



Maximum Power Point Tracking (MPPT)

KA1224MPPT20A - KA1224MPPT40A

Solar Charge Controller

User Manual



Model	KA1224MPPT20A	KA1224MPPT40A
Battery voltage	12V/24V	
Max. solar panel voltage	100V(25°C), 90V(-25°C)	
Charging current	20A	40A

Version: 1.03

The above information is subject to change without prior notice.

1. PRODUCT INTRODUCTION

- This product is designed to monitor a solar panel's generated power, tracking the highest voltage and current values in real time. This allows the charging of your battery to its highest potential, enabling the maximum power output.
- Can be used on all types of solar panels.
- The product features an easy to read LCD display allowing you to check and adjust parameters by using the direction keys below the screen. This also allows you to modify your controller to best suit your system.
- With built-in diagnostics technology, the controller is able to identify faults and display error codes for ease of troubleshooting.

1.1 Exterior Interface

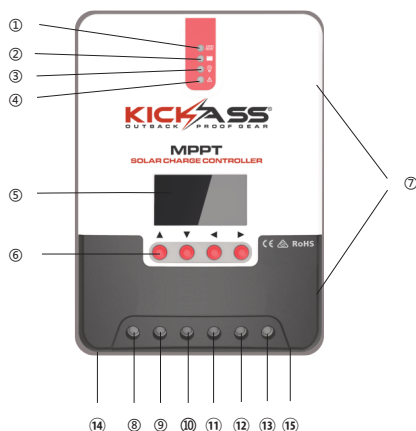


Fig. 1-1 Product appearance and interfaces

No.	Item	No.	Item
①	Charging indicator	⑩	Battery "+" interface
②	Battery indicator	⑪	Battery "-" interface
③	Load indicator	⑫	Load "+" interface
④	Abnormality indicator	⑬	Load "-" interface
⑤	LCD screen	⑭	External temperature sampling interface
⑥	Operating keys	⑮	RJ12 communication interface
⑦	Installation hole		
⑧	Solar panel "+" interface		
⑨	Solar panel "-" interface		

2. INSTALLING CONTROLLER

- Take care when installing lead acid batteries, always wear correct safety equipment.
- Keep terminals protected from foreign metal objects to ensure terminals don't short.
- Make sure battery is sufficiently ventilated.
- Keep battery away from open flames.
- Make sure battery is protected from direct sunlight and rain/water intrusion.
- Loose connections or corrosion to the terminals can cause excessive heat which may melt wiring.
- Always use insulated tools and keep hands dry when carrying out installation.
- Always follow the safety advice given by the battery manufacturer.
- Connect the controllers earth terminal to ground.


2.1 Wiring Specifications


Wiring installation must comply with with national and local electrical specifications. The wiring specifications of the battery and loads must be selected correctly to the size of the maximum output current.


See table below for correct wiring specifications:

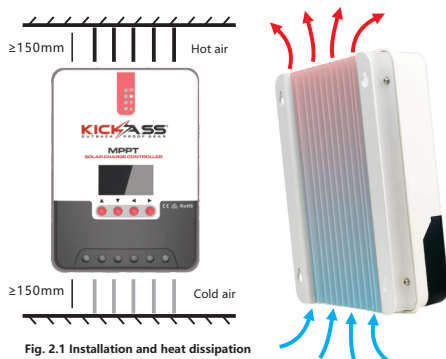
Model	Rated charging current	Rated discharging current	Battery wire diameter (mm ²)	Load wire diameter (mm ²)
ML2420	20A	20A	5 mm ²	5 mm ²
ML2440	40A	20A	10 mm ²	5 mm ²

2.2 Installation and Wiring

 Risk of explosion! Never install the controller and battery together in a sealed environment where battery gas may accumulate.

 Solar panels connected in series can produce a high voltage. Always disconnect battery whilst connecting any wiring to controller.

 When installing controller, make sure it is in a well ventilated area (see fig 2.1)



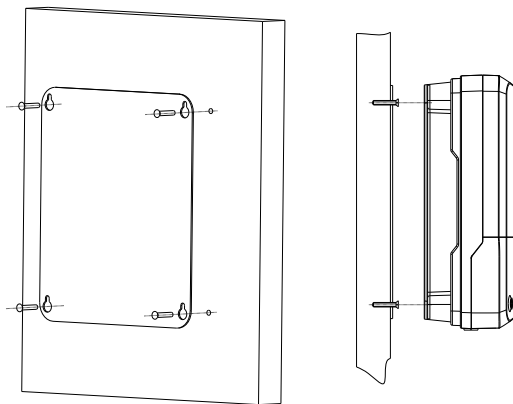
3. PRODUCT OPERATION AND DISPLAY

CHOOSING AN INSTALLATION SITE

Keep controller away from direct sunlight or high temperatures. This will ensure that you get the maximum efficiency from your controller. Make sure area is well ventilated and away from any moisture.

MOUNTING THE CONTROLLER

Using the template provided, mark 4 holes on flat surface area intended for controller. Screw into flat surface and line up mounting holes on controller and hang controller.






BEFORE OPERATION









Make sure all connections are tight, secure and that all fuses and circuit breakers are ok.

If the LCD screen fails to turn on, remove fuse from battery and check that all connections have been made correctly.






Once LCD screen turns on manually test that the load is switching on and off.

-  When controller is charging, always disconnect the load before disconnecting your battery. This will save your controller from any possible damage.
-  Within 10 minutes after the controller stops charging, reversely connecting battery will result in damage to the controller.
-  Never connect an inverter, fridge, or other accessory requiring consistent, reliable power directly to the load side of the controller. Always connect your inverter and accessories directly to your battery, fused appropriately.

3.1 LED Indicators

		PV array indicator	Indicating the controller's current charging mode.
		BAT indicator	Indicating the battery's current state.
		LOAD indicator	Indicating the load's On/ Off and state.
		ERROR indicator	Indicating whether the controller is functioning normally.

PV array indicator:

No.	Graph	Indicator state	Charging state
①	 BULK	Steady on	MPPT charging
②	 ACCEPTANCE	Slow flashing (a cycle of 2s with on and off each lasting for 1s)	Boost charging
③	 FLOAT	Single flashing (a cycle of 2s with on and off lasting respectively for 0.1s and 1.9s)	Floating charging
④	 EQUALIZE	Quick flashing (a cycle of 0.2s with on and off each lasting for 0.1s)	Equalizing charging
⑤	 CURRENT-LIMITED	Double flashing (a cycle of 2s with on for 0.1s, off for 0.1s, on again for 0.1s, and off again for 1.7s)	Current-limited charging
⑥		Off	No charging

BAT indicator:

Indicator state	Battery state
Steady on	Normal battery voltage
Slow flashing (a cycle of 2s with on and off each lasting for 1s)	Battery over-discharged
Quick flashing (a cycle of 0.2s with on and off each lasting for 0.1s)	Battery over-voltage





LOAD indicator:

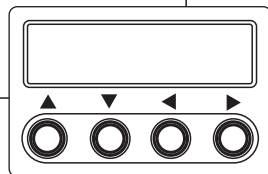
Indicator state	Battery state
Off	Load turned off
Quick flashing (a cycle of 0.2s with on and off each lasting for 0.1s)	Load overloaded/ short-circuited
Steady on	Load functioning normally

ERROR indicator:

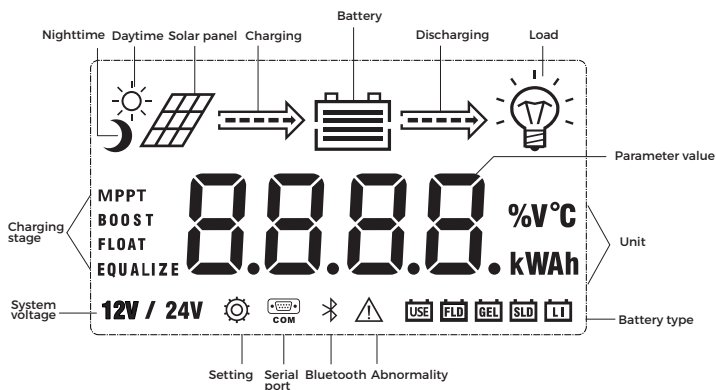
Indicator state	Battery state
Off	System operating normally
Steady on	System malfunctioning

3.2 Key Operations

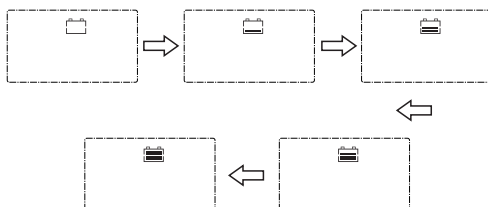
	Up	Page up; increase the parameter value in setting
	Down	Page down; decrease the parameter value in setting
	Return	Return to previous menu (exit without saving)
	Set	Enter into sub-menu; set/save; Turn on/off loads (in manual mode)



3.3 LCD Startup and Main Interface

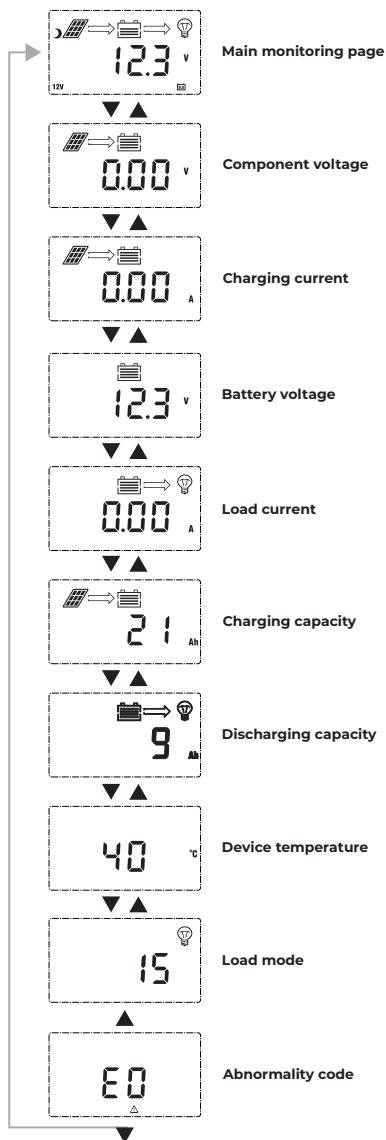


3.3.1 Startup interface



During startup, the 4 indicators will first flash successively, and after self-inspection, the LCD screen starts and displays the battery's voltage level which will be either a fixed voltage selected by the user or a voltage automatically recognized.

3.3.2 Main interface



3.4 Load Mode Setting Interface

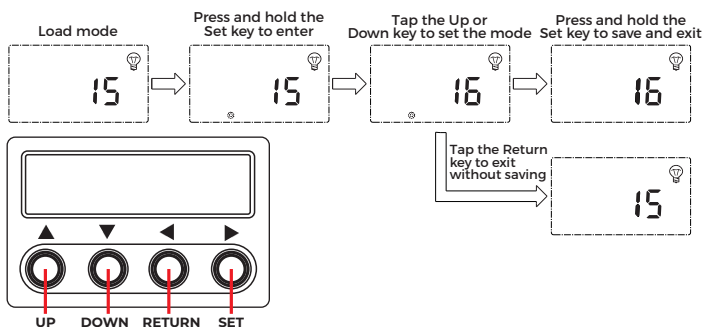
3.4.1 Load modes introduction

This controller has 5 load operating modes which will be described below:

NO.	MODE	DESCRIPTION
0	Solar Controlled (Switched based on solar state)	5 minutes after sunlight is no longer present, the load will be switched on. The load will remain on until 1 minute after sunlight returns.
1-14	Solar Controlled + Duration (Switched based on solar state and mode 1-14)	5 minutes after sunlight is no longer present, the load will be switched on. The load will then remain on for a period of hours specified by the mode number - ie. mode 2 = 2 hours, before switching off.
15	Manual Mode	Load output is switched manually using arrow keys on controller.
17	Constant Power Mode	Load output remains powered on continuously.

3.4.2 LOAD MODE ADJUSTMENT

Press the set key until the load mode screen appears, then press and hold the set key to enter, then press the up and down key to desired setting then press and hold the set key to save and exit.



4. PRODUCT PROTECTION AND MAINTENANCE

Waterproof

Waterproof level: IP32

Battery reverse polarity protection

If the battery is connected in reverse the controller will not turn on, as to protect the controller from component damage.

Solar input high voltage protection

If the solar panel array voltage is too high, the controller will automatically shut down.

Solar input short circuit protection

If the solar panel has a short circuit, the controller will stop working until the short is rectified. The controller will then start working normally again.

Solar panel reverse polarity protection

If the solar panel is reversely connected, the controller will stay illuminated however there will be no power fed to the battery. The controller will return to normal operation once the wiring has been corrected.

Load overpower protection

When the load power exceeds the rated power value, the load will enter into delay protection.

Load short circuit protection

If the load is short circuited, the controller will protect the load by shutting it down this can happen 5 times per day without affecting the controller.

Reverse charging protection at night

This function will protect the battery from discharging through the solar panel at night.

Over temperature protection

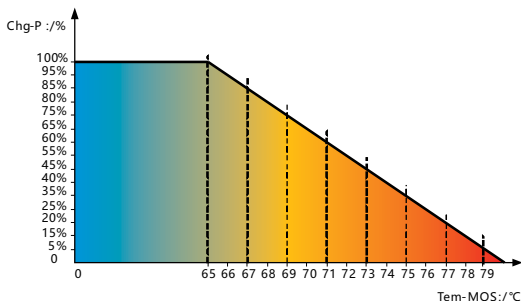


Fig. 4-1

4.1 System Maintenance

To maintain the controller's performance it is recommended that the following maintenance be carried out.

- Make sure there is enough air flow around and behind controller
- Ensure cooling fins are free of dirt or debris.
- Check for any exposed wiring between solar panel and battery and also check the load if applicable.
- Check that indicators are working correctly and check for fault codes in data analysis page, repair faults if recorded
- Check all terminal screws are tight and that there is no corrosion on terminals and wiring
- If the lightning arrestor has lost its efficiency replace with a new one in a timely manner.

4.2 Abnormality Display

No.	Error display	Description	LED indication
1	EO	No abnormality	ERROR indicator off
2	E1	Battery over-discharge	BAT indicator flashing slowly ERROR indicator steady on
3	E2	Battery over-voltage	BAT indicator flashing quickly ERROR indicator steady on
4	E3	Battery under-voltage warning	ERROR indicator steady on
5	E4	Load short circuit	LOAD indicator flashing quickly ERROR indicator steady on
6	E5	Load overloaded	LOAD indicator flashing quickly ERROR indicator steady on
7	E6	Over-temperature inside controller	ERROR indicator steady on
8	E7	Battery over temperature (E7 and E16 are different in that charging and discharging have separate upper limit protection temperature)	ERROR indicator steady on
9	E8	Solar array overloaded	ERROR indicator steady on
11	E10	Solar array over-voltage	ERROR indicator steady on
12	E13	Solar array reverse polarity	ERROR indicator steady on
13	E15	Battery not connected or lithium battery feed protection	ERROR indicator steady on
14	E16	Battery over temperature (E7 and E16 are different in that charging and discharging have separate upper limit protection temperature)	ERROR indicator steady on
15	E18	BMS over-current protection	ERROR indicator steady on
16	E17	Over-temperature inside controller	ERROR indicator steady on
17	E20	Battery reverse polarity	ERROR indicator steady on

5. PRODUCT SPECIFICATION PARAMETERS

5.1 Electric Parameters

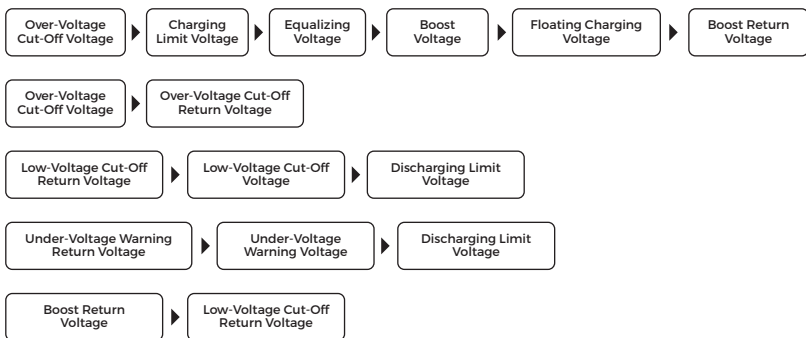
Parameter	Value	
Model	KA1224MPPT20A	KA1224MPPT40A
System voltage	12V/24VAuto	
No-load loss	0.7 W to 1.2W	
Battery voltage	9V to 35V	
Max. solar input voltage	100V(25°C) 90V(-25°C)	
Max. power point voltage range	Battery Voltage+2V to 75V	
Rated charging current	20A	40A
Rated load current	20A	
Max. capacitive load capacity	10000uF	
Max. photovoltaic system input power	260W/12V 520W/24V	520W/12V 1040W/24V
Conversion efficiency	≤98%	
MPPT tracking efficiency	>99%	
Temperature compensation factor	-3mv/°C/2V (default)	
Operating temperature	-35°C to +45°C	
Protection degree	IP32	
Weight	1.4Kg	2Kg
Communication method	RJ12	
Altitude	≤ 3000m	
Product dimensions	210*151*59.5mm	238*173*72.5mm

5.2 Battery Type Default Parameters (parameters set in monitor software)

PLEASE NOTE: you can access very basic user setup without bluetooth module but to access all will need the module or remote screen

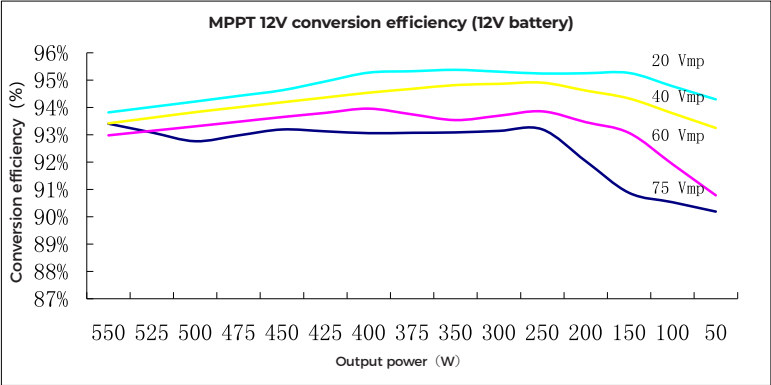
Parameters cross-reference table for different types of batteries					
Voltage to set Battery type	Sealed lead-acid battery	Gel lead-acid battery	Open lead-acid battery	Li Battery	User (self-customized)
Over-voltage cut-off voltage	16.0V	16.0V	16.0V	—	9~17V
Equalizing voltage	14.6V	—	14.8V	—	9~17V
Boost voltage	14.4V	14.2V	14.6V	14.4V	9~17V
Floating charging voltage	13.8V	13.8V	13.8V	—	9~17V
Boost return voltage	13.2V	13.2V	13.2V	—	9~17V
Low-voltage cut-off return voltage	12.6V	12.6V	12.6V	12.6V	9~17V
Under-voltage warning return voltage	12.2V	12.2V	12.2V	—	9~17V
Under-voltage warning voltage	12.0V	12.0V	12.0V	11.1V	9~17V
Low-voltage cut-off voltage	11.1V	11.1V	11.1V	—	9~17V
Discharging limit voltage	10.6V	10.6V	10.6V	—	9~17V
Over-discharge time delay	5s	5s	5s	—	1~30s
Equalizing charging duration	120 minutes	—	120 minutes	—	0~600 minutes
Equalizing charging interval	30 days	0 days	30 days	—	0~250D (0 means the equalizing charging function is disabled)
Boost charging duration	120 minutes	120 minutes	120minutes	—	10~600 minutes

When selecting User, the battery type is to be self-customized, and in this case, the default system voltage parameters are consistent with those of the sealed lead-acid battery. When modifying battery charging and discharging parameters, the following rule must be followed:

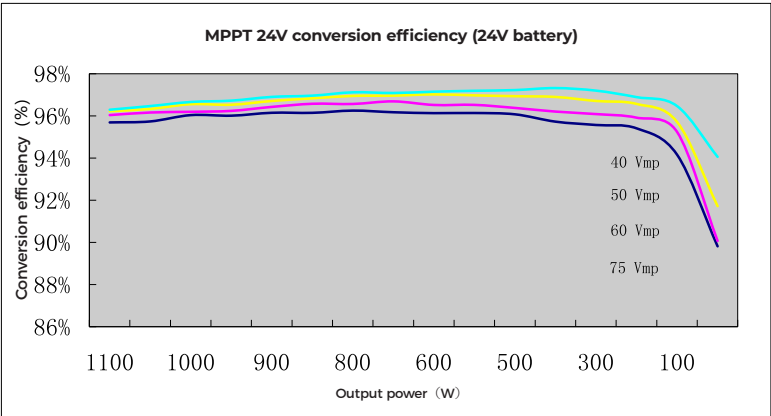


6. CONVERSION EFFICIENCY CURVE

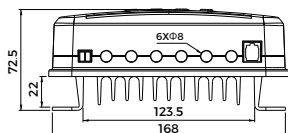
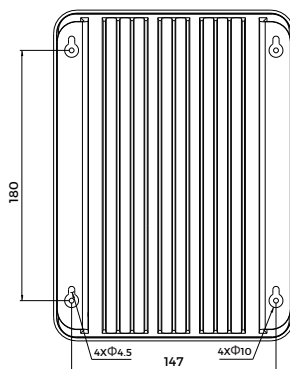
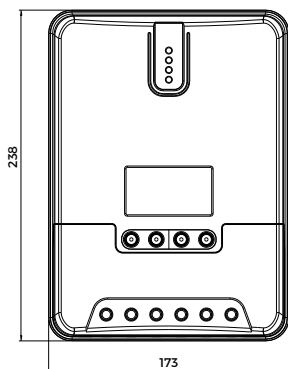
6.1 12V System Conversion Efficiency



6.2 24V System Conversion Efficiency



7. PRODUCT DIMENSIONS



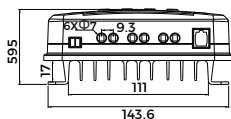
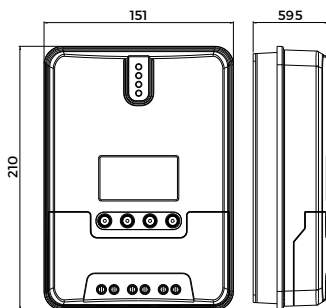
KA1224MPPT40A

Product dimensions: 238*173*72.5mm

Hole positions: 180*147mm

Hole diameter: Φ3mm

Applicable wire: max. 8 AWG



KA1224MPPT20A

Product dimensions: 210*151*59.5mm

Hole positions: 154*131mm

Hole diameter: Φ3mm

Applicable wire: max. 8 AWG

