Smart series

Solar charge controller

12V

User Manual

User Manual_Smart series_ML
CE, Rohs, ISO9001:2015
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Solar charge controller Smart series User Manual

Dear Clients,

Thanks for selecting the **Smart** series solar controller. Please take the time to familiarise yourself with this user manual, as it will help you take full advantage of the controller's features. This manual gives important recommendations for installing, using, and programming the solar controller. Read this manual in full before installing or connecting the solar controller.

1.Functions

Smart series intelligent solar controller is programmable and well-suited for a wide range of solar systems.

It comes with many outstanding features, such as:

- Output constant DC12V
- Monitoring of the running status and parameters
- When BMS power off because of LCD,it can be activate the system automatically(Lithium)
- 0℃ Charging Protection
- Auto sleeping during transportation
- Day/Night threshold can adjust automatically
- Configurable with an LCD remote programmer (S-Unit)
- Waterproof IP67, Strong and durable aluminum case
- Full automatic electronic protect function

2.Safty Instructions and Liability Waiver

2.1 Safety

①The solar charge controller may only be used in PV systems in accordance with this user manual and with solar panels specifications in line with the requirements of this controller. No energy source other than solar panels may be connected to the solar charge controller.

②Batteries store a large amount of energy, never short-circuit a battery under any circumstances. We strongly recommend connecting an in-line fuse or circuit-breaker on the "+" wire between the battery and controller, no more than 15cm from the battery terminal.

③Batteries can produce flammable gases. Avoid sparks and flames near the batteries. Make sure the battery is installed in a well ventilated area.

④Avoid touching or short circuiting wires or terminals. Be aware that the voltages on special terminals or wires can be several times greater than the battery voltage. Use isolated tools and only perform any work in a dry environment.

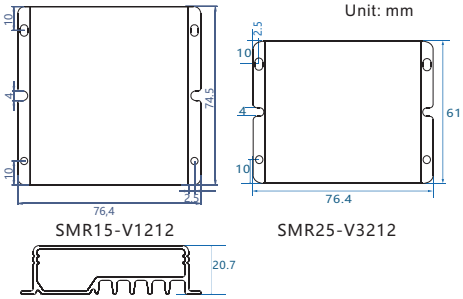
⑤Keep children away from batteries and the charge controller.

2.2 Liability Exclusion

The manufacturer shall not be liable for damages to the controller or battery caused by use other than as instructed in this manual, or if the battery manufacturer's recommendations are neglected. The manufacturer shall not be liable if there has been service or repair carried out by any unauthorised person, unusual use, incorrect setup, or bad system design.

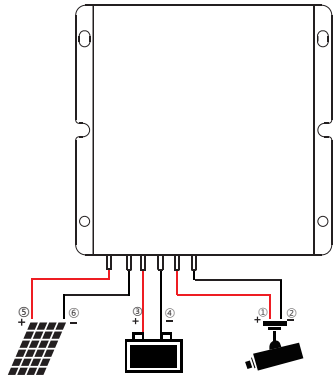
3.Dimensions

Unit: mm



4.Installation

4.1Connection sequence



1. As the chart, Connect the load first with corresponding grown(positive) and blue(negative) cables, then seal them with tape.
2. Connect the battery with corresponding positive and negative cables, load will be on after 8 seconds.
3. Connect panel with the corresponding red(positive) and black(negative) cables, the controller begins charging 5s later.
4. Confirm the LED display status, please refer to the **9.2 Faults and Alarms** to identify the reason.

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

Recommended Wire size: Load and battery: 4mm²

PV: 2.5mm²

4.2 Transportation mode(Lithium)

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 Press the "Test" key

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

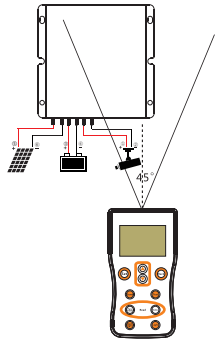
4.2.2 Exit the transportation mode

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 settings

Settings can be changed using the "S-Unit" infrared remote programmer. For detailed instructions and settings, please see the S-Unit programmer remote manual.

Be sure to only set one controller at a time.



5.1 Test function(Streetlight mode)

Press the "Test" key of S-Unit, the controller will turn on the load for 30s. During daytime, this can verify correct installation and help with troubleshooting.

Default "24H" mode, the test key is invalid.

5.2 Reading the parameters

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

Num	Name	V1212	V3212
1	Time1	24H	24H
2	Dim1	100%	100%
3	Time2	0H	0H
4	Dim2	100%	100%
5	Time3	0H	0H
6	Dim3	100%	100%
7	Time4	0H	0H
8	Dim4	0%	0%
9	Time5	0H	0H
10	Dim5	100%	100%
11	D/N Thr	5V	2V
12	D/N Dly	0m	0m
13	Load I	0.3A	0.3A
14	Dim Auto	No	No
15	Battery	Li	Li
16	CVT	12.6V	3.6V
17	CVR	12.4V	3.4V
18	LVD	9.0V	2.6V
19	LVR	9.8V	3.0V
20	0℃ Chg	Yes	Yes

Dimming function, if you set 0%, the load will be off, otherwise the load will be on.

5.3 Reading the running status

Press the "Status" key of the S-Unit to read the running status of the controller. This will display the current mode of the controller and any measured values.

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 powered, it starts a self test routine. After this, the LED display will change to normal operation.

6.2 System Voltage

SMR25-V3212: The controller is applied to Lithium rechargeable battery . The charging target voltage and charging recovery voltage can be set according to customer requirements.

SMR15-V1212: The controller applies to Lithium, AGM, Liquid and Gel battery, the factory default setting is suitable for Lithium battery. It is your responsibility to check and ensure that these settings are correct for your battery, otherwise they must be amended.

When the controller 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 system voltage when it is set to Gel, Liquid or AGM battery. The controller infers a 12V system when the battery voltage on start-up is 10V-15V.If the battery voltage is not within the normal operating rang(ca.10 to 15V) at start-up, please refer to 9.2 Faults & Alarms.

6.3 0℃ Charging Protection(Lithium)

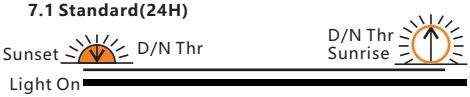
"0℃ Chg" can be set to "Yes", "Slow" or "No". When the controller detects that the ambient temperature is higher than 0℃, the charging function is normal. when the ambient temperature is low than 0℃, if the "0℃ Chg" is set to "Yes", the charging function is normal, else if the "0℃ Chg" is set to "slow", 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.Load Output Timer Modes

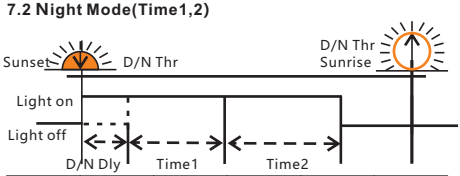
Smart series controller has advanced day/night time control functions. Can be Progrmmable according to customer needs.

7.1 Standard(24H)



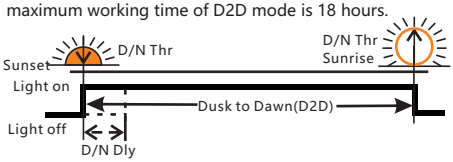
If "Time1" is set to "24H" and sent to the controller successfully, the controller's load will always be on.

7.2 Night Mode(Time1,2)

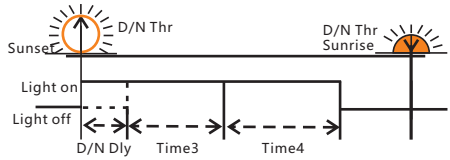


	Time1	Time2	Time3	Time4	Time5
Setting Rage	0~6.5H D2D	0~7.5H	/	/	/

Set time 1 and 2 by the S-Unit to output at night.
When time 1 is set to D2D, which means dusk to dawn mode, load output will last for the whole night, and the maximum working time of D2D mode is 18 hours.



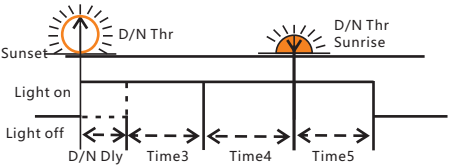
7.3 Day Mode(Time3,4)



	Time1	Time2	Time3	Time4	Time5
Setting Rage	0H	0H	0~7.5H	0~7H T0T	0H

Set time 3 and 4 by the S-Unit(set time 1, 2 and 5 to 0h at the same time) to output during the day.The load will continue to output until night when time 4 is set to T0T. The maximum working time of T0T mode is 18 hours.

7.4 Day + Night Mode(Time3,4,5)



	Time1	Time2	Time3	Time4	Time5
Setting Rage	0H	0H	0~7.5H	0~7H T0T	7.5H

The controller will output both in the day and night through set Time 3,4,5 by S-Unit(time 1 and 2 are set to 0H at this time).
If you want to achieve daytime output and night output at regular time, you can set time 4 to T0T and time 5 to desired time.

8.LVD, LVR, Threshold

8.1 Low Voltage Disconnect (LVD)

When the battery voltage drops below the LVD voltage, the controller will disconnect the load to prevent deep discharge of the battery. If this occurs, the battery should be well charged before resuming use.

	SMR25-V3212	SMR15-V1212
Gel, Liquid and AGM	--	10.8~11.8V
Lithium	2.6~7.2V	8.0V~15.0V

8.2Low Voltage Reconnect (LVR)

If the low voltage disconnect is triggered, the controller will restore load connection only when the battery voltage increases above the LVR voltage.

	SMR25-V3212	SMR15-V1212
Gel, Liquid and AGM	–	11.4~12.8V
Lithium	2.8~7.4V	8.6V~16.0V

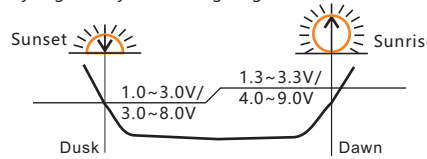
8.3Day/Night Threshold, Day/Night Delay

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: 1.0~3.0V/3.0~8.0V

The actual time of turning on can be delayed by up to 30 minutes from the time the threshold was reached using the Day/Night delay setting (D/N Dly).

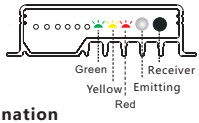
Day/Night delay time setting range: 0~30min.



Day/Night threshold voltage of load disconnect is 0.3/1V higher than the setting data.

The controller will automatically adjust the day/night threshold. If the lowest solar voltage is higher than the day/night threshold. The load will have no output the first night, then 24 hours later the controller will automatically adjust the setting to give output the following night.

9.LED indicators, Faults & Alarms



9.1 LED Display Explanation

LED	Status	Function
Green LED	On	Solar panel is correctly connected, but not charged
	Slow flash(0.5/2s)	Charging
Yellow LED	Off	Over voltage protection
	On	Battery is normal
	Flash slowly(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.
	Flash(0.5s/0.5s)	Over temperature
	Fast flash(0.1/0.1s)	Short circuit or over current protection *
	Flash slowly(0.2/5s)	Transport mode

* If the controller is in transport mode, the red LED flashes slowly(0.2s on/5s off),the green ang yellow LED is off.

* Detailed fault information can be read by S-Unit remote controller.

9.2 Faults & Alarms

Fault	Status	Reason	Remedy
Loads are not powered	Low volt. protection	Low Battery capacity	Recharge battery above LVR.
	Overcurrent, short circuit protection	Overload or load short-circuit	Switch off all loads, remove short-circuit, load will be reconnected after 1 minute.
	Over temp. protection	Controller temp. is too high	Controller will turn the system off until temperature is below 60 ° C.
High voltage at battery terminal	Over voltage protection	Battery overvoltage >(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.
Incorrect system voltage	All LED fast flashing	Battery voltage not in right range	Charge or discharge battery to correct the voltage
Battery is empty after a short time	Low voltage protection	Battery has low capacity	Change battery
Battery not charging	Green LED is on	PV panel fault or reverse connection	Check panels and wire connections

* Lithium: Battery overvoltage >(CVT+0.2V)
Gel, Liquid and AGM: Battery overvoltage >15.5V

10.Safety Features

	Solar terminal	Battery terminal	Load terminal
Reverse polarity	Protected	Protected	Protected
Short circuit	Protected	Protected *1	Switches off immediately *2
Over current	——	——	Switches off with delay
Reverse Current	Protected	——	——
Over voltage	Max. 15V *3	Max. 10V	——
Under voltage	——	——	Switches off
Over temp.	The controller cuts off the load if the temperature reaches the set value.		

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

*2.This operation has no effect on the controller, but the load may be damaged.

*3.The solar panel voltage should not exceed this limit for a long time.

	Max Volt. on PV	Max Volt. on battery
SMR25-V3212	15V	10V
SMR15-V1212	23V	20V

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

11.Technical Data

	Item		SMR25-V3212	SMR15-V1212
Battery Parameters	System Volt.		3.2V	12V
	Max Charging Current		20A	15A
	MAX Volt. on Bat. Terminal		10V	20V
	Battery Type		Lithium	Gel, AGM, Liquid and Lithium
	Gel, AGM and Liquid	MPPT Charging Volt.	--	<14.5V@25℃
		Boost Volt.	--	14.5V @25℃
		Equalization Volt.	--	14.8V @25℃ (Liquid, AGM)
		Float Volt.	--	13.7V @25℃
		Low Volt. Disconnect	--	10.8~11.8V (Programmable)
		Reconnect Volt.	--	11.4~12.8V (Programmable)
		Overcharge Protect	--	15.5V
		Temp. Compensation	--	-4.17mV/K per cell (Boost, Equalization), -3.33mV/K per cell (Float)
	Lithium	Charging Volt. target	3.0~9.0V(Programmable)	10.0~17.0V(Programmable, Default: 12.6V)
		Charging Volt. recovery	2.9~8.9V(Programmable)	8.5~16.8V(Programmable, Default: 12.4V)
		Low Volt. disconnect	2.6~7.2V(Programmable)	8.0~15.0V(Programmable, Default: 9.0V)
		Low Volt. reconnect	2.8~7.4V(Programmable)	8.6~16.0V(Programmable, Default: 9.8V)
		0℃ Charging protection	Yes, No, Slow(Programmable)	
PV Parameters	Max Volt. on PV terminal		15V	23V
	Dusk/Dawn detect volt		1.0~3.0V(Programmable)	3.0~8.0V(Programmable)
	Day/Night delay time		0~30min(Programmable)	
Load Parameters	Max output current		1.6A	4A
	Output Volt.		12±0.5V	
	Output current		1~20W	1~48W
	Max load driver efficiency		92%@3.2V	95%@12V
	Work mode		Stantard(24H),Day Mode,Night Mode,Day+Night Mode(Programmable)	
System Parameters	Self consumption		12mA@Transport Mode	7mA@Transport Mode
	Dimensions		76.4 *61 * 20.7mm	76.4 * 74.5 * 20.7mm
	Weight		150g	190g
	Wire size		4mm²	
	Ambient temperature		-35~+60℃	
	Ambient humidity		0~100%RH	
	Protection degree		IP67	
	Max Altitede		4000m	