

Thank you for selecting RH series solar charge controller.
Please read this manual carefully before using the product.

RH series solar charge controller

1. Overview

Thank you for selecting the RH series common positive solar charge controller. The RH controller is a PWM charge controller with built in LCD display that adopts the most advanced digital technique. The multiple load control modes enable it to be widely used on solar home system, traffic signal, solar street light, solar garden lamp, etc. The features are listed below

- Adopts high quality components.
- Terminals have UL and VDE certification, the product is safer and more reliable.
- Controller can work continuously at full load within the environment temperature range -25 to 55°C
- 3-Stage intelligent PWM charging: Bulk, Boost/Equalize, Float
- LCD Display design, dynamically displaying device's operating data and working condition
- Double USB design to charge electronic equipments.
- With button setting, operation will be more comfortable and convenient
- Multiple load control modes
- Energy statistics function
- Extensive Electronic protection

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2. Product Features

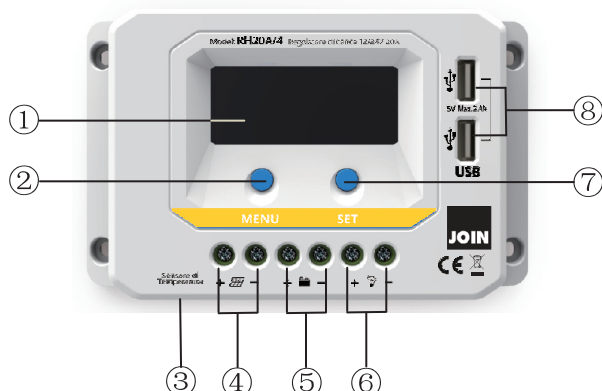


Figure 1 Characteristic

①	LCD	⑤	Battery Terminals
②	MENU Button	⑥	Load Terminals
③	RTS Port	⑦	SET Button
④	PV Terminals	⑧	USB Output Ports*

* USB OUTPUT provide the power supply of 5VDC/2.4A and have the short circuit protection.

3. Wiring

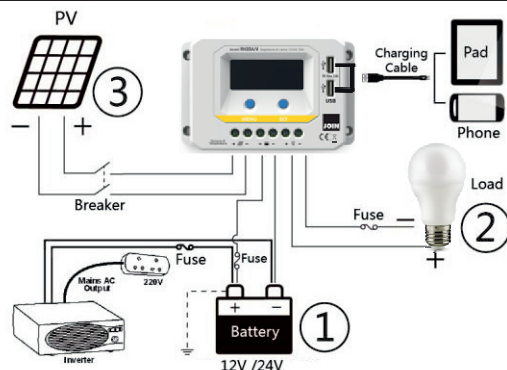


Figure 2 Connection diagram

- (1) Connect components to the charge controller in sequence as shown above and pay attention to the "+" and "-". Please insert the fuse first, then turn the power on. When disconnecting the system, the sequence must be reserved
- (2) after power on the controller, check the LCD is on. Otherwise please refer to chapter 6. Always connect the battery first, in order to allow the controller to recognize the system voltage.
- (3) The battery fuse should be installed as close to battery as possible. The suggested distance is within 150mm.
- (4) The RH series is a positive ground controller. Any positive connection of solar, load or battery can be earth grounded as required.



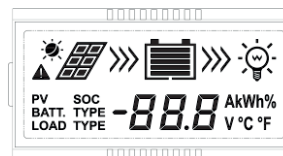
Note: Please connect the inverter or any other load with a high start current to the battery rather to the controller, in case any inverter or other load is necessary

4. Operation

4.1 Button Function

Button	Function
MENU button	<ul style="list-style-type: none"> • Browse interface • Setting parameter
SET button	<ul style="list-style-type: none"> • Load ON/OFF • Clear error • Enter into Set Mode • Save data

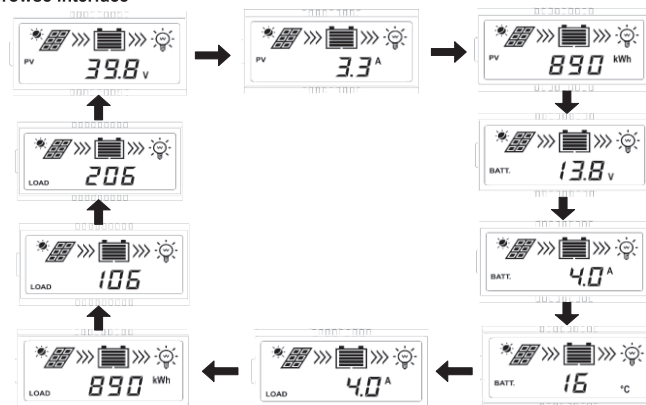
4.2 LCD Display



Status Description

Item	Icon	Status
PV array		Day
		Night
		No charging
		Charging
Battery	PV	PV Voltage, Current, Power
		Battery capacity, in Charging
	BATT.	Battery voltage, current, temperature
Load	BATT. TYPE	Battery type
		Load ON
		Load OFF
	LOAD	Load Voltage, Current, Load mode

Browse interface



NOTE:

- (1) When no operation, the interface will be automatic cycle, but the follow two interfaces won't be displayed.





- 2) Accumulative power zero clearing: Under PV power interface, press SET button and hold on 5s then the value blinks, press SET button again to clear the value.
- 3) Setting temperature unit: Under battery temperature interface, press SET button and hold on 5s to change it.

Fault Indication

Status	Icon	Description
Battery over discharged		Battery level shows empty, battery frame blink, fault icon blink
Battery over voltage		Battery level shows full, battery frame blink, fault icon blink

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Battery Overheating		Battery level shows current value, battery frame blink, fault icon blink
Load failure		Load overload ①, Load short circuit

1 When load current reaches 1.02-1.05 times, 1.05-1.25 times, 1.25-35 times and 1.35-1.5 times more than nominal value, controller will automatically turn OFF loads in 50s, 30s, 10s and 2s respectively.

4.3 Load mode settings

Operating Steps:

Under load mode setting interface, press SET button and hold on 5s till the number begin flashing, then press MENU button to set the parameter, press SET button to confirm.

1**	Timer 1	2**	Timer 2
100	Light ON/OFF	200	Disabled
101	Load will be on for 1 hour since sunset	201	Load will be on for 1 hour before sunrise
102	Load will be on for 2 hours since sunset	202	Load will be on for 2 hours before sunrise
103~113	Load will be on for 3~13 hours since sunset	203~213	Load will be on for 3~13 hours before sunrise
114	Load will be on for 14 hours since sunset	214	Load will be on for 14 hours before sunrise
115	Load will be on for 15 hours since sunset	215	Load will be on for 15 hours before sunrise
116	Test mode	216	Disabled
117	Manual mode(Default load ON)	217	Disabled

Note: Please set Light ON/OFF, test mode and Manual mode via Timer1, Timer2 will be disabled and display "2n"

Day/night recognition by panel voltage

4.4 Battery Type

Operating Steps

Under Battery Voltage interface, press SET button and hold on 5s then enter into the interface of battery type setting. Choose the battery type pressing MENU button, then press SET button for 5s to modify successfully.

Battery Type



① Sealed (Default)

② Gel


③ Flooded




Note: Please refer to the battery voltage parameters table for the different battery type

5. Protections

Protection	Conditions	Status
PV Reverse Polarity	When the battery is correct connecting the PV can be reversed.	The controller is not damage
Battery Reverse Polarity	When the PV is not connecting, the battery can be reversed.	
Battery Over Voltage	The battery voltage reaches to the OVD	Stop charging
Battery Over Discharge	The battery voltage reaches to the LVD	Stop discharging
Battery Overheating	Temperature sensor is higher than 65 °C	Output is OFF
	Temperature sensor is less than 55 °C	Output is ON
Controller Overheating	Temperature sensor is higher than 85 °C	Output is OFF
	Temperature sensor is less than 75 °C	Output is ON
Load Short Circuit	Load current ≥ 2.5 times rated current One short circuit, the output is OFF 5s; Two short circuit, the output is OFF 10s; Three short circuit, the output is OFF 15s Four short circuit, the output is OFF 20s Five short circuit, the output is OFF 25s Six short circuit, the output is OFF	Output is OFF Clear the fault: restart the controller or wait for one night-day cycle (night time>3 hours)
Load Overload	Load current ≥ 2.5 times rated current 1.02-1.05 times, 50s 1.05-1.25 times, 30s 1.25-1.35 times, 10s 1.35-1.5 times 2s	Output is OFF Clear the fault: restart the controller or wait for one night-day cycle (night time>3 hours)
Damaged RTS	The RTS is short-circuited or damaged	Charging or discharging at 25 °C

6. Troubleshooting

Faults	Possible reasons	Troubleshooting
The LCD is off during day time when sunshine falls on PV modules properly	PV array disconnection	Confirm that PV wire connections are correct and tight
Wire connection is correct, LCD not Display	1) Battery voltage is lower than 9V 2) PV voltage is less than battery voltage	1) Check the voltage of battery. At least 9V voltage to activate the controller 2) Check the PV input voltage which should be higher than battery voltage.
 Interface blink	Battery over voltage	Check if the battery voltage is higher than OVD point (Over voltage disconnect voltage), and disconnect the PV.

 Interface blink	Battery over discharged	When the battery voltage is restored to or above LVR point (low voltage reconnect voltage), the load will recover.
 Interface blink	Battery Overheating	The controller will automatically turn the system off. But when the temperature will be below 50 °C, the controller will resume.
 Interface blink	Over load or Short circuit	Please reduce the number of electric equipments or check carefully loads connections

7. Technical Specifications

Item	RH10A/4	RH20A/4	RH30A/4
Nominal system voltage	12/24VDC Auto		
Battery input voltage range	9V~32V		
Rated charge/discharge current	10A@55 °C	20A@55 °C	30A@55 °C
Max. PV open circuit voltage	50V		
Battery type	Sealed(Default) / Gel / Flooded		
Equalize Charging Voltage**	Sealed:14.6V/ Gel: No/ Flooded:14.8V		
Boost Charging Voltage**	Sealed:14.4V/ Gel:14.2V/ Flooded:14.6V		
Float Charging Voltage**	Sealed/Gel/Flooded:13.8V		
Low Voltage Reconnect Voltage**	Sealed/Gel/Flooded:12.6V		
Low Voltage Disconnect Voltage**	Sealed/Gel/Flooded:11.1V		
Self-consumption	≤9.2mA/12V; ≤11.7mA/24V		
Temperature compensation coefficient	-3mV/°C/2V (25 °C)		
Charge circuit voltage drop	≤0.29V		
Discharge circuit voltage drop	≤0.16V		
LCD temperature range	20 °C~+70 °C		
Working environment temperature	25 °C~+55 °C (Product can work continuously at full load)		
Relative humidity	≤95%, N.C.		
Enclosure	IP30		
Grounding	Common Positive		
USB output	5VDC/2.4A (Total)		
Overall dimension	142x85x41.5mm	160x94.9x49.3mm	181x100.9x59.8mm
Mounting dimension	130x60mm	148x70mm	172x80mm
Mounting hole size	Φ4.5mm		
Terminals	4mm²/12AWG	10mm²/8AWG	16mm²/6AWG
Net weight	0.22kg	0.35kg	0.55kg

** Above the parameters are in 12V System at 25 °C, Twice in 24V System

8. Disclaimer

This warranty does not apply under the following conditions:

- 1) Damage from improper use or use in an unsuitable environment.
- 2) PV or load current, voltage or power exceeding the rated value of controller.
- 3) The controller is working at a temperature exceeding the limit of working environment temperature
- 4) User disassembled or attempted to repair the controller without permission.
- 5) The controller is damaged due to natural elements such as lightning

Warranty

The warranty lasts 24 months (from any defect due to material/production phase). The warranty does not cover a malfunction that has resulted from improper and/or careless use or maintenance, accident, lightning, power surges, or in case of tampering/dismantling of any type. The products showing a defect must be sent back to the retailer in order to repair it. In order the warranty to be valid, the proof of purchase (receipt/invoice) must be sent back with the product to be repaired. In case the proof of purchase is missing, the production date will be considered.

Note

Alpha Elettronica S.r.l. reserves the possibility, in accordance with the rules in force, may modify any detail or specification of the product without prior notice, in order to improve the features and characteristics of the product.

CE mark



This product carries the CE mark according to the provisions of the rules:

Directive 2014/30/EU for electromagnetic compatibility

Directive 2014/35/EU for the electrical safety of the product

Directive 2011/65/EU, 2015/863EU on the restriction of use of hazardous substances in devices electronic.

For more information visit our website www.alphaelettronica.com

The user must not make any modification or dismantle the product.

Any variation or modification will void the user's authorization to use the product.

Instructions for the disposal of equipment for domestic use

According to Directive 2012/19/EU (European Law 2018 – Law no.37 of 03 May 2019), the mark of the crossed bin on the product indicates that this product, at the end of his life, must be handled separately from household waste, must be taken to a collection point for electrical and electronic equipment. For more information for collection point of your waste equipment, contact