



Keeper SERIES

Maximum Power Point Tracking Solar Charge Controller

MPPT 20A-40A



Please connect the battery first, and then connect the solar panel after setting the system parameters. If you do not operate in order, the battery will be damaged.

Table of Contents

※	Overview	P1-P2	※
	Installation and Wiring	P3-P5	
	Operation Guide	P6-21	
	Protection and Troubleshooting	P22-24	
	Technical Data	P25-26	

※When using lithium batteries, please set the system voltage first, and then set the corresponding battery type (see P10 3.7 Setting Pages & P14 3.9 System Voltage Setting)

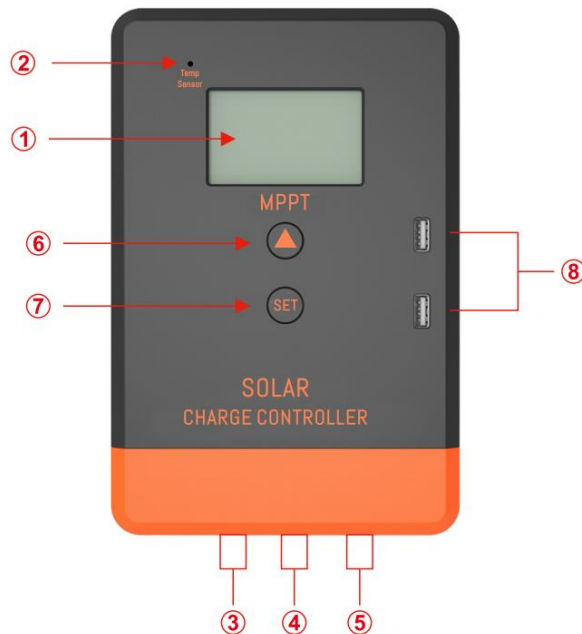
1. Overview

Thank you for selecting Keeper series solar charge controller with the most advanced MPPT control algorithm and the maximum power point of the PV array can be quickly tracked in any environment so that it can get the maximum energy from the solar panel and significantly improve the utilization of energy in solar system.

1.1 Features

- 12V/24V automatic voltage recognition.
- Compatible with multiple battery types: GEL, SLD, FLD, and LiFePO4 lithium batteries.
- Multiple load control modes: General mode, Light control mode, Light & Time control mode, and Reverse Light Control Mode.
- Equipped with battery temperature compensation function.
- Ultra-fast maximum power point tracking speed while ensuring tracking accuracy.
- Two 5V/1A USB ports can provide power for mobile devices.
- The LCD screen dynamically displays the device's operating data and working status.

1.2 Product Appearance

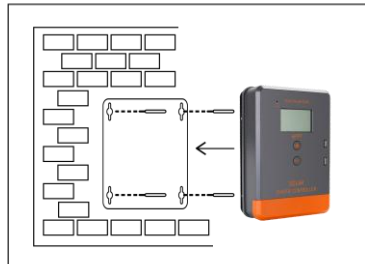


①	LCD
②	Temperature sensor interface
③	PV input port
④	Battery port
⑤	Load port
⑥	Menu button
⑦	Set button
⑧	USB output

2. Installation and Wiring

2.1 Installation

Install the controller vertically with its ports facing downward, securing it to the wall through the four mounting holes using screws.

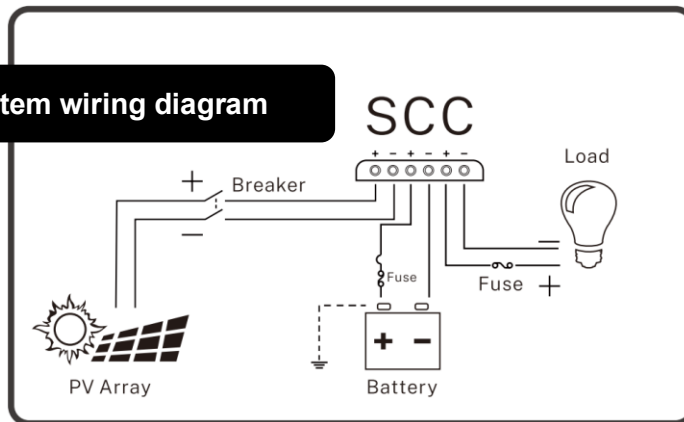


NOTICE

- Install the controller in a space with good natural ventilation/exhaust.
- Avoid direct sunlight.
- Ensure there is ample clearance around the controller.
- Install the controller on a non-combustible wall and ensure there are no flammable materials nearby; an increase in temperature during controller operation is a normal occurrence.

2.2 Wiring Precautions

Solar energy system wiring diagram



※Perform the following steps to connect cables and install them※



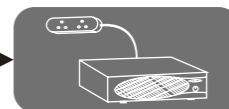
Step 1
Connect
batteries



Step 2
Connect the
solar panels



Step 3
Connect the
load



Step 4 **Connect**
the inverter to the
battery

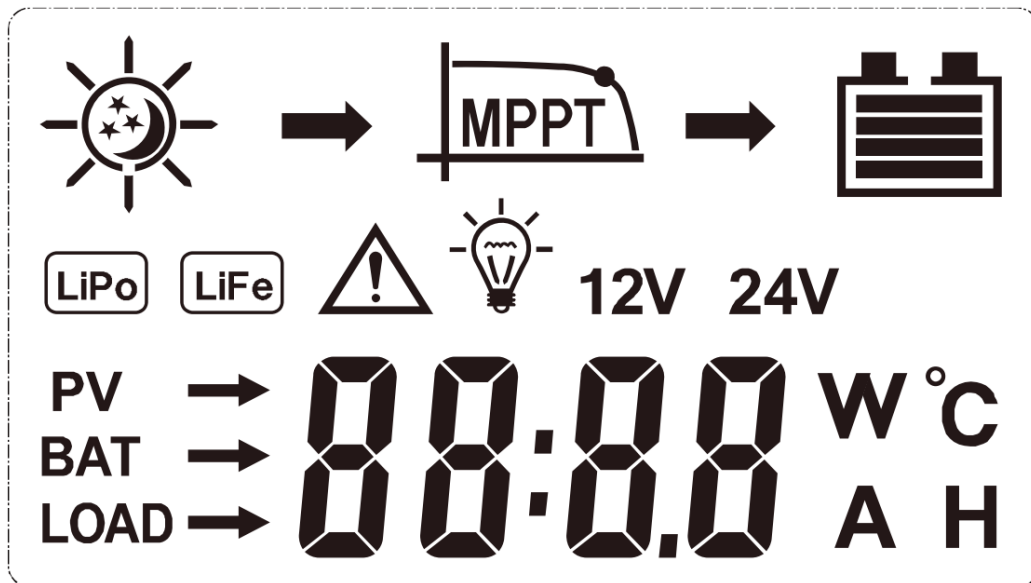
(You can
ignore this if
no inverter)

NOTICE

- This series of MPPT is a common positive controller, PV array, battery and load of the positive pole can be grounded at the same time.
- To avoid short-circuits and polarity reversal, pay attention to connecting the positive (+) cable to the device's positive (+) terminal and the negative (-) cable to the device's negative (-) terminal.
- Loose and/or incomplete connections can lead to cable or terminal overheating. Therefore, tighten all cables to minimize transition resistance, using cable sizes appropriate for the specific circuit's current rating.
- If the inverter or other starting current is loaded in the system, please connect the inverter directly to the battery. Do not connect with the controller's load terminal.
- If a lithium battery is used, set the system voltage and the battery type before use. (See P11-3.8 for details)

3. Operation Guide

3.1 LCD Screen



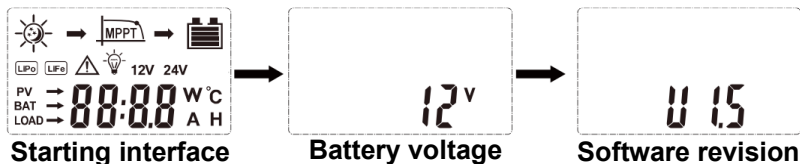
3.2 Status Introduce

Item	Icon		Status	
PV array			Day	Night
			Charging	
Battery			Uncharged/ Battery capacity	
			Battery type	
Load			Load on	Load off

3.3 Button Definition

Button meaning	Button pattern	Button function
MENU		Short Press to switch down press, and hold for 3 seconds to enter the next interface.
SET		Short press to switch up. Press and hold for 3 seconds to exit without saving.

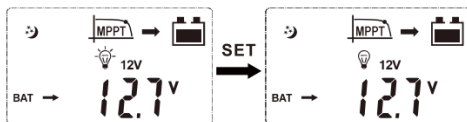
3.4 Boot Screen



- (1) Starting interface: It is normal to detect LCD when the system is powered on.
- (2) Battery voltage interface: Battery voltage.
- (3) Software revision.

NOTICE: At the first interface long press “MENU” button to enter the secondary interface. It will automatically switch to first interface without doing anything for 15 seconds.

3.5 Load Switch on/off

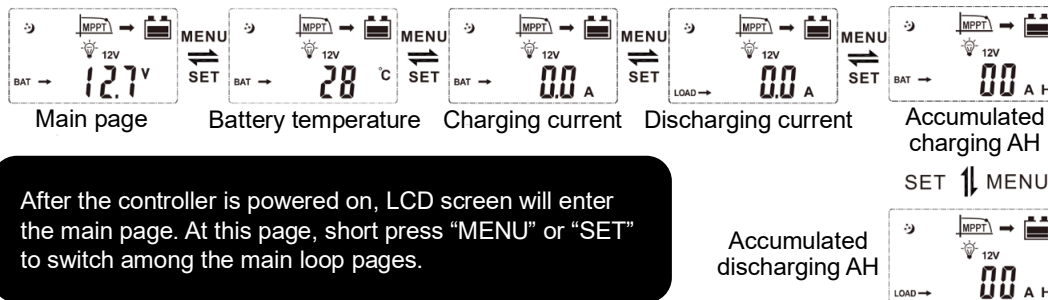


Main page

3.5.1 Short pressing “SET” button to switch on/off the load

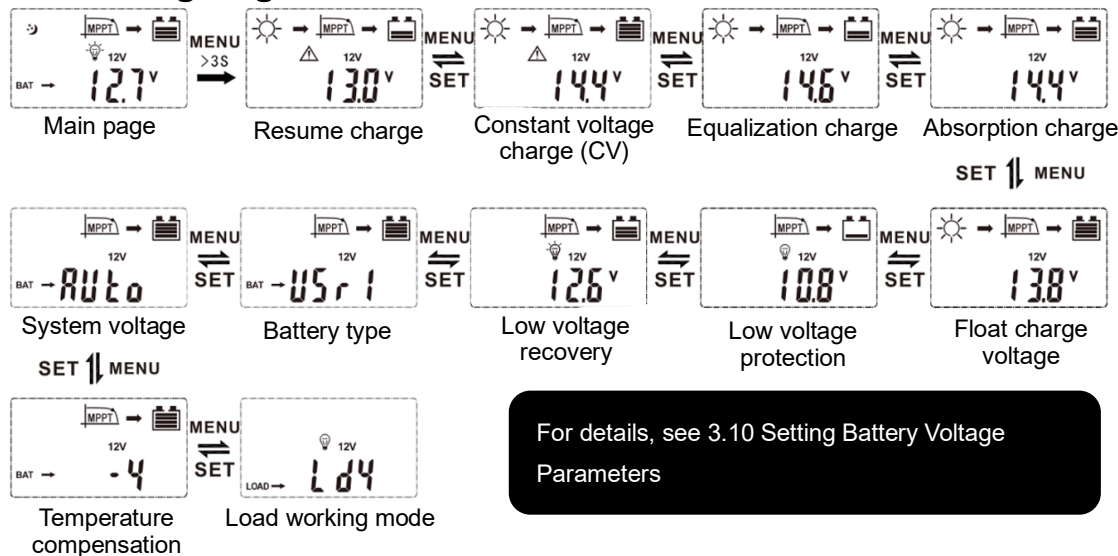
* On the main page, the load on/off button is functional in any load operating mode.

3.6 Main Loop Pages



After the controller is powered on, LCD screen will enter the main page. At this page, short press “MENU” or “SET” to switch among the main loop pages.

3.7 Setting Pages



For details, see 3.10 Setting Battery Voltage Parameters

Under the main page, long press “MENU” for 3 seconds to enter the setting page, and then short press “MENU” or “SET” to switch among the setting pages. After setting, long press “MENU” for 3 seconds to save the setting, long press “SET” 3 seconds switch to main page without saving setting.

3.8 Battery Type

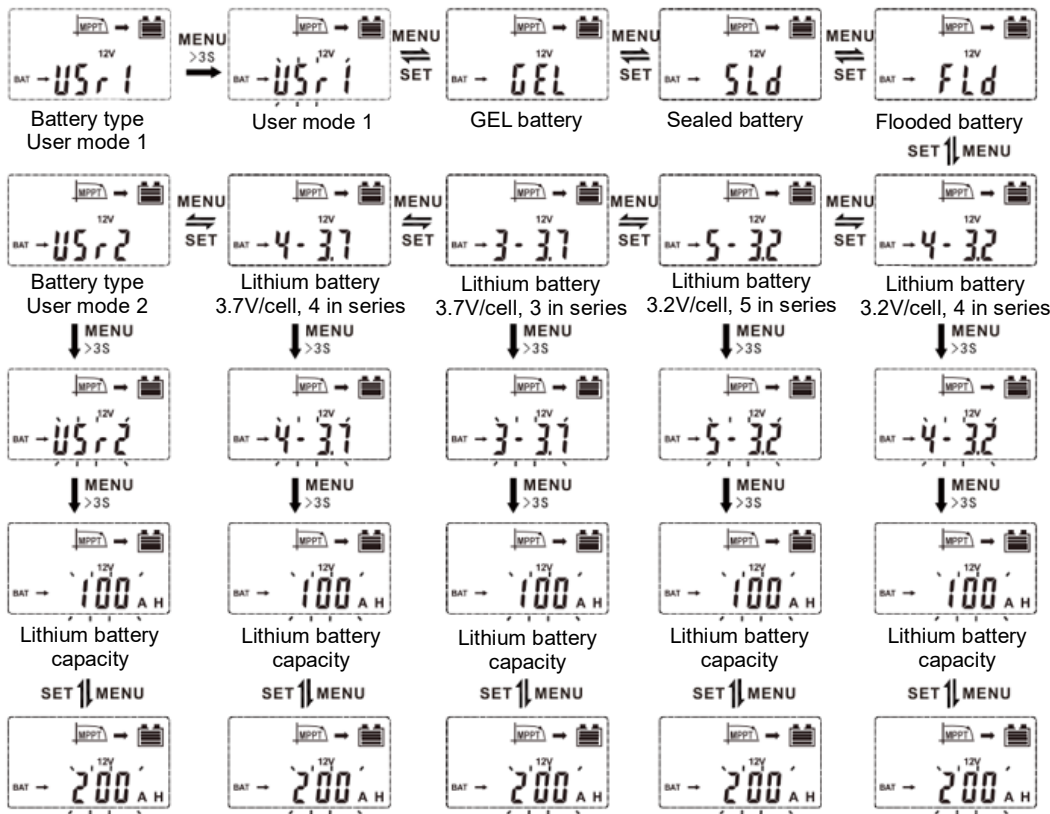
Under the main page, long press "MENU" for 3 seconds to enter the setting page, and then short press "MENU" to switch to the battery type page (user mode 1).

After entering battery type page(user mode 1), long press "MENU" for 3 seconds to enter battery type selection pages, short press "MENU" or "SET" to switch among GEL battery, sealed battery, flooded battery and lithium batteries.

Under each lithium battery page, long press "MENU" for 3 seconds to enter a program of setting lithium battery's capacity, at this time the parameters on screen will start flashing, keep long pressing "MENU" for 3 seconds, the parameter will become to battery capacity, short press "MENU" or "SET" to set the capacity of the currently connected lithium batteries. After setting the parameters, save the data, long press for "MENU" 3 seconds to save.

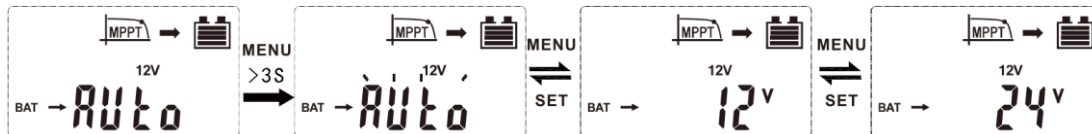
For lithium batteries, please set the system voltage before selecting the battery type.

Display	Battery type
USE 1	Lead-acid battery custom
GEL	Colloidal lead acid battery
SLD	Sealed lead acid battery
FLD	Valve-Regulated Lead-Acid Battery
4*3.2	4S LiFePO4 battery
5*3.2	5S LiFePO4 battery
3*3.7	3S Lithium-ion battery
4*3.7	4S Lithium-ion battery
USE 2	Lithium battery custom



3.9 System Voltage Setting

After completing the battery type configuration, proceed to the next setting, which is the system voltage setting. "AUTO" indicates automatic detection of the system voltage.



After entering setting pages, switch to the system voltage page, long press for "MENU" 3 seconds until the "auto" starts to flash. Then short press "MENU" or "SET" to turn the system voltage 12V or 24V.

3.10 Battery parameters of different types

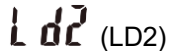
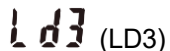
After completing the battery type and system voltage settings, if you choose a custom battery type (USE1/USE2), you can refer to the table below to configure the charging voltage. If the voltage parameter interface you switch to can be configured, the "⚠" icon will be displayed above the numerical value.

Battery Type Parameter	USE 1	GEL	SLD	FLD
Resume charge voltage	13.6V	13.6V	13.6V	13.6V
Constant voltage charge voltage	14.4V	14.4V	14.4V	14.4V
Equalization charge voltage	14.6V	14.2V	14.6V	14.8V
Absorption charge voltage	14.4V	14.2V	14.4V	14.6V
Float charge voltage	13.8V	13.8V	13.8V	13.8V
Low voltage protection voltage	10.8V	10.8V	10.8V	10.8V
Low voltage recovery voltage	12.6V	12.6V	12.6V	12.6V

Battery Type Parameter	4*3.2	5*3.2	3*3.7	4*3.7	USE 2
Resume charge voltage	13.0V	16.2V	12.0V	16.0V	13.6V
Constant voltage charge voltage	14.4V	18.0V	12.6V	16.8V	14.4V
Equalization charge voltage	-	-	-	-	-
Absorption charge voltage	-	-	-	-	-
Float charge voltage	-	-	-	-	-
Low voltage protection voltage	11.2V	14.0V	9.9V	13.2V	11.2V
Low voltage recovery voltage	12.8V	16.0V	11.1V	14.8V	12.8V

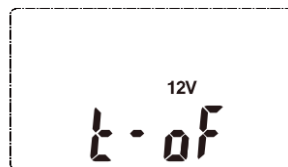
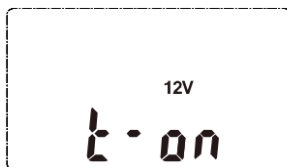
3.11 Load Working Mode

Then controller default load working 24 hours, and there are 4 load working modes for selection:

Icon	Description
 (LD1)	Regular mode: The load works normally and can be turn on or off manually.
 (LD2)	Light control mode: The load automatically turns on at dark and turns off at dawn.
 (LD3)	Light & time control mode: Load working hours after dark, load working hours before dawn. (Automatically identify dark and light according to local environment)
 (LD4)	Reverse light control mode: Load automatically turns on at dawn, load automatically turns off at dark.



If the “Light & time control mode” is selected, the user will enter the setting interface for configuring the duration of DC output. Once the duration is set, the LD3 mode configuration program can be activated or deactivated by selecting the “on” or “off” option in the switch interface.

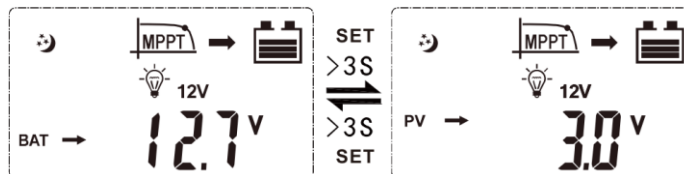


In the light control mode, time and light control mode, and reverse light control mode, the controller will start or stop the load with a delay of approximately 30 seconds after the light is detected or disappears.

On the main page, the load on/off button is functional in any load operating mode.

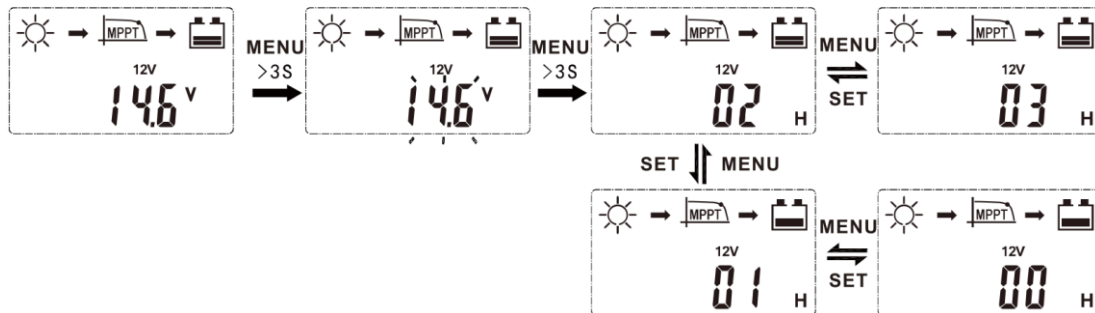
3.12 PV Voltage Page

Long press “SET” for 3 seconds to switch between the main page and PV voltage page.



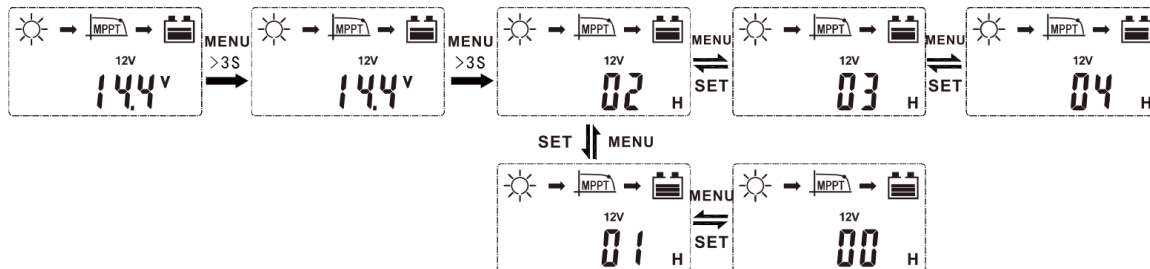
3.13 Setting of equalization charging duration

After switching to the equalization charging page from the main page, long press “MENU” for 3 seconds when the parameter starts to flash, keep pressing it for 3 seconds to turn the page to equalization charging duration setting page, short press “MENU” or “SET” to increase or decrease the time.



3.14 Setting of absorption charging duration

After switch to the absorption charge page from the main page, long press “MENU” for 3 seconds when the parameter status to flash, keep pressing it for 3 seconds to turn the page to absorption charging duration setting page, short press “MENU” or “SET” to increase or decrease the time.



4. Protection Function

Protection	Condition	Status
Solar panel reversed	Solar panel can be reversed if battery is not connected.	Controller isn't broken.
Battery is reversed	Battery can be reserved if PV is unconnected.	
Battery over-voltage	Battery voltage reaches the over-voltage point.	Stop charging and discharging.
Battery over-discharge	Battery voltage drops the under-voltage point.	Stop discharging.
Over-load	The load current is over the rated current.	Turn off the output.

5. Fault Management

Error code	Cause	Correction
PV array indicator is off when sunlight is enough.	Solar panel is disconnection.	Check whether if PV array connection is proper or not.
No sign on the LCD when connection is right.	1.Battery voltage is less than 8V. 2.Voltage of solar panel is less than battery voltage.	1.Check battery voltage (at least 8V to activate the controller). 2.The voltage of PV must be higher than battery voltage.
 (Ex1)	Battery over discharge.	The load will stop automatically and recover when battery voltage reaches 12.6V (LVR).
 (Ex2)	Battery over voltage.	Make sure the settled value of high voltage disconnection voltage is over battery voltage and reconnect PV array.
 (Ex3)	Over load.	Reduce load or check load connection.

Error code	Cause	Correction
E 5 (Ex5)	Controller overheating.	The controller will restart after it cools down.
E 6 (Ex6)	Input voltage of solar panel is too high.	Check voltage of solar panel and reduce quantities of solar panel in series.
E 7 (Ex7)	No operation.	Controller will restart after setting system voltage.

The fault code consists of an "E" and two digits. The first digit represents the current error count, and the second digit indicates the specific fault condition. When the fault code displays as "E-2," it means that there is one error at the moment, and the specific reason is overvoltage in battery.

6. Technical Data

Rated Charge Current	20A	30A	40A
PV Input			
Max. open voltage of PV array	<60V	<75V	<100V
System rated voltage	12/24V Auto recognized		
Battery voltage range	8V~32V		
Maximum input power	260W(12V) 520W(24V)	390W(12V) 780W(24V)	520W(12V) 1040W(24V)
DC Output			
Rated Discharge Current	20A	20A	30A
Battery type	User default, Sealed, Flooded, GEL, LiFePO4, Li(NiCoMn)O ₂		
Equalize charging voltage※	Maintenance-free lead-acid battery: 14.6V; GEL: 14.2V; Lead-acid Flooded battery: 14.6V. Duration: 2 hours.		
Absorption charging voltage※	Maintenance-free lead-acid battery: 14.4V; GEL: No; Lead-acid Flooded battery: 14.8V. Duration: 2 hours.		
Float charging voltage※	Maintenance-free lead-acid battery, GEL, Lead-acid Flooded battery: 13.8V.		
LVR※	Maintenance-free lead-acid battery, GEL, Lead-acid Flooded battery: 12.6V.		

LVD※	Maintenance-free lead-acid battery, GEL, Lead-acid Flooded battery: 10.8V.
Static loss	≤50mA
HVD	Lead acid battery 16V
Light control voltage	5V/10A
Temperature compensation coefficient	-4mV/°C/2V(25°C)
Discharge loop voltage drop	≤0.2V
LCD temperature	-20°C~+70°C
Operating temperature	-20°C~+55°C
Storage temperature	-30°C~+80°C
Working humidity	≤90%, No condensation
Protection class	IP30
Grounded type	Positive grounded
Aperture for installation	φ5mm
※Above the parameters are in 12V system at 25°C, twice in 24V system.	



SHENZHEN HEHEJIN INDUSTRIAL CO.,LTD

Tel/Fax: +86 755-28219903

Email: support@powmr.com

Web: www.powmr.com

Add: Henggang Street, Longgang District, Shenzhen, Guangdong, China