

# MEH Series

## Gen4 Intelligent MPPT AC/DC Hybrid Solar Charge Controller With Step-up LED Driver

12V/24V

# User Manual

Product Type	Application Scene
MEH160-W	160W Municipal Electricity Complementation MPPT Charging Control Constant Current All-In-One Machine, 2.4G Wireless Remote Controller
MEH200-R	160W Municipal Electricity Complementation MPPT Charging Control Constant Current Integrated Machine, Infrared Remote Controller
MEH200-W	200W Municipal Electricity Complementation MPPT Charging Control Constant Current All-In-One Machine, 2.4G Wireless Remote Controller
MEH200-R	200W Municipal Electricity Complementation MPPT Charging Control Constant Current Integrated Machine, Infrared Remote Controller

Version: V1.02

Any change shall not be notified in advance.

## 1. Product Characteristics

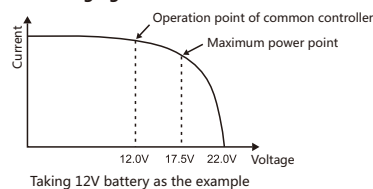
MEH Waterproof MPPT constant current all-in-one machine for mutual control of charging and electric supply, integrating tracking charging management of solar energy under maximum power, LED boost constant current drive, load electric supply control and other functions, is suitable for lead-acid batteries/lithium batteries/colloidal batteries, etc. and widely applicable to solar street lamps, solar courtyard lamps, etc. The product has characteristics such as high reliability, high efficiency, high precision, simple installation and easy maintenance.

### Product characteristics

- ◆ MPPT maximum power tracking technology has as high as 99.5% tracking efficiency and as high as 96% charging conversion efficiency.
- ◆ With DC detection function and DC, when battery voltage drops to DC switching voltage point, it shall switch to DC power supply automatically. Without DC, when the battery continues to discharge beyond the over-discharge point, close the output.
- ◆ Settable switching voltage.
- ◆ Lead-acid batteries and lithium batteries are universal. Operating parameters can be set with a remote controller.
- ◆ Very low dormancy current, more energy-saving and convenient for long-distance transportation and storage
- ◆ Multistage temperature compensation and constant voltage charging of lead-acid batteries
- ◆ 10-period programmable load power/time control
- ◆ High and low temperature protection function for storage battery in charging and discharging, and settable operation temperature
- ◆ Various intelligent power modes can be selected to automatically adjust the load power according to the battery power.
- ◆ High precision digital boost constant current control algorithm, high efficiency and high constant current accuracy
- ◆ With infrared wireless communication, parameters can be set/read, states can be read, etc.
- ◆ Multiple protection functions, such as battery/PV reverse connection protection, LED short circuit/open circuit/limited power protection, etc.
- ◆ Extensible IoT remote communication and monitoring functions (-U/-C series)
- ◆ With all-aluminum metal shell and IP67 waterproof grade, it can be used in various severe environments.

## 2. Operation Instruction

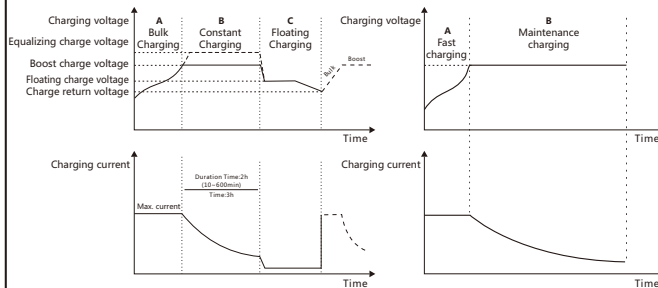
### 2.1 Introduction to MPPT Charging:



Taking 12V battery as the example

Maximum Power Point Tracking (MPPT) is an advanced charging method. MPPT controller can detect the power generated by solar panels in real time and track the maximum voltage and current value (VI), so that the system can charge the battery at the highest efficiency. Compared with the traditional PWM controller, MPPT controller can give play to the maximum power of the battery panel, so it can provide greater charging current. Generally speaking, MPPT can improve the energy utilization ratio by 15%-20% compared with the PWM controller. MPPT cannot be used independently as a charging stage. Usually it needs to be combined with elevation charging, floating charging, balanced charging and other charging methods to jointly complete the battery charging.

A complete lead-acid battery charging process includes fast charging, maintenance charging and floating charging. There is no balanced charging or floating charging process in the charging process of lithium batteries.



### ➤ Bulk Charging

In bulk charge stage, the battery voltage has not reached the set value of full voltage (i.e. balanced/boost voltage), and the controller will charge the battery with MPPT and provide the maximum solar energy to charge the battery. When the voltage reaches the preset value, the battery will be charged at constant voltage.

### ➤ Constant Charging

When the battery voltage reaches the set value of the customer voltage, the controller will charge at a constant voltage without MPPT charge in the process. At the same time, the charging current will gradually decrease with time. Customer charging is divided into two stages, namely, balanced charging and boost charging. These two charging processes are not repeated. Wherein, the balanced charging is started once every 30 days.

### ◆ Boost Charging

The default duration of the boost charging stage is 2 hours. Customers can also adjust the maintenance time and the preset value of the boost voltage point according to actual demands. When the duration reaches the set value, the system will be transferred to floating charging.

### ◆ Equalizing charge

Certain types of batteries benefiting from regular balanced charging can agitate the electrolytes, balance battery voltage and complete chemical reactions. Balanced charging increases the battery voltage so that it is higher than the standard complementary voltage and gasifies the battery electrolyte. If the detection controller automatically controls the following charge for balanced charging, the balanced charging shall last for 120 minutes (default). Balanced charging and boost charging are not repeated during a full charging process to avoid too much precipitated gas or battery overheating.

### ➤ Floating Charging

Floating charging is a continuous charging stage after which the controller shall decrease the battery voltage by reducing the charging current and keep the battery voltage at the set value of floating charging voltage. In the floating charging stage, the battery is charged very slightly to ensure that the battery is maintained in full state. In the floating charging stage, the load can obtain nearly all the solar energy. If the load exceeds the electric quantity provided by the solar energy, the controller will not be able to maintain the battery voltage at the floating charge stage. When the battery voltage is low enough to raise and resume the set charging value, the system will exit from the floating charging stage and return to the fast charging stage again.

## 2.2 Dormancy awakening:

1. After dormancy, press button [ON] of CU or MINI remote controller to wake up the controller and restore to normal operation;

2. PV awakening:

A. If [PV awakening] function is selected as [yes], after controller dormancy, if the photovoltaic panel is connected, the controller can be awakened for charging if the charging condition is satisfied during the day. The charging time exceeds 1 minute. The load will be automatically turned on at night. If the charging time is less than 1 minute, the light will not on at night, and the controller dormancy shall continue.

B. If [PV awakening] function is selected as [no], after controller dormancy, if the photovoltaic panel is connected, the controller charging can be awakened in days if the charging condition is satisfied in days. However, at night, the controller shall further enter into the dormancy state.

(Note: [PV awakening] function can be selected with CU remote controller. 2.4 G wireless remote control type can only be awakened with PV)

Controller State	Dormancy	Awakening-R	Awakening -W	Charging	Discharging	After dormancy LED indicator light State
CU-ALL5	Button OFF	Button ON	Cannot be awakened	--	--	All off
CU-mini2	Button OFF	Button ON	--	--	--	All off
PV awakening [yes]	--	--	The controller starts with in 10 seconds after the PV voltage is greater than the battery voltage by +1V, the load is turned on for 10 seconds, and the controller is awakened after charging for 1 minute.	Normal charging in days	After awakening, the load light shall be on automatically for 10s. Test whether the load is normal. The load discharge normally at night.	--
PV awakening [no]	--	--	The controller starts within 10 seconds after the PV voltage by +1V, the load is turned on for 10 seconds, and the controller is awakened after charging for 1 minute.	Normal charging in days	After awakening, the load light shall be on automatically for 10s. Test whether the load is normal, without discharge at night, the load dormancy shall further continue	--

## 2.3 State of Indicator Light and Remote Controller

The state of indicator light of the controller is shown below:

Indicator Light	State of Indicator Light	Description of Indicator Light	State of Remote Controller System
① PV indicator light	Normally on	Battery panel voltage is greater than the light-controlled voltage	Idling
	Off	Battery panel voltage is smaller than the light-controlled voltage	Idling
	Slow flash	Charging	Charge
② BAT indicator light	Double flash	Fully charged battery	Full charge
	Quick flash	BMS protection of lithium battery Or BAT excessive voltage Or PV excessive voltage Or over temperature (ambient temperature)	E-BMS BV excessive temperature PV excessive temperature Over-temperature
	Normally on	Normal operation of storage battery	Idling
③ LOAD indicator light	Off	Battery is not connected or over-discharge protection of lithium battery protection panel	/
	Quick flash	Over-discharge of battery	Over discharge
	Normally on	Load opening	Discharge
④ DC indicator light	Off	Load off	Idling
	Slow flash	Open circuit of load	Open circuit
	Double flash	Short circuit of load	Short circuit
⑤ ②③④	Off	No DC access	/
	Slow flash	DC access	/
	Quick flash	Abnormal DC voltage	/
⑤②③④	Four indicator light flashes in flowing at 1Hz	Under lead-acid cell mode, only DC power or solar panel is connected.	No communication can be performed, waiting for storage battery connection.

## 2.4 Intelligent Power:

The controller can select intelligent power mode according to actual battery capacity, rainy day number and other factors. Specific intelligent power mode: high, medium, low, automatic, USE (custom), or not (close).

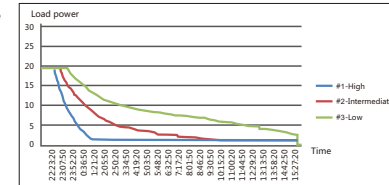
### Intelligent power shift:

**High:** The storage battery at the starting point of power reduction has higher capacity and the longest on duration of load light. Therefore, it is suitable for use in areas with more cloudy and rainy days or poor lighting.

**Middle:** The storage battery at the starting point of power reduction has proper capacity and proper on duration of load light. Therefore, it is suitable for use in areas with requirements on both luminance and rainy days;

**Low:** The storage battery at the starting point of power reduction has proper capacity and proper on duration of load light. Therefore, it is suitable for use in areas with higher requirements on luminance effect

### Intelligent Power Curve

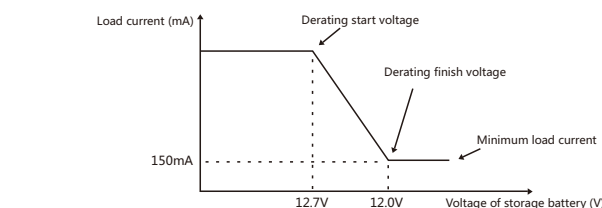


### Intelligent power experimental data

Comparison of Intelligent Power Consumption and Rainy Days		
Intelligent Power Grade	Daily Power Consumption	Continuous operation days
No	100%	1
Low	50%	2
Middle	25%	4
High	15%	6

**Test Description:** 1. Test battery is fully charged and loads have consistent maximum power and operation duration.  
It is assumed that the power consumption at closure of intelligent power is 100%.  
The test result is the test data obtained under single condition (daily charging amount is 0).  
The practical use condition may be different from the test condition and the test result is only for reference.

Automatic-intelligent power mode can automatically select the high/middle/low shifts for operation according to the charging amount, power consumption and other parameters on the day. For example, in summer, more charging quantities are required, operating at intelligent mode - low; there are better lighting effects; in winter, less charging quantities are required, operating at intelligent mode - high; the load operating in power saving mode can withstand more rainy days. USE (Custom) - Users set the derating start point voltage, derating finish voltage and minimum load current value for intelligent power.



**No (turn off)** - turn off the intelligent power and load power is output according to the power at the set duration.

**Note:** When the intelligent power is turned on, the intelligent power will take effect only when power is supplied to load from the battery. When the power is supplied from DC, the load power is equal to the power at the set current duration.

## 2.5 Operation of remote controller:

### 2.5.1 Remote controller CU-ALL5:

The communication between the controller and the hand-held remote controller CU-ALL5 can be controlled remotely in infrared way or wireless way. At the same time, [+ ] and [- ] keys of the remote controller are selected to select [remote control type] (infrared/wireless). In practical use, the infrared remote control signal is easily attenuated under outdoors strong light. The remote control communication distance is 5-6m. At night, the remote control communication distance 8-10m; the wireless remote control signal can penetrate the plastic shell or the aluminum shell. The wireless remote control distance can be adjusted with a remote controller at 0.3m-20m.

The specific remote controller [parameter setting] and [operation status] are as follows:

Parameter setting:

Parameter Name	Default Parameter	Parameter Range
Battery type	Lead	Lead/ lithium 12V/ lithium 24V
Induction delay	No	No
PV awakening	Yes	No/yes
Light-controlled voltage	5V	3V-11V
Light-controlled delay	10s	5s-60min
Over-discharge voltage	11.0V	9.00V-17.0V
Over-discharge return	12.6V	9.00V-17.0V
Boost charging	14.4V	9.00V-17.0V
Floating charge	13.8V	9.00V-17.0V
Charging at low temperature	-35°C	-35°C-0°C
Operation at high temperature	65°C	40°C-90°C
Load current	0.33A	0.15A-7.0A
Intelligent power	Intermediate	No/high/intermediate/low/automatic /USE
* Derating start	12.4V	9.00V-17.0V
*Derating finish	11.4V	9.00V-17.0V
* Minimum current	0.15A	0.05A-1.00A
Setting of load parameter	The Nth time	00:00-15:00
	The Nth power	0%-100%
Restore default	No	No/yes
Switching voltage	11.5V	9.00V-17.0V

### Default value set for load parameter:

Duration	Hour/minute	Power of duration
1	00:30	50%
2	00:30	70%
3	02:00	100%
4	00:30	70%
5	00:30	50%
6	04:00	30%
7	00:00	0%
8		
9		
Morning light		

### Status data:

In any interface, [operation state] data of the controller can be read by pressing key [state] of the remote controller.

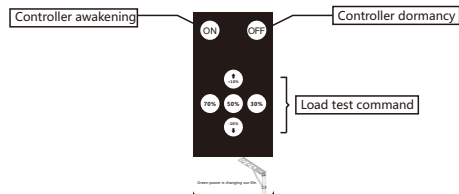
In any interface, press key [state] of the remote controller for long time to enter into sub-menu of [state data], choose to read [operation state]/ [historical data]. After choosing [operation state] or [historical data], press key [state] to read corresponding state data.

## Operation State:

Name of State	Example	Description of State Value
System state	Discharge	Current operation state: discharge/charge/idle/full /over-discharge, etc.
Battery voltage	12.3V	Current voltage of battery
PV voltage	17.6V	Current solar panel voltage
Charging current	0.0A	Current charging current
Charging power	0.0W	Current charging power
Charging ampere-hour	0.01AH	Charging ampere-hour on the day
Load voltage	27.1V	Current load voltage
Load current	0.19A	Current load current
Load power	5.15W	Current load power
Lighting duration	05:20	Practically total illumination duration on the night
Induction duration	01:10	Illumination duration for actually induced human power on the night
Discharge ampere-hour	2.05AH	Discharge ampere-hour on the night
Ambient temperature	23°C	Presently internal temperature
Operation days	15D	Accumulated operation days
Overdischarge times	2N	Total overdischarge times of lithium batteries
Full charging times	10N	Total full charge times of lithium batteries
Date of manufacture	1909	Production date of controller
Software version	1000	Software version number of controller

### 2.5.2 Remote controller CU-mini2:

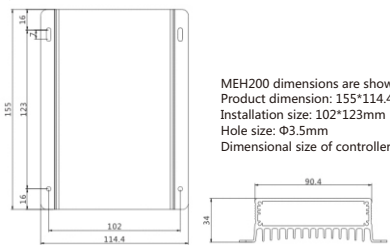
Small remote controller CU-mini2 is used for on/off and test.



Icons and description about seven keys [ON], [OFF], [70%], [50%], [30%], [+10%] and [-10%] are shown below:

Icon	Key Description
	Controller is awakened from dormancy
	Controller enters into dormancy mode with low power consumption
	The controller operates for one minute at 70% of the set load current
	The controller operates for one minute at 50% of the set load current
	The controller operates for one minute at 30% of the set load current
	The test current is increased by 10% and the device operates for 1 minute after each press
	The test current is decreased by 10% and the device operates for 1 minute after each press

### 2.6 Dimensional Figure:



MEH200 dimensions are shown below:  
Product dimension: 155\*114.4\*34mm  
Installation size: 102\*123mm  
Hole size: Ø3.5mm  
Dimensional size of controller:

## 3. Technical Parameter

Parameter Name	Parameter Value	Adjustable Parameter	Default Value
Model	MEH160 MEH200		
Remote control type	2.4G wireless remote control -MEH200-W; infrared remote control -MEH200-R		
System voltage	12V/24V	√	Lead
Static power consumption	-R Infrared: < 10mA/12V; < 7mA/24V -W Wireless: < 30mA/12V; < 15mA/24V		
Sleep power consumption	< 1mA/12,24V		
Load current	50mA - 5600mA 50mA - 7000mA	√	330mA
Load voltage	15V - 75V		
Load maximum power	80W/12V ;160W/24V 100W/12V ;200W/24V		
Load conversion efficiency	90% - 96%		
Load current accuracy	< 3%		
Load power	High/intermediate/low/automatic/custom/no	√	Middle
Load operation period	Nine periods + morning light		
Period regulation range	1 minute/10 minutes		
Power regulation range	1%/10%		
Maximum solar input power	200W/12V;400W/24V 260W/12V;520W/24V		
Maximum charging current	15A 20A		
Solar input voltage	≤ 95V		
Overvoltage	Lead-acid battery: 16V; lithium battery: charging voltage +2V; x2/24V		
Equalizing charge voltage	Lead-acid battery: 14.6V; lithium battery: without balanced charge; x2/24V		
Equalizing charge interval	30 days		
Boost charging voltage (lead acid)			
Charging voltage (lithium)	9.00V -17.00V settable; x2/24V	√	14.4V
Floating charging voltage (lead acid)	9.00V -17.00V settable; x2/24V	√	13.8V
Charging return voltage (lithium)	9.00V -17.00V settable; x2/24V	√	12.6V
Over-discharge voltage	9.00V -17.00V settable; x2/24V	√	11.0V
Over-discharge return voltage	9.00V -17.00V settable; x2/24V	√	12.6V
Switching voltage	9.00V -17.00V settable; x2/24V	√	11.5V
DC voltage input range	10-14V/12V system; 20-28V/24V system		
Light control voltage	3V - 11V ; x2/24V	√	5V
Temperature compensation coefficient	Lead acid battery: -3 mV/°C/2V; lithium battery: without temperature compensation		
Light control delay	5s - 60s/2min - 60min	√	10s
High temperature operation	40°C - +90°C	√	65°C
Low temperature charging	0°C - -35°C	√	-35°C
Operation temperature	-35°C - +65°C		
IP rating	IP67		
Protection function	Reverse polarity protection of storage battery, reverse polarity protection of battery, overvoltage protection of battery panel, overcharge and overdischarge protection of lithium battery, BMS overcharge detection protection of lithium battery, overtemperature protection, load open-circuit and short-circuit protection, load overcurrent protection, etc.		
Weight	780g		

## 4. Protection Function

### • Waterproof protection

Waterproof grade: IP67

### • Overcharge Detection Protection for Lithium Batteries BMS

When the controller detects BMS overcharge protection, the controller immediately stops charging to prevent the high voltage at the photovoltaic end from being added to both ends of BMS for long time, thereby resulting in the high voltage damage of BMS;

### • Low Temperature Charging Protection for Lithium Batteries

When the ambient temperature drops to the set value, the controller stops charging to prevent the irreversible damage to lithium battery caused by low temperature charging;

### • High temperature protection

When the ambient temperature is higher than the set value, the controller stops charging and discharging to prevent the risk of lithium battery damage caused by excessive temperature;

### • Reverse polarity protection of storage battery

The system will not operate after the battery is connected with reverse polarities, thereby it shall not burn out the controller.

### • Overvoltage protection of photovoltaic input end

In case of excessive voltage at the input end of the photovoltaic panel, the controller will automatically cut off the photovoltaic input.

### • Short circuit protection for photovoltaic input end

When the input end of photovoltaic array is short-circuited, the controller disconnects the charging. When the short circuit condition is cleared, the charging will restore automatically.

### • Photovoltaic input reverse connection protection

When the polarity of photovoltaic array is connected reversely, the controller will not be damaged and it will continue to operate normally after correcting wiring errors.

### • Limited power protection of load

When power of LED lamp holder used by the customer is too large or the load current is adjusted too large, the controller will limit the load power output to be less than the rated power to ensure that the controller and the LED load will not be damaged.

### • Load overload and short circuit protection

In case of less lamp holders and beads (3 strings or less) connected in series with the load, the controller will stop output immediately to prevent LED load or the controller against damage; In case of any short circuit, the controller will immediately cut off the load output to prevent the controller against damage. After the load short-circuit condition is relieved, the controller can restore output automatically within 1 minute (in case of short circuit for long time, the controller can restore output automatically within 1 hour), or you can also press the test key of the remote controller (CU or mini2) for 10s for restoring output automatically.

### • Open protection of load

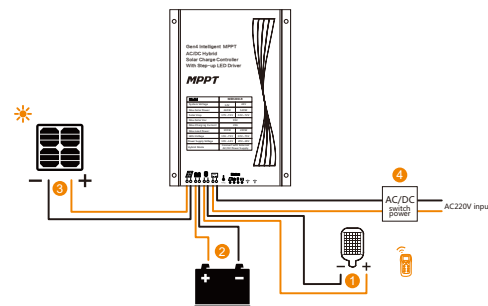
When the load wire is disconnected suddenly during normal on of LED load light, the controller can immediately turn off the load output and protect the controller from damage. When the load connection is restored, the controller automatically restores the output within 10 seconds (in case of open circuit for long time, the output shall be restored once at every 1 hour), or the output can be restored automatically after pressing the test key of the remote controller (CU or mini2).

### • Reverse charge protection at night

At night, the storage battery shall be protected against discharge via the battery panel.

### • TVS lightning protection at night

## 5. Electrical Connection Diagram



⚠ Wiring sequence: Please connect the load first, then the battery, then the solar panel, and finally the DC. Please don't connect 220V AC directly to the controller!

When system voltage is [lithium 12V] or [lithium 24V], even if no battery, but only DC power, solar panel and load are connected, the controller can operate normally;

When system voltage is [lead], in the first power on, the controller can operate normally after the battery is connected for automatic identification of system voltage.

## 6. Complementary Function of Commercial Power

Commercial power switching function of MEH series controller has two functions: battery priority and battery priority.

### 6.1 Battery Priority:

When the battery voltage is higher than the [switching voltage], the battery power should be used preferentially; when the battery voltage is lower than the power supply and [switching voltage] is set lower than the battery voltage, the battery is in the preferential mode.

### 6.2 Municipal Electricity Priority:

In case of municipal power access, municipal power shall be supplied to the load preferentially. When there is no municipal power or the municipal power voltage is incorrect, it shall switch to battery for power supply. When [switching voltage] is set higher than the maximum voltage of the battery, the commercial power is in the preferential mode.

**6.3 When the commercial power complementary controller is in use, it is required to pay attention to:**

A. AC/DC power only supplies power to the load, but not to the battery.

B. AC/DC power supply range: 10-14V/12V system; 20-28V/24V system, the controller will not be connected to the commercial power if beyond the range.

C. In case of normal access of AC/DC power, the battery voltage drops to the DC switching voltage point, and the load is automatically switched to DC power supply. If there is no DC access or DC range is incorrect, the accumulator shall continuously discharge to the overdischarge point for closure and output.

D. Switching voltage point can be set via the remote controller.

E. In the course of using, if the battery is removed, under normal power supply condition of battery panel and AC/DC power, DC power can be supplied to the load at night and the load can operate normally.

F. When the intelligent power is turned on and the load is switched to DC power supply, the intelligent power fails, and the current power of the load is the power set for the period.

G. In order to ensure reliability and stability of the system, please ensure that the output power of AC/DC power supply is more than 1.2 times of the maximum operating power of the load; AC/DC power output is constant voltage source output. The output voltage maintains unchanged.

## 7. Common Abnormity and Treating Method

No.	Phenomenon	Problem	Treatment Method
1	Remote controller cannot be used.	Wrong password of remote controller Incorrect operation way is selected for remote controller (infrared or wireless) Wireless remote control distance is too short Insufficient battery capacity of remote controller	B1. Press keys "+" and "-" at the same time to call out [remote controller setting] interface and set a correct password. B2. Press keys "+" and "-" at the same time to call out [remote controller setting] interface, and then select [infrared remote controller] or [wireless remote controller]. C1. Press keys "+" and "-" at the same time to call out [remote controller setting] interface, and then perform test after turning up [remote control distance] option. D1. Please replace two AA (double A) batteries.
2	The controller has no response when connected to the battery, the indicator light is not on, and the remote controller is unresponsive.	A. Battery power supply problems B. Controller dormancy	A1. Check whether the battery wiring is in good condition A2. Whether there is voltage at the storage battery terminal, whether the protection board is protected. If there is no voltage at the storage battery terminal, activate the storage battery by charging the storage battery. B1. Activate the controller by pressing key "ON" of the remote controller. B2. Connect the battery panel to activate the battery by activation.
3	Charging is normal during the day, but the load light is not on at night, and the LED indicator light on the controller is still not on.	A. Dormancy state of controller	A1. Activate the controller by pressing key "ON" of the remote controller. A2. Please select <PV awakening> as yes, the controller is activated automatically after charging in days.
4	Battery indicator light flashes LED lamp holder of the load is not on.	A. Insufficient battery capacity	A1. Inspect whether the battery panel is charged normally and whether the battery panel is blocked. A2. Inspect whether the wire between the storage battery and the battery panel is broken or loose.
5	Short light on time for load	Insufficient storage battery capacity Excessive load power	A1. Inspect whether the battery panel is charged normally, or configured correctly. A2. Inspect whether there is single battery protection condition for the lithium battery. A3. Open "intelligent power" option. B1. Inspect whether controller current is set correctly and whether the load power is normal.
6	Load light on current does not reach the set value	A. Intelligent power regulation load current B. LED lamp holder power exceeds the rated power	A1. Close "intelligent power" and then test the load current. B1. Turn down the set current or replace less lamp holders connected in the series.
7	Load indicator light flashes and load LED light is not on.	Open circuit of load Short circuit of LED load wire or too few LED lamp holder connected in series	A1. Please inspect whether the load wire is correct and whether LED positive and negative poles are connected reversely. B1. Please inspect whether the load wire is short circuited and whether LED positive and negative poles are connected reversely. B2. Please inspect whether LED lamps are connected in series correctly and substitute LED lamp holders with suitable quantities connected in series or parallel.
8	Light cannot be adjusted via LED load lamp holder	A. There is a problem with number of lamp holder connected in series. Lamp holders are connected in 3 circuits or voltage drop lamp holders are used.	A1. Substitute boost lamp holder (more than 5 in series).
9	Light cannot be adjusted via LED load lamp holder	Battery panels are not connected Battery panels are connected reversely.	A1. Inspect whether the battery panels are connected correctly and whether wires are connected reliably. B1. Battery panel wires are connected reversely in days and observe whether the indicator light for charging flashes.
10	With sunshine in days, the charging indicator light shall not flash slowly for charging	A. Battery panel failure or battery panel wiring error	A1. Inspect whether the solar panel is connected correctly and reliably and whether the solar panel is covered.
11	LED load is not on and storage battery indicator light is normally on.	A. Battery panel voltage is not lower than the light-controlled voltage or delay time is not up. B. Controller time is up.	A1. Wait for automatic on after voltage of the battery panel is reduced. B1. The controller is recharged for resetting the timer.
12	Charge indicator light flashes quickly, and there is no charge current.	A. Overcharging protection of lithium battery BMS protection board.	A1. Wait until the voltage of lithium battery is reduced to the overcharge return voltage, restore charging automatically.