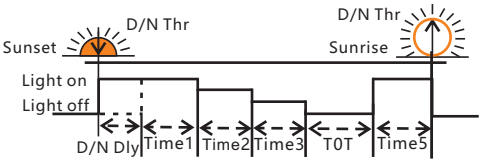
2. If "Time1" is set to D2D mode, "Time4" can not be set to T0T mode.

7.2 Five-stage Night Mode(Time3、Time4 can induction)



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

7.3 T0T mode(Time3、T0T can induction)



If "Time4" of the S-Unit is set to "T0T", this mode is T0T mode.

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

Parameter setting example:

Time1: 1.0H/100% Time2: 2.0H/80%
Time3: 3.0H/60% Time4: T0T/40%
Time5: 2.0H/100%
DelayOff: 10s Dim NP: 10%

The controller works as follows:

After the arrival of the evening the first time the load is lit for 1 hour (full power 100%), the second time the load is lit for 2 hours (power 80%), the third time load light for 3 hours (when people is near the lamp then the load is 60% light, when people is away from the lamp the load is 60% * 10% light), and then the controller according to the actual night time automatically calculate the length of the fourth paragraph (when people is near the lamp then the load is 40% light, when people is away from the lamp the load is 40% * 10% light), the fifth time load light 2 hours (full power 100%).

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.

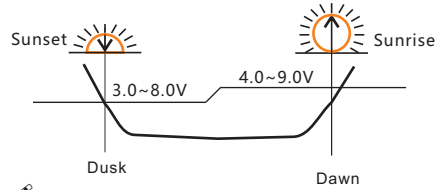
8.3 Day/Night Threshold, Day/Night Delay

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 Auto Dimming

8.4.1 Auto Dimming mode

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 minimum output current is 10% of the setting current.

If the controller is set to "Dim" or "Auto Dim" , the minimum output power can be as low as 50mA.

8.4.2 365mode

365 mode is based on the battery power (charge power, discharge power) energy control. If the battery charge more during the day, then discharge more at night. The controller can calculate the dimming ratio according to the charging power and the remaining power of battery, so as to avoid the load shutdown due to the low battery voltage.

When using the 365 mode, the system should be designed to meet the requirements of three rainy days.

9.Safety Features

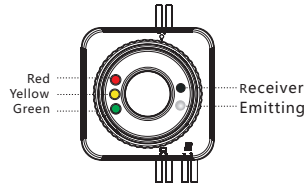
	Solar terminal	Battery terminal	Load terminal
Reverse polarity	Protected	Protected	Protected
Short circuit	Protected	Protected *1	Switches off immediately
Over current	——	——	Switches off with delay
Reverse Current	Protected	——	——
Over voltage	Max.25V *2	Max. 20V	——
Low voltage	——	——	Switches off
Over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

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

*2. 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.

10.LED indications and Faults & Alarms



10.1LED Display Explanation

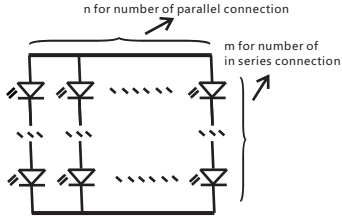
LED	Status	Function
Green LED	On	not charging
	Slow flash(0.5/2s)	Charging
Yellow LED	Off	Over voltage protection
	On	Battery is normal
	Slow flash(0.5/2s)	Battery voltage is low
	Fast flash(0.1/0.1s)	Low voltage protection
Red LED	Slow flash(2.5/2.5s)	Work normal
	On	The output power is 0.
	Fast flash(0.1/0.1s)	Short circuit or Over current protection
	Flash(0.5/0.5s)	Over temperature protection
	Super slow flash (0.2s on/5s off)	Open circuit or 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.

10.2Faults & 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> (" CVT" +0.2V)	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	Low voltage protection	Battery has low capacity	Change battery
Battery can't be charged	Green LED is off	PV panel fault or reverse connection	Check panels and connection wires

11.Recommended connection of LED



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

Output Voltage	Load current	Recommendatory connect way
(Vbat+2V) ~ 55V	0.3~2.0A	M=5~18 N=1~6

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

12.Technical Data

	Item	SMR1006-DCN5MLiR
Battery Parameters	Max Charging Current	10A
	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)
	Battery Type	Lithium
	0℃ Charging protection	Yes, Slow, No(Programmable)
	Max volt on Bat. Terminal	20V
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 Current	0.15~2.0A(Programmable)
	Output Voltage	(Battery voltage + 2V) ~ 55V
	Output power	1~30W
	Min current	50mA(Dimming)
	Current precision	±2%
	Max LED driver efficiency	95%
	Dimming	0~100%(Programmable)
	Auto dimming	Yes, No, 365(Programmable)
	Voltage of start dimming	9.0~Charging target voltage(Programmable)
	Dimming percentage	1~20%(Programmable)
	Induction delay off time	10~150s(Programmable)
	Dimming when no people	0~100%(Programmable)
System Parameters	Self consumption	6mA
	Dimensions	68 * 68 * 39mm
	Weight	150g
	Wire size	2.5mm²
	Ambient temperature	-35~+60℃
	Ambient humidity	0~100%RH
	Protection degree	IP65
	Max Altitude	4000m