MPPT

SOLAR CHARGING

USER MANUAL

Product overview

Thank you for choosing our MPPT controller. The MPPT controller produced by our company is a product developed according to the latest technology and represents the development level of the latest photovoltaic technology. This product has many excellent performance, excellent heat dissipation design, intelligently controlled cooling fan and innovative maximum power point tracking technology, which can significantly improve the energy utilization of the solar system, and the conversion efficiency is as high as 97% The open-ended LAN can track the maximum power point. The charging program of lead-acid battery and lithium battery series is optional. The controller has the automatic protection function of overcharge, over discharge and short circuit. The RS485 communication interface has a communication distance of 1km. It communicates with the upper computer to view the operating parameters of the controller. This controller is used in the solar off grid system (independent system), Automatic regulation of charge and discharge control has a progressive tracking algorithm to obtain the maximum power of solar cell modules and charge the battery; At the same time, Its low voltage is disconnected (damage caused by excessive discharge of LVD pool. The battery charging process of MPPT controller is optimized to prolong battery life and improve system performance. Its comprehensive self-test function and electronic protection function can avoid controller damage caused by installation error and system failure. Although Y-series MPPT controller is easy to operate and use, in order to enable you to better use control All functions of the device to improve your photovoltaic system, please carefully read the instructions and instructions in this manual.

Characteristics of maximum power point tracking technology

When the maximum power point of the column changes with environmental conditions, the controller automatically tracks the maximum power point of the array to ensure that the maximum energy of the day is obtained from the solar array.

- **Increase current**

In most cases, the maximum power point tracking technology will assume that a system may have 10 amps of current flowing from the charging current array of the "solar power generation system", and 12 amps of current flowing from the MPPT controller. The energy input to the MPPT controller is similar to its output energy. The power is voltage and current (volts x amps)
(1) Input energy of MPPT controller = output energy of MPPT controller

(2) Input voltage κ Input current = output voltage x output current
*Assuming an efficiency of 100%, the power loss in the conductor and conversion process is ignored.
If the maximum power point voltage VMP of the solar array is greater than the battery voltage, the battery current must be proportionally greater than the output current of the solar array, so that the input and output power can be leveled. It is very important in the system, because the maximum power point voltage VMP of the solar panel in the solar power generation system is usually higher than the battery voltage.

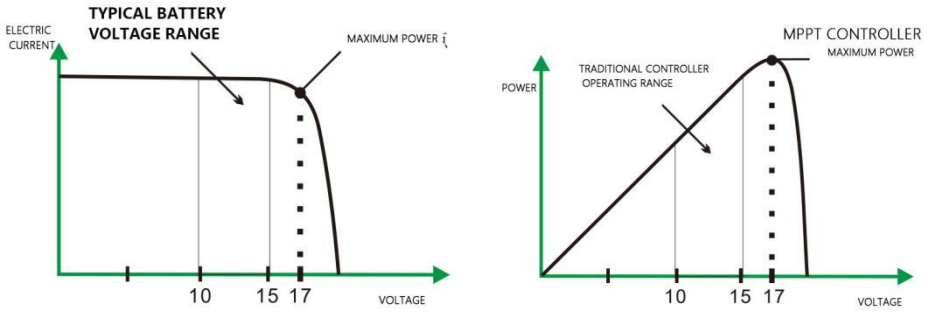
Characteristics of maximum power point tracking technology

Advantages over traditional controllers

When charging, the traditional controller directly connects the solar array to the battery. This requires the solar array to operate within the voltage range of VMP. Taking the 12V system as an example, the battery voltage range is usually 11-15v, but the MP voltage of the solar array is usually about 16 or 17V.

The following figure shows the current, voltage and output power of a typical off grid solar cell with a nominal rated voltage of 12V

12V solar cell current and voltage 12V solar cell output power



Nominal 12V solar cell | - V curve and output power diagram

The maximum power point voltage V MP of the solar photovoltaic array is the electricity when the output power (ampere x volt) is the maximum. At the "knee" of the solar photovoltaic array | - V curve, as shown in the left figure above, since the traditional controller is not always wasted when the solar photovoltaic array VMP operates, these energy 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 VMP of the solar photovoltaic array, the more energy is wasted. The controller will always operate at the maximum power point, which reduces energy waste compared with traditional controllers.

Factors limiting the efficiency of maximum power point tracking controller

The VMP of solar photovoltaic array will decrease with the increase of array temperature. In hot weather, the controller will get little or almost no energy. However, as long as the nominal voltage of the system photovoltaic module is higher than the battery voltage, the VMP of the photovoltaic module will always be higher than the battery voltage. In addition, because the current of the solar array is reduced, the wiring is saved, so that the MPT controller also has obvious advantages in hot weather.

Catalogue

1. Precautions

This manual describes the operation of MPPT solar charging controller.

1.1 effectiveness

This manual is applicable to installers and operators

1.2 target groups

This manual is applicable to installers and operators.

1.3 before installing and operating the controller, please read it first and keep it properly for reference.

1.4 symbol description

The following is a description of the types of signs that appear in this manual:

	Warning! Warning "means that if not avoided, it may lead to machine failure or accident.
	DANGER! "Danger" means that if not avoided, it may lead to machine failure or accident.
	be careful! In order to operate the equipment effectively, please read the equipment operation instructions carefully.

2. Safety instructions

2.1 safety precautions

	warning! ● The input voltage range of the controller is large, please operate with caution, otherwise personal injury will be caused ● All work on the charging controller must be carried out by technicians ● The device cannot be operated by children or those who lack physical sensory ability and mental ability, or those who lack experience and knowledge ●Keep away from children and ensure that children do not touch.
	Warning! High heat enclosure components. ● Please install it in an environment with good heat dissipation and ventilation.
	Warning! Radiation can damage health. ●Do not stay near the solar charging controller with a distance of less than 20 cm for a long time

Safety instructions

2.2 sign description

This section gives a description of the signs displayed on all equipment labels.

Sign	explain
	Danger of electric shock The energy stored in the capacitor will still exist five minutes after disconnection. Do not touch the internal components five minutes after disconnection.
	Do not try to remove the cover if the parts without self maintenance are inside the machine; Only professionals can operate and maintain the equipment; Please use insulated tools during operation to reduce hazard risk.
	Beware of high heat enclosures The solar charging controller will become hot during operation. Avoid contact uring operation; Do not put anything on the equipment and block the fan vent.

2.3 safety instructions

● When using this equipment, please remember the following information to avoid fire, lightning or other personal injury:

	Warning! Ensure that the input set current voltage is ≤ the specified maximum voltage. Excessive voltage may cause permanent damage to the solar controller, which will not be included in the warranty period. This chapter contains important safety and operating instructions. Read and keep this operating manual for future reference
	Warning! If technicians want to maintain or clean the solar controller or connect to the circuit, they must first follow the relevant steps.

●Before using the solar charging controller, read all instructions and warning marks on the solar charging controller and the corresponding chapters of this manual

●Please use the parts recommended or sold by our company

●In order to avoid the danger of fire and electric shock, ensure that the existing lines are in good conditions and the wire size is suitable, and do not operate when the solar controller is damaged and the wiring is unqualified;

● do not disassemble the solar charging controller by yourself. Or attempt to repair the solar charging controller, which may lead to further damage or accidents, and lose the warranty qualification;

● Keep away from inflammables and explosives to avoid fire;

●The installation position shall be away from damp or corrosive substances;

●In order to avoid short circuit, technicians must use insulating tools to operate the equipment

3. Equipment unpacking inspection

3.1 the following accessories are included after purchasing the equipment

name	quantity	remarks
controller	1	
Communication line / optical disc	1	Options
Temperature sensor	1	Options
User manual	1	

If missing parts are found, please contact your dealer.

3.2 check whether there is any damage during transportation

After receiving the equipment, don't rush to sign for it. Please open the seal first to check whether the equipment has obvious falling injury such as deformation or shell crack. If there is similar damage, please refuse to sign for it and contact the dealer

3.3 determining the charging controller

There is a label of this charging controller on the side of the chassis. If you find it inconsistent with your own purchase, please contact your dealer.

4. Controller installation

The installation must be completed by professional technicians

4.1 selection of installation position

	DANGER: The charging controller chassis becomes hot during operation. ● Do not install on flammable building materials; ● Do not install near highly flammable materials ● Do not install in areas with potential explosion hazards; ● Do not install the charging controller where the sun shines directly, so as to avoid the loss caused by power overheating.
	Warning: Due to the built-in thermal storage module components. ● Please do not touch the controller by hand after opening the shell during operation.

4.1. 1 Size

model	MPPT-30A/40A	MPPT-50A/60A	MPPT-80A/100A
size	Length * width * height (mm) 190 * 200 * 95	Length * width * height (mm) 240.5 * 220 * 95	Length * width * height (mm) 320 * 260.5 * 130

Controller installation

4.1. 2 environmental conditions

●Mounted on solid surfaces:

●The installation position must be accessible at all times

●Install in a position that can be removed at any time

● The ambient temperature should be - 20 ° C ~ 50 ° C to ensure the optimal working environment

●Do not install the charging controller in direct sunlight to avoid power loss due to overheating

4.1. 3 safety distance

Observe the following safety clearances to ensure that other equipment or objects are not within this range, so as to have enough heat dissipation space.

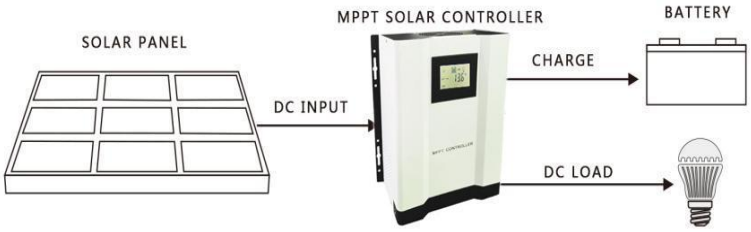
explain	safe distance
edge	20CM
high	30CM
low	30CM

5. MPPT controller connection

	DANGER! If the high voltage input is not operated correctly, the solar charging controller may cause life danger ● The newly opened solar panel array shall use a circuit breaker to avoid accidental activation and power on; ●Disconnect the circuit breaker and ensure that it cannot be reconnected; ●Ensure that no voltage is present in the system
	Warning: Overvoltage destroys the system. ●Thunderstorms and lightning will increase the risk of damage in the field of external overvoltage protection.

5.MPPT controller connection

5.1 composition of solar charging system

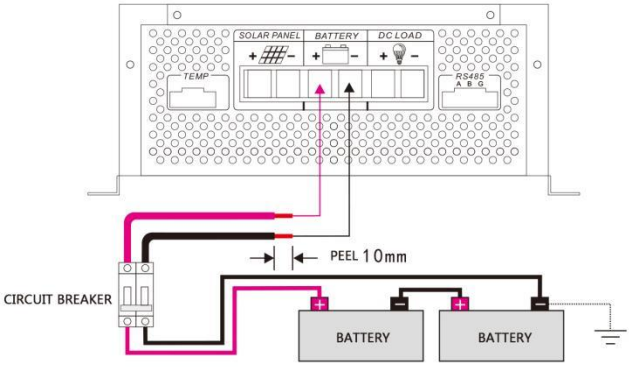


5.2 wiring

5.2. 1 wiring steps

5.2. 2 battery connection

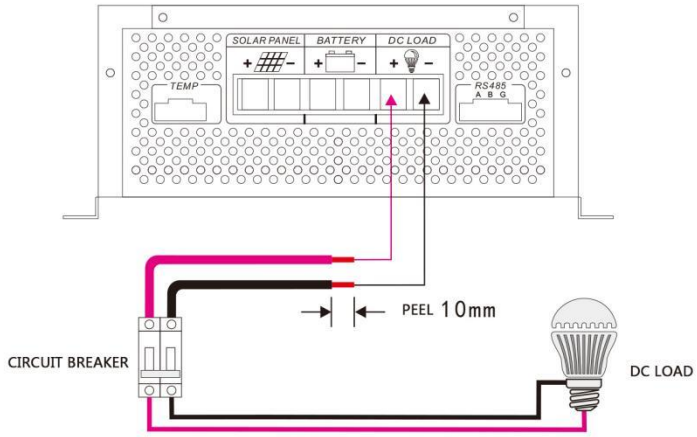
Warning: the short circuit between the positive and negative terminals of the battery and the wires connected to the positive and negative electrodes may cause fire or explosion. Please be careful



Note: the battery pack must be connected with the circuit breaker disconnected.

5.2. 3 DC load connection

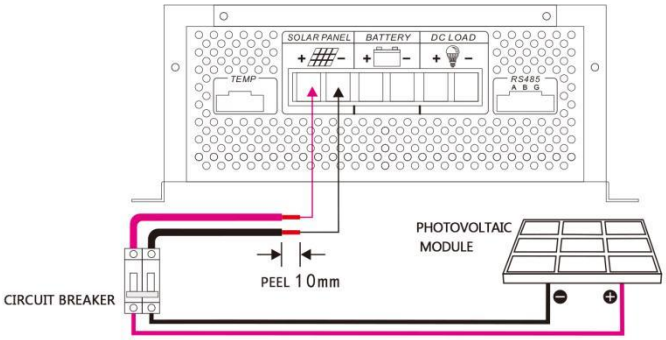
The controller "dcl0ad" and "negative" can be connected to DC electrical equipment with the same rated working voltage as the rated voltage of the battery. The controller supplies power to the load based on the battery voltage



5.2. 4 PV module connection

Warning: danger of electric shock! Photovoltaic modules may generate high voltage. Be careful to prevent electric shock when wiring.

The controller can be applied to off grid solar groups of 12V, 24V and 48V, and grid connected components with the specified maximum input voltage. The voltage of solar modules in the system is not plotted.



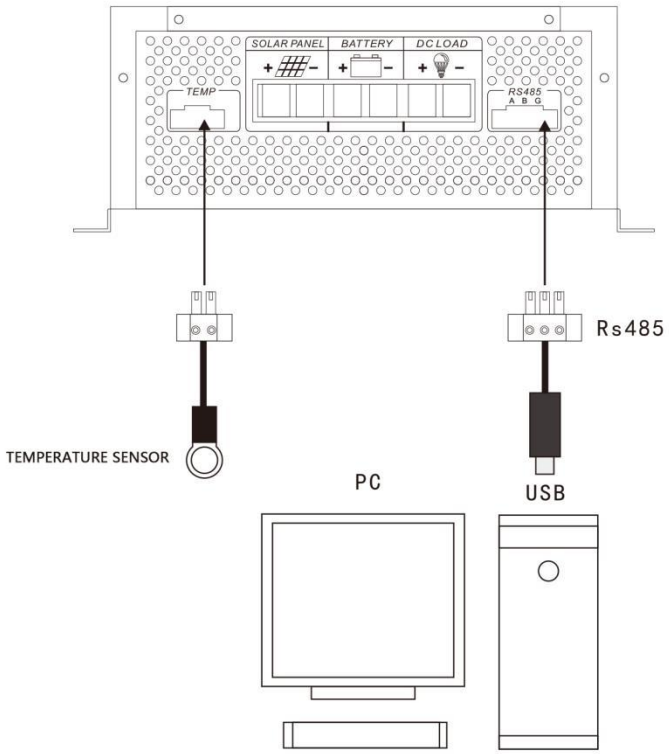
Note: the connection of photovoltaic modules must be carried out with the circuit breaker disconnected.

5.MPPT controller connection

Specifications of cables and miniature circuit breakers:

model			30-40A	50-60A	80-100A
Cable (copper)			8 mm2	10 mm2	16 mm2
Circuit breaker			63A	63A	100A

5.2. 5 temperature sensor and MPPT controller are connected with PC



RS485 communication cable is optional

If necessary, install the upper computer software (purchased separately). The accessories are provided with detailed instructions for use and installation.

5.3 power on test run

Note: before power on test run, please check that the positive and negative poles of all DC connecting wires are completely connected correctly

Please follow the following steps for commissioning:

1.Check that the positive and negative poles of the connecting line must be completely connected correctly, and measure whether the open circuit voltage of the photovoltaic module is within the working range of the controller

2.First open the circuit breaker connected between the controller and the battery

3.Then turn on the circuit breaker connected between the controller and the solar panel

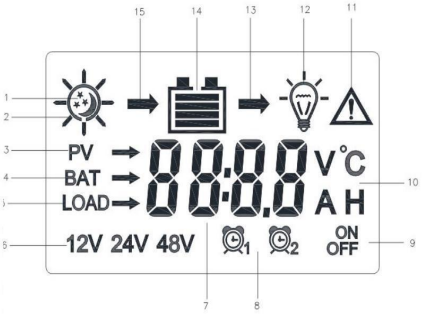
4. Then the controller starts to enter the self-test mode; If the system conditions are correct, the controller will automatically enter the working mode. If the system conditions are incorrect, the controller will give a fault prompt. Refer to the chapter to remove the fault

5. Battery type: the controller is a factory default lead-acid maintenance free battery. Refer to the battery type setting.

6. Operating instructions of MPPT controller

MPPT CONTROLLER TOUCH SEGMENT CIDE SCREEN SPECIFICATION AND OPERATION INSTRUCTIONS

LCD SCREEN DIAGRAM



1). The controller recognizes the night icon : When the controller detects that the voltage of the solar input terminal is smaller than the light control recognition point, the icon will be lit up.

2) The controller recognizes the daytime icon: When the controller detects that the voltage of the solar input terminal is greater than the light control identification point, the icon will be lit up.

3). Indicate solar panel parameters: This icon will be lit up when solar panel related data is displayed. For example, the voltage of solar panels.

4). Indicator battery parameters: When battery related parameters are displayedthis icon will be lit up. The voltage of the battery, the temperature of the
battery.

5). Indicate load parameters: When load related parameters are displayed, this icon will be lit up.

6) System voltage: when different system voltages are displayed, the controller will automatically adjust the corresponding technical data
7) . Numerical display area.
8) . Timing function.
9) . Switch icon.
10) . Unit symbol of numerical value
11) . Alarm symbol.

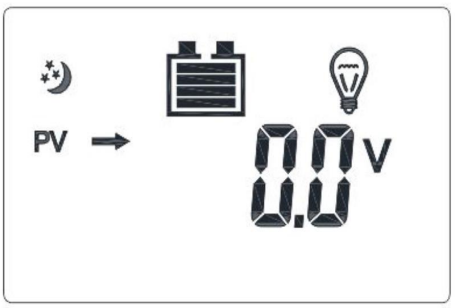
12) . Load status icon: Load on, Load off.

13) Load power supply icon: when the load end is powered externally, this icon will be lit
14) . Battery capacity icon: different number of capacity bars will be lit at different power levels.
15) . Charging status icon: When charging, the indicator light will be on, floating charge will flash, and no display will be displayed when not charging .

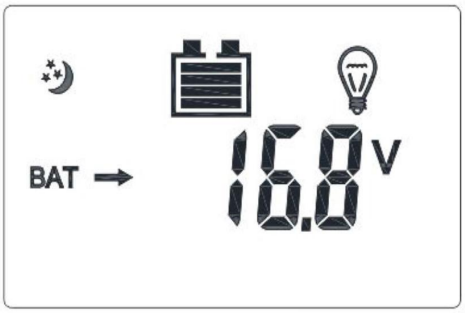
OPERATION INSTRUCTIONS

touch DOWN ▼ 、 UP ▲ Switching between solar panel voltage, battery voltage, charging current and controller temperatureDisplays various values.

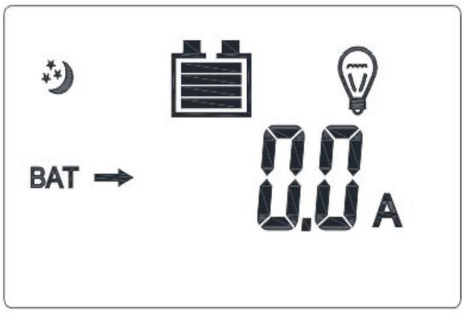
X



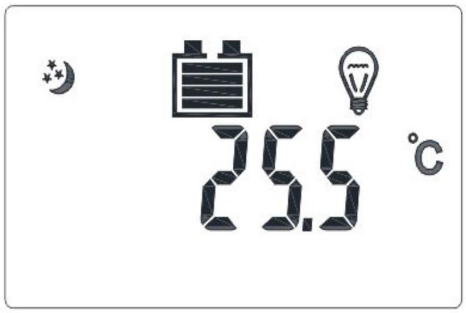
Solar panel voltage



Battery voltage



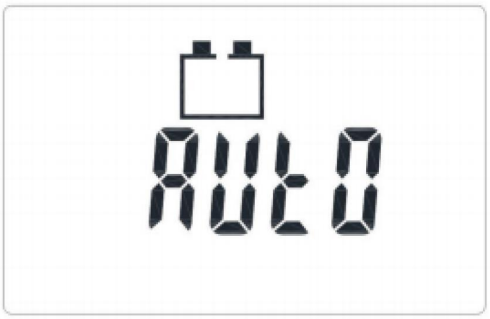
Battery charging



Current radiator temperature

Long press MENU/ESC Press the key for 5 seconds, and the buzzer will enter the setting state with a long beep.

1). The system voltage is selected to meet the customer's demand for wide battery voltage. The default display is "AUTO" system voltage Automatic voltage identification (12V/24V)



Press ENTER Go in and choose,

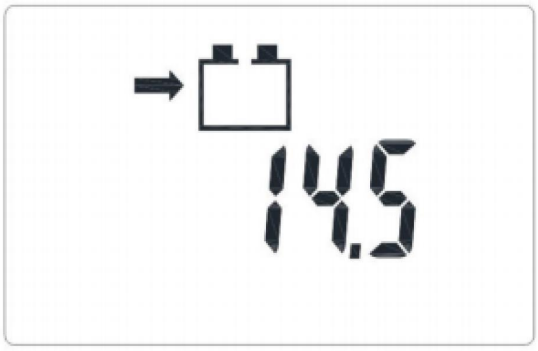
DOWN UP Select 12V / 24Vand lock

2) Equalizing setting

Press ENTER Go in and choose,

DOWN UP Make adjustments,

Press ENTER determine.

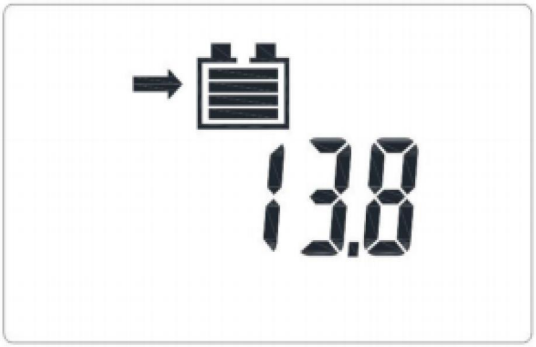


3) Float charging setting

Press ENTER Go in and choose,

DOWN UP Make adjustments,

Press ENTER determine.

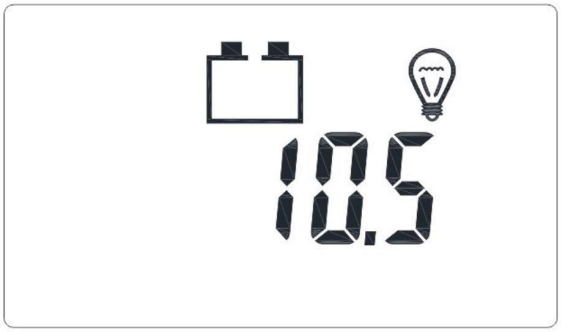


4 Battery low voltage protection (LVD)

Press ENTER Go in and choose,

DOWN ▼ 、 UP ▲ Make adjustments,

Press ENTER determine.



5) Load recovery supply voltage (LVR) The voltage to restore power supply after load undervoltage

Press ENTER Go in and choose,

DOWN ▼ 、 UP ▲ Make adjustments,

Press ENTER determine.

6) Battery overvoltage protection (ovD)

Press ENTER Go in and choose,

DOWN ▼ 、 UP ▲ Make adjustments,

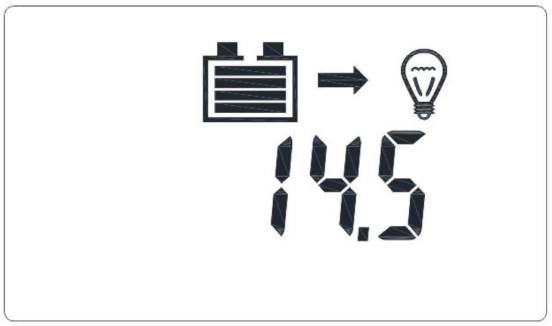
Press ENTER determine.

7) Battery overvoltage protection Load recovery supply voltage

Press ENTER Go in and choose,

DOWN ▼ 、 UP ▲ Make adjustments,

Press ENTER determine.

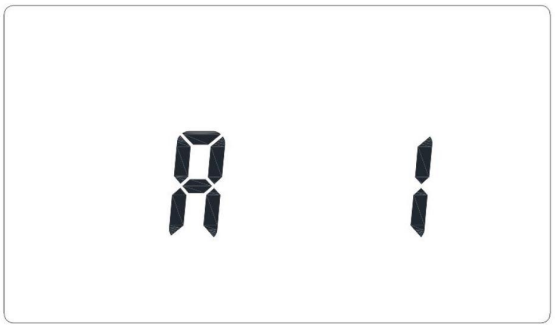


8. Mailing address

Press ENTER Go in and choose,

DOWN ▼ 、 UP ▲ Make adjustments,

Press ENTER determine.

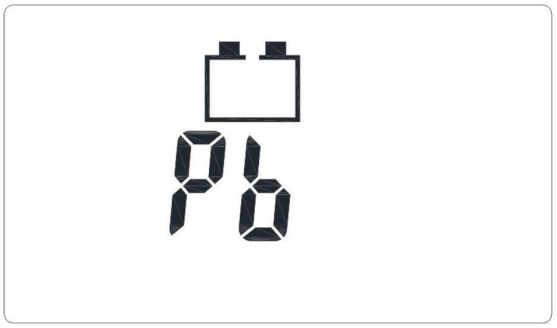


9) Battery type

Press ENTER Go in and choose,

DOWN ▼ 、 UP ▲ Make adjustments,

Press ENTER determine.



10) The default load of this controller is 24H when the load working mode is selected.

When this value is set to 24H, it means that the load will continue to supply power for 24H without failure. When it is set to ≤ 23H, it means that the load starts the optical time control function. When it is set to the light time control mode, when the battery capacity is sufficient, the load will be turned on at sunset. Turn off after working for the set time or daybreak. When the load enters the optical time control mode, if the set working time of the load is greater than the night time, the load output will be automatically turned off as long as daylight is detected, no matter whether the set time is detected or not.

For example, the actual night time in this region is 10 hours. At this time, if the night light time is set to 12 hours, the output will be automatically turned off after 10 hours of daylight, and the subsequent time will be set to zero no matter how long it is set. The load will start working at the next dark time.

* Fault code

E 0	No fault
E 01	Automatic identification error
E 02	Battery over discharge protection
E 03	Fan fault
E 04	Over temperature protection
E 05	DC output short-circuit protection
E 06	Internal temperature 1, no internal temperature sensor detected
E 07	Internal temperature 2
E 08	External temperature, no external temperature sensor detected
E 09	Battery overvoltage

7 .technical parameters

Model: MPPT series		30A	40A	50A	60A	80A	100A
Charging mode	MPPT automatic maximum power point tracking						
Charging mode	Three stages: constant current (MPPT) equalizing charge and floating charge						
System type	2V24V48V/48V96	Automatic identification / manual setting					
System identification voltage range	12V system	DC9V-DC15V					
	24V system	DC18V-DC30V					
	48V system	DC36V-DC60V					
	96V system	DC72V-DC120V					
Soft start time	12v24v/48v96v	W10s					
Dynamic response recovery time	12v24v/48v96v	W500us					
Static power consumption	12v24v/48v96v	W2W					
Overall efficiency	12v24v/48v96v	＞96.5%					
PV module utilization	12v24v/48v96v	W99. 97%					
Input properties							
MPPT operating voltage range	12V system	DC18V-DC150V					
	24V system	DC34V-DC150V					
	48V system	DC65V-DC150V					
	96V system	DC130V-DC180V					
Input any voltage protection point	12V system	DC16V					
	24V system	DC30V					
	48V system	DC60V					
	96V system	DC120V					

technical parameter

Input low voltage recovery point	12V sydedrem	DC18V					
	24V system	DC34V					
	48V system	DC65V					
	96V system	DC130V					
Limit input voltage	12v/24v48v	DC170V(96v:225)					
Input overvoltage protection point	12v/24v48v	DC175V(96v:230)					
Input overvoltage recovery point	12v/24v48v	DC170V(96v:225)					
Maximum solar panel input power	12V system	420W	570W	700W	900W	1140W	1400W
	24V system	840w	1130w	1400w	1700w	2260w	2600w
	48V system	1650w	2270w	2800w	3400w	4540w	5600w
	96V system	3360w	4540w	5600w	7200w	9120w	11200w
output characteristic	(same as battery voltage) 96V system has no DC output						
Optional battery type Default is lead-acid (maintenance free battery)	12v24v/48v96v	Lead acid maintenance free battery, colloidal battery, liquid battery, lithium battery (you can also customize charging for other types of batteries)					

Floating charge voltage (lead-acid battery)	12V system	13. 8 V(floating charge voltage can be customized)
	24V system	27. 60V (floating charge voltage can be customized)
	48V system	55. 20V (floating charge voltage can be customized)
	96V system	110. 4V (floating charge voltage can be customized)
Equalizing	12V system	14.5V (customizable equalizing voltage)

voltage (lead-acid battery)	24V system	29V (customizable equalizing voltage)					
	48V system	58V (customizable equalizing voltage)					
	96V system	116V (customizable equalizing voltage)					
Rated current	12v/24V/48/96V	30A	40A	50A	60A	80A	100A
Current limiting protection	12v/24V/48/96V	32A	42A	52A	62A	82A	102A
temperature coefficient	12v/24V/48/96V	±0.02%/c					
Automatic temperature compensation	12v/24V/48/96V	14.2v (maximum temperature - 25 ℃) * 0.3					
Output voltage stabilizing accuracy	12v/24V/48/96V	±1.5%					
LCD display	See LCD display description for details						
LED display	Charging indication DC output switch status indication						
PC upper computer (communication port)	RS485 (optional)						
Protect							
Input low voltage protection	See input properties						

technical parameter

Input high voltage protection	See input properties
Input polarity reverse connection protection	With polarity reverse connection protection

Output polarity reverse connection protection	With polarity reverse connection protection			
Short circuit protection	After 5 trial starts, it enters the protection state and recovers from startup			
Temperature protection	85 ° C			
Temperature rise protection	Reduce power output above 80 ℃			
Other parameters				
Acoustic noise	W50dB			
Heat dissipation mode	Forced air cooling, the fan speed is regulated by the temperature. When the internal temperature is low, the fan runs slowly or stops; The controller stops working			
element	Imported materials, in line with EU standards, the rated temperature of electrolytic electricity selected for all temperatures shall not be less than 105 ℃			
smell	No peculiar smell and harmful smell			
Environmental requirements	Meet 20095 / EC; No cadmium, hydride and fluoride			
Machine size	Length*width *height（mm）	190*168*95	245*190*95	320*235*130
Package size	Length*width *height（mm）	245*230*145	285*270*140	320*260.5*130
net weight	Kilogram（KG）	2.5	3.5	7.5
Gross weight	Kilogram（KG）	3	4	8

technical parameter

Photovoltaic power conversion efficiency curve

8. Remove the fault

Professional, efficient and energy-saving

When the controller is abnormal, please check the items in the table below before contacting the customer service representative

Fault anomaly	Remove the fault
When the MPPT controller is powered on for the first time, the fault prompt: the battery voltage exceeds the normal identification range.	1. Check whether 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. (see rated battery voltage setting in operation parameter setting for details)
Fault prompt: over temperature protection	1. Check whether the cooling fan is damaged and whether the ventilation vent is blocked by sundries. The MPPT controller shall be installed in a ventilated environment. 2. Reasonable PV module configuration can improve conversion efficiency and reduce temperature rise (see technical parameters PV module configuration)
Fault prompt: battery over discharge protection	End of battery power consumption
Fault prompt: no external temperature transmitter is detected	1. Is the external temperature sensor connected 2. Check whether the sensor is in poor contact
The charging indicator is not on and there is no charging current, and the charging power is displayed	1. Whether the voltage of photovoltaic module is within the working voltage range of MPPT. 2. Check whether the charging voltage parameters displayed in the system information are correct 3. Correct the charging voltage parameters or restore the factory settings and restart the MPPT controller 4. Check whether the fuse is blown out and whether the circuit breaker is disconnected
The charging indicator light turns on and off again soon, and the charging current is sometimes not available	It is normal that the situation usually occurs on cloudy days or in the evening when the light is insufficient
No power curve and current curve display	Check whether the time and date displayed by MPPT controller are correct. See time and date settings

If the problem still exists according to the above table, please contact the customer service personnel for the detailed description of the problem (if the system type is used, the problem

occurs occasionally or often, referring to the lamp, display, etc.).

9. Maintenance and cleaning

9.1 Replace the fuse

If the fuse is blown out due to excessive temperature or other faults, it is necessary to replace the fuse correctly; Remove the broken fuse from the interface, install a new fuse, check whether it is connected correctly, and then install the equipment. (the fuse is near the junction box)

9.2 Clean the vent fins

Wipe with dry or slightly wet cloth; Note that liquid is allowed to flow into the machine to ensure the safety of the equipment

10. Quality assurance

The company will repair or replace the defective products free of charge

Evidence

During the warranty period, the company requires customers to show the invoice and date of purchasing products.

At the same time, the trademark on the product shall be clearly visible, otherwise it has the right not to provide quality assurance.

Condition

●Nonconforming products after replacement shall be handled by the company

●The customer shall reserve reasonable maintenance time for the company to repair the faulty equipment

Exemption from liability

The company has the right not to conduct quality assurance under the following circumstances

●The whole machine and parts exceed the free warranty period

●Transport damage

●Incorrect installation, modification or use

●Operate in very harsh environments beyond those described in this manual

●Machine failure or damage not caused by the company's service organization, repair, change or disassembly

●Damage caused by abnormal natural environment

In case of product failure caused by the above conditions, the customer requires maintenance service. After being judged by the service organization of the company, paid maintenance services can be provided.

 explainProduct size and parameters are subject to the latest information of the company without notice。