RICH SOLAR RS-PWM40P 40 Amp PWM Solar Charge Controller User Manual

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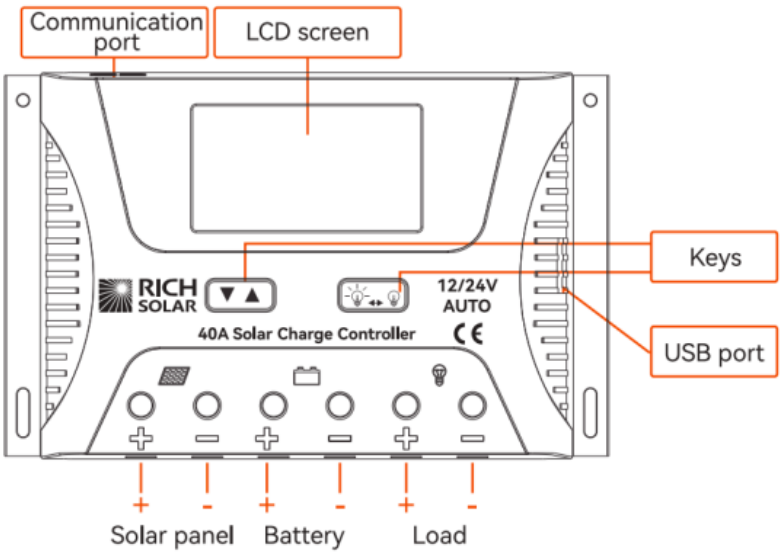
Product Features

- Automatic system voltage identification.
- Charging program options for sealed, GEL and flooded lead-acid batteries and lithium

batteries, are available.

- An upgraded 3-stage PWM charging algorithm is adopted. Application of an equalizing charge to the battery periodically or when over-discharged, can effectively prevent the battery from non-equalization and sulfurization, thus extending the battery's service life (with the exception of GEL and lithium batteries).
- With temperature compensation employed, charging parameters can be automatically adjusted (with the exception of lithium batteries).
- A wide range of load working modes facilitate the product's application to different types of street lights and monitoring devices.
- The product provides overcharge, over-discharge, overload protection, as well as short-circuit and reverse-connection protection.
- By virtue of an advanced load starting method, large-capacitance loads can be started smoothly.
- A range of parameter settings and power-down saving functions are available, thus requiring no repeated setting.
- The product provides a dot matrix graphic LCD screen and a human-machine interface with 2 keys.
- The user-friendly design of browser and dynamic interfaces ensures convenient and intuitive oper-ation.
  (Optional communication function) Provides an RJ12 data port (output of TTL232-level or Blue-tooth signals).
- The data adopts the standard Modbus protocol and can be used with our upper-computer monitoring software or mobile phone App.
- Boasting an industrial-grade design, the product can function well in various tough conditions.
- TVS lightning protection is adopted.

Panel Structure



State Indicators

LCD ico n	Indicated Object	State	Meaning
☀	Day recognition	Steady on	Day time
☾	Night recognition	Steady on	Night time
▦	Solar panel	Steady on	Solar panel indication
BOOST	Charging state	Steady on	BOOSt CHIP FQ i FIQ
FLOAT		Steady on	floating charging
EQUATI ZE		Steady on	Equalizing charging
▮	Battery	C}uick flashi ng	Battery overvoltage
▭		Slow flashing	Battery over-discharge
💡		Steady on	Load turned on

	Load	Steady on	Load turned off
		Quick flashing	Overload or short-circuit protection

Five Load Working Modes

- **Pure light control (0):** When sunlight disappears and the light intensity drops to the starting point
  ("light control off"), the controller initiates a 10-minute delay (settable) to confirm the starting signal, and then switches on the load for operation. When sunlight emerges and the light intensity reaches the starting point, the controller initiates a 1-minute (fixed) delay to confirm the shutting-down signal, and then shuts down the output to stop the load's operation.
- **Light control + time control (1 to 14):** The starting process is the same as pure light control. After operating for a preset period of time (settable from 1 to 14 hours), the load stops operation automatically.
- **Manual mode (15):** In this mode, the user can switch the load on or off by the keys, no matter whether it's day or night.
- **Debugging mode (16):** When the solar panel voltage is higher than the "light control off" voltage, switch off the load immediately; when the solar panel voltage is lower than the "light control on" voltage, switch on the load immediately.
- **Normal on (17):** The energized load keeps in output state.

LCD Display	Mode	LCD Display	Mode
0	Pure light control mode	9	Light control+time control (9 hour)
1	Light control+time control (1 hour)	10	Light control+time control (10 hour)
2	Lipht control*time control (2 hour)	11	Light control+time control (11 hour)

3	Light control+time control (3 h our)	12	Light control*time control (12 ho ur)
4	Light control+time control (4 h our)	13	Light control+time control (13 h our)
5	Light control*time control (5 h our)	14	Light control*time control (14 ho ur)
6	Light control+time control (ó h our)	15	NÏanual mode
7	Light control*time control (7 h our)	1ó	Debugging mode (default)
8	Light control+time control (8 h our)	17	Normal on mode

Load Working Mode Settings

In the load mode menu, long press ▽△ for 2s, and the number (e.g.,15) will begin to flash. Press to adjust the mode (from 0 to 17), and then long press ▽△ again for 2s to complete and save the setting.

Note:

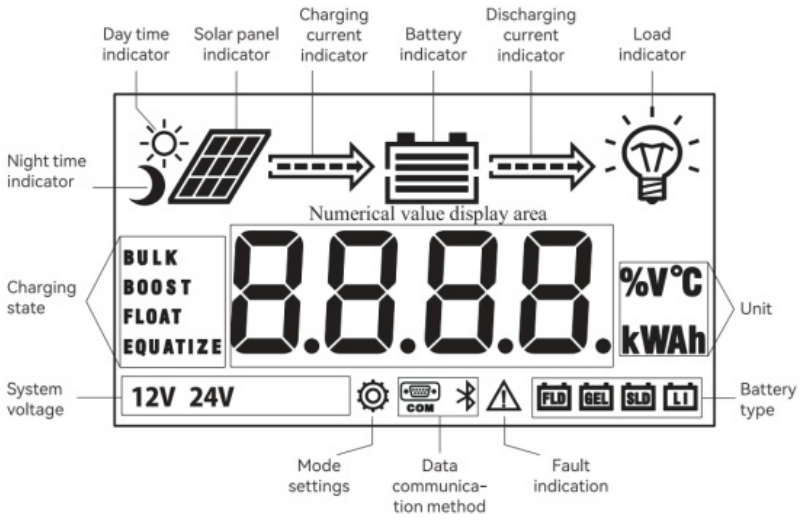
1. After parameter adjustment, if ▽△ is not pressed and held long enough for exiting, the system exits to the main menu after 12s, and the parameter that was set is not saved.
2. When the system is saving data, the screen may flicker slightly. This is normal and the user may ignore it.

Safety Advice

1. When connected to a 24V system, the solar panel terminal voltage may exceed the limit for human safety. If operation is to be performed, be sure to use insulation tools and keep your hands dry.

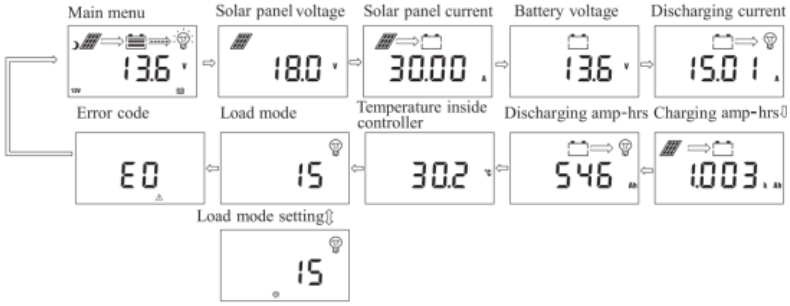
2. If the battery is reversely connected, the controller itself won't be damaged, but the load end will have a negative voltage output, which may damage your load device. Take care not to let this happen.
3. In a 24V system, separately reversing the battery or the solar panel connection will not damage the controller. However, if both the battery and solar panels are connected in reverse, it may cause damage to the controller.
4. The battery contains a large amount of energy. Therefore, in no case should the battery be short-circuited. It's recommended that a fuse be serially connected to the battery.
5. Keep the battery away from fire and sparks, as the battery may produce flammable gas.
6. Keep children away from the battery and controller.
7. Follow the safety advice provided by the battery manufacturer.

LCD Screen Illustration



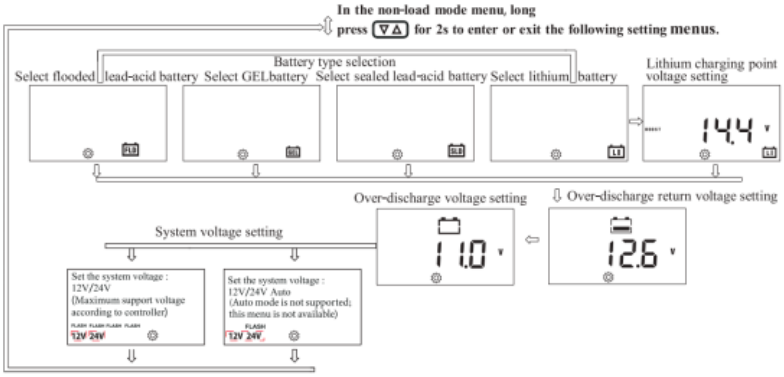
Browsing Menu on LCD Screen

Continuously press ▽△, the screen will display the following in order: "main menu"–"solar panel voltage"–"solar panel current"-"battery voltage"–"discharging current"-"charging amperes"-"discharging amperes"-"temperature inside controller"–"load mode"-"load mode setting"-"error code", and then back to "main menu". If the keys are not operated for 12s, the system will automatically return to display the "main menu".



Setting Menu on LCD Screen

When “load mode” is displayed, long press A to enter the load mode setting. Press adjusted mode, and long press A for 2s to save and exit; otherwise, the system will not save the setting that was just made and automatically exits the setting after 12s. to



Battery Types, Charging Voltages (Lithium Battery), Over-Discharge Return and Over-Discharge Voltage Settings

In the non-load mode menu:

1. When ▽△ is long pressed, the first interface entered is for battery type setting, and the flashing one is the currently selected battery type. Press ☼←→ to select among FLD/GEL/SLD/LI.)
2. After selection, short press ▽△ to enter over-discharge return and over-discharge voltage settings; or the first to enter charging voltage setting menu for lithium battery.
3. After parameters have been set, long press ▽△ for 2s to save and exit.
   Parameters shall be set according to the following rule: over-discharge voltage over-discharge return voltages under-voltage warning <floating charging voltage < boost charging return s equalizing charging voltage < overcharge voltage; and two adjacent values shall have a difference greater than 0.5 V.

Charging and Discharging Overload Protection and Recovery Time

In the charging and discharging overload protection mechanism, the relation between overload current and **protection time is as follows:** An overload current 1.25 times the rated current initiates a delay of 30s before starting protection; similarly, 1.5 times, 5s and 2 times, 1s.

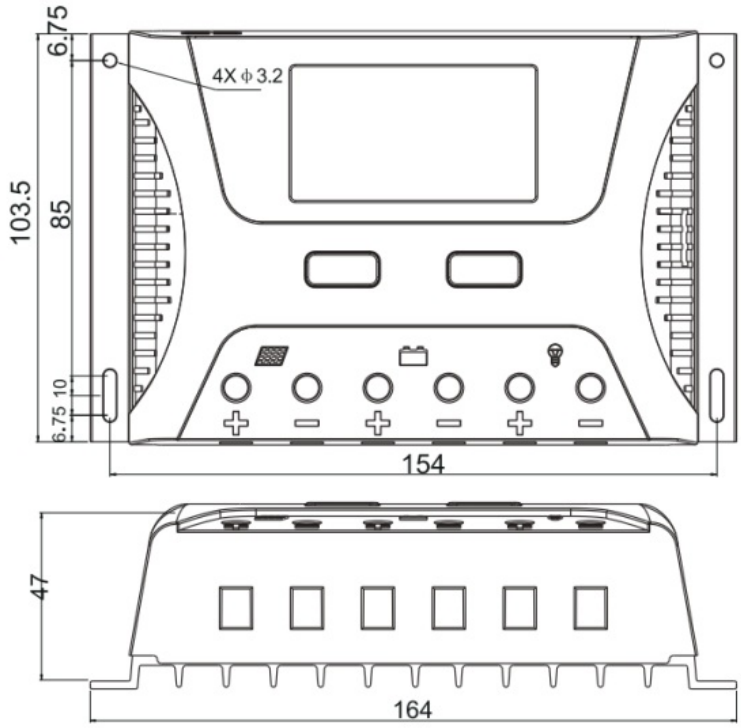
Overload recovery: automatic recovery after 1 minute.

Load Short Ciruit and Recovery

Short-circuit automatic recovery time: 1st time, 5s; 2nd time, 10s; 3rd time, 15s; 4th time, 20s, 5th time, 4 hours or automatic recovery the next day; or long press to resume load output.

Installation Instructions and Precautions

1. The controller shall be securely installed, and its dimensions are as follows:
2. Installation hole diameter: 3.2mm/0.125in



Precautions:

1. If it is 12V system, the bottom left comer of LCD display will show ’12V, 24V system will show ’24V
2. The first step is to connect the battery. If the connection is correct, the controller screen will light up, otherwise, check the connection.

3. The second step is to connect the solar panel. If sunlight is present and strong enough (the solar panel voltage is greater than battery voltage), the sun icon on the LCD screen is on; otherwise, check the connection (it's recommended that the operation be performed under the debugging mode.)
4. The third step is to connect the load. Connect the load leads to the controller's load output terminal, and the current shall not exceed the controller's rated current.
5. As the controller will generate heat during operation, it's recommended that the controller be installed in an environment with good ventilation conditions.
6. Choose cables with large enough capacity for connection, in case too much loss incurred on the lines causes the controller to misjudge.
7. The controller has a common positive pole inside. If grounding is needed, ground the positive pole.
8. It's important to fully charge the battery regularly. At least once full charge every month is recommended, and failure to do that may cause permanent damage to the battery. The battery can only be fully charged when the energy input exceeds the energy output. Users shall bear this in mind when configuring the system.
9. Check whether the controller's each connection terminal is securely tightened; otherwise, it may be damaged when a large current passes.

Error Code List

Error Code	Error Descriptions
E0	No error
E1	Battery over-discharge
E2	Battery overvoltage
E3	Undervoltage warning
E4	Load short circuit
E5	Load overload
E6	Temperature too high inside controller

E8	Charging current too high
E10	Solar panel input voltage too high

Common Problems and Solutions

Issues	Solutions
LCD screen does not light up	Check whether the battery is correctly connected.
Incomplete display or no re newal on LCD screen	Check whether the ambient temperature is too low and whether the display recovers as the temperature rises.
No charging with sunlight p resent	Check whether the solar panel is correctly connected an d the contact is good and reliable. Check whether the so lar panel voltage falls below the battery voltage.
The sun icon does not light up, while the solar panel is on. The battery voltage is n ormal, but there is no outpu t.	The load will be switched on automatically after 10 min utes (set by the user).
The battery icon flashes qu ickly, and there is no output .	System overvoltage. Check whether the battery voltage is too high.
The battery icon flashes sl owly, and there is no output .	The battery is over-discharged and will recover after ad equately recharged.
The load icon flashes quick ly, and there is no output.	The load’s power exceeds the rated value or it’sshort-cir cuited. After removing the problem, long press the key o r wait until it recovers automatically.

The load and the encircling ring stays lit, and there is n o output.	Check whether the power-consuming device is connecte d correctly and reliably.
Other symptoms	Check whether wiring is sound and reliable, and system voltage is correctly recognized.
The charging and dischargi ng amperes displays 9999. K Ah	The decimal point flashes indicate the displayed value h as reached its upper limit. Long press to reset.

Parameter Details

I lodel	RS-PWM40P	Remarks
Rated current	40A	–
System voltage	Automatic recognition of 12V/24V	Default automatic ‘dentification
	Manual setup	
Rated power	12V/600W 24V/1200W	The lower the system vo ltage, the tower the no-l oad loss.
No-loa d lose	<13mA/12V; *15mA/24V	
I 1ax. s olar en ergy in put volt age	<55V	

Nlax. voltage at the battery end	<34V				
Battery type		–		–	Default SLD
	FloodedFLD	Sealed SLD	GELGEL	Litx¡qm LI	
Overvoltage protection		1ó.OV		–	
Equalizing charging voltage	14.8V	14.óV	–	–	
Boost charging voltage	14.óV	14.4V	14.2V	14.4V	

Floating charging voltage	13.8V	13.8V	13.BV	–	X1/12V X2/24V
Charging recovery voltage	13.2V				
Over-discharge recovery voltage	12.SV (settable with keys)				
Over-discharge voltage	11.0V (settable with keys)				
Equalizing charging interval	30 days				–
Equalizing charging time	1H				
Boost charging time	2H				

Temperature compensation	-3.0mvAC/2V		
Light control voltage	Light control on SV, light control off óV (light control on plus IV)		X1/12 V; X2/24 V;
Light control judgment time	10 minutes		
USB function	Yes	Operating temperature	-13°F to +131 °F
Bluetooth function	Optional	IP protection degree	IP30
Net weight	0.8ólb	Dimensione	ó.46×4.07×1.85in
Protection functions	Battery plate reverse connection protection, battery reverse connection protection, charging battery board short circuit protection, charging battery open circuit protection, charging overcurrent protection, overload protection, load short-circuit protection, and controller over-temperature protection.		

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Documents / Resources

	RICH SOLAR RS-PWM40P 40 Amp PWM Solar Charge Controller [pdf] User Manual RS-PWM40P 40 Amp PWM Solar Charge Controller, RS-PWM40P, 40 Amp PWM Solar Charge Controller, Solar Charge Controller, Charge Controller

References

- User Manual

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40 Amp PWM Solar Charge Controller, charge controller, RICH SOLAR, RS-PWM40P, RS-PWM40P 40 Amp PWM Solar Charge Controller, Solar Charge Controller

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