Smart™-5 series
Solar charge controller
infrared /RS485
10/20A

User Manual

User Manual_Smart-N5 series_MF
CE, Rohs, ISO9001:2015
Subject to change without notice!

Solar charge controller Smart-N5 series User Manual

Dear Clients,

Thanks for selecting the **Smart™-N5** 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-N5 series intelligent solar controller, is programmable and especially for solar light system.

It comes with some outstanding features, such as:

- 5 stages time can be adjusted(Purchased remote controller)
- Can read parameters and running status(Adjust with remote)
- 12/24V system voltage automatic recognition
- Automatic temperature compensation(Liquid/AGM/GEL) (Adjust with remote)
- Four stages charge: fast, boost, equal,
- When BMS power off because of LVD, it can activate the system automatically(Lithium)
- Charging target and recovery voltage can be set(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
- Standard Modbus protocol based on RS485 communication bus, with external power supply 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.

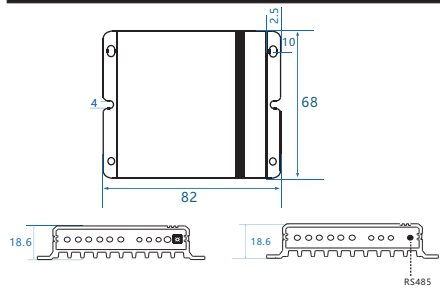
④Avoid touching or short circuiting wires or terminals. Be aware that the voltages on special terminals or wires can be as much as twice the battery voltage. Use isolated tools, stand on dry ground, and keep your hands dry.

⑤Keep children away from batteries and the charge controller.

2.2 Liability Exclusion

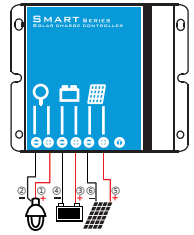
The manufacturer shall not be liable for damages, especially on the battery, caused by use other than as intended or as mentioned in this manual or if the recommendations of the battery manufacturer are neglected. The manufacturer shall not be liable if there has been service or repair carried out by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

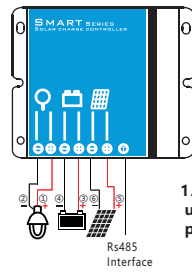
3.Dimensions



4.Installation

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





Wire	RS485
Brown	Battery +
Black	GND
Blue	RS485-A
Green	RS485-B

1.It is forbidden to plug and unplug RS485 interface with power!

1.First connect the RS485 well.

2.Follow the chart, connect the load (positive pole and negative pole) with the corresponding red and black cables firstly, then seal them with tape.

3.Connect battery positive pole and negative pole to the corresponding red and black cables, the load will be on.

4.Connect the panel positive pole and negative pole to the corresponding red and black cables, the controller begins to charge.

5.Please refer to the **10.2Faults and Alarms** to confirm the controller’ s status.

- Make sure the length between battery and controller is as short as possible.
- Recommended minimum wire size: 10A: 2.5mm²; 20A: 4mm².

5.communication mode, Default setting

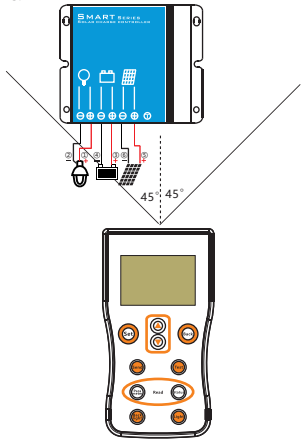
5.1RS485 communication

Connect the SMR-RS485 series controller to the system according to the installation instructions, and set relevant parameters through the computer according to the system setting requirements, Please refer to "Communication Protocol V3.9" for communication protocol

5.2 Infrared communication

When SMR-N5 series controller is connected to the system, you can setting the controller with S-Unit infrared remote controller. Detailed settes operations, please read S-Unit User Manual.

Remark: Be sure to set only one Smart-N5 unit at a time.



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

5.4 Test function(Streetlight mode)

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.

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

5.5 Read the parameters

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

Num	Name	SMR-N5
1	Time1	24H
2	Dim1	100%
3	Time2	0H
4	Dim2	100%
5	Time3	0H
6	Dim3	100%
7	Time4	0H
8	Dim4	100%
9	Time5	0H
10	Dim5	100%
11	D/N Thr	5V
12	D/N Dly	0min
13	Load I	0.3A
14	Dim Auto	No
15	Battery	GEL
16	LVD	11.2V
17	LVR	12.0V

1.Dimming function, if you set 0%, the load will be off, otherwise the load will be on.
2.The setting data of "Load I" and "Dim Auto" is for "DC" series with LED driver built-in, does not work in this type controller.

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, the factory default setting is suitable for Gel battery.

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 or 24V system voltage when it is set to Gel, Liquid or AGM battery. If the battery voltage on start-up is 5V-15.5V 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(ca.10 to 15V or ca.20 to 30V) at start-up, please refer to **10.2 Faults & Alarms**.

7.Safety Features

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

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

*2.When the PV is not charged, the solar terminal will be short circuited and the controller will not be damaged.

Warning: PV shall not be short circuited during charging, otherwise the controller will be damaged.

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

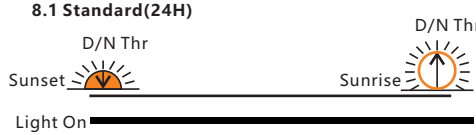
*4. The solar panel voltage should not exceed this limit for a long time.

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

8. Output Function

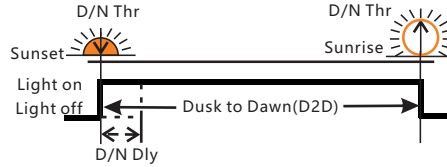
Smart-N5 controller with advanced light control function. The modes of lighting can be based on customer needs.

8.1 Standard(24H)



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

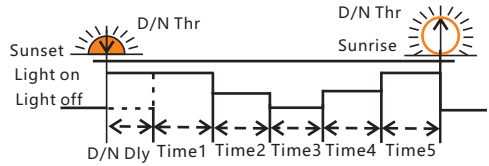
8.2 Dusk to Dawn (D2D)



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

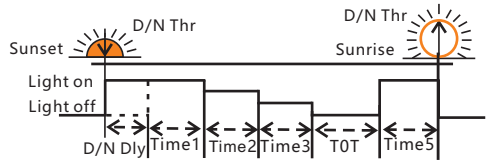
1.Smart-N5 series controller is set to D2D mode, the corresponding dimming setting is still valid.
2. If "Time1" is set to D2D mode, "Time4" can not be set to T0T mode.

8.3 Five-stage Night Mode(SMR-N5)



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

8.4 T0T mode(can set the load on time before morning coming,SMR-N5)



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.

9.LVD, LVR, Threshold

9.1 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.

1. Gel, Liquid and AGM Battery

Battery capacity control

SOC1：11.0~11.6V/22.0~23.2 V

SOC2：11.1~11.7V/22.2~23.4 V

SOC3：11.2~11.8V/22.4~23.6 V

SOC4：11.4~11.9V/22.8~23.8 V

SOC5：11.6~12.0V/23.2~24.0 V

Battery voltage control

LVD range: 10.8~11.8V/21.6~23.6V.

2. Lithium Battery

LVD range: 9.0~30.0V.

9.2 Low 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.

1. Gel, Liquid and AGM Battery

LVR range: 11.4~12.8V/22.4~25.6V.

2. Lithium Battery

LVR range: 9.6~31.0V.

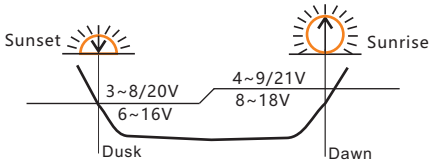
9.3 Day/Night Threshold, Day/Night Delay

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.

Liquid, AGM or GEL: 3.0~8.0V/6.0~16.0V.

Lithium: 3.0~20.0V.

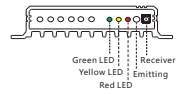
In the evening, when the solar array open circuit voltage reaches the setting day/night threshold, you can adjust the day/night delay time to make the load turn on a little later.

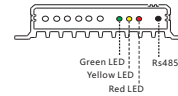


1. Day/Night threshold voltage of load disconnect is 1V/2V higher than the setting data, means the load will disconnect when the solar voltage at 4~9V/8~18V(Liquid, AGM or GEL) / 4.0~21.0V(Lithium).

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.

10.LED indications and Faults & Alarms





10.1LED Display Explanation

LED	Status	Function
Green LED	On	Not charged
	Flash fast(0.1/0.1s)	MPPT charging
	Flash(0.5/0.5s)	Equal or Boost charging (Gel, Liquid or AGM)
	Flash slowly(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.
	Flash(0.5s/0.5s)	Over temperature
	Fast flash(0.1/0.1s)	Short circuit or over current protection *

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 >15.5V/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.
Can't recognize system voltage	All LED slow flashing (1s on/1s off)	Battery voltage is not in right range	Charge or discharge, make battery voltage in the right range
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 overvoltage >(CVT+0.2V)
Gel, Liquid and AGM: Battery overvoltage >15.5/31.0V

11.Technical Data

	Model		SMR10-N5	SMR20-N5
	Max. Current		10A	20A
	System Voltage		12/24V	
	Max. battery voltage		40V	
	Battery type		Liquid, AGM, GEL and Lithium(Programmable)	
Battery Para-meters	Liquid, AGM, GEL	Fast Voltage	<14.5V/29.0V (25℃)	
		Boost Voltage	14.5V/29.0V (25℃)	
		Equal Voltage	14.8V/29.6V (25℃) (Liquid)	
		Float Voltage	13.7V/27.4V (25℃)	
		Overcharge Protect	15.5/31.0V	
		Low voltage disconnect	10.8~11.8V/21.6~23.6V; SOC1~5	
		Low voltage reconnect	11.4~12.8V/22.8~25.6V	
		Temp compensation	-4.17 mV/K per cell (Boost, Equal) ;-3.33 mV/K per cell (Float)	
	Lithium	Charging voltage target	11.0~32.0V(Programmable)	
		Charging voltage recovery	9.5~31.8V(Programmable)	
		Low voltage disconnect	8.0 ~30.0V(Programmable)	
		Low voltage reconnect	8.6 ~ 31.0V(Programmable)	
Panel Para-meters	Day/Night threshold		Liquid, AGM, GEL: 3.0~8.0V/6.0~16.0V(Programmable) Lithium: 3.0~20.0V(Programmable)	
	Day/Night delay time		0~30min(Programmable)	
	Max. panel voltage		25V/50V	
System Para-meters	Dimensions		82 x 68 x 18.6mm	
	Weight		190g	
	Wire size		2.5mm²	4mm²
	Self consumption		10mA	
	communication mode		Infrared positive	
	Grounding		Common anode	
	Ambient temperature		-35℃ ~ +60 ℃	
	Degree of protection		IP67	
	Max. Altitude		4000m	

Note: Around oblique line value separately on behalf of 12V and 24V system’ s value.

	Model		SMR10- RS485	SMR20- RS485
	Max. Current		10A	20A
	System Voltage		12/24V	
	Max. battery voltage		40V	
	Battery type		Liquid, AGM, GEL and Lithium(default: Gel)	
Battery Para-meters	Liquid, AGM, GEL	Fast Voltage	<14.5V/29.0V (25℃)	
		Boost Voltage	14.0~14.8V/28.0~29.6V @25℃(default:14.5/29V)	
		Equal Voltage	14.0~15.0V/28.0~30.0V @25℃(default:14.8/29.6V)(Liquid)	
		Float Voltage	13.0~14.5V/26.0~29.0V @25℃(default:13.7/27.4V)	
		Overcharge Protect	15.3V/31.3V	
		Low voltage disconnect	10.8~11.8V/21.6~23.6V(default: 11.2/22.4V)	
		Low voltage reconnect	11.4~12.8V/22.8~25.6V(default: 12.0/24.0V)	
		Temp compensation	-4.17 mV/K per cell (Boost, Equal) ;-3.33 mV/K per cell (Float)	
	Lithium	Charging voltage target	11.0~32.0V(Programmable)	
		Charging voltage recovery	9.5~31.8V(Programmable)	
		Low voltage disconnect	8.0 ~30.0V(Programmable)	
		Low voltage reconnect	8.6 ~ 31.0V(Programmable)	
		0°C Charge Protection	Yes, No, Slow(Programmable)	
Panel Para-meters	Day/Night threshold		Liquid, AGM, GEL: 3.0~8.0V/6.0~16.0V(Programmable) Lithium: 3.0~20.0V(default: 8.0/16.0V)	
	Day/Night delay time		0~30min(default: 0min)	
System Para-meters	Max. panel voltage		25V/50V	
	Dimensions		82 x 68 x 18.6mm	
	Weight		190g	
	Wire size		2.5mm²	4mm²
	Self consumption		10mA	
	communication mode		RS485	
	Grounding		Common Negative	
	Ambient temperature		-35℃ ~ +60 ℃	
	Degree of protection		IP67	
	Max. Altitude		4000m	