User Manual of MPPT Solar Charge Controller

Suitable for Lead-acid batteries or Li-ion batteries

40A/50A/60A/80A/100A

RUNNER SERIES

Please keep this handbook in case of need

(Revision data: 202006

Important safety instructions (Please keep this handbook for future reference. Please read all instructions and precautions in the manual carefully before installation.)

This manual contains all the safety, installation and operation instructions of this series solar charge controller (hereinafter referred to as "controller"):

- Install the controller in a well ventilated place. The controller's case temperature may be very high during operation. Please don't touch the metal shell directly to prevent burns.
- It is recommended to connect fuse or circuit breakers to the input, load and battery terminals to prevent electric shock hazard during use.
- After installation,check all wiring connections are secure, so as to avoid the danger of heat build-up caused by virtual connection.
- If the controller does not display properly when first use, please cut off the fuse or circuit breaker immediately and check whether the wiring connection is correct or not.
- If the solar system needs to connect the inverter, please connect the inverter directly to the battery, instead of the load terminal of the controller.
- Don't disconnect the battery when the controller is charging. Otherwise, it may damage the DC load.

Operation fault codes description

Code	Description	Code	Description	Code	Description
001	Battery over-voltage	—	——	100	Trigger over-voltage protection
002	PV over-voltage	020	Internal over-temperature	200	Command mode
004	Overcharging	—	——	400	Battery system unrecognized
008	Over-discharging	080	Battery under-voltage	—	——

Table 1

System Voltage and Battery Types

1)The controller identifies the system voltage according to the battery voltage at start-up. And the controller will re-identify the system voltage when power-off and restart. Please ensure the system voltage displayed in controller is consistent with the actual voltage. Otherwise, need to recheck the battery pack voltage.

Note: Please refer to **Table 9** for the battery detailed system identification voltage.

2)The controller has 3 kinds of conventional battery charging parameters (**Table 2**) . To charge other types of batteries, please select "USE" , then set up by PC software or APP. The controller can identify 12V/24V/36V/48V ONLY. To charge lithium battery , please select "Lit", then set up on the controller.

Battery type	Constant voltage = C*N (V)	Floating voltage = F*N (V)	
Flooded(FLD)	14.6 * N	13.8 * N	1. **C** = Constant charging parameter.(9≤F<C≤15) 2. **F** = Floating charging parameter.(9≤F<C≤15) 3. **N** = Series number of battery.(1≤N≤4) [e.g. N=2,battery system is 24V] 4. **Example**:If battery system is 48V,then N=4; If battery pack's saturation voltage is 58.4V,then C=58.4/N=14.6V.
Sealed(SEL)	14.4 * N	13.8 * N	
Gel(GEL)	14.2 * N	13.8 * N	
User (USE)	C * N	F * N	
Li-ion(Lit)	Set the charging and protection parameters according to the specifications of the selected lithium batteries. **Example**:Step1: Enter the setup mode. Step2: Set the battery type to "Lit". Step3: Set the parameters of S05~S10. Step4: Save the setting parameters and exit. **Note:** Please refer to **Table 7.** Cell Specification: Nominal Voltage:3.7V; Charge Voltage:4.2V; Cut-off Voltage:2.7V — 12 cells in series → Reference Settings: S06 : 44.4V Nominal Voltage; S05 : 50.4V Charge Voltage; S07 : 32.4V Under-volt protection		

Table 2

Strip Indicator Instruction

The controller has bar indicator light, user can identify the controller current working status according to the color and flash rule of the light.

Strip Indicator Light	Instruction
Yellow Light	Standby state
Red Light	Error warning
Blue Light	Charging state
Green Light	Load indicators

Table 3

1. Characteristics

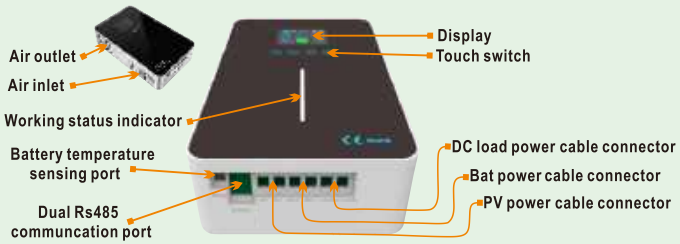


Figure 1

2. Product List

	Description	Quantity
Product	MPPT controller	1 unit
Installation accessories package	Mounting backboard	1 pcs
	Temperature sensing cable	1 pcs
	M4 screws (for mounting backboard)	4 pcs
	plastic expansion particles	4 pcs
Accessory pack	User manual	1 pcs
Optional	Screwdriver	1 pcs
	RS485-USB cable	1 pcs
	External WIFI communication module	1 unit

Table 4 (If there are any parts missing, please contact dealer.)

3. Installation Instructions. (Please refer to the illustration at the end of the manual)

4. Serial connection(string) of solar panels

The **Table 5** is the quantity (N) of solar panels in series, for reference only.

Voc * N = PV_{input} < DC150V (Table 5)												
System Voltage	Voc<23V		Voc<31V		Voc<34V		Voc<38V		Voc<46V		Voc<62V	
	Max.	Best	Max.	Best	Max.	Best	Max.	Best	Max.	Best	Max.	Best
12V	6	2	4	1	4	1	3	1	3	1	2	1
24V	6	3	4	2	4	2	3	2	3	2	2	1
36V	6	4	4	3	4	3	3	3	3	2	2	1
48V	6	5	4	4	4	3	3	3	3	2	2	2

5. DC Load Output Voltage and Max. Discharge Current

The controller has DC LOAD output function, and its output voltage range is the same as battery pack

For example, if the battery's voltage is 48.6V, the instant DC output voltage is 48.6V, too.

It can supply power to DC LOAD continuously if the DC LOAD's current in within the rated range.

When the DC LOAD's working current is 100%-120% of rated current for 5 mins, DC LOAD will be OFF.

As soon as DC LOAD's working current is over 120% of rated current, the DC LOAD will be OFF immediately.

To restart DC LOAD, user should set Load Type to "ON" or "USE" manually through controller/APP/PC.

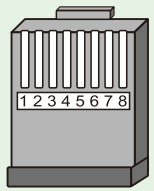
6. Communication port description

The communication port of the controller is compatible with RS485-USB communication cable for real-time monitoring by PC software and Wi-Fi module to have remote cloud monitoring by APP.

The communication port is a standard 8 pin RJ45 interface, and the pins are defined as follows(**Table 6**):

PIN	Function
1	RS485-A
2	RS485-B
3	Dry contact
4	Dry contact
5	GND
6	GND
7	+5V(Non-Isolated)
8	+5V(Non-Isolated)

Table 6



(Figure 2)

(**Note:** The pin definition is applicable to our related products ONLY!)

When the Load output is off due to the triggering protection mechanism, the dry contact output interface will be ON (**low impedance**). Otherwise, it is OFF (**high impedance**).

The controller has dual RS485 communication ports. It can be used for communication and parallel connection.

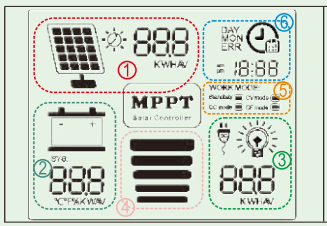
If need to monitor multiple controllers centrally, please set the device address order (1~254) of the controllers accordingly. **For example,** 5 controllers in parallel connection and monitor centrally, set controllers' address order as 1, 2, 3, 4, 5.

If want to monitor the multiple controllers in Master-Slave communication, set the host device address to 255. **For example,** 5 controllers in parallel connection, just need to set the MASTER(host) controller address order as 255.

Tip: For more information, please refer to the official website document.

7. Operation

7.1 LCD displayarea description



① PV information
② Battery information
③ DC Load information
④ Charging navigator
⑤ Working status
⑥ System information

7.2 Button Operation: (Four buttons: PV , BAT/up , DC/down , S) (Table 7)

Button	Accessible information	In setup mode fucton
PV	PV voltage/PV current/ PV power/PV total energy	
BAT up	Bat voltage/Bat current/ Bat power/Bat percentage/ Bat temp/Bat type/ Device address	Go up/increase
DC down	Load voltage/Load current/ Load power/ Load total energy/ Load working mode	Go down/decrease

Button	Setup items
S • Long press 3S to enter or exit setup mode • Press the button: -> Select of settable parameters S01~S14. -> Save parameters before exit	S01 Bat-Type->USER/SEL/FLD/GEL/LIT S02 Device address S03 Load mode->ON/OFF/USER S04 Bat-temp->℃/℉ S05 Charge-Volt->9~60V S06 Nominal-Volt->8.5~58V S07 Under-volt protection voltage S08 Under-volt recovery voltage S09 Over-volt protection voltage S10 Over-volt recovery voltage S11~S12 Realtime set S13~S14 Date set } Available for Li-ion

8. FAQ . (Table 8)

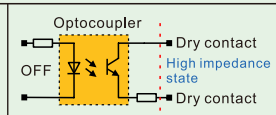
Fault	Possible Reasons	Solution
Controller cannot start up, screen can not be on	Battery positive and negative reversely connected.	Check the wiring, reconnect in right order.
Controller-not charging, PV voltage undetectable.	PV Input positive and negative reversely connected.	Check the wiring, reconnect in right order.
Controller is on and PV voltage is normal, but not charging.	The controller can not recognize battery system voltage. (The "System" in LCD flashes).	Check whether battery voltage in LCD is in the range of controller system recognition.
The battery is in a low energy or empty for a long time.	Solar panels quantity are too less to generate enough energy.	Increase solar panels quantity.
	Battery capacity is too small to Store enough energy.	Increase battery capacity.

9. Parameters

Model			R48L40	R48L50	R48L60	R48L80	R48L100
Product Category	MPPT efficiency		≥ 99.5%				
	Standby consumption		0.5W~1.2W			1W~1.6W	
	Heat-dissipating method		Fan-Cooling				
	Battery system voltage Range(Lead acid)		12V system:9~15VDC	24V system:18~30VDC	36V system:32~40VDC	48V system:42~60VDC	
	Li-ion battery system		8~60VDC(Default), ≤60VDC(Optional activation function)				
Input Parameters	Max. PV input voltage(Voc)		150VDC				
	Min. Vmpp Voltage		Battery voltage + 2V				
	Start-up charging voltage		Battery voltage + 3V				
	Low input voltage protection		Battery voltage + 2V				
	Over voltage protection / Recovery		150VDC / 145VDC				
	Rated PV Power	12V system	520W	650W	780W	1040W	1300W
		24V system	1040W	1300W	1560W	2080W	2600W
		36V system	1560W	1950W	2340W	3120W	3900W
		48V system	2080W	2600W	3120W	4160W	5200W
		Li-ion	504W~2016W	630W~2520W	756W~3024W	1008W~4032W	1260W~5040W
Charge Parameters	Activation for lithium battery		Optional				
	Battery types(Default Gel battery)		Sealed(SEL), Gel(GEL), Flooded(FLD), User-defined(USE) Li-ion(Lit)				
	Rated charge current		40A	50A	60A	80A	100A
	Temperature compensation		-3mV/℃/2V (default)				
	Charge method		3-stages: CC(Constant Current), CV(Constant Voltage), CF(Floating Charge)				
	Output voltage stability accuracy		≤ ± 0.2V				
LOAD Parameters	Load voltage		Same as battery voltage.				
	Rated load current		30A			50A	
	Load control mode		On\Off mode, PV voltage control mode, Dual-time control mode, PV + Time control mode				
	Low voltage protection		Settable				
	Setting method		PC software / APP / Controller				
Display & Communication	Display		High-definition LCD segment code backlight display				
	Communication		Dual RJ45 port / RS485 protocol / PC (via RS485-USB Cable) & APP (via Wi-Fi module) / Centralized monitoring (via parallel connection and RS485-USB cable)				
Other Parameters	Protection		Input & output over-volt / low-voltage protection, reverse polarity protection, over-heating protection, battery shedding protection etc.				
	Operating ambient temperature		-20℃~+50℃				
	Storage temperature		-40℃~+75℃				
	IP(Ingress protection)		IP21				
	Altitude		0~3000m				
	Max. Wiring size		28mm²			50mm²	
	Recommended breaker		≥60A	≥80A	≥80A	≥100A	≥120A
	N.weight (kg) / G.weight (kg)		2.15/3.05			5/6.15	
	Product size / Packing size(mm)		305×185×72 / 420×275×150			380×210×80 / 490×350×195	

10.External electrical port — Dry contact

The dry contact signal follows the state of LOAD. When load is on, the optocoupler receives the "OFF" signal.Dry contact turn to high impedance state



The dry contact signal follows the state of LOAD. When load is off, the optocoupler receives the "ON" signal.Dry contact turn to low impedance state