MPK 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):
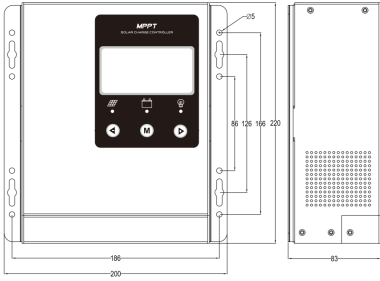
30A/40A dimensions:
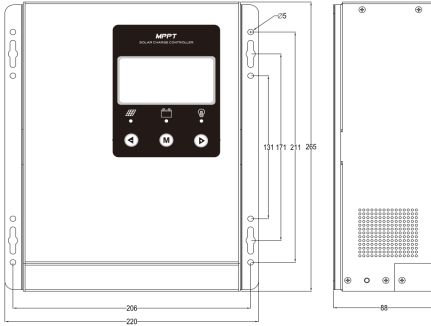Mounting hole pitch: 86mm*186mm
Mounting hole pitch: 126mm*186mm
Mounting hole pitch: 166mm*186mm
Mounting hole diameter: 5mm
Length*Width*Thickness: 220mm*200mm*83mm
Connecting terminal:Maximum 16mm²

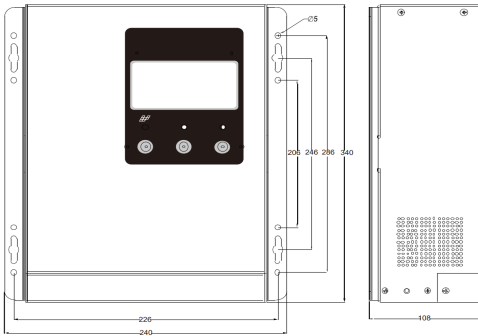**50A/60A dimensions:**
Mounting hole pitch: 131mm*206mm
Mounting hole pitch: 171mm*206mm
Mounting hole pitch: 211mm*206mm
Mounting hole diameter: 5mm
Length*Width*Thickness: 265mm*220mm*88mm
Connecting terminals: Maximum 16mm²

80A/100A dimensions:
Mounting hole pitch: 206mm*226mm
Mounting hole pitch: 246mm*226mm
Mounting hole pitch: 286mm*226mm
Mounting hole diameter: 5mm
Length*Width*Thickness:340mm*240mm*108mm
Connecting terminals: Maximum 25mm²

⚠ Attentions

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

（2）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;

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

（4）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:
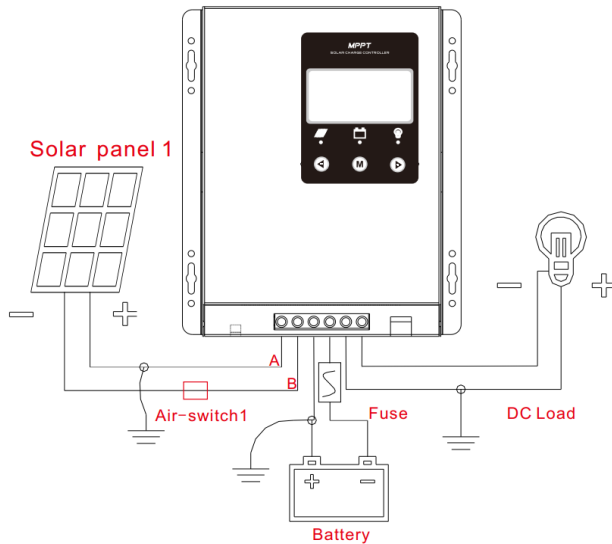
3.2 Installation process:

⚠ **Note: Please switch off the breakers of battery, solar panels array before install ing 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:
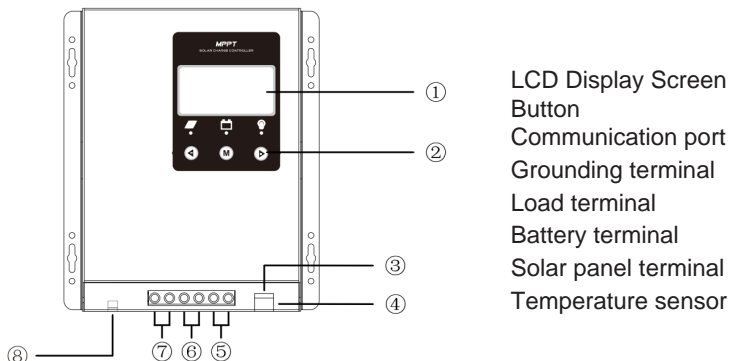
① LCD Display Screen
② Button
③ Communication port
④ Grounding terminal
⑤ Load terminal
⑥ Battery terminal
⑦ Solar panel terminal
⑧ Temperature sensor

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 than12.6v (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 gothrough 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)
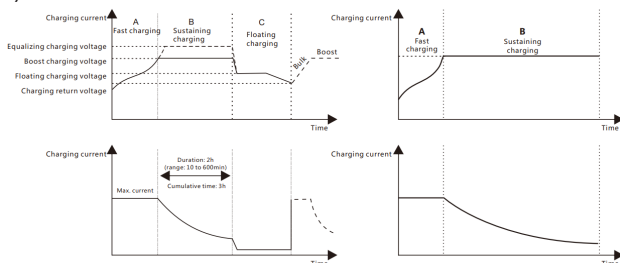
(3) Charge Voltage Temperature-compensated

The controller will compensate the Float charging voltage and Absorption charging voltage by -4Mv/Cell/¡æ according to the current battery temperature.

For 12V battery, the compensated voltage U= (t-25)*6*(-0.004)V

For 24V battery, the compensated voltage U= (t-25)*12*(-0.004)V

For 48V battery, the compensated voltage U= (t-25)*24*(-0.004)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 acertain 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 thecontroller, 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 (Vpp) 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.

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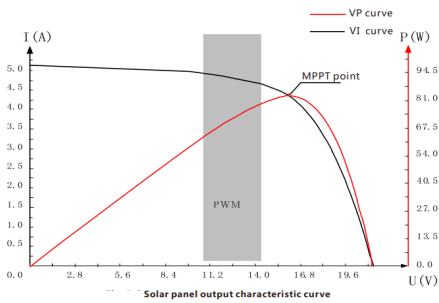
Meanwhile, due to changing ambient temperature and illumination conditions, the max.power point varies frequently, and our MPPT controller can adjust parameter settings according to the environmental conditions in real time,so as to always keep the system close to the max.operating point. The whole processis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

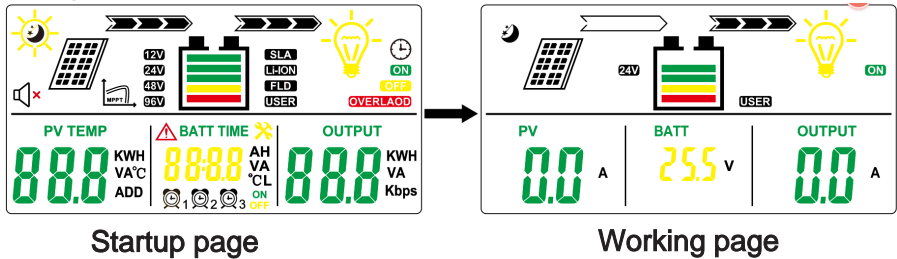# 8.Operation Instruction

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
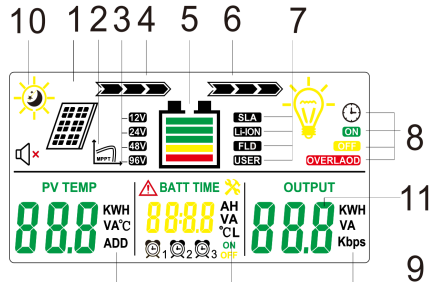

8.2 LCD Interface

8.2.1 Start up Interface

Startup page　　　　　　**Working page**

(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 discha-rging current, battery voltage, system voltage, battery type etc. can be checked in this page.
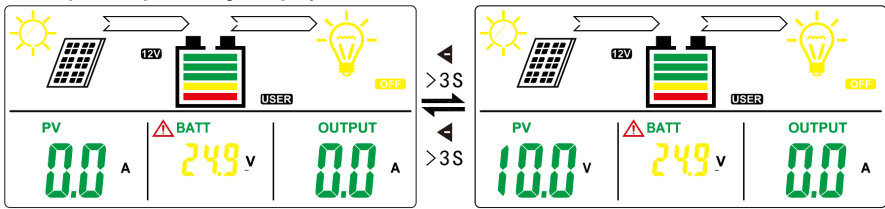
8.2.2 LCD Main Interface display
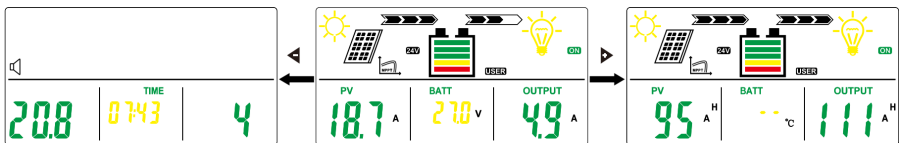
By pressing ◀ or ▶ to circulate interfaces. It will switch automatically to fault interface after 15s if something is out of work.By pressing◀ o ▶ to cancle " error code" interface.

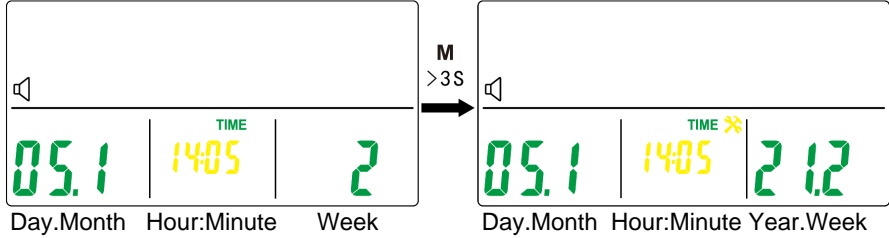　　**Reamrks:**Below situation valid only for products with loading control function.

8.2.3 Solar panel input voltage display

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

8.2.4 Time Setting:

Day.Month Hour:Minute   Week   Day.Month Hour:Minute Year.Week

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.

   Reamrks:For Monthe display,O means Oct.,N means Nov.,D means Dec.

8.2.5 Total charge and discharge AH value display:
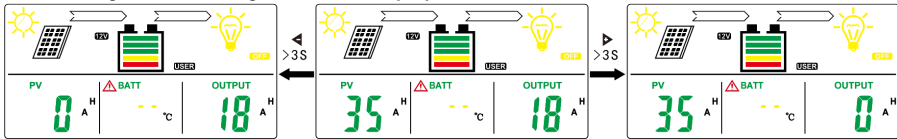
After charging discharging AH value up to 65KAH, the controller starts counting again from 0Ah.
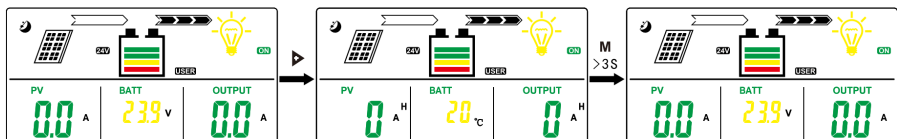
   Reamrks:By long press botton ◄ to clear the value.
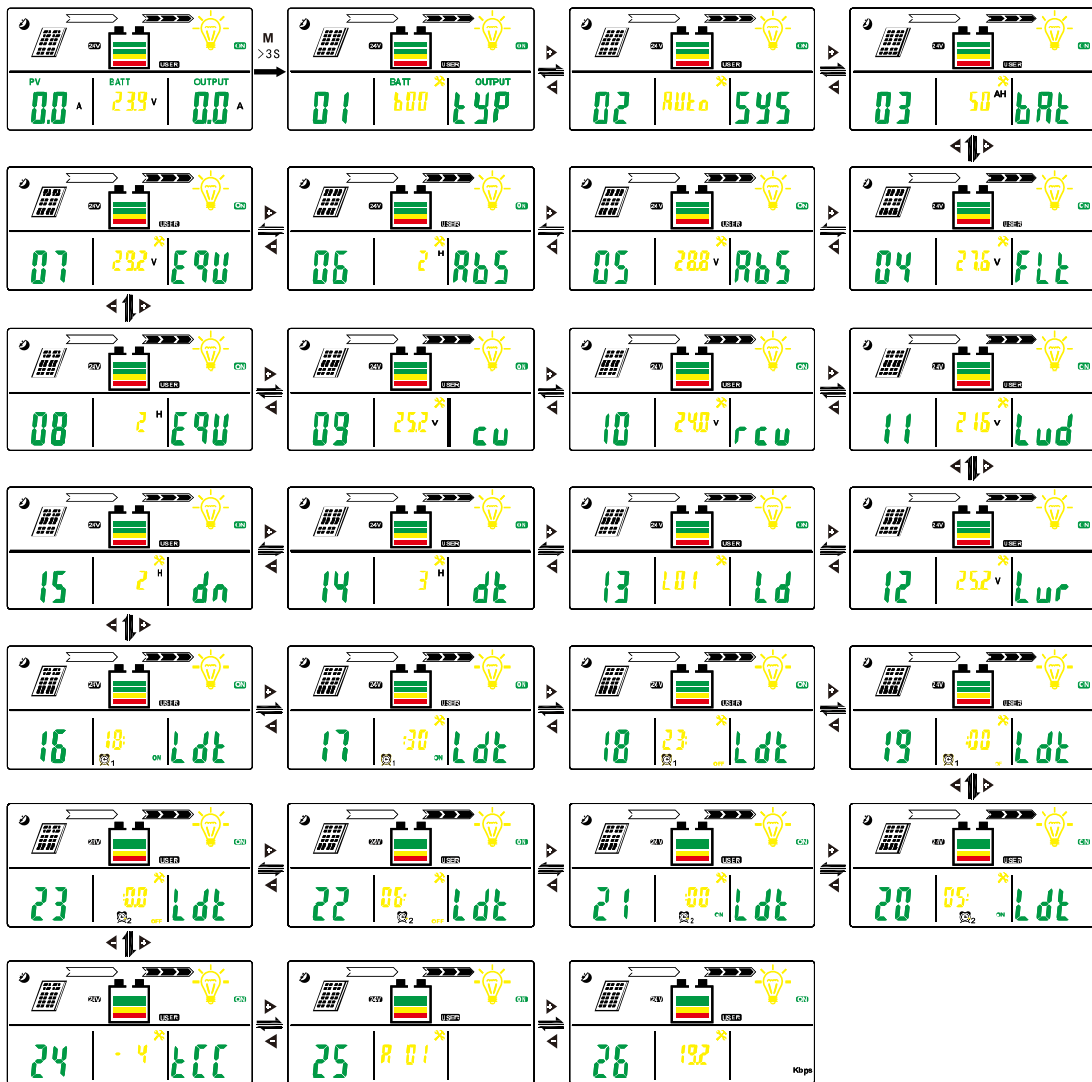
8.2.6 Adjustment of sound volume:
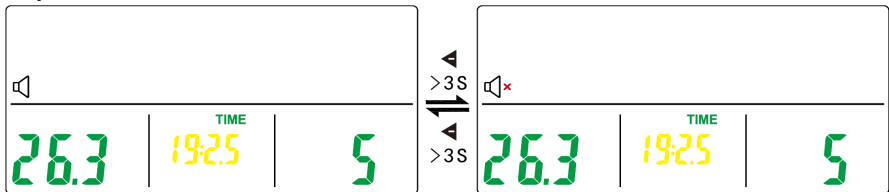
By long press the button at the time page to adjust the sound volume.

8.2.7 Restore factory setting:

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

9. Parameters setting:

The parameter setting pages show LCD display readings:

- Page 00 (Working page): PV 0.0 A, BATT 23.9 V, OUTPUT 0.0 A
- 01 | 600 tYP
- 02 | Auto 545
- 03 | 50 AH bAt
- 07 | 292 V EQU
- 06 | 2 H Abs
- 05 | 288 V Abs
- 04 | 276 V FLt
- 08 | 2 H EQU
- 09 | 252 V cu
- 10 | 240 V rcu
- 11 | 216 V Lud
- 15 | 2 H dn
- 14 | 3 H dt
- 13 | L01 Ld
- 12 | 252 V Lur
- 16 | 18 Ldt
- 17 | -30 Ldt
- 18 | 23 Ldt
- 19 | 00 Ldt
- 23 | 00 Ldt
- 22 | 06 Ldt
- 21 | 00 Ldt
- 20 | 05 Ldt
- 24 | -4 tCC
- 25 | A 01
- 26 | 192 Kbps

Reamrks: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 　09:Lithium battery constant Volt. setting
10:Lithium battery recover charging volt. 　11:Battery low volt. disconnection
12:Battery low volt. recovery charing 　13:Load working mode setting
14:Load working time set after dark 　15:Load working time set before dawn
16-23: Load time control and time setting 　24:Temperature compensation coefficient
25:Communication Address Setting 　26:Serial port communication baud rate set

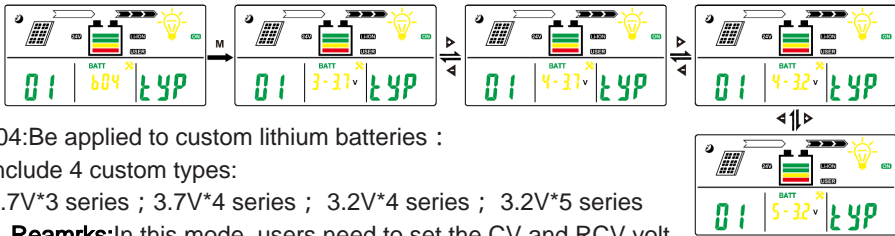## 9.1 Battery Types and setting:
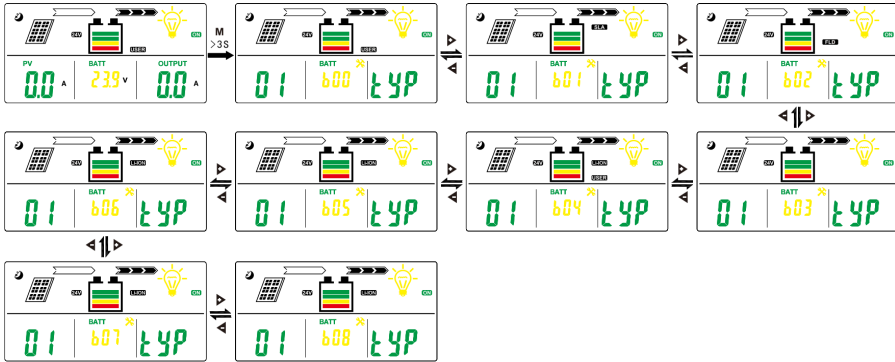
Battery types:

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;
　Reamrks:Charging parameters cannot be set from b05 to b08
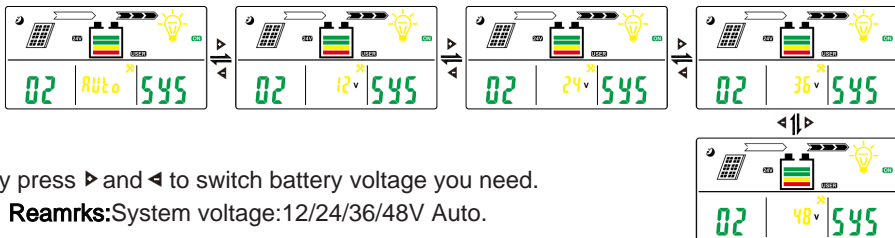

b04:Be applied to custom lithium batteries
include 4 custom types:
3.7V*3 series 　3.7V*4 series 　3.2V*4 series 　3.2V*5 series
　Reamrks:In this mode, users need to set the CV and RCV volt.
by themselves.

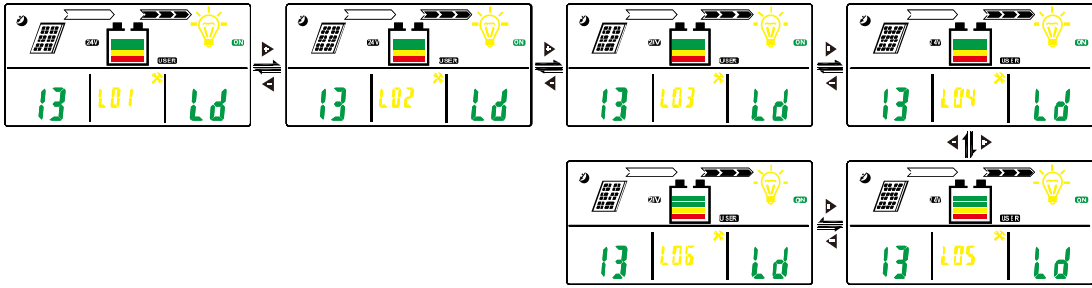## 9.2 Battery voltage setting:

By press ▷ and ◁ to switch battery voltage you need.
　Reamrks:System voltage:12/24/36/48V Auto.

9.2 Load working mode:

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

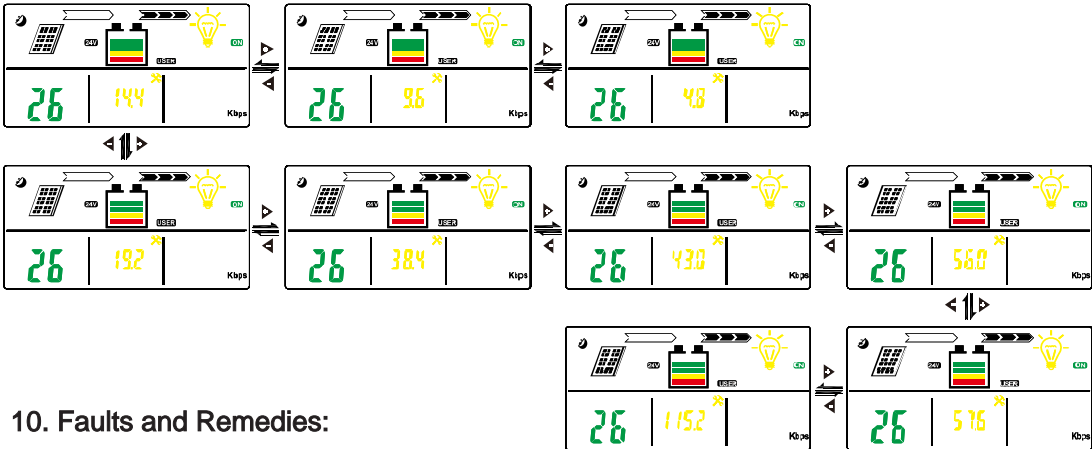LO2:Light control mode(The load works only at night)

L03:Reverse light control mode(The load works only during the day)

L04:Dual time control mode(light control first)

L05:Time control mode(Set load works time)

L06: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	When battery voltage less than 10.8V	battery voltage is very low and load switch off auto.	Charge the battery with a charger
Ex2	When battery voltage more than rated HVD value	battery voltage is very high	Check the battery voltage setting is correct or not check the parameters setted is correct or not
Ex3	When the load current exceeds the rated current of the controller	output overload protection and stop to output	Reduce the load output, and switch on load manually or wait 6 minutes for auto switch-on by controller
Ex4	The pluses and minuses are straight through	Load short circuit protection	Check load wiring or rewiring
Ex5	The controller temperature exceeds the rated temperature	Controller Overheat Protection and stop charging	The controller automatically resumes charging when the temperature drops
Ex6	Input current is higher than rated value of controller	Input overcurrent protection and stop working	Verify that the input current of the solar panel is within the rated value specified by the controller. Please reduce the number of panels in parallel.
Ex8	After saving modified parameters		restart controller

11.Technical Data

Model	MPK40		MPK60		MPK80	
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
Output						
System voltage	12V/24V/36V/48V Auto					
Rated Discharge Current	20A		30A		40A	
Own consumption	≤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					
Absorption charge	14.4V/28.8V/43.2V/57.6V					
Equalization charge	14.6V/29.2V/43.8V/58.4V					
Load disconnection(LVD)	10.8V/21.6V/32.4V/43.2V					
Load reconnection(LVR)	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	AL alloy heat sink and cooling fan					
Wiring	High current copper terminal≤25 mm² (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 condendation					
Size	222*200*85mm		268*220*95mm		340*240*108mm	
Net Weight	2500g		3500g		4700g	

Reamrks:

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.