

Smart Series

Solar Charge Controller

(Infrared/RS485/IoT)

12/24V, 10/20A

User Manual

User Manual_Smart series_V1.0_QE
CE, RoHS, ISO9001:2015
Subject to change without notice!

Solar Charge Controller Smart Series User Manual

Dear Client,

Thank you for choosing the Smart series product! Before using this product, please read this manual carefully. This product manual provides some important recommendations related to the controller, including installation, operation, programming, and troubleshooting.

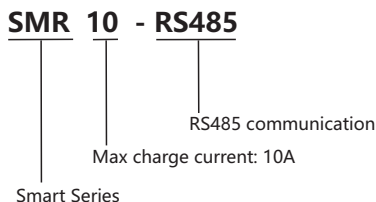
1. Product Overview

The Smart series solar charge controller is an intelligent programmable controller specifically designed for off-grid solar systems, which can reduce the overall system cost.

1.1 Features:

- Operating parameters and status can be read (via remote control).
- Five-stage time adjustment (adjustable via remote control).
- Clear and easy-to-read charging/discharging and fault indications.
- Automatic light control point adjustment function (adjustable via remote control).
- Applicable to FLD, AGM, GEL, and Lithium batteries.
- 12/24V system voltage automatic recognition (FLD, AGM, GEL).
- External temperature sensor with automatic temperature compensation (FLD, AGM, GEL).
- Four-stage PWM charging: Full charge, Boost charge, Equalization charge, Float charge (FLD, AGM, GEL).
- Automatic activation after lithium battery BMS protection (Lithium battery).
- Lithium battery overcharge protection and overcharge recovery voltage are adjustable (Lithium battery type, adjustable via remote control).
- Sturdy and durable aluminum housing, waterproof rating up to Ip67.
- Excellent EMC and thermal dissipation design.
- Standard Modbus protocol based on RS485 communication bus, with power supply capability on the interface.

1.2 Product Naming Rules



2. Safety Instructions and Disclaimer

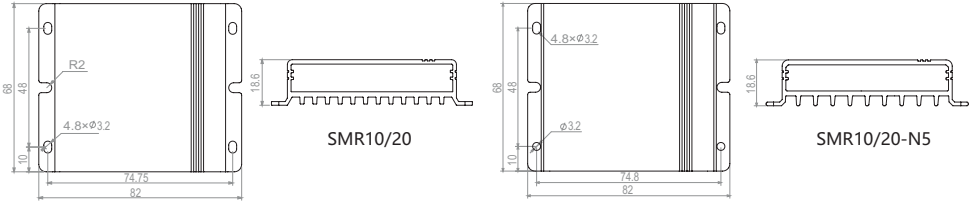
2.1 Safety Instructions

- ① The solar controller can only be used in solar photovoltaic systems. During installation and operation, this manual and the technical parameters provided by component manufacturers must be followed. No energy source other than solar modules may be connected to the controller.
- ② The battery stores a large amount of energy. Under no circumstances should the battery be short-circuited. It is recommended to connect a slow-acting fuse to the battery according to the controller's rated current.
- ③ Batteries can generate flammable gases. Keep the battery away from sparks, open flames, or unprotected fires, and ensure the battery storage area is well ventilated.
- ④ Do not touch or short-circuit wires or terminals, as some terminals or wires may carry voltages up to twice the battery voltage. When performing operations, keep your hands dry, use insulated tools, and stand on dry ground.
- ⑤ Keep children away from the battery and the controller.

2.2 Disclaimer

Please follow the safety recommendations of the battery manufacturer. If you have any questions, please contact the dealer or installer. The manufacturer assumes no responsibility for any losses caused by failure to comply with the recommendations or specifications mentioned in this manual, or by neglecting the recommendations of the battery manufacturer. The manufacturer also assumes no responsibility in cases where maintenance services are provided by unauthorized personnel, improper use occurs, incorrect installation is performed, or the system is improperly designed.

3.Dimensions(Unit:mm)



4.Installation

4.1 Electrical Connection Diagram

Connect the controller to the solar system in the order indicated in the diagram.

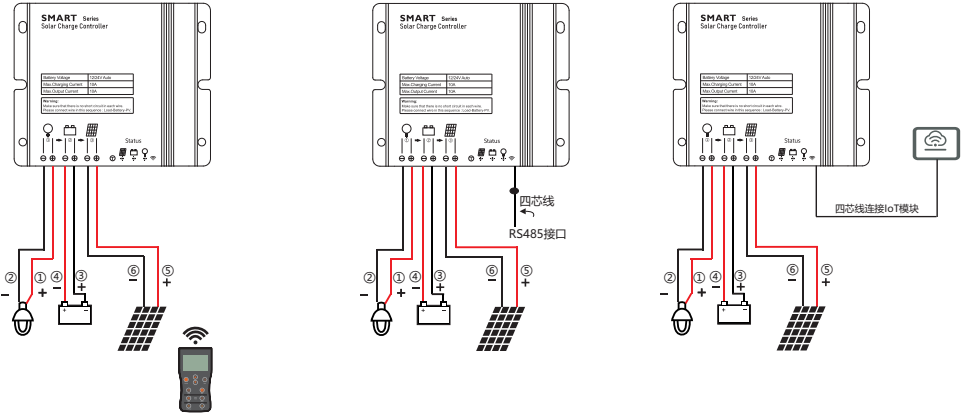


Figure 1. Infrared Communication

Figure 2. RS485 Communication

Figure 3. IoT Communication

RS485 (Optional):



Female connector

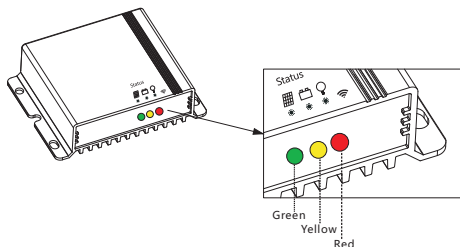
Num	Wire	RS485
1	Black	GND
2	Blue	RS485-A
3	Green	RS485-B
4	Brown	B+

Do not hot-plug this interface!
GND is not connected to B-!

4.2 Wiring steps

- ① If an external module is present, connect it first. (If no external module is present, proceed directly to step 2.)
 - ② Connect the positive and negative terminals of the load to the corresponding red and black wires, seal them with tape, and then proceed to the next step.
 - ③ Connect the positive and negative terminals of the battery to the corresponding red and black wires; the load will then turn on.
 - ④ Finally, connect the positive and negative terminals of the solar panel to the corresponding red and black wires. Wait a moment, and the controller will enter charging mode.
 - ⑤ Please refer to "9. Faults and Alarms" to confirm the controller's operating status via the LED indicators.
- Ensure that the cable length between the battery and the controller is as short as possible to prevent controller misjudgment caused by excessive voltage drop on the cable.
 - Recommended wire gauge: 10A: 2.5mm²; 20A: 4mm².

5.LED Status Indication



LED	Status	Function
Green LED	On	Not charged
	Fast flash(0.1s on/0.1s off)	Normal charging
	Flash(0.5s on/0.5s off)	Boost or Equalization charging(GEL,FLD,AGM)
	Slow flash(0.5s on/2s off)	Float Charging
Yellow LED	On	Battery is normal
	Slow flash(0.5s on/2s off)	Battery voltage is low
	Fast flash(0.1s on/0.1s off)	Low voltage protection
	Off	Over voltage protection
Red LED	Off	Work normal
	On	Output power is 0
	Flash(0.5s on/0.5s off)	Over temperature protection
	Fast flash(0.1s on/0.1s off)	Short circuit and overcurrent protection *

*If the controller is in multiple protection states at the same time, the priority order for displaying fault information is: Short circuit protection → Overcurrent protection → Low voltage protection → Overvoltage protection → Overtemperature protection → Open circuit protection.

6.Factory default settings

6.1 Read the running status

Press the "Status" key of the SU10G to read the running status of the controller.

Num	Name	Name describe	Unit	Example
	Status :	Charge		
1	BattVolt	Battery voltage	V	12.5V
2	LoadCurr	Load current	A	0.00A
3	Load V	Load voltage	V	15.0V
4	PV	PV voltage	V	50.0V
5	PV I	PV current	A	3.0A
6	Energy	Total generating capacity	AH	15AH
7	OD Times	Over discharge times	Times	0
8	FC Times	Fully charge times	Times	0
9	Day1-HV	A day ago highest voltage	v	14.5V
10	Day1-LV	A day ago lowest voltage	v	12.8V
11	Day2-HV	Two days ago highest voltage	v	14.6V
12	Day2-LV	Two days ago lowest voltage	v	12.2V
13	Day3-HV	Three days ago highest voltage	v	14.3V
14	Day3-LV	Three days ago lowest voltage	V	11.9V

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6.2 Factory default settings

Press the "Data" key of the SU10G to read the controller's setting parameters.

Num	Name	Default settings	Setting range
1	Time1	24H	0~6.5H+D2D
2	Dim1	100%	0/100% *1
3	Dim NP1	—	— *2
4	Time2	0H	0~7.5H
5	Dim2	100%	0/100%
6	Dim NP2	—	—
7	Time3	0H	0~7.5H
8	Dim3	100%	0/100%
9	Dim NP3	—	—
10	Time4	0H	0~7.0H+TOT
11	Dim4	0%	0/100%
12	Dim NP4	—	—
13	Time5	0H	0~7.5H
14	Dim5	100%	0/100%
15	Dim NP5	—	—
16	D/N Thr	5.0V	3.0~20.0V
17	D/N Dly	0m	0~30min
18	Load I	—	—
19	Dim Auto	—	—
20	Battery	GEL	LI/GEL/FLD/AGM
21	LVD	11.2V	10.8~12.0V
22	LVR	12.0V	11.4~12.8V
23	Delayoff	—	—
24	Password	—	—

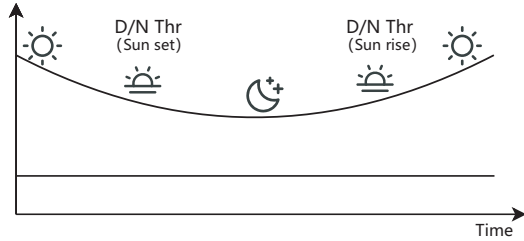
***1** Indicates that here, 0 and 100% can be set. Values other than 0 default to 100% as well.

***2** The "—" position may have a numerical value, but it has no practical meaning.

7. Operation Modes

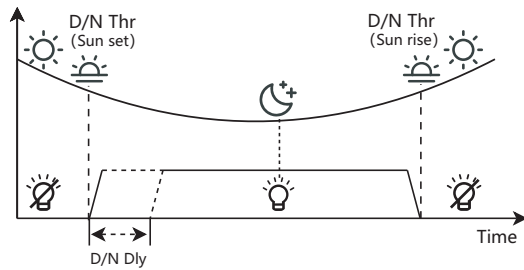
The Smart series controller features advanced load control functions. The time and method of load activation can be flexibly programmed according to customer needs.

7.1 Normally On Mode (24H)



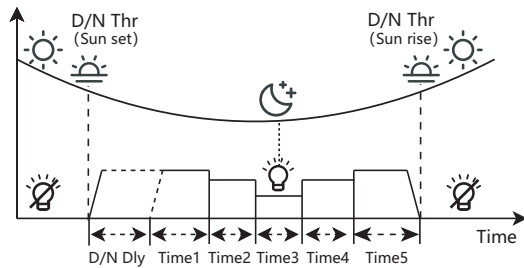
After setting SU10G "Time1" to 24H and sending it to the controller, the load output of the controller will remain on continuously.

7.2 Dusk to Dawn(D2D)



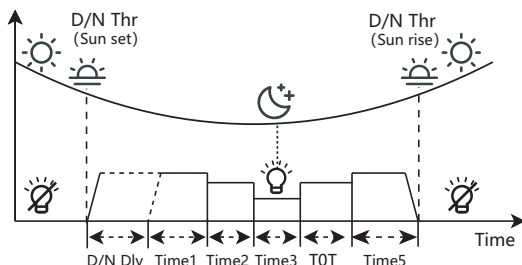
When the Smart series controller is set to D2D mode, the "Dim1" set at the "Time1" is effective for the entire time period.

7.3 Five-stage night mode



By setting time points 1 to 5 and their corresponding power levels via the SU10G smart remote control, various time and power combination modes can be achieved.

7.4 T0T mode (Can set the load on time before morning coming)



On the SU10G smart remote control, time point 4 can be set to T0T mode. If the load is required to be turned off during the T0T time period, set the power of time point 4 to 0%.

※ When “Time4” is set to T0T mode, “Time1” cannot be set to D2D.

8.Default Voltage Parameters,Threshold,Advanced Settings

8.1 Default Voltage Parameters Table

Battery type	AGM	GEL	FLD	Range	LI	Range
OVD	15.5V	15.5V	15.5V	/	14.6V	/
OVr	15.0V	15.0V	15.0V	/	14.4V	/
Equalization	14.7V	/	14.8V	/	/	/
BCV	14.5V	14.5V	14.5V	/	14.4V	11.0~32.0V
BVR	/	/	/	/	14.0V	9.5~31.8V
Float	13.6V	13.7V	13.7V	/	/	/
LVD	11.2V	11.2V	11.2V	10.8~12.0V	10.6V	8.0~30.0V
LVR	12.0V	12.0V	12.0V	11.4~12.8V	12.0V	8.6~31.0V
Remarks	/				The setting range for LI batteries is the same for both 12V and 24V systems.	

※ AGM, GEL, and FLD battery voltage parameters are all for 12V systems. For 24V systems, the values are automatically multiplied by 2.

※ For lithium batteries, the setting range can be configured according to the battery type and the number of cells in series.

8.2 Low Voltage Disconnect(LVD) and Low Voltage Reconnect(LVR)

1.GEL, FLD and AGM

LVD setting range:10.8~12.0V/21.6~24.0V(Default:11.2V/22.4V);

LVR setting range:11.4~12.8V/22.8~25.6V(Default:12.0V/24.0V).

2.Lithium

LVD setting range:8.0~30.0V(Default:10.6V);

LVR setting range:8.6~31.0V(Default:12.0V).

※1.After the controller enters the low voltage protection state, it can only recover when the battery is recharged by the controller and reaches the set “LVR” voltage.

※2.The LVR should be at least 0.6V/1.2V higher than the LVD.

8.3 Boost Charging Voltage(BCV) and Boost Voltage Reconnect Voltage(BVR)(Lithium)

BCV setting range:11.0~32.0V(Default:14.4V);

BVR setting range:9.5~31.8V(Default:14.0V).

8.4 Day/Night Threshold, Day/Night Delay

The controller automatically distinguishes between day and night by measuring the open-circuit voltage of the solar panel. Depending on the geographical location and the type of solar panel used, users can manually set different light control point voltages (the threshold voltage between day and night).

When night falls, once the solar panel voltage reaches the set light control point, different light control delay settings can be used to postpone the time when the light turns on at night.

Day/Night threshold setting range:

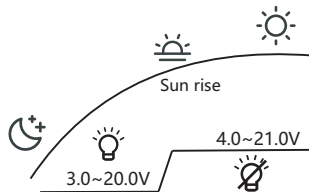
GEL,AGM and FLD: 3.0~8.0V/6.0~16.0V(Default:5V/10V);

Lithium:3.0~20.0V(Default:5V).

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

①Lithium:

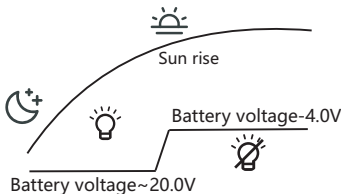
When the Day/Night threshold is lower than the battery voltage, the load off light control point voltage is 1V higher than the set value. This means that during the early morning, the load will only turn off when the solar panel voltage is between 4.0V and 21.0V.



②GEL,AGM and FLD:

When the Day/Night threshold is lower than the battery voltage, the load off Day/Night threshold voltage is 1V higher than the set value (for 12V systems); when the battery voltage is 24V, the load will only turn off when the load off Day/Night threshold voltage is 2V higher than the set value.

③When the Day/Night threshold is higher than the battery voltage, the load off Day/Night threshold voltage is (battery voltage - 4.0V).



※ 1.The Day/Night threshold should be set to approximately 0.22 times the open-circuit voltage of the solar panel.

※ 2.The controller features an automatic light control point adjustment function. If the minimum night voltage of the solar panel is higher than the controller's Day/Night threshold, the controller will not be able to enter the discharge state that night, and the load will have no output. After 24 hours, the controller will automatically adjust the Day/Night threshold to meet the night lighting requirements.

8.5 Advanced Settings

This function can only be viewed visually using the remote control; the controller provides no indication.

①Once the short-circuit protection switch (On/Off) is successfully set via the remote control, it will take effect immediately: Capacitive loads may draw a large inrush current at startup, which could trigger the controller's short-circuit protection and cause the output to shut down. In this case, the user can disable the short-circuit protection function. This function is On by default. Setting suggestion: It is recommended to keep the default value.

Setting	N	Key	
01SCP	Key :	Yes	
02PWM	Key :	Yes	
03OTP	Key :	75	

②Once the PWM switch (On/Off) is successfully set via the remote control, it will take effect immediately: PWM may cause noise and interference in the system, especially when using lithium batteries with a BMS. PWM charging may trigger BMS protection, causing system failure. Therefore, the customer can choose to turn off PWM. In this mode, once the battery voltage is charged to the preset voltage, the controller immediately stops charging. When the battery voltage drops back down, charging will resume.

This function is On by default. Setting suggestion: It is recommended to keep the default value.

③Remote control over-temperature protection setting: The over-temperature protection value can be adjusted between 55°C and 87°C. When the internal temperature exceeds this set value, the controller will activate over-temperature protection and stop working. Over-temperature protection default value: 75°C.

9. Faults and Alarms

Fault	Status	Reason	Remedy
Load are not powered	low voltage protection	Battery capacity is low	Load will be reconnected when battery is recharged
	Overcurrent, short protection circuit	Loads are over current or short circuit	Switch off all loads, remove short circuit, load will be reconnected after 1 minute automatically
	Over temperature protection	Controller temperature is too high	Load reconnects after temperature reduces
High battery voltage	Over voltage protection	High battery voltage *	Check if other sources overcharge the battery. If not, controller is damaged
		Battery wires or damaged battery fuse battery has high resistance	Check battery wires, fuse and battery.
Unable to recognize the system voltage	The red, yellow, and green lights flash at the same time	The battery voltage is out of the normal range during startup	Charge or discharge the battery to keep the battery voltage within the normal operating range
Battery is empty after a short time	Low voltage protection	Battery has low capacity	Change battery
Battery can't be charged	The green light stays on	PV panel fault or reverse connection	Check panels and connection wires

*Lithium battery: Battery voltage too high > (overcharge protection voltage + 0.2V);
GEL, AGM, and FLD batteries: Battery voltage too high > 15.5V / 31.0V.

10.Safety Features

- **Waterproof Protection**

Waterproof rating: Ip67

- **Lithium Battery BMS Overcharge Detection Protection**

When the controller detects BMS overcharge protection, it immediately stops charging to prevent high voltage from the PV side from being continuously applied across the BMS, which could cause BMS damage due to overvoltage.

- **Lithium Battery Low-Temperature Charging Protection**

When 0°C charging prohibition is enabled and the ambient temperature drops below 0°C, the controller stops charging to prevent irreversible damage to the lithium battery caused by low-temperature charging.

- **High-Temperature Protection**

When the ambient temperature or the controller's internal temperature becomes too high, the controller stops charging and discharging to prevent the risk of damage to the lithium battery or controller due to excessive temperature.

- **Battery Reverse Polarity Protection**

If the battery is connected in reverse, the system will not operate and the controller will not be damaged.

- **PV Input Overvoltage Protection**

If the input voltage of the solar panel is too high, the controller will automatically disconnect the PV input.

- **PV Input Reverse Polarity Protection**

If the PV array is connected with reverse polarity, the controller will not be damaged. After correcting the wiring error, normal operation will resume.

- **Load Power Limiting Protection**

When the load current set by the user is too high, the controller outputs the rated load power to ensure that the controller and LED load are not damaged.

- **Load Short-Circuit Protection**

When a short circuit occurs, the controller will immediately cut off the load output to prevent damage to the controller. Once the short circuit condition is cleared, the controller will automatically restore output after a short moment.

- **Load Open-Circuit Protection**

If the LED load is operating normally and the load wiring suddenly becomes disconnected, the controller will immediately turn off the load output to protect the controller from damage. After the load wiring is reconnected, the controller will automatically restore output within 1 minute, or output can be restored by pressing the test button on the remote control.

- **Night Reverse Charging Protection**

Prevents the battery from discharging through the solar panel at night.

- **TVS Lightning Protection**

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11. Technical Parameters

	Item	Standard product	SMR10/SMR10-N5	SMR20/SMR20-N5
		Suffix Description	RS485: 485 communication IoT: Internet of Things communication	
Battery parameters	Max. charging /discharging current		10A	20A
	System Voltage		12/24V	
	Max volt on Bat. Terminal		40V	
	Battery Type		FLD, GEL, AGM and Lithium(Programmable, default: GEL)	
	Temp. Compensation		-4.17mV/K per cell(Boost, Equalization), -3.33mV/K per cell(Float)	
Panel parameters	Dusk/Dawn detect volt.		FLD,AGM and GEL: 3.0~8.0V/6.0~16.0V(Programmable) Lithium: 3.0~20.0V(Programmable)	
	Day/Night delay time		0~30min(Programmable)	
	Max volt on PV terminal		25V/50V	
System parameters	Dimensions		68*82*18.6mm	
	Net weight		190g	
	Wire size		2.5mm ²	4mm ²
	Self consumption		10mA	
	Communication mode		Infrared/RS485/IoT	
	Ambient temperature		-35℃ ~ +60℃	
	Ambient humidity		IP67	
	Max. Altitude		4000m	

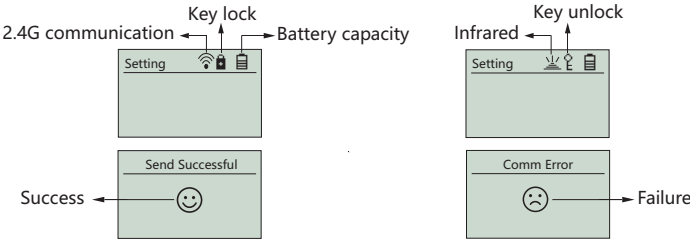
Note: The values before and after the slash apply to 12V and 24V systems respectively.

12.Remote Control Introduction

12.1 Remote Control Diagram



12.2 Remote Control Icon Positions and Descriptions



★Battery capacity indication:

	Capacity $\geq$ 75%
	50% $\leq$ Capacity < 75%
	25% $\leq$ Capacity < 50%
	Capacity < 25%

12.3 Remote Control Button Descriptions

Key	Function	Key	Description
	Parameter setting/confirmation		Test the setting
	1.Menu Page Up 2.Increase the setting data		Read Parameters
	1.Menu Page Down 2.Decrease the setting data		Read running status
	Return to the menu/exit		Send dormancy command
	Send Parameters		Function keys(Combined application)

Combina- tion keys	Function	Combina- tion keys	Description
+	Enter the remote controller setting interface	+	Turn on the light / Switch to SOS mode
+	Lock/Unlock parameter settings	+	Advanced function setting interface
+	Switch between old and new versions	/	/