SUNOPEN 拓阳

MPPT Solar Charging Controller User Manual

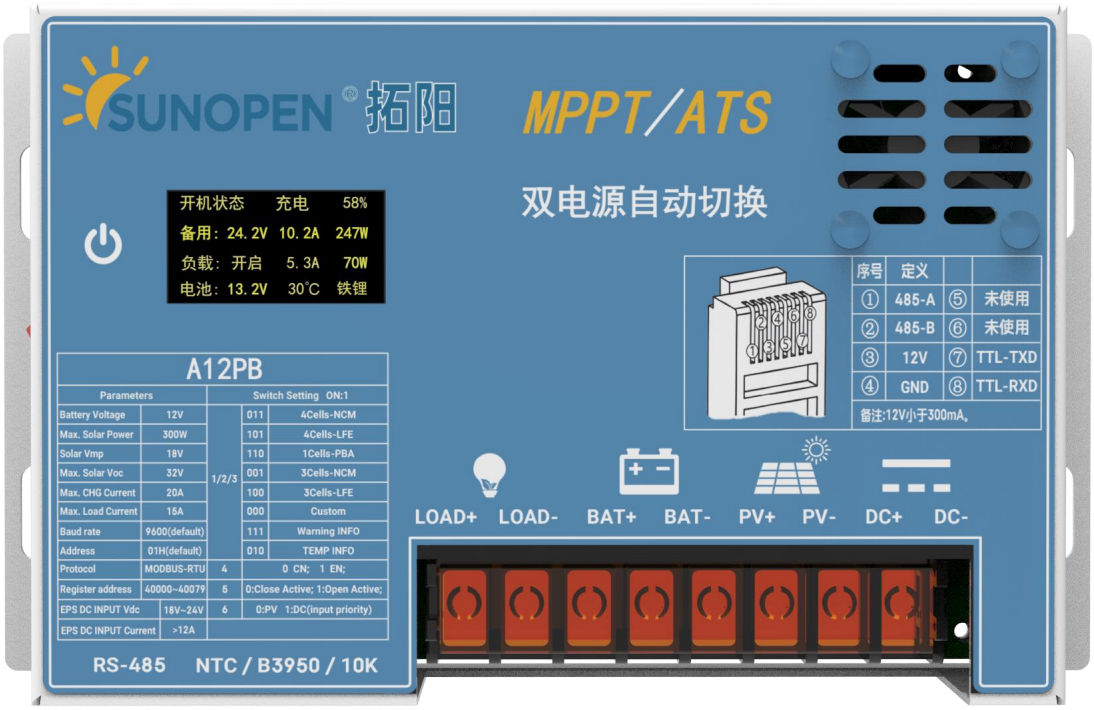
Model A12PB

Applicable to 12V platform batteries (ternary, lithium iron, lead-acid, custom) step-down version

Intelligent dual power switching/grid power DC supplement

Integrated ATS system with ultra-small size, an industry first

MPPT+ATS, dual system integration



Provides an additional guarantee for your product, worry-free, intelligent switching

Manual version: V1.2 Changes may occur without prior notice; please contact sales for the latest electronic documentation

Thank you very much for choosing our products!

安全说明

1. Since this controller operates at a voltage exceeding the safe voltage for the human body, please read the manual carefully and complete safety operation training before operating this controller.

2. There are no parts inside the controller that require maintenance or repair; users should not disassemble or repair the controller themselves.

3. Please install the controller indoors to avoid exposing components and to prevent water from entering the interior of the controller.

4. Please install the controller in a well-ventilated area, as the temperature of the heat sink can be very high during operation.

5. It is recommended to install a suitable fuse or circuit breaker outside the controller.

6. Before installing and adjusting the wiring of the controller, be sure to disconnect the photovoltaic array and the fuse or circuit breaker near the battery terminals.

7. After installation, check that all wire connections are secure to avoid the risk of heat buildup due to loose connections.

Warning: Indicates that this operation is dangerous; safety preparations must be made before proceeding.

Note: Indicates that this operation is destructive.

Tip: Indicates suggestions and tips for the operator.

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1.产品简介

1.1 Product Overview

The A12PB controller adopts industry-leading MPPT (Maximum Power Point Tracking) technology to achieve maximum energy tracking of solar panels, enabling it to quickly and accurately track the maximum power point of solar cells in various environments. It real-time obtains the maximum energy from solar panels, significantly improving the energy utilization efficiency of solar systems. It is widely used in off-grid photovoltaic systems, managing the operation of solar panels, batteries, and loads, and serves as the core control component of off-grid photovoltaic systems. The controller features comprehensive software and hardware fault detection and protection functions, minimizing the risk of damage to product components due to installation errors and system failures.

The highlight is that the A12PB comes with an ATS switching system. Its compact size integrates an automatic dual power switching system and an MPPT system, with the power for switching the power supply being equal to its own MPPT charging power. The efficiency reaches >96%~99%. If, due to environmental issues during the day, the battery does not have enough power to supply the system throughout the night, the A12PB will automatically switch to direct current from the mains to power the battery until it is fully charged, then automatically stop.

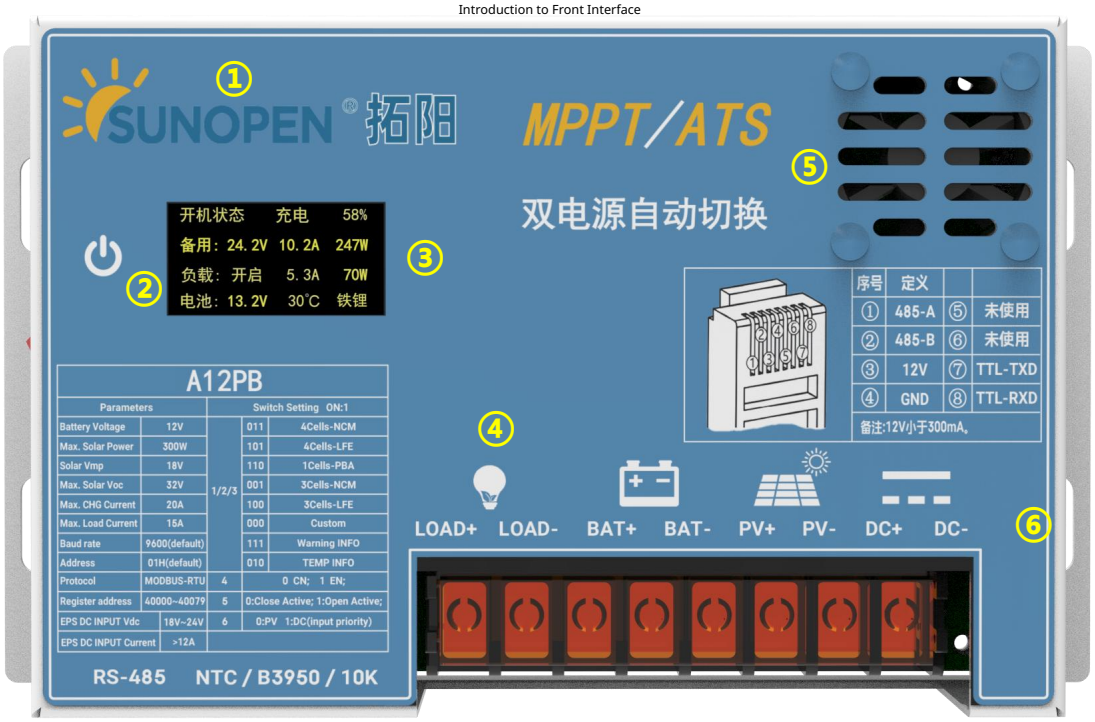
It ensures system stability and reliability. The A12PB cleverly reuses the internal DC/DC conversion hardware, saving costs.

1.2 Product Features

- It adopts MPPT (Maximum Power Point Tracking) technology, with MPPT tracking efficiency reaching 99.9%.
- It is the industry's first MPPT control integrated ATS system.
- It supports simultaneous full-power charging and discharging.
- It supports various types of batteries, including sealed, gel, open, lithium, and custom types.
- It supports activation of lithium and lead-acid batteries.
- It supports charging current settings.
- It supports full charge settings.
- Supports temperature compensation function.
- Supports parallel charging.
- Supports multiple load operating modes.
- Supports starting capacitive and inductive loads.
- Supports saving historical data.
- Supports RS485 communication with standard Modbus protocol, with configurable baud rate (default 9600bps).
- Supports TTL communication with standard Modbus protocol, with configurable baud rate (default 9600bps).
- Supports Bluetooth and Ethernet communication functions (optional).
- Equipped with comprehensive protection mechanisms for over-voltage, over-current, overload, over-temperature, and short-circuit during charging and discharging.
- Uses high-quality aluminum heat sinks, air cooling, and high-temperature derating to ensure reliable and efficient operation in various working environments.

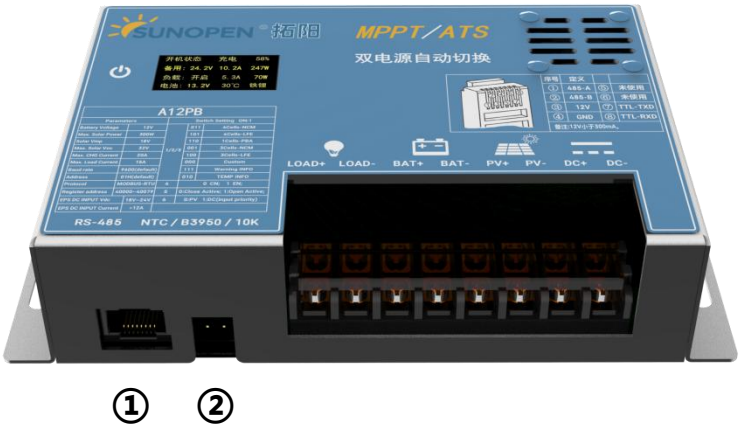
1.3 Appearance and Interface Description

Introduction to Front Interface



Serial Number	Function Description	Remarks
①	Side toggle switch, battery type selection, Chinese and English switching, interface switching toggle switch, input priority setting	See the toggle switch section for details
②	Start Button	Side boat-shaped switch
③	Display interface	
④	Load interface; battery interface; photovoltaic input interface; backup power interface	Interface barrier
⑤	Fan outlet	Do not block
⑥	Ground screw hole position	

Introduction to Side Interface



Serial Number	Function Description	Remarks
①	RS485 Communication Interface	Pin definitions for the interface can be found in other sections
②	Battery temperature monitoring interface, external NTC B3950 10K temperature sensor	No battery temperature monitoring when not connected

The A12PB series Maximum Power Point Tracking (MPPT) system is an advanced charging technology that adjusts the operating state of the electrical module to enable solar panels to output more electrical energy. Due to the nonlinear characteristics of solar panel arrays, there exists a maximum power point on their curve. Traditional PWM charging technology cannot maintain charging at this point, thus failing to capture the maximum energy from the solar panels. However, solar controllers with MPPT technology can continuously track the maximum power point of the array to charge the batteries with the maximum energy. For example, in a 12V system, the peak voltage (Vpp) of the solar panel is around 18V, while the battery voltage is about 12V. General charging controllers operate at around 12V during charging, which does not fully utilize the maximum power.

MPPT controllers can overcome this issue by real-time adjusting the input voltage and current of the solar panels to achieve maximum input power. Compared to traditional PWM controllers, MPPT controllers can harness the maximum power of solar panels, thus providing a larger charging current. Generally, MPPT can improve energy utilization by 20% to 30% compared to PWM controllers.

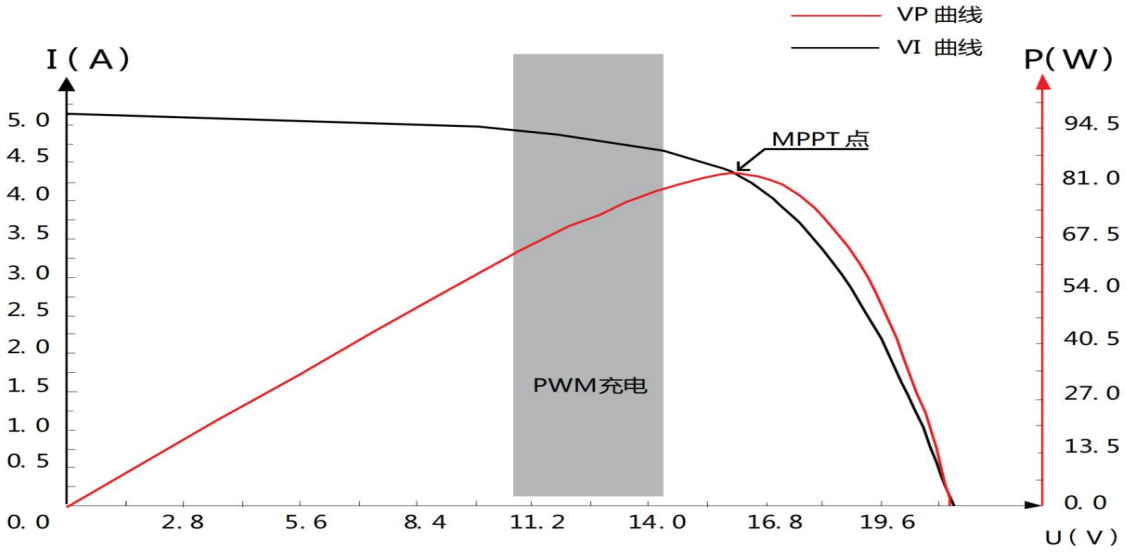


Figure 1-2 Battery Panel Output Characteristic Curve

Due to varying environmental temperatures and lighting conditions, the maximum power point often changes. Our MPPT controllers can adjust parameters in real-time based on different conditions to keep the system near the maximum operating point. The entire process is fully automatic, requiring no user adjustments.

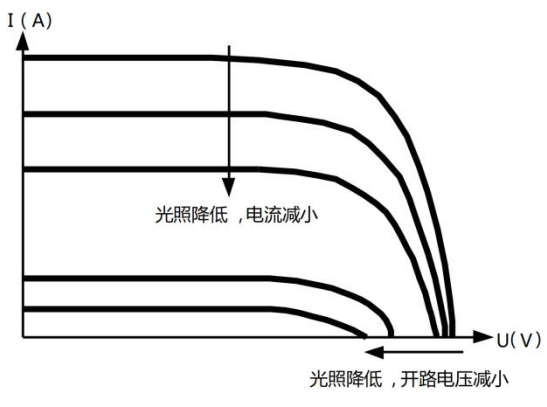


Figure 1-3 Relationship between Battery Panel Output Characteristics and Illumination

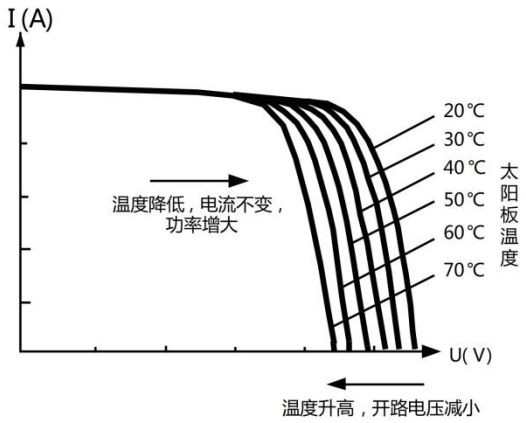


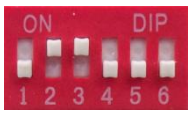
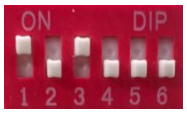
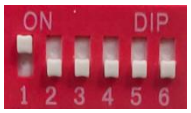
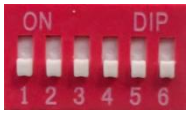
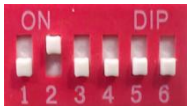
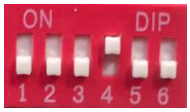
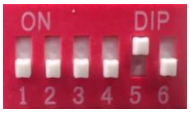
Figure 1-4 Relationship between Battery Panel Output Characteristics and Temperature

2.技术参数

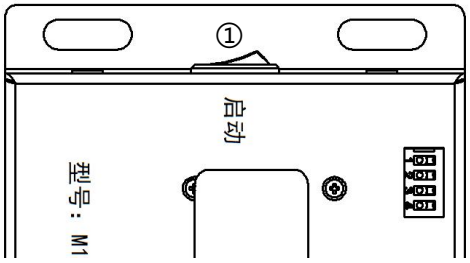
Product Model	**A12PB**
Static Power Consumption	≤30mA
Battery Type	Li-ion/LiFePO4/Lead Acid/Colloidal/Other Batteries (User can configure independently via the upper computer)
Battery Voltage	12V Platform
System Mode	Step-down
Rated Battery Charging Current	20A
Maximum PV Input Current	18A
Maximum Solar Panel Power	300W
Max: PV Open Circuit Voltage (Voc)	<30V
Recommended PV Power Point Voltage (Vmp)	14V~24V (recommended)
AUX input voltage	14V~28V
Maximum input current	18A
Maximum input power	300W
Battery voltage to start ATS system setting	8V~16.8V (e.g., set to 11V, ATS will automatically intervene only if the battery voltage is below 11V; otherwise, it will not intervene)
Maximum system voltage tolerance	36V (±2%) overvoltage will damage the system
MPPT tracking efficiency	>99.9%
MPPT Tracking Rate	<1ms
Charging Conversion Efficiency	>96%
Rated Load Current	20A
Load Operating Mode	Manual Mode, Automatic Mode (User can configure independently via the upper computer)
Charging Operating Mode	Activation/Trickle/Constant Current/Constant Voltage
Battery charging temperature control can be set	√
Temperature Protection	√
Activate Battery	√
Load Overload/Short Circuit Protection	√
TTL Communication	√
RS485 Communication	√
External 12V Power Supply (<300mA)	√
Display Screen	√
Supports SOC Display	√
Charging Power Adjustable	√
Configurable battery model series	√
Supports Bluetooth (optional expansion)	√
Supports Ethernet (optional expansion)	√
Set auto-save	√
Supported baud rate types	4800/9600/14400/19200/38400/56000/57600 Default 9600 (replacement requires upper computer configuration)
Backlight adjustment function	A12PB does not support, always on, can be adjusted according to customer needs
Protection functions	PV over-voltage protection, PV reverse connection protection, PV short-circuit protection, night reverse charging protection, input power limit protection, over-temperature protection, load short-circuit protection, load overload protection, battery over-voltage/over-discharge protection, battery reverse connection protection
Working environment temperature range	-35℃~65℃
Protection Level	IP32
Cooling Method	Natural Convection, Air Cooling
Dimensions	Length x Width x Height 97x170x37mm
Weight	0.57kg
Lithium Iron Phosphate Battery Support	4 String
Lithium ternary battery support	3, 4 strings
Lead-acid/gel battery support	1 String
Sodium battery support	3, 4 strings
Other batteries	Users can set undervoltage and overvoltage points (set via the upper computer 8.4V~16.8V)

3.拨码开关及开关机使用说明

3.1 DIP switch usage instructions (please select the battery type carefully from the front)

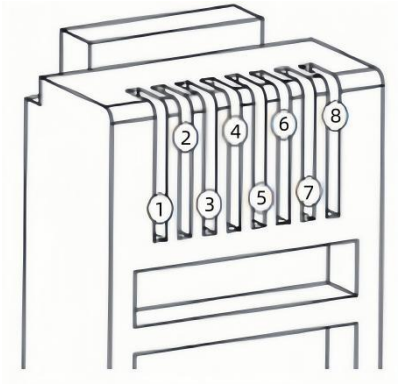
	The first three DIP switch positions [1 2 3] “011” represent: Select 4 strings of ternary lithium battery Overvoltage protection point: 16.8V Undervoltage protection point: 11.6V (automatically generated by the system)
	The first three DIP switch positions [1 2 3] “101” represent: Select 4 strings of lithium iron phosphate battery Overvoltage protection point: 14.4V Undervoltage protection point: 11.2V (automatically generated by the system)
	The first three dial codes [1 2 3] “110” represent: selecting 12V lead-acid or 12V gel battery Overvoltage protection point: 14.4V Undervoltage protection point: 10.5V (automatically generated by the system)
	The first three dip switches [1 2 3] “001” represent: selecting 3 series of ternary batteries Over-voltage protection point: 12.6V Under-voltage protection point: 8.7V (automatically generated by the system)
	The first three dip switches [1 2 3] “100” represent: selecting 3 series of lithium iron phosphate batteries Over-voltage protection point: 10.8V Under-voltage protection point: 8.4V (automatically generated by the system)
	The first three dip switches [1 2 3] “000” represent: custom battery, over-voltage and under-voltage settings need to be configured by the user through the upper computer
	The first three dip switches [1 2 3] “111” represent: all alarm information can be viewed (using this function will automatically stop charging the system)
	The first three dip switches [1 2 3] “010” represent: system temperature information and battery temperature information can be viewed (using this function will automatically stop charging the system), users need to configure the protection values through the upper computer
	The 4th dip switch “1”: English interface, “0”: Chinese interface
	The 5th dip switch “1”: start activation; “0”: prohibit activation;
	The 6th dip switch “1”: priority charging from backup power input; “0”: priority charging from photovoltaic input (default)

3.2 Device Start Switch Usage Instructions



① To start the device, switch left for off, right for on

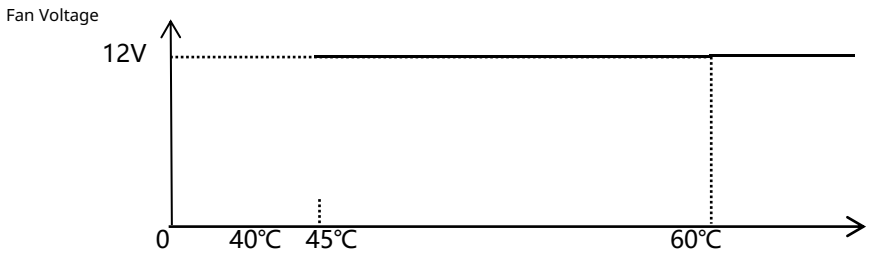
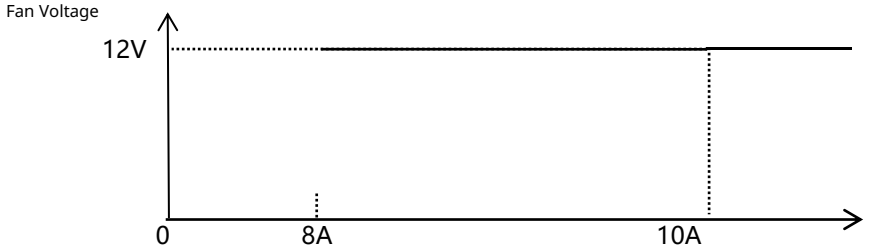
4.TTL 通讯、RS485 通讯、外扩 12V 输出接口针脚定义



Serial Number	Definition
①	485-A
②	485-B
③	12V
④	GND
⑤	Unused
⑥	Unused
⑦	TTL-TXD
⑧	TTL-RXD

Note: The 12V maximum provides 300mA of current; exceeding this may damage the interface with a certain probability.

5.风扇温度控制

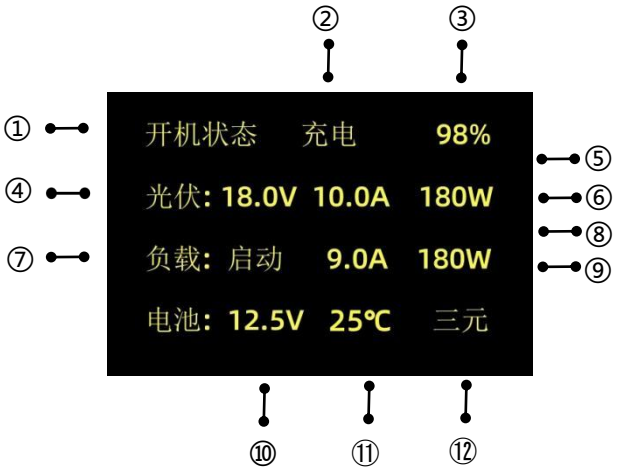
Serial Number	Fan Start Logic Diagram
When PV is Charging	
When PV is Not Charging, Start with Discharge Load Current	

6、常见问题和解决方法

Phenomenon	Processing Method
Indicator light and LCD screen are not lit	Check if the connections of the battery and solar panel are correct
Solar panel has voltage, but no voltage output at the battery terminal	Disconnect the battery to check if it has voltage. If there is no voltage, activate the battery in the system settings. (The battery is in an activated state, and the system does not support reverse connection protection for the battery)
Battery type and series cannot be modified while MPPT is in operation	Changing the battery type will alter the over-voltage and under-voltage protection points!
Charging power does not reach the rated value	The system uses current limiting and constant temperature control; Check if the system has reset the charging power; Whether the voltage difference between the PV model and the battery model is too large.
Load cannot start some loads	Short circuit load time can be set through the upper computer to accommodate different external loads
Other issues or difficult-to-solve exceptions	Go to the settings interface to initiate a factory reset. After setting the factory settings, reconfigure the relevant parameters according to the system configuration. Please be cautious!
No response when the battery is connected	1. Check if the last reverse connection caused the fuse to blow. If so, replace the fuse or contact the manufacturer for repair.
The fan does not turn	1. Check if there are any foreign objects blocking the fan and clean the air duct regularly. 2. If the fan still does not turn after cleaning, contact customer service for fan replacement. 3. Check if the silent mode is enabled.

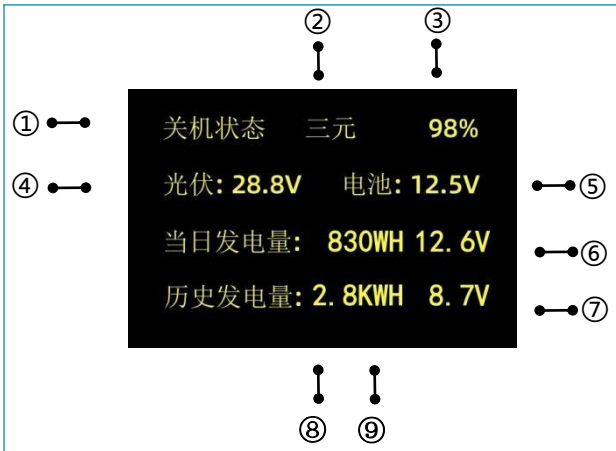
7、显示界面介绍

7 . 1Start System Display Interface



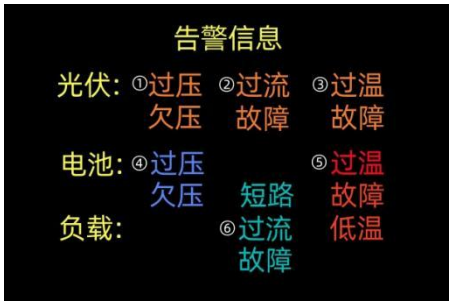
① Power On Status Display
② System is in Charging State (Charging, Discharging, Protection)
③ Battery Level SOC Display
④ Display photovoltaic voltage value, backup power supply voltage value, alternating
⑤ Display photovoltaic charging current magnitude
⑥ Display photovoltaic charging power magnitude
⑦ Load startup status display
⑧ Display load output current magnitude
⑨ Display load output power magnitude
⑩ Display battery voltage magnitude
⑪ Battery temperature display (NTC not connected, not displayed)
⑫ Display battery selection type (ternary, lithium iron, lead-acid, other)

7 . 2Close System Display Interface



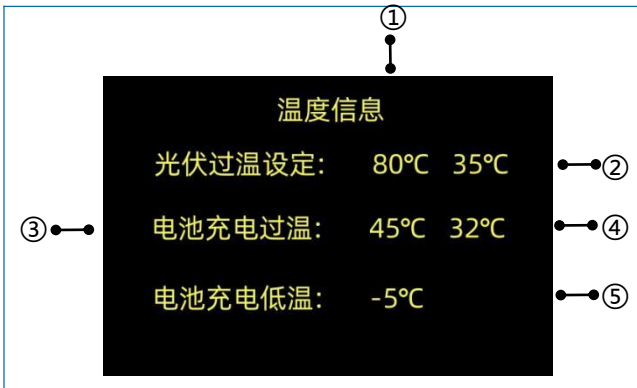
① Represents the current power-off state
② Represents the current battery selection as ternary type
③ Displays battery state of charge (SOC)
④ Alternately displays photovoltaic/backup power supply voltage values
⑤ Displays battery voltage values
⑥ Current battery over-voltage protection set point
⑦ Current battery under-voltage protection set point
⑧ Display the current day's power generation
⑨ Display historical power generation

7 . 3System alarm interface "Fault": Sensor failure(Users can take corresponding measures based on the alarm information)



① Photovoltaic "Overvoltage", "Undervoltage" warning
② Photovoltaic "Overcurrent", "Fault" warning
③ Photovoltaic "Overtemperature", "Fault" warning
④ Battery "Overvoltage", "Undervoltage" warning
⑤ Battery "Overtemperature", "Low temperature", "Fault" warning
⑥ Load "Short circuit", "Overcurrent", "Fault" warning

7 . 9ystem temperature interface



① The current photovoltaic over-temperature protection point (can be modified through the upper computer)
② Current photovoltaic working real-time temperature
③ Current battery set charging over-temperature value (modifiable via upper computer)
④ Current battery real-time temperature
⑤ Current battery set charging low-temperature value (modifiable via upper computer)

8、产品安装

8.1 Installation Precautions

- Be very careful when installing batteries. For open lead-acid batteries, protective goggles should be worn. If battery acid comes into contact, rinse immediately with clean water.
- Avoid placing metal objects near the battery to prevent short circuits.
- Charging the battery may produce acidic gases; ensure the surrounding environment is well-ventilated.
- The battery may produce flammable gases; keep away from sparks.
- When installing outdoors, avoid direct sunlight and rainwater infiltration.
- The virtual connection points and corroded wires can cause significant heat, melting the wire insulation, burning surrounding materials, and even leading to fires. Therefore, ensure that all connections are tightly secured, and it is best to use cable ties to fix the wires to avoid movement that could loosen the connections during application.
- When connecting the system, the output voltage of the components may exceed the safe voltage for humans. When operating, be sure to use insulated tools and keep your hands dry.
- The battery terminal on the controller can connect to either a single battery or a group of batteries. The subsequent instructions in the manual are for use with a single battery, but they also apply to a system with a group of batteries.
- Please follow the safety recommendations of the battery manufacturer.
- Ground the controller's grounding terminal.
- During installation, reverse connection of the battery is prohibited, as it can cause irreversible damage.

8.2 Installation Steps

Wiring and installation methods must comply with national and local electrical code requirements. Wiring specifications must be selected according to the rated current, generally at 5A/mm^2.

Step 1: Choose the installation location.

Avoid installing the controller in direct sunlight, high temperatures, or areas prone to water ingress, and ensure that there is good ventilation around the controller.

Step 2: Secure the hanging screws.

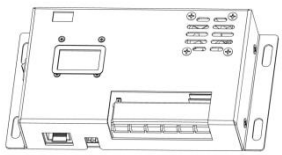
Mark the installation position according to the dimensions of the controller, drill two appropriately sized mounting holes at the two marks, and secure screws in the two mounting holes.

Step 3: Fix the Controller

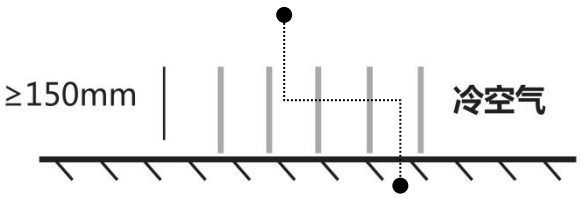
Align the controller's mounting holes with the two pre-fixed screws and hang it up, then secure the two screws at the bottom.

Step 4: Fix the Ground Wire

Lock one wire to the side screws of the controller, and ensure the other end is effectively connected to the ground (it can be tied to a metal block for burial) to allow leakage, static electricity, and lightning currents to be directed into the ground.



Effective Grounding of Equipment



9、保护功能

- Overtemperature Protection of Equipment

  When the internal temperature of the controller exceeds the set value, it will automatically reduce the charging power or even shut down during charging, thereby further slowing the rise in internal temperature.

- Overtemperature Protection of the Battery

  The battery over-temperature protection requires an external battery temperature sampling sensor. When the battery temperature is detected to be too high, charging will stop. When the battery temperature drops to 5 degrees below the set value and remains there for 2 seconds, charging will automatically resume.

- Input over-power protection

  When the power of the solar panel exceeds the rated power, the controller will limit the charging power within the rated power range to prevent excessive current from damaging the controller, and the controller will enter current-limiting charging.

- Excessive voltage at the photovoltaic input terminal

  If the voltage at the photovoltaic array input terminal is too high, the controller will automatically disconnect the photovoltaic input.

- Photovoltaic input reverse connection protection

  When the polarity of the photovoltaic array is reversed, the controller will not be damaged and will continue to operate normally after correcting the wiring error.

- Nighttime anti-reverse charging protection

  Prevents the battery from discharging through the solar panel at night. Special note: There is no reverse connection protection function for the battery.

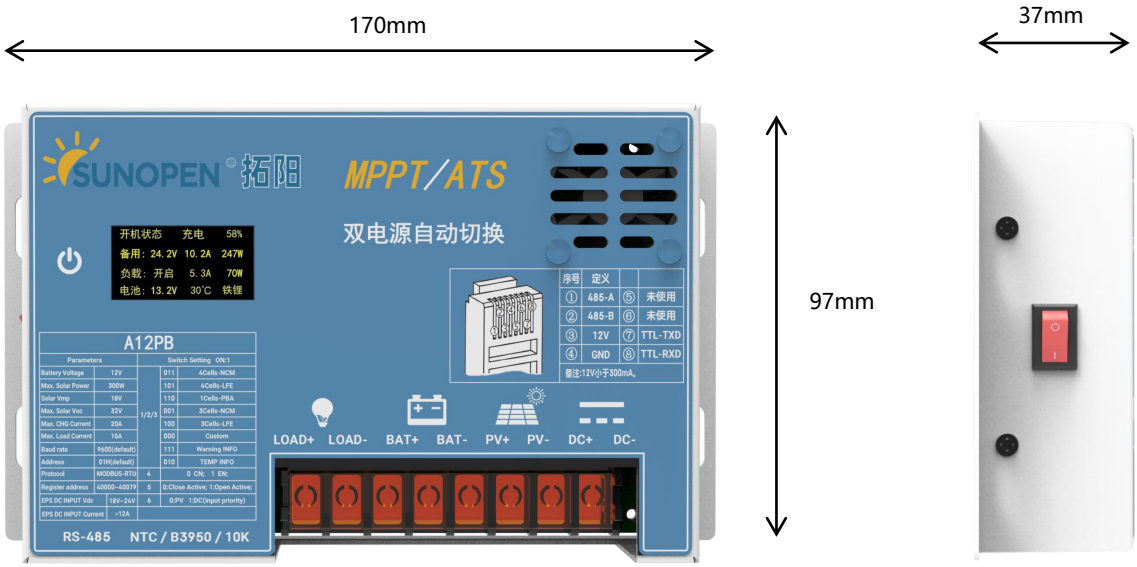
10、系统维护

To ensure that the controller maintains optimal working performance over time, it is recommended to regularly check the following items.

- When an abnormal fault or error message is detected, corrective measures should be taken promptly.
- Check whether the terminal blocks have signs of corrosion, insulation damage, high temperature, burning/discoloration, deformation of the casing, etc. Repair or replace them in a timely manner.
- If any exposed, damaged, or deteriorating insulation wires are found during inspection, they should be repaired or replaced promptly.
- If there is dirt, nesting insects, or corrosion found during inspection, it should be cleaned up in a timely manner.

Warning: Risk of electric shock! Ensure that all power to the controller is disconnected before performing the above operations, and then proceed with the corresponding checks or operations! Non-professionals should not operate witho

11、产品尺寸示意图



12、通讯协议

12.1 Basic Communication Configuration

Transmission Mode	RTU	Protocol Standard/Function Code	0x02 Read one or more input states	Bitwise reading
Baud rate	Default is 9600bps	This communication protocol is based on <standard MODBUS protocol>, the master cyclically requests data from the slave, the slave receives the request command and responds with data.	0x03 Read holding registers	Read by 16-bit words
Parity bit	No parity		0x04 Read one register	Read by 16-bit words
Data Bit	8bit		0x05 Write a coil status	Bitwise write
Stop bit	1bit		0x06 Write a holding register	Write by 16-bit words
Frame interval	Not less than 3.5 byte times		0x10 Write multiple holding registers	Write by 16-bit words
Frame Length	200 Bytes		When the communication module detects errors other than CRC code errors, it must send a message back to the host, with the highest bit of the function code set to 1; 01 illegal function code, 02 illegal data	
Maximum slave response time	350 Bytes time			
Minimum host polling interval	400 Bytes time		03 Illegal data value 04 service fault	

12.2 Information Address

Register address table, read corresponding function code 0x03, set corresponding function code 0x06. The addresses in the table below are the same as those in the actual information frame, and no offset or other conversion is needed.

Address (Decimal)	Meaning	Byte	Read/Write	Example	Explanation
40000	Device Model	2	R	11222	A12PB
40001	Software Version	2	R	10	V1.0
40002	Hardware Version	2	R	10	V1.0
40003	Maximum Power Support	2	R	300	300W
40004	Maximum Input and Output Current	2	R	1820	PV:18A, BAT:20A
40005	Photovoltaic Voltage Regulator Temperature	2	R	25	Current System Temperature 25 degrees Celsius
40006	PV NTC Status	2	R	0	0~7
40007	BAT NTC Status	2	R	0	0~7
40008	Reserved	2	R	Unused	Reserved
40009	Reserved	2	R	Unused	Reserved
40010	Charging Stage	2	R	3	1: Activation, 2: Trickle, 3: Constant Current, 4: Constant Voltage
40011	Charging Status	2	R	1	0: Not Charged, 1: Charging
40012	Fully Charged Status	2	R	1	0: Not fully charged, 1: Fully charged
40013	Current load status	2	R	1	1 Starting, 0 Shutting down
40014	BUCK Heatsink temperature	2	R	50	50℃ (Accuracy 1℃)
40015	Reserved	2	R	Unused	Reserved
40016	Reserved	2	R	Unused	Reserved
40017	Reserved	2	R	Unused	Reserved
40018	Reserved	2	R	Unused	Reserved
40019	DC input voltage	2	R	2024	24.24V (accuracy 0.01V)
40020	Photovoltaic input voltage	2	R	2498	24.98V (accuracy 0.01V)
40021	DC or photovoltaic input current	2	R	275	2.75A (accuracy 0.01A)
40022	DC or photovoltaic input power	2	R	100	100W (accuracy 1W)
40023	DC or photovoltaic heatsink temperature	2	R	20	20 (accuracy 1℃)
40024	Photovoltaic Fault Code	2	R	0	See Fault Table 1
40025	Battery Output Voltage	2	R	1156	11.56V (Accuracy 0.01V)

40026	Battery Output Current	2	R	12	None
40027	Battery Output Power	2	R	100	None
40028	Battery Heat Sink Temperature	2	R	25	25℃ (Accuracy 1℃)
40029	Battery fault code	2	R	See fault table 2	See fault table 2
40030	Load output current	2	R	18	1.8A
40031	Load output power	2	R	125	125W
40032	Fan Startup Status	2	R	0	0: Off 1: On
40033	Historical System ChargingW High Value	2	R	H+L (Unit: WH)	Historical Total Power Generation WH
40034	Historical System ChargingW Low Value	2	R		
40035	CurrentS O Value	2	R	982	98.2%
40036	Reserved	2	R	Unused	Reserved
40037	Today's Power Generation	2	R	1855	1855WH
40038	M P P WTorking Mode	2	R	0	See Table 2
40039	Remote Load Switch	2	R/W	0	1: Load On; 0: Load Off
40040	Maximum Voltage for Photovoltaic Access	2	R	300	30.0V
40041	Minimum Voltage for Photovoltaic Access	2	R	130	13.0V
40042	User-defined maximum charging power	2	R/W	100	100W (Limit for maximum photovoltaic charging power setting)
40043	Reserved	2	R/W	Unused	Reserved
40044	Photovoltaic stop working temperature setting	2	R/W	70	70℃
40045	Current photovoltaic startup fan temperature	2	R	40	40℃ Fan Start
40046	Device Communication Address	2	R/W	01	Communication Address: 01H (01~255)
40047	Battery Charging Maximum Voltage Setting	2	R	1440	14.4V (System automatically allocates based on dip switch)
40048	Battery discharge minimum voltage setting	2	R	1120	11.2V (The system automatically allocates based on the dial)
40049	Reserved	2	R/W	Unused	Reserved
40050	Current battery discharge high temperature setting	2	R/W	60	>60℃ stop load output
40051	Current battery discharge low temperature setting	2	R/W	-10	<-10℃ stops load output
40052	Current battery charging high temperature setting	2	R/W	45	>45℃ stops charging the battery
40053	Current battery charging low temperature setting	2	R/W	0	<0 stops charging the battery
40054	Reserved	2	R/W	Unused	Reserved
40055	Set battery type	2	R	0	0: Ternary lithium, see Function Table 1
40056	Set battery series number	2	R	3	Ternary lithium 3 series
40057	Power on	2	R/W	1	0: Disable power generation, 1: Start power generation (default)
40058	Battery Activation Settings	2	R	0	0: Activation (M12PA model default)
40059	Baud rate	2	R/W	0	1: 9600 (default) 0~7 (4800~115200)
40060	Backlight time	2	R/W	60	60S (default) (some models do not support M12PA)
40061	Lock screen	2	R/W	0	0: Unlock, 1: Lock (some models do not support M12PA)
40062	Set the size of the DC charging power	2	R/W	100	100W (unit 1W)
40063	User set battery overvoltage value	2	R/W	160	16.0V(100~170)
40064	User set battery undervoltage value	2	R/W	100	10.0V(75~140)
40065	User-defined load short-circuit time	2	R/W	100	100*20(us)(Customer adjusts based on external load)
40066	A T System startup voltage	2	R/W	130	Battery voltage less than 13.0V starts the ATS system
40067	Reserved	2	R/W	Unused	Reserved
40068	Reserved	2	R/W	Unused	Reserved
40069	Reserved	2	R/W	Unused	Reserved
40070	Reserved	2	R/W	Unused	Reserved

13、附件详细表

13.1 Function table

Function Table 1 (Decimal)		
NMC Battery	Tri-Element Lithium Battery	0
LFP Battery	Lithium Iron Phosphate Battery	1
PAB Battery	Lead-Acid Battery	2
OTH Battery	Other Batteries	5
ERR	Error Configuration	8

Function Table II (Decimal)		
MPPT->BAT	Solar panel charging battery	0

13.2 Fault table

Fault Table 1 (Decimal)					
OV	Solar Panel Over Voltage	1	SC	Solar Panel Short Circuit	128
UV	Solar Panel Under Voltage	2			
OT	System Over Temperature	4			
TF	Temperature sensor failure	8			
OC	Solar panel overcurrent	16			
OP	Solar panel overpower	32			
SF	Current sensor failure	64			

Fault Table II (Decimal)					
OV	Battery Over Voltage	1	SF	Battery Current Sensor Fault	128
UV	Battery Under Voltage	2	SC	Battery Short Circuit	256
OT	Battery Over Temperature	4	LOC1	Load Level 1 Over Current	512
UT	Battery Low Temperature	8	LOC2	Load Secondary Overcurrent	1024
TF	Temperature sensor failure	16	LSC	Load Short Circuit	2048
OC	Battery Overcurrent	32	LSF	Load Current Sensor Fault	5096
OP	Battery Overload	64	PF	Battery Configuration Abnormality	10192
DPF	Charging Dial Fault Code	20384			

14、应用接线图