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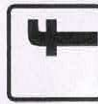
V.1

SUOER®

MPPT SOLAR CONTROLLER
SMP series



USER MANUAL



@SuoerGroup

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MADE IN CHINA

MPPT

30A/40A/50A/60A/80A/100A

Product Overview

Thank you for choosing the SMP series MPPT controller. The new generation MPPT controller produced by our company is a product developed based on the latest technology and represents the latest development level of photovoltaic technology. This product has many excellent performances:

- Excellent heat dissipation design and intelligently controlled cooling fan.
- Innovative maximum power point tracking technology can significantly improve the energy utilization of solar systems, with conversion efficiency as high as 98%.
- Optional charging procedures for lead-acid batteries, lithium iron phosphate batteries and ternary lithium series batteries. In addition, users can also make customized inputs based on their own battery parameters.
- The controller has overcharge, over-discharge, overload and automatic protections.

This controller is used in solar off-grid systems (independent systems) to automatically adjust charging and discharging. MPPT control has an advanced tracking algorithm to obtain the maximum power of the solar cell module to charge the battery; at the same time, its low voltage disconnect (LVD) function can prevent damage caused by excessive discharge of the battery. The battery charging process of the MPPT controller is optimized to extend battery life and improve system performance. Its comprehensive self-test functions and electronic protection features prevent controller damage due to installation errors and system failures. Although the SEP4860NE9 MPPT controller is easy to operate and use, in order for you to better use all the functions of the controller and improve your photovoltaic system, please read the instructions and instructions in this manual carefully.

Features of MPPT

The SMP series MPPT controller uses maximum power point tracking technology to extract the maximum power from the solar array to charge the battery. The maximum power point tracking method is completely automatic and does not require user adjustment. When the array maximum power point changes with environmental conditions, the controller automatically tracks the array maximum power point to ensure that the maximum energy of the day is obtained from the solar array.

• Increase current

In most cases, maximum power point tracking technology will "increase" the charging current of the solar power generation system. Assume that a system may have 10 amps of current flowing from the solar array to the MPPT controller, then 12 amps of current will flow out of the MPPT controller to the battery. The MPPT controller does not generate current! The energy input to the MPPT controller is equal to its output energy. Since power is the product of voltage and current (volts x amperes), the following conditions are true:

- (1) MPPT controller input energy = MPPT controller output energy
- (2) Input voltage x input current = output voltage x output current

* Assume 100% efficiency, ignoring power losses in wires and conversion processes.

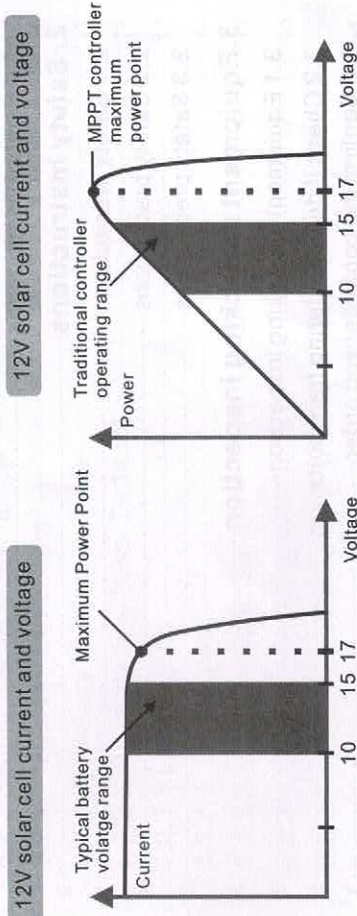
If the maximum power point voltage V_{mp} of the solar array is greater than the battery voltage, the battery charging current must be proportionally greater than the solar array output current so that the input and output power can be balanced. The greater the difference between the V_{mp} voltage and the battery voltage, the greater the current enhancement. Current enhancement is extremely important in the system because the maximum power point voltage V_{mp} of the solar panel in a solar power generation system is usually higher than the battery voltage.

Features of MPPT

• Advantages compared to traditional controllers

When charging, traditional controllers connect the solar array directly to the battery. This requires the solar array to operate in a voltage range that is usually lower than V_{mp} . Taking a 12V system as an example, the battery voltage range is usually 11-15V, but the V_{mp} voltage of the solar array is usually about 18V.

The pictures below are showing the current, voltage and output power curves of a typical off-grid solar cell with a nominal rated voltage of 12V.



The maximum power point voltage V_{mp} of the solar PV array is the voltage when the output power (amperes x volts) is the maximum, which is at the "knee" of the solar PV array I-V curve as shown in the left picture above.

Since traditional controllers do not always operate at the solar PV array V_{mp} , energy is wasted, which could have been used to charge the battery and provide power to the system load. The greater the difference between the battery voltage and the solar PV array V_{mp} , the more energy is wasted. The MPPT controller will always operate at the maximum power point, reducing energy waste compared to traditional controllers.

• Factors that limit the efficiency of the maximum power point tracking controller

The V_{mp} of the solar PV array decreases as the temperature of the array increases. In hot weather, the V_{mp} may be close to or even lower than the battery voltage. In this case, the MPPT controller will obtain little or no energy compared to the traditional controller. However, as long as the nominal voltage of the system PV module is higher than the battery bank voltage, the V_{mp} of the PV module will always be higher than the battery voltage. In addition, since the current of the solar array is reduced, the wiring is saved, which makes the MPPT controller have a clear advantage even in hot weather.

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This manual introduces the operation of MPPT solar charge controller.

1.1 Validity

This manual is applicable to our SMP series MPPT solar charge controller

1.2 Target groups

This manual is intended for installers and operators.

1.3 Before installing and operating the controller, please read it first and keep it in a safe place for easy reference.

1.3 Symbol Descriptions

The following are descriptions of the symbol types that appear in this user manual:

	Warning! "Warning" indicates a situation that, if happens, could result in machine failure or an accident.
	Danger! "DANGER" indicates a situation that, if happens, could result in machine failure or an accident.
	Attention! "DANGER" indicates a situation that, if happens, could result in machine failure or an accident.

2. Safety Precautions

2.1 Safety Precautions

	Warning! - The input voltage range of this controller is large, please operate with caution, otherwise it may cause personal injury; - All work on the charging controller must be operated by a technician; - The device cannot be operated by children or people with poor physical sensory ability and mental ability or lack of experience and knowledge; - The device cannot be operated by children or people with poor physical sensory ability and mental ability or lack of experience and knowledge;
	Warning! High heat enclosure components. Please install in an environment with good heat dissipation and ventilation.
	Warning! Radiation can damage your health. Do not stay less than 20 cm with the solar charge controller for a long time.

2.2 Symbol Description

This section gives a description of the symbols that appear on all equipment labels.

Logo	Description
	Risk of electric shock; The energy stored in the capacitor will still exist five minutes after disconnection. Do not touch the internal components for five minutes after disconnection.
	There are no self-detecting parts inside the machine, do not try to remove the cover; only professionals can operate and maintain the equipment; please use insulated tools when doing so to reduce the risk of harm.
	Beware of hot casing The solar charge controller will become hot during operation. Avoid contact during operation; do not place any objects on the device and do not block the fan vents.

2.3 Safety Instructions

When using this device, please keep in mind the following information to avoid fire, lightning strike, or other personal injury.

	Warning! Make sure the input voltage is ≤ the specified maximum voltage. Excessive voltage may cause permanent damage to the solar controller and will not be covered by the warranty. This chapter contains important safety and operating instructions. Read and keep this operating manual for future reference.
	Warning! Make sure the input voltage is ≤ the specified maximum voltage. Excessive voltage may cause permanent damage to the solar controller and will not be covered by the warranty. This chapter contains important safety and operating instructions. Read and keep this operating manual for future reference.

- Before using the solar charging controller, read all instructions and warnings on the solar charging controller and the corresponding chapters of this manual;
- Please use the parts recommended or sold by our company;
- To avoid the risk of fire and electric shock, ensure that the existing circuit is in good condition and the wire size is suitable. Do not operate when the solar controller is damaged and the wiring is unqualified;
- To avoid the risk of fire and electric shock, ensure that the existing circuit is in good condition and the wire size is suitable. Do not operate when the solar controller is damaged and the wiring is unqualified;
- The installation location should be away from moisture or corrosive substances
- To avoid short circuits, technicians must use insulating tools to operate the equipment.

3. Equipment unpacking inspection

3.1 Accessories are included

NAME	Quantity	Remark
Solar controller	1	
User manual	1	

*If you find that you are missing any parts, please contact your dealer.

3.2 Check for damage during transportation

After receiving the device, do not rush to sign for it. Please open the package and check whether the device has obvious damage such as deformation or cracks in the shell. If there is such damage, please refuse to sign for it and contact the dealer.

3.3 Confirm the solar controller

There is a label on the side of the case for the charge controller. If you find that it does not match the one you purchased, please contact the dealer.

4. Controller Installation

*Installation must be completed by professional technicians

4.1 Installation must be completed by professional technicians

	Danger: The case of charging controller will become hot during operation. - Do not install on the flammable building material; - Do not install nearby the highly flammable material; - Do not install in the potentially dangerous explosion area; - Do not install the charging controller in direct sunlight in order to avoid the loss caused by overheating.
	Warning: The controller has built-in thermal storage module components. Do not touch the controller while it is working and the case is open.

4.1 Size

Model	Size
SMP-4830	
SMP-4840	
SMP-4850	
SMP-4860	303X230X105mm
SMP-4880	
SMP-48100	

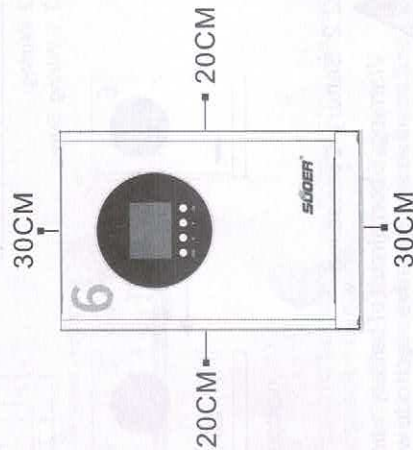
4.1.2 Environmental conditions

- Mounting on solid surface;
- The installation location must be accessible at all times;
- The installation location must be accessible at all times;
- The ambient temperature should be between -20 and 50°C to ensure the best working environment;
- Do not install the charge controller in direct sunlight to avoid power loss due to overheating.

4.1.3 Safe distance

Observe the following safety clearances and ensure that other equipment or objects are not within this range to ensure sufficient heat dissipation space.

Details	Safety distance
Side	20CM
Top	20CM
Down	30CM

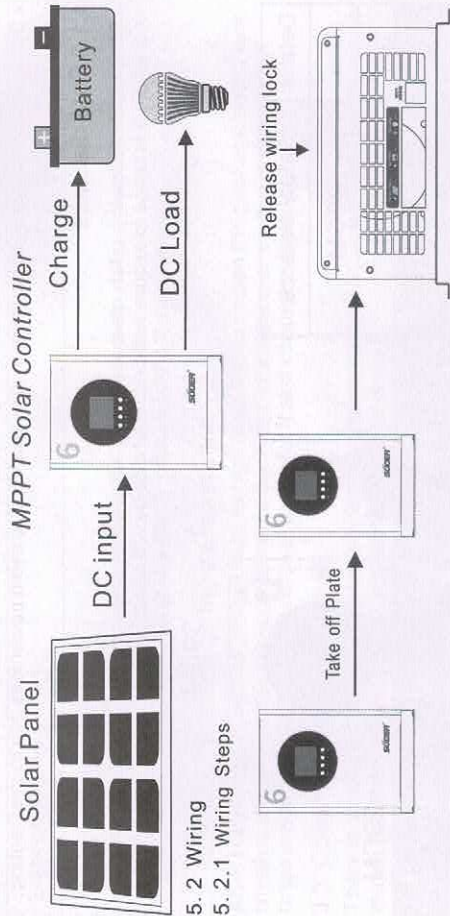


5. MPPT controller connection

	Danger! Solar charge controllers can cause life-threatening situations if high voltage input or operated not correctly - Use a disconnect device to disconnect the solar panel array and avoid accidental activation of power-on; - Disconnect the circuit breaker and make sure it cannot be reconnected; - Make sure there is no voltage in the system.
	Warning: Overvoltage damages the system. Thunderstorms and lightning increase the risk of damage to the external overvoltage protection field.

5. MPPT Controller Connection

5. 1 Combination of Solar Charging System

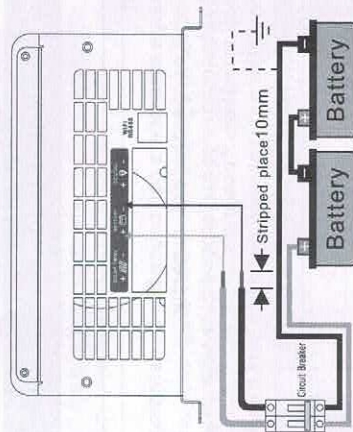


5. 2 Wiring

5. 2.1 Wiring Steps

5. 2.2 Battery Connection

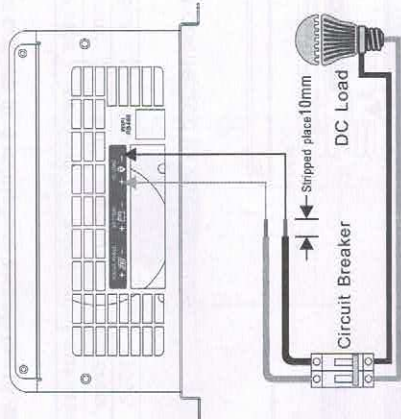
Warning: Short circuit of battery's positive and negative terminals and wires of positive and negative electrode will lead to fire or risk of explosion. Please operate carefully.



Note: The battery pack must be connected with the circuit breaker turned off.

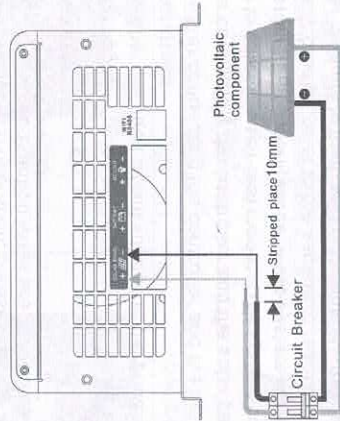
5. 2.3 DC Load Connection

Controller "DC LOAD" side can be connected to the DC power equipment whose rated operating voltage is same with battery's rated voltage. The controller supplies electricity with battery voltage.



5. 2.4 Photovoltaic component connection

Warning: Electric shock danger! Photovoltaic component may produce very high voltage, so be careful electric shock when wiring. Controller can match 12V, 24V, 48V off grid system solar component, it's also can use a grid-connected component that open-circuit voltage does not exceed the specified maximum input voltage. The solar component voltage in the system must be not lower than the system voltage.



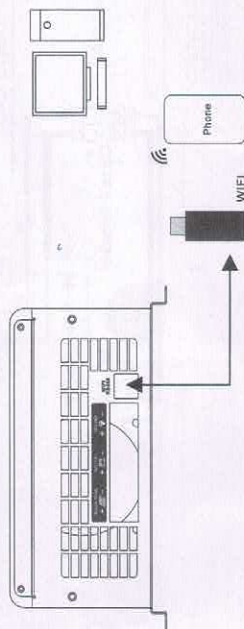
Note: The PV panels must be connected with the circuit breaker disconnected.

5. MPPT Controller Connection

5.2.5 Specifications of cables and miniature circuit breakers

Model	SMP-4830	SMP-4840	SMP-4850	SMP-4860	SMP-4880	SMP-48100
Cable (copper)	6mm ²	8mm ²	10mm ²	16mm ²	20mm ²	25mm ²
Circuit Breaker	50A	63A	63A	100A	125A	150A

5.2.6 MPPT controller connected to WIFI Module.



WIFI module is an optional part, if necessary, please contact suppliers, distributors, agents to purchase. Accessories with detailed instructions, the user can monitor the machine operation data and status through the mobile phone or computer web page.

5.3 Power on and test run

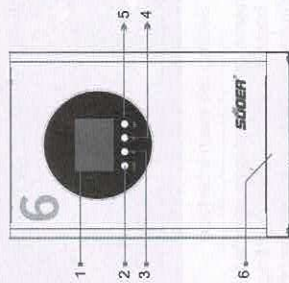
! Note: Before powering on for trial operation, please check that all positive and negative poles of the DC connection wires are connected correctly.

Follow the steps below to test run:

1. Check that the positive and negative poles of the connection wires are completely connected correctly, and measure whether the open circuit voltage of the photovoltaic module is within the working range of the controller;
2. First turn on the circuit breaker connecting the controller and the battery;
3. Turn on the circuit breaker connecting the controller and the solar panel;
4. Then the controller starts to enter the self-test mode: if the system conditions are correct, the controller automatically enters the working mode; if the system conditions are incorrect, the controller will display a fault prompt, refer to the section to resolve the fault.
5. Battery type, the controller defaults to lead-acid maintenance-free battery, refer to the battery type setting.

6. MPPT Controller Operation Instructions

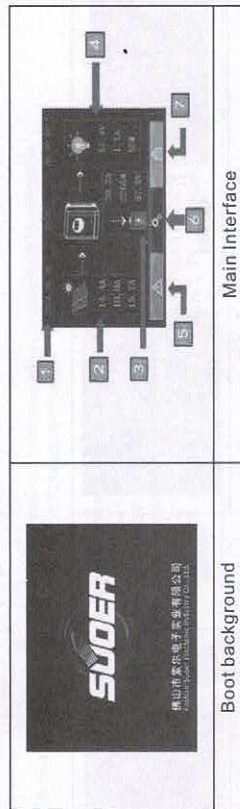
6.1 Panel Components Description



No	Name	No	Name
1	LCD display	4	Up
2	Menu	5	Enter
3	Down	6	Junction box cover

6.2 LCD Display Description

6.2.1 Main interface description



Number	Description
1	Date
2	Solar (PV input voltage, current and power)
3	Battery (charge and discharge current, power and battery voltage)
4	Load (output voltage, current and power)
5	Alarm (green means no fault, red means fault)
6	Settings options
7	Information options

6.MPPT Controller Operation Instruction

6.2.3 Setting interface description

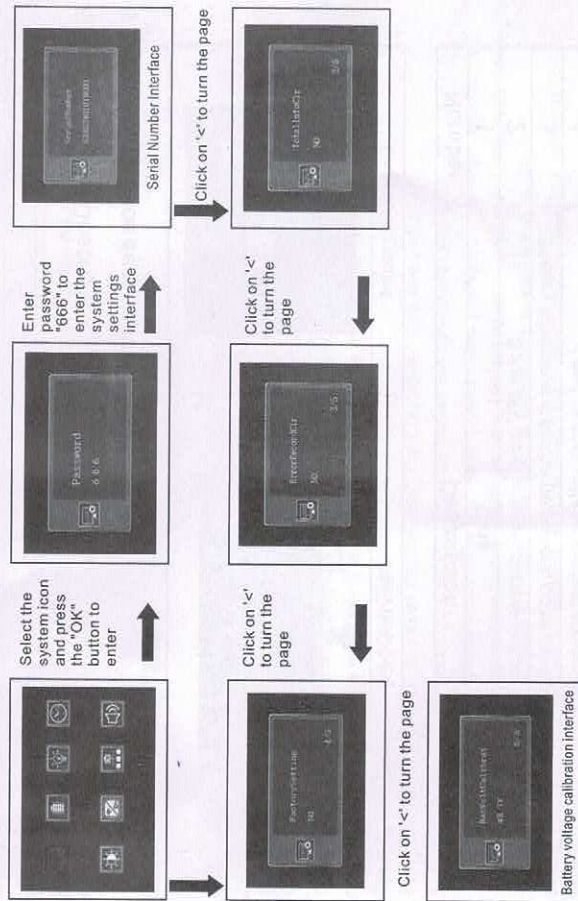


Setting the main interface

There are eight configurable items in the settings interface, starting from the upper left corner, they are system settings, battery settings, load settings, time settings, brightness settings, language settings, communication settings and sound settings.

6.2.3.1 "System" explanation

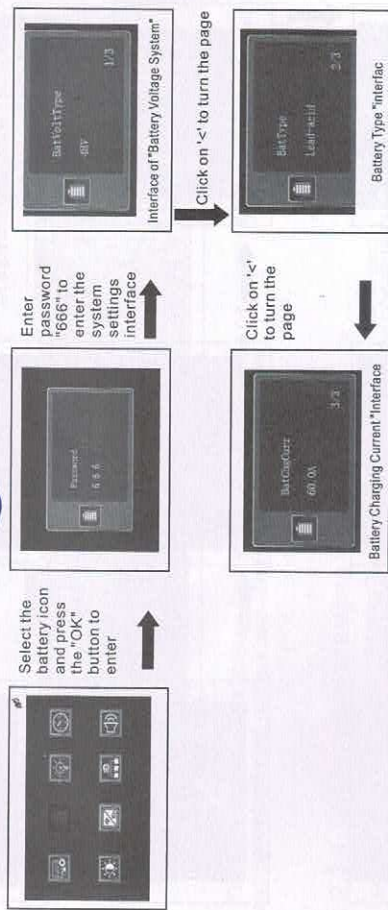
On the settings interface, press the ">" or "<" key to select battery settings, then press the "OK" key, and then enter the password "666" to enter the system settings interface.



Users can query serial numbers, clear statistics, clear fault records, restore factory settings, and calibrate battery voltage on the system interface.

6.2.3.2 "Battery" setting

On the settings interface, press the ">" or "<" key to select battery settings, then press the "OK" key, and then enter the password "666" to enter the system settings interface.



In the battery interface, users can select the battery voltage system, connect the battery type and the battery charging current, and even customize the battery parameters, which enables the connection of multiple battery systems and battery types, making it more convenient and comfortable for users to use. As shown in the following table:

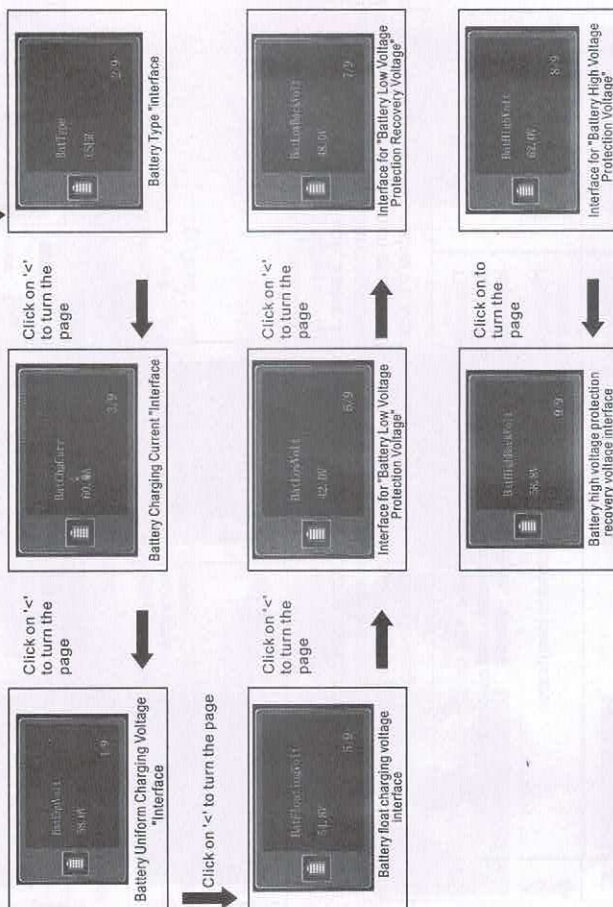
Battery voltage system	The battery voltage system as follows: 12V voltage system, 24V voltage system, 48V voltage system and automatic identification battery voltage system. PS: Only lead-acid batteries have the automatic identification battery voltage system function.
Battery type	In the battery type, users can choose: lead-acid battery, lithium iron phosphate 3.2V*4 cells, lithium iron phosphate 3.2V*8 cells, lithium iron phosphate 3.2V*15 cells, lithium iron phosphate 3.2V*16 cells, ternary lithium 3.7V*3 cells, ternary lithium 3.7V*6 cells, ternary lithium 3.7V*7 cells, ternary lithium 3.7V*13 cells, ternary lithium 3.7V*14 cells and user-defined.
Battery charging current	Charging current can be set in the range of 5~60A (setting step is 5A/level)

6.2.3.2.1 Battery type "User Defined"

If the user's battery does not meet the available battery types, users can set the battery type that suits him according to his battery parameters in the "User Defined" option in the battery type.

As shown below

Select the battery icon in the settings interface, click the "OK" button, enter the password to enter the battery settings, and the "Battery Type" interface, click the "OK" button, then use the "<" button to flip pages, find the "User Custom" option, click the "OK" button to return to the main interface, and then start setting according to the above operation.

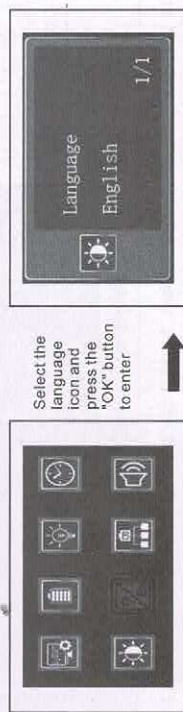


The above is the user-defined operation of the battery type. When using this function, please understand your battery parameters clearly before using this function. If the battery is damaged due to the user setting the wrong parameters, company will not be responsible.

PS: After the user selects a new battery type option, it will automatically jump to the main interface and the user needs to re-enter the battery settings. At this time, the lower right corner of the battery settings will change from the original 3 pages to 9 pages, and the user can then set the battery parameters.

6.2.3.6 Language setting.

In the setting interface, press the ">" or "<" key to select the language setting, and then press the "OK" key to enter the language setting interface. Select the language icon and press the "OK" button to enter



The language options include Chinese and English. Users can choose the appropriate language according to their own language habits.

6.2.3.7 Communication setting

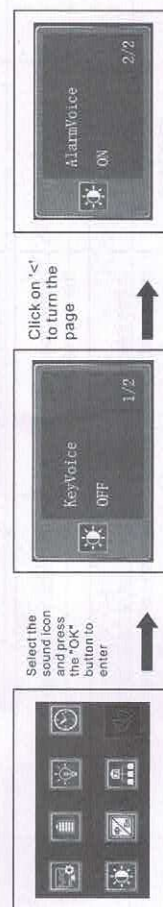
In the setting interface, press the ">" or "<" key to select the communication icon and press the "OK" button to enter the settings interface, press the ">" or "<" key to select the communication settings, then press the "OK" key to enter the communication settings interface.



Users can select the corresponding baud rate according to different communication signals.

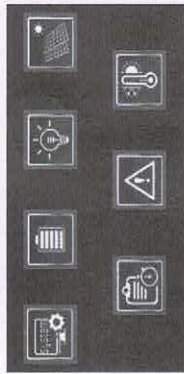
6.2.3.8 Sound setting

In the setting interface, press the ">" or "<" key to select the sound setting, then press the "OK" key to enter the sound setting interface.



Users can choose the volume and alarm sound according to their needs.

6.2.4 Information interface description



Information main interface

Users can query system information, battery parameter information, load parameter information, photovoltaic input information, relevant statistical information, alarm history records and machine working parts temperature on the information interface.

Interface	Information
System information interface	In this interface, you can query the current device model, software version number, hardware version number, communication protocol version number, serial number and other information.
Battery information interface	In this interface, you can query the current battery voltage system, battery type, battery identification voltage, battery charging current, battery equalizing charging voltage, battery floating charging voltage, battery low voltage protection voltage, battery low voltage protection recovery, battery high voltage protection voltage, battery high voltage protection recovery and other information.
Load information interface	In this interface, you can query the current device's maximum load protection current, load output mode and other related information.
Photovoltaic input information interface	In this interface, you can query the current device's maximum photovoltaic input voltage, MPPT operating voltage range, maximum photovoltaic input power and other information.
Information statistics interface	In this interface, you can query the current equipment's operating time, total power generation, total discharge, daily power generation, daily discharge, daily maximum charging power and other statistical information.
Alarm information interface	In this interface, you can query the alarm information statistics of the current device.
Temperature information interface	In this interface, you can query the input radiator temperature and output radiator temperature information of the current device.

7. Technical Parameter

Model: SMP series MPPT		SMP-4830	SMP-4840	SMP-4850	SMP-4860	SMP-4880	SMP-48100
Charging Mode	MPPT automatic maximum power point tracking						
Charging Method	Three stages: constant current (MPPT), equalization charge, floating charge.						
System Type	12V/24V/48V	Automatic identification (lead-acid battery only) / manual setting					
System identification voltage range	12V System	DC8V- DC16V					
	24V System	DC16V- DC32V					
	48V System	DC32V- DC64V					
Static power consumption	12V/24V/48V	≤5W					
Efficiency	12V/24V/48V	≥95.5%					
Photovoltaic module utilization rate	12V/24V/48V	≤99.9%					
Input Characteristics							
MPPT Working voltage range	12V System	DC18V-DC150V					
	24V System	DC36V-DC150V					
	48V System	DC72V-DC150V					
Input low voltage protection	12V System	DC14V					
	24V System	DC28V					
	48V System	DC56V					

Technical Parameter

Input low voltage recovery (Lead-acid battery as an example)	12V System	DC16V					
	24V System	DC32V					
	48V System	DC64V					
Input overvoltage protection		DC180V					
Input overvoltage recovery		30A 40A 50A DC170V 40A					
Maximum solar panel input power	12V System	450W	600W	750W	900W	1200W	1500W
	24V System	850W	1150W	1400W	1700W	2300W	2900W
	48V System	1700W	2250W	2850W	3400W	4500W	5700W
Optional battery types (Default is lead-acid)		12V/24V/48V		Lead acid, lithium iron phosphate 3.2V * 4, lithium iron phosphate 3.2V * 8, lithium iron phosphate 3.2V * 15, lithium iron phosphate 3.2V * 16, ternary lithium 3.7V * 3, ternary lithium 3.7V * 6, ternary lithium 3.7V * 7, ternary lithium 3.7V * 13, ternary lithium 3.7V * 14 (It can also be customized to charge other types of batteries)			

MODEL	SMP-4830	SMP-4840	SMP-4850	SMP-4860	SMP-4880	SMP-48100
Rated current 12V/24V/48V	30A	40A	50A	60A	80A	100A
Protection level	Ip21					
Environmental requirements						
Humidity	0~90%RH (No fogging)					
Altitude	0~3000m					
Ambient temperature	-20°C~+40°C					
Storage temperature	-40°C~+70°C					
Atmospheric pressure	70~106kPa					
Photovoltaic module configuration						
System voltage (battery voltage)				Photovoltaic module load voltage (recommended value)		
Input reverse polarity protection				Yes		
Output reverse polarity protection				Yes		
Temperature protection				70°C		
Other parameters						
Noise				≤50dB		
Cooling method				Forced air cooling, fan speed is adjusted by temperature, charging current and load current		
Parts				Forced air cooling, fan speed is adjusted by temperature, charging current and load current		
Smell				No unpleasant odor or unhealthy smell		
Environmental requirements	Complies with 2002/95/EC; free of cadmium, hydride and fluoride					

8. Resolve the fault

When the controller is abnormal, please check the parameters in the following table

Fault abnormality	Troubleshooting
When the MPPT controller is powered on for the first time, the fault message is: Battery voltage error.	1. Check if the battery voltage is within the system voltage identification range. (See Technical Parameters System Voltage Identification Range) 2. Manually set the rated battery voltage level.
Fault prompt: Over temperature protection	1. Check whether the cooling fan is damaged and whether the ventilation holes are blocked by debris. The MPPT controller should be installed in a ventilated environment. 2. Reasonable configuration of photovoltaic modules can improve the replacement efficiency and reduce temperature rise.
Fault prompt: low battery voltage	The battery is nearly exhausted
Fault prompt: Battery voltage is high	The voltage of the connected battery does not meet the system voltage recognition range (See technical parameters system voltage recognition range)
Fault prompt: Battery charging overcurrent	The charging current exceeds the maximum charging current set by the device
Fault prompt: Battery not in place	No battery input detected or no battery connected
Fault prompt: PV input voltage is high	The photovoltaic input voltage exceeds the input overvoltage protection point (See technical parameters input overvoltage protection point)
Fault prompt: output overload	The output current exceeds the maximum load output current set by the device
Fault prompt: Channel * fault (* represents: 1, 2, 3)	At this time, the current difference between channel * and other channels is too large 1. Check whether the photovoltaic buck IGBT tube is damaged 2. Check whether the VCC voltage of the driving optocoupler is consistent
The temperature sensor temperature is not found in the information query interface	1. Check if the external temperature sensor is connected 2. Check if the sensor has poor contact

If the problem persists after following the steps in the table above, please contact customer service:

Please provide the following information: Equipment information: model, order number, serial number (labeled on the back panel), detailed description of the problem (such as the type of system used, whether the problem occurs occasionally or frequently, display, etc.).

9. Maintenance and cleaning.

9.1 Replace the fuse

If the fuse is blown due to overheating or other faults, you need to replace the fuse correctly: unplug the broken fuse from the interface, install the new fuse, and then check whether the connection is correct before installing the device.
(The fuse is near the junction box)

9.2 Clean the heat sink

Clean the fan vents and internal heat sink regularly with a dry or slightly damp cloth;
Note: Do not use detergent or corrosive solvents for cleaning, do not allow liquid to flow into the machine, and ensure that the ventilation holes of the device are not blocked.

10. Quality Assurance

Quality Assurance

If the device fails, our company will repair it or replace it with a new one free of charge

Evidence

During the quality assurance period, our company requires customers to show the invoice and date of purchase of the product. At the same time, the trademark on the product should be clearly visible, otherwise we have the right to not provide quality assurance.

Condition

- The replaced defective products shall be handled by our company
- Customers should allow the company reasonable time to repair faulty equipment.

Waiver of liability

The company has the right not to provide quality assurance in the following circumstances

- The whole machine or parts are beyond the free warranty period
- Transportation damage
- Improper installation or modification
- Operation in extremely harsh environments beyond the description in this manual
- Machine failure or damage caused by repair, modification or disassembly by non-company service agencies
- Damage caused by abnormal natural environment

If the product fails due to the above circumstances and the customer requires repair service, paid repair service can be provided after the judgment of our service organization.

Attention

Product dimensions and parameters are subject to change without prior notice.