

# MPPT - K Series

## MPPT Solar Charge Controller

### User Manual



**30A/40A/50A/60A/80A/100A    12V/24V/36V/48V**



Please read this manual carefully before use. This manual is subject to change without notice, and the company's interpretation of it shall prevail!

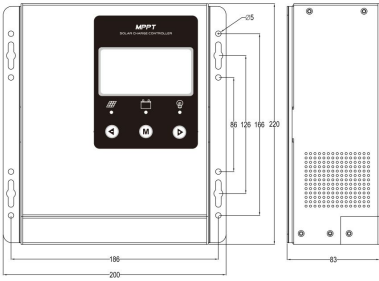
Dear Consumer

The manual gives important recommendations for installing and using the MPPT controller. Please read the manual carefully and thoroughly before using this product.

#### 1. Safety Instruction:

- (1) The controller is only used for off-grid solar system. It offers the management of charging and discharging for lead-acid and lithium battery from 12V to 48V.
- (2) The controller only can be used in dry conditions, please avoid direct sunlight.

## 2. Dimensions(mm):



### 30A/40A dimensions:

Mounting hole pitch: 86mm\*186mm

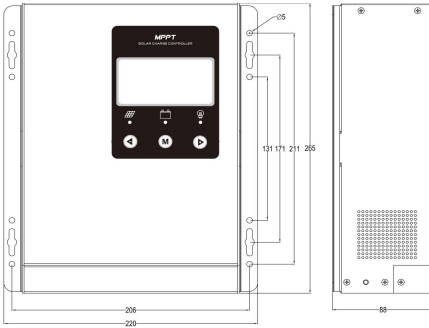
Mounting hole pitch: 126mm\*186mm

Mounting hole pitch: 166mm\*186mm

Mounting hole diameter:  $\varnothing$ 5mm

Length\*Width\*Thickness: 220mm\*200mm\*83mm

Connecting terminal: Maximum 16mm<sup>2</sup>



### 50A/60A dimensions:

Mounting hole pitch: 131mm\*206mm

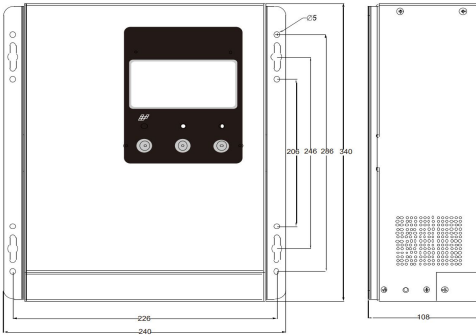
Mounting hole pitch: 171mm\*206mm

Mounting hole pitch: 211mm\*206mm

Mounting hole diameter:  $\varnothing$ 5mm

Length\*Width\*Thickness: 265mm\*220mm\*88mm

Connecting terminals: Maximum 16mm<sup>2</sup>



### 80A/100A dimensions:

Mounting hole pitch: 206mm\*226mm

Mounting hole pitch: 246mm\*226mm

Mounting hole pitch: 286mm\*226mm

Mounting hole diameter:  $\varnothing$ 5mm

Length\*Width\*Thickness: 340mm\*240mm\*108mm

Connecting terminals: Maximum 25mm<sup>2</sup>

## ⚠ Attention

Please confirm the polarity before wiring the solar panel, reverse connection may damage the controller;

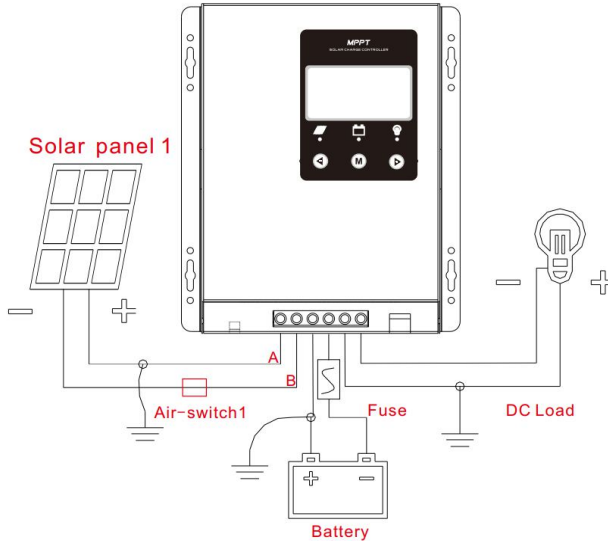
Don't disconnect the battery while the controller is charging, otherwise may damage the controller; If need disconnect the battery, please disconnect the solar panel first, and then disconnect the battery;

Don't connect the solar panel to the battery terminal, or may damage controller. Please check the wiring carefully and power on;

When connect the controller, be sure to tighten the terminal screws. Do not press the wire and check the wiring tightly.

### 3. Wiring

#### 3.1 Connection diagram:



#### 3.2 Installation process:



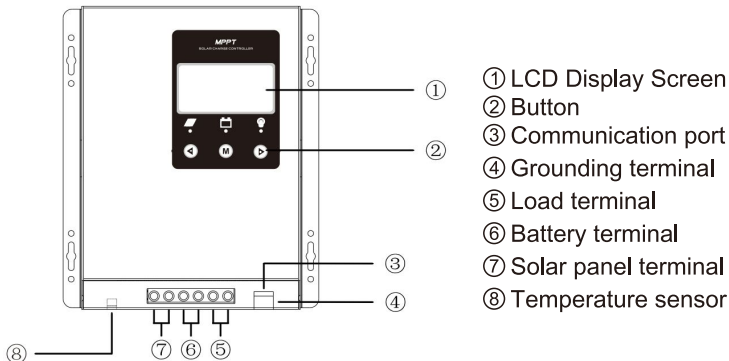
**Note: Please switch off the breakers of battery, solar panels array before installing the controller. Do not touch the positive and negative pole of solar panels or battery at the same time when installing, otherwise there is danger of electric shock!**

- (1) Mount the controller on the wall and fasten the screws.
- (2) Check whether the battery voltage and solar panels array voltage is within the requested range
- (3) Switch off the over-current breaker or fuse of the battery, solar panels array and load.
- (4) Connect the battery to the battery terminal on the controller by cables and fasten the screws.
- (5) Connect the load to the load terminal on the controller by cables and fasten the screws.
- (6) Connect the solar panel to the solar panel terminals on the controller with cables.
- (7) Switch on the breaker or fuse of the battery, then LCD display the system status.
- (8) Switch on the breaker or fuse of the battery, then the controller starts to charge the battery.

#### 4. Overview:

MPK solar charge controller is Multi-stage Maximum Power Point Tracking (MPPT) photovoltaic battery charge controller with our own technology. It's main topology adopts in Buck conversion circuit, and uses MCU to adjust the solar panels working point intelligently in order to make the solar panels output is maximum power. When the circumstances change, the working point of solar panels deviate from the maximum power point, MCU will adjust the solar panels working point based on MPPT calculation to make the solar panels back to the maximum power point again. Compared with PWM controller, MPPT can increase the output power of solar panels by 5%-30%. The output power increasing proportion is affected by the factors such as solar panel property, humidity and light intensity. The controller uses wall-mount installing. Connecting terminal makes the wiring area bigger and wiring lossless.

## 5. Instruction:



## 6. Functions:

### (1) Maximum Power Point tracking technology.

The controller uses Buck conversion circuit and MCU technology to track the maximum power point to implement the maximum output power of solar panels in different illumination intensity and temperature. The MPPT algorithm increases efficiency of your PV system and decreases the quantity of solar panels.

### (2) Multi-stage

The starting charging voltage of battery is different; the controller will use different charging strategies to finalize the charging process. When starting charging voltage is lower than 12.6V (for 12V battery), the battery will go through three stages as Bulk, Absorption and Float charging, when starting charging voltage of battery is higher than 12.6V (for 12V battery), battery will go through two stages as Bulk and Float charging.

#### (2.1) Bulk Charge

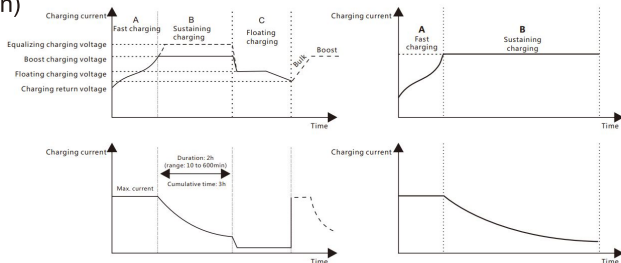
The controller charges the battery at the maximum output current. At this stage, it is in the maximum power point tracking state.

#### (2.2) Absorption Charge

The controller begins to limit the charging current to make the battery voltage at a settled absorption voltage (this voltage has temperature compensation) for two hours. It increases the charging saturation level of battery and prevents battery from leaking gas, and can increase the lifetime of battery.

#### (2.3) Floating Charge

The battery is at saturation state, and the controller charges the battery at a trickle current to make the battery voltage fixed at the settled float charging voltage (this voltage has temperature compensation)



### **(3) Charge Voltage Temperature-compensated**

The controller will compensate the Float charging voltage and Absorption charging voltage by  $-4\text{mV}/\text{Cell}/^{\circ}\text{C}$  according to the current battery temperature.

For 12V battery, the compensated voltage  $U = (t-25)^{\ast}6^{\ast}(-0.004)\text{V}$

For 24V battery, the compensated voltage  $U = (t-25)^{\ast}12^{\ast}(-0.004)\text{V}$

For 48V battery, the compensated voltage  $U = (t-25)^{\ast}24^{\ast}(-0.004)\text{V}$

### **(4) Discharge control**

The controller records the battery voltage all the time. The load will be switched off when the voltage lower than the Low Voltage Disconnect (LVD) point, and it won't be switched on until the voltage higher than the Low Voltage Reconnect (LVR) point.

### **(5) Battery Reverse Connection Protection**

Connecting the battery to the controller by reversed polarity (with the solar panel disconnected) will not damage the controller. The controller will work normally when it is correct connected.

### **(6) Solar Panel Reverse Connection Protection**

Connecting the solar panel to the controller by reversed connection will not damage controller (with the battery disconnected). The controller will work normally when it is correct connected.

### **(7) Reverse Current Protection**

The controller prevents reverse current from flowing into the solar panel at night.

### **(8) Overheating Protection**

When the controller detects that the temperature of the internal power module is higher than a certain value, the controller stops charging the battery. When the temperature drops to a certain value, the controller will restart charging the battery.

### **(9) Solar panel Over voltage Protection**

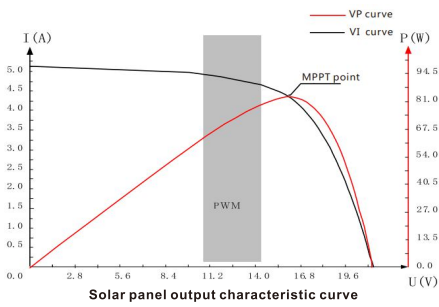
If the input voltage of the solar panel exceeds the maximum voltage allowed by the controller, it will enter into protection state automatically and stops charging. When the input voltage returns to the normal range, the controller will restart charging the battery.

### **(10) Solar panel input power limit**

When the solar panels are too powerful, the controller will deviate from the maximum power point to limit the output current to prevent the controller being damaged.

## **7. Introduction to Maximum Power Point Tracking Technology**

Maximum Power Point Tracking (MPPT) is an advanced charging technology that enables the solar panel to output more power by adjusting the electric module's operating status. Due to the nonlinearity of solar arrays, there exists a maximum energy output point (maximum power point) on their curves. Unable to continuously lock onto this point to charge the battery, conventional controllers (employing switching and PWM charging technologies) can't get the most of power from the solar panel. But a solar charge controller featuring MPPT technology can continuously track arrays' maximum power point so as to get the maximum amount of power to charge battery. Take a 12V system as an example. As the solar panel's peak voltage ( $V_{pp}$ ) is approximately 17V while the battery's voltage is around 12V, when charging with a conventional charge controller, the solar panel's voltage will stay at around 12V, failing to deliver the maximum power. However, the MPPT controller can overcome the problem by adjusting the solar panel's input voltage and current in real time, realizing a maximum input power. Compared with conventional PWM controllers, the MPPT controller can make the most of the solar panel's max. power and therefore provide larger charging current. Generally speaking, the latter can raise the energy utilization ratio by 15% to 20% in contrast with the former.



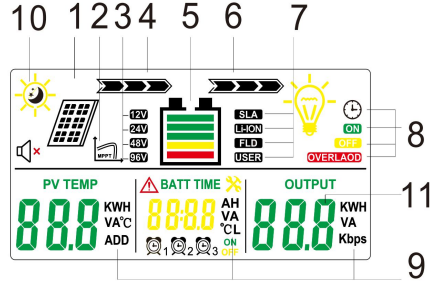
Meanwhile, due to changing ambient temperature and illumination conditions, the max.power point varies frequently, and our MPPT controller can adjust parameter settings according to the environmental conditions in real time, so as to always keep the system close to the max.operating point. The whole process is entirely automatic without the need of human intervention.

## 8.Operation Instruction

### 8.1 Symbols:

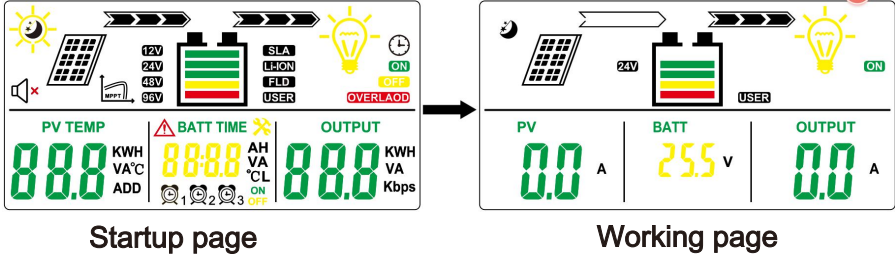
#### Icons Explanation:

- |                     |                            |
|---------------------|----------------------------|
| 1:Solar panel       | 7:Battery type             |
| 2:Working status    | 8:Load working mode&status |
| 3:System voltage    | 9:Parameters unit          |
| 4:Charge display    | 10:Day or Night            |
| 5:Battery capacity  | 11:Parameters display      |
| 6:Discharge display |                            |



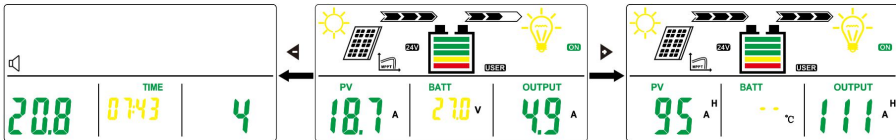
### 8.2 LCD Interface

#### 8.2.1 Start up Interface:



- (1)Startup page:the interface when system is powered on by which you check whether the LCD is in good condition.
- (2)Working page: By pressing bottom **M** to switch load on/off.The battery is properly connected to the controller, rated charging and discharging current, battery voltage, system voltage, battery type etc. can be checked in this page.

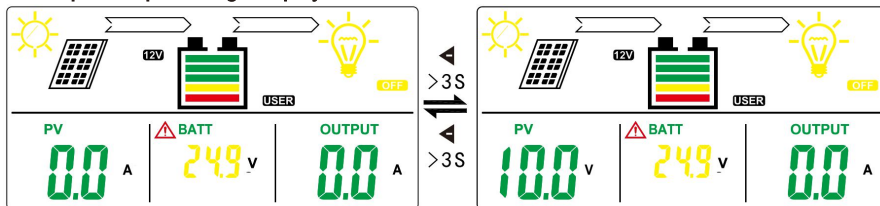
#### 8.2.2 LCD Main Interface display :



By pressing **◀** or **▶** to circulate interfaces. It will switch automatically to fault interface after 15s if something is out of work.By pressing **◀** or **▶** to cancel " error code" interface.

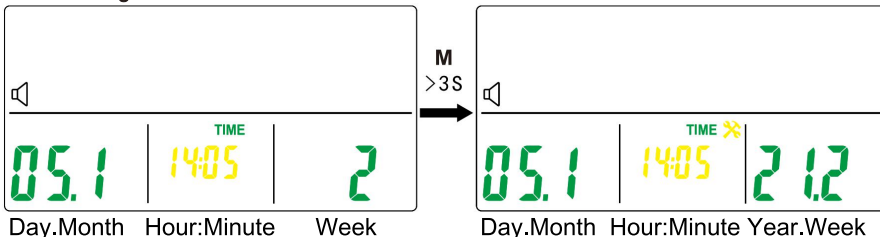
※**Notice**:Below situation valid only for products with loading control function.

### 8.2.3 Solar panel input voltage display :



By Long pressing ◀ over 3s to check PV input voltage value.

### 8.2.4 Time Setting:

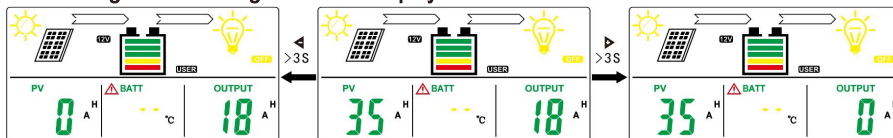


By long pressing **M** over 3s to set Real Time Clock and Date. Above screen from left to right, it means Day, Month, Hour, Minute, Year and week.

By pressing **M** to switch value you want to set and long pressing ◀ and ▶ to set parameters you need, finally long pressing **M** over 3s to save parameters you set.

※ **Notice** : For Month display, O means Oct., N means Nov., D means Dec.

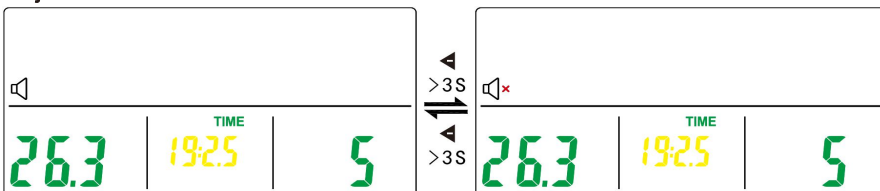
### 8.2.5 Total charge and discharge AH value display:



After charging discharging AH value up to 65KAH, the controller starts counting again from 0Ah.

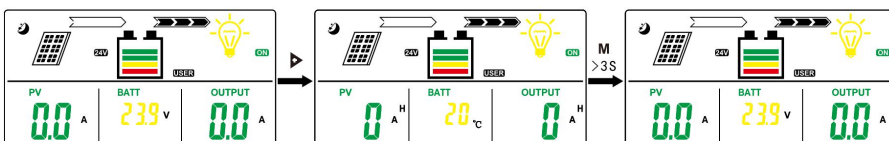
※ **Notice** : By long press bottom ◀ to clear the value.

### 8.2.6 Adjustment of sound volume:



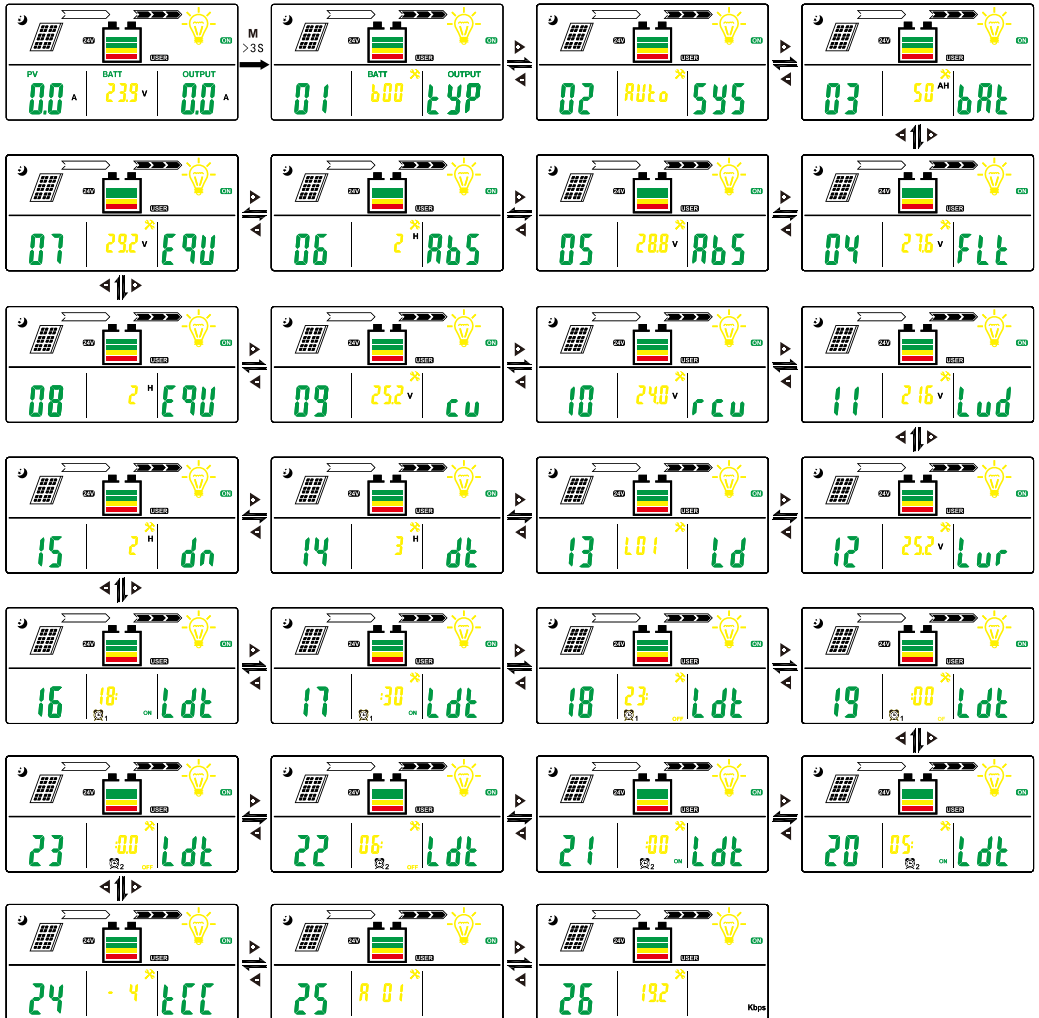
By long press the button at the time page to adjust the sound volume.

### 8.2.7 Restore factory setting:



By press the button ▶ to second page and long press bottom **M** to restore factory settings.

## 9. Parameters setting:



※ **Notice:**Explanation of the above pages:(From Page00-Page26)

00:Working page

01:Battery type(lithium,lead acid)

02:System volt.(12/24/48V Auto.)

03:Battery capacity

04:Battery floating charge volt. setting

05:Battery absorption Charge volt. setting

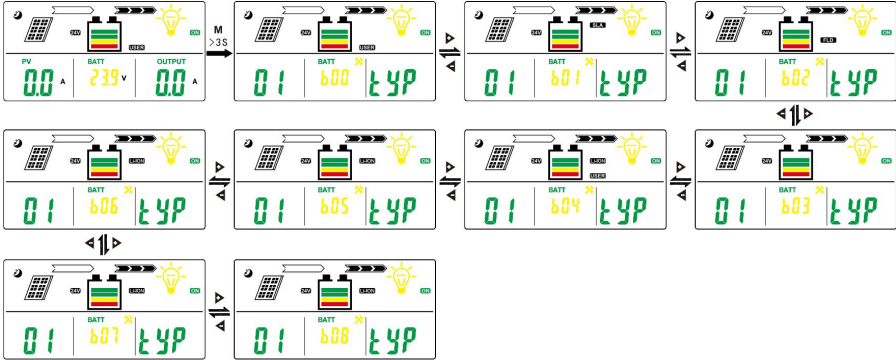
06:Battery absorption Charging time setting

07:Battery equalizing charge volt. setting

- 08: Battery equalizing Charging time setting
- 10: Lithium battery recover charging volt.
- 12: Battery low volt. recovery charging
- 14: Load working time set after dark
- 16-23: Load time control and time setting
- 25: Communication Address Setting

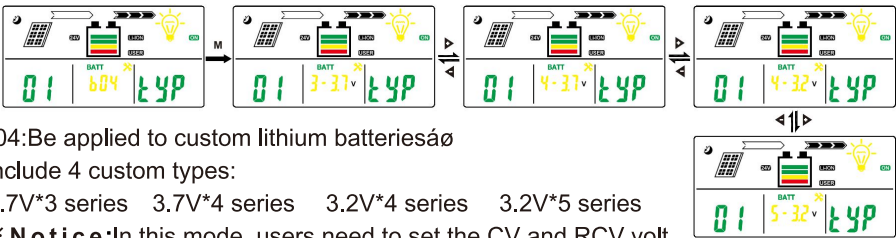
- 09: Lithium battery constant Volt. setting
- 11: Battery low volt. disconnection
- 13: Load working mode setting
- 15: Load working time set before dawn
- 24: Temperature compensation coefficient
- 26: Serial port communication baud rate set

**9.1 Battery Types and setting:**



**Battery types:**

- b00: lead-acid custom;
  - b01: sealed battery (sealed);
  - b02: flooded battery;
  - b03: Gel battery (gel);
  - b05: 3.2V\*4 series of LiFePO4;
  - b06: 3.2V\*5 series of LiFePO4;
  - b07: 3.7V\*3 series polymer lithium battery;
  - b08: 3.7V\*4 series polymer lithium battery;
- ※ **Notice:** Charging parameters cannot be set from b05 to b08

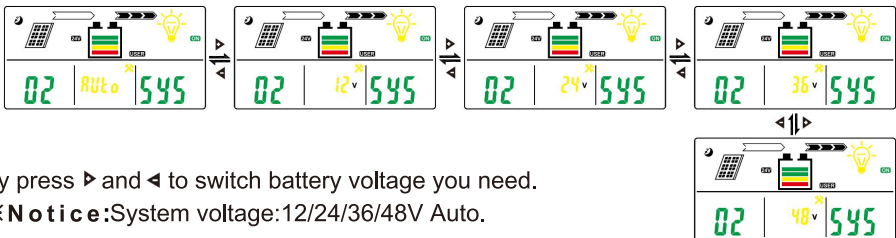


b04: Be applied to custom lithium batteries and include 4 custom types:

- 3.7V\*3 series
- 3.7V\*4 series
- 3.2V\*4 series
- 3.2V\*5 series

※ **Notice:** In this mode, users need to set the CV and RCV volt. by themselves.

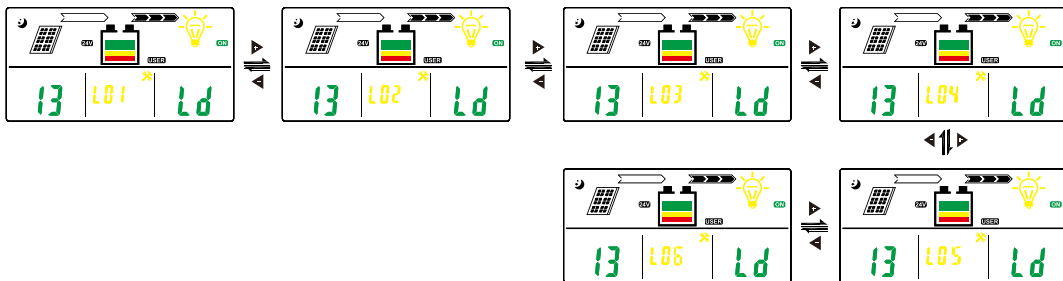
**9.2 Battery voltage setting:**



By press **▶** and **◀** to switch battery voltage you need.

※ **Notice:** System voltage: 12/24/36/48V Auto.

## 9.2 Load working mode:



LO1:Regular mode(The load continues working for 24hs a day)

LO2:Light control mode(The load works only at night)

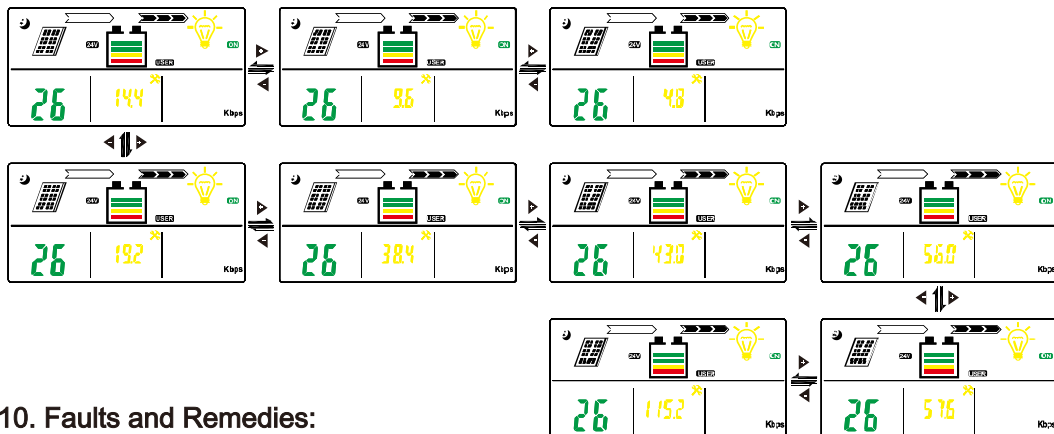
LO3:Reverse light control mode(The load works only during the day)

LO4:Dual time control mode(light control first)

LO5:Time control mode(Set load works time)

LO6:Charge only mode

## 9.3 Serial port communication baud rate setting:



## 10. Faults and Remedies:

### 10.1 Error Code and Correction:

Error code	Reason	Controller status	Solution
Ex1	Battery over discharge	1. Battery voltage is less than 10.8v 2. Loads will be disconnected	Charge the battery
Ex2	Battery over voltage	Loads will be disconnected and battery charging will automatically stop	Make sure the settled value of high voltage disconnection voltage (LVD) is over battery voltage and reconnect PV array.
Ex3	Over load	If discharging current is 1.2times the rated controller's current, the load will disconnect automatically after 60s. If 1.5 times, the load will disconnect after 10s. The load work after 6mins	Reduce the load output, and switch on load manually or wait 6 minutes for autoswitch-on by controller
Ex5	PV input over voltage protection	When PV Input voltage exceeds 149v, battery charging will stop	Battery charging will recover when PV input voltage is below 146v.
Ex6	Controller overheating	The controller will stop charging when it's temperature exceeds 85°C and restart to work when it's temperature is below 75°C	Cool down the controller.
Ex7	Internal temperature sensor doesn't work	The controller will work normally	
Ex8	Controller will restart after setting system voltage		Disconnect PV array first and disconnect battery. Power on again.

## 11. Technical Data

Model	MPPT4840K	MPPT4860K	MPPT4880K	MPPT48100K			
Input							
Maximum PV open circuit voltage	150V (at the lowest temperature) 138V (at a standard temperature of 25°)						
Minimum PV voltage	20V/40V/60V/80V						
Rated Charge Current	30A	40A	50A	60A	80A	100A	
Maximum input power	12V	390W	520W	650W	780W	1040W	1300W
	24V	780W	1040W	1300W	1560W	2080W	2600W
	36V	1170W	1560W	1950W	2340W	3120W	3900W
	48V	1560W	2080W	2600W	3120W	4160W	5200W
Output							
System voltage	12V/24V/36V/48V Auto						
Rated Discharge Current	15A	20A	25A	30A	40A	50A	
Self-consum	≤35mA(48V)						
MPPT highest accuracy	99%						
Maximum charging efficiency	97%						
Charging control mode	Multi-stage(MPPT, Absorption, Float, Equalization, CV)						
Float charge	13.8V/27.6V/41.4V/55.2V						
Boost charge	14.4V/28.8V/43.2V/57.6V						
Equalization charge	14.6V/29.2V/43.8V/58.4V						
Low voltage disconnect voltage	10.8V/21.6V/32.4V/43.2V						
Low voltage recovery voltage	12.6V/25.2V/37.8V/50.4V						
Load control mode	Normal, light control, light and timing control, timing control, reverse light control						
Light control point voltage	5V/10V/15V/20V						
Battery Type	GEL, SLD, FLD and USR(default), Lithium batteries customization 3series 3.7V, 4 series 3.7V, 4series 3.2V, 5series 3.2V						
Other							
Human interface	Color LCD with backlight, 3 buttons						
Cooling mode	Iron case heat sink and cooling fan						
Wiring	High current copper terminals ≤25 mm <sup>2</sup> (3AWG)						
Temperature probe	10K, line length 3 meters						
Communication mode	RS485, RJ45 port						
Working temperature range	-20~+55° C						
Storage temperature range	-30~+80° C						
Humidity	10%~90% No condensation						
Size	220mm*200mm*83mm	265mm*220mm*88mm	340mm*240mm*108mm				
Weight	2.2KG	3.3KG	4.5KG				
Note: Please operate at the ambient temperature allowed by the controller. If the ambient temperature exceeds the allowable range of the controller, please derate it							

### ※ Notice:

Please operate at the ambient temperature allowed by the controller. If the ambient temperature exceeds the allowable range of the controller, please derate it.

\*36V is not automatically recognized and can be set as a fixed system voltage;

\*\* There is no equalizing charging method for colloidal batteries.

## **12. After sales service:**

Manufacturer provides

- (1) One-month warranty of free replacement is provided for this product commencing from the date of purchase.
- (2) One-year warranty of free repair is provided for this product commencing from the date of purchase.
- (3) Lifetime warranty of payable repair is provided for this product commencing from the date of purchase.

Free guarantee service will not be provided to the said equipment if

- (1) It has been damaged through transportation or storage or
- (2) It has been operated otherwise than in accordance with the instructions or
- (3) Any unauthorized repair or modification has been carried out on the unit or
- (4) It has been damaged through natural calamities

## **13. Return & Repaire:**

Please contact customer service before return controller for repair and send controller together with original invoice and associated information like controller model, SN, cause. After receiving return controller, customer service will contact you to confirm cost and time etc. Please note any cost of transportation is on the account of purchaser.