

HP Series Solar Smart Charge Controller

(HP2420_ND)

User Manual



Dear customers:

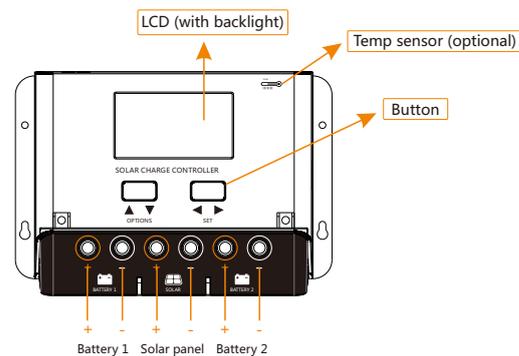
Thank you very much for choosing our product. Before using this product, please read the manual carefully!

Manual Version: 1.01 Subject to change without notice

1. Features

1. Automatically identify system voltage.
2. Charging procedures for sealed, colloidal and vented lead acid battery and lithium battery are optional.
3. Improved three-stage PWM charging algorithm enables an equalizing charge for the battery regularly or when it is over discharged, effectively preventing battery disequilibrium and vulcanization, and thereby improving battery life (except colloidal, lithium battery).
4. Temperature compensation automatically adjusts charging parameters (except lithium battery which requires an external temperature sensor).
5. Dual battery charge controller is ideal for RV, caravan, ship and other occasions.
6. Two battery simultaneous charging technology.
7. Rich charging modes allow users to easily set the battery charging priority.
8. Provide overcharge, over-discharge, over-temperature protection and reverse polarity protection.
9. Provide rich parameters settings power-down saving function, without the need for repetitive setting.
10. Graphic dot matrix LCD and 2-button man-machine interface.
11. User-friendly dynamic interface for convenient and intuitive operations.
12. Industrial level design meets the requirements of various harsh environments.
13. Backlight display; when a button is pressed, the backlight is turned on, and it will be turned off after a period of time.
14. TVS lightning protection.

2. Panel Diagram



3. Status Indication

Icons on LCD	Indications	Status	Functions
	Identification in the daytime	Steady on	Daytime
	Identification in the nighttime	Steady on	Nighttime
	Solar panel	Steady on	Solar panel indication
BULK	Charging state	Steady on	Direct charge
BOOST		Steady on	Boost charge
FLOAT		Steady on	Floating charge
EQUATIZE		Steady on	Equalizing charge
	Battery	Quick flash	Battery overvoltage
		Slow flash	Battery over-discharge
	Battery SOC	4 bars	100%
		3 bars	75%
		2 bars	50%
		1 bars	25%
		0 bars	0%

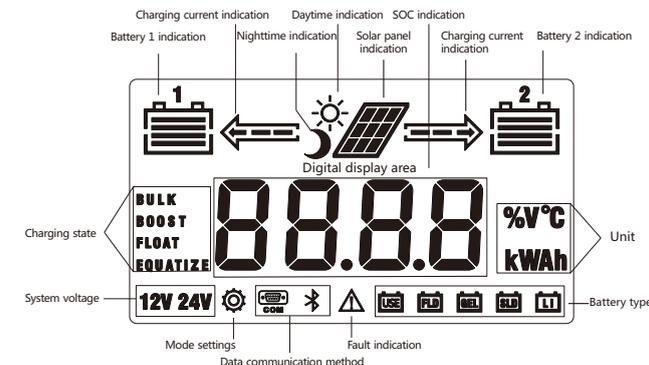
4. Charging Modes

The system comes with nine charging modes (1-9) which can be set via the button. They represent the charging percentage of battery 1. Only the charging percentage of battery 1 is required to be set, and the controller will automatically calculate the charging percentage of battery 2.

Charging modes	LCD display	Battery 1	Battery 2
1	P 10%	10%	90%
2	P 20%	20%	80%
3	P 30%	30%	70%
4	P 40%	40%	60%
5	P 50%	50%	50%
6	P 60%	60%	40%
7	P 70%	70%	30%
8	P 80%	80%	20%
9	P 90%	90% (The default)	10%

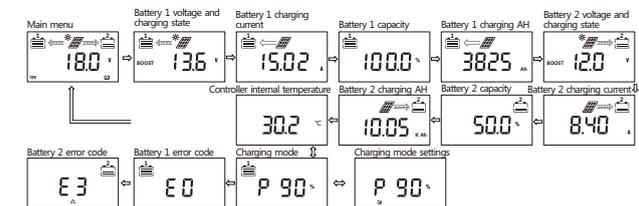
- Note:**
1. In normal charging state, the controller will distribute the energy of solar panel to battery 1 and battery 2 according to the set percentage.
 2. When one of the batteries is fully charged, more energy will be distributed to the other battery and when the battery voltage is low, the energy will be automatically distributed according to the set charging percentage.
 3. When the controller detects only one battery, all energy will be automatically distributed to this battery.

5. LCD Display Diagram



6. LCD View Menu

Press the button over and over again to successively view the "Main menu" ---- "Battery 1 voltage and charging state" ---- "Battery 1 charging current" ---- "Battery 1 capacity" ---- "Battery 1 charging AH" ---- "Battery 2 voltage and charging state" ---- "Battery 2 charging current" ---- "Battery 2 capacity" ---- "Battery 2 charging AH" ---- "Controller internal temperature" ---- "Charging mode" ---- "Battery 1 error code" ---- "Battery 2 error code", then go back to the "Main menu". Press and hold the button for 12 seconds without any operations to automatically return to the "Main menu". The main menu shows the voltage of solar panel, the icon of battery 1 as the battery 1 is connected and the icon of the battery 2 as the battery 2 is connected.



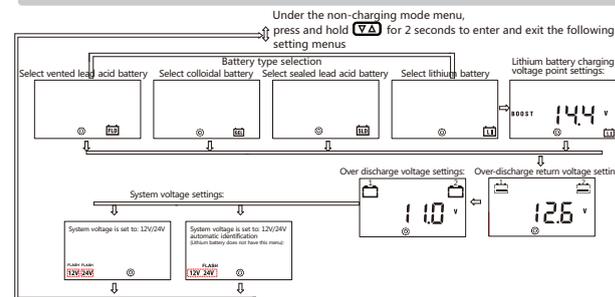
7. Charging Mode Settings

In the "Charging mode" menu, press and hold $\Delta \nabla$ for 2 seconds, and the figure (e.g. 90%) starts flashing. Press $\leftarrow \rightarrow$ to adjust the mode (range: 10%~90%). Press and hold $\Delta \nabla$ for 2 seconds again to complete the settings and save.

Note: 1. If you do not press and hold $\Delta \nabla$ to exit after adjusting the parameters, it will automatically exit to the main menu after 12s, and the parameters just set will not be saved.

2. The screen shows a slight jitter during data storing. This is a normal phenomenon, so do not worry about it.

8. LCD Setting Menu



9. Battery Type, Charging Voltage (Lithium Battery), Over-discharge Return, Over-discharge Voltage Settings

Under the non-charging mode menu:

- Press and hold $\Delta \nabla$ to enter the first screen for battery type settings. The flashing one is the currently selected battery type. Press $\leftarrow \rightarrow$ to select between FLD/GEL/SLD/LI;
- After selection, press $\Delta \nabla$ to enter over-discharge return and over-discharge voltage settings. The lithium battery is the first to enter the charging voltage point setting menu.
- After the parameters are set, press and hold $\Delta \nabla$ for 2s to save the data and exit.

The set values shall follow: over-discharge voltage <over-discharge return voltage \leq under voltage warning <floating charge voltage <boost charge return <boost charge \leq equalizing charge voltage <overvoltage voltage, and the difference between adjacent set values shall be set to more than 0.5V.

10. Charging Current Protection and Recovery Time

Charging over-current protection, charging over-current and protection time relationship: for 1.25 times of rated current, delay 30 seconds before protection; for 1.5 times of rated current, delay 5 seconds before protection; for 2 times of rated current, delay 1 second before protection. Over current recovery: automatic recovery after 30 seconds.

11. Instructions for Use

- Firstly, connect the battery. If two batteries are connected, connect one battery and controller first, and then connect the other battery and controller.
- Secondly, connect the solar panel and the controller.
- According to actual usage, set appropriate charging mode, the default is working mode 9.
- When removing the controller, remove it in reverse order.

12. Safety Recommendations

- If a 24V system is connected, the terminal voltage of solar panel may exceed the safe voltage for human body. When operating, it is necessary to use insulated tools and ensure that the hands are dry.
- If the battery is reversely connected, the controller will not be damaged, but please avoid this situation.
- The battery stores a lot of energy. Please do not short-circuit the battery under any circumstances. It is recommended to connect the fuse in series with the battery.
- The battery may generate flammable gas. Please keep it away from sparks.
- Keep children away from the battery and controller.
- Observe the battery manufacturer's safety recommendations.

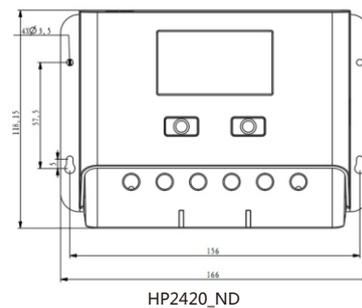
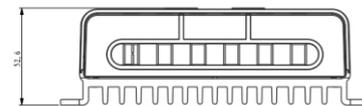
13. Installation Guide and Attention

- The controller should be installed securely and the dimensions are as follows:**

Outline dimensions: 166.0×118.2×52.6(mm)

Installation dimensions: 156×57.5 (mm)

- Installation hole diameter: 3.5(mm)**



3. Attention:

- If it is a 12V system, "12V" is displayed on the bottom left corner of the LCD screen; if it is a 24V system, "24V" is displayed.
- If the battery is properly connected, the controller screen will light up; otherwise, check if the connection is proper.
- If the solar panel is properly connected, and it is sunny and strong enough (the solar panel voltage is higher than the battery voltage), the sun icon on the LCD screen will light up, otherwise, check if the connection is proper.
- The controller will generate heat during operation. It is recommended to install it in a ventilated environment for fast heat dissipation.
- Select a cable with enough capacity to avoid excessive loss on the line and the controller will result in incorrect judgment.
- The controller features common negative electrode design inside. Ground the negative electrode as needed.
- It is very important to often fully charge the battery. It shall be fully charged at least once a month, otherwise, the battery may be permanently damaged.
- Check whether each terminal of the controller is firmly locked. Otherwise, the terminal may be easily damaged when the current is too high.
- If two batteries are connected, the voltage type of both batteries should be consistent.
- When wiring, first connect the battery, and then the solar panel. If the system voltage is set as automatic identification, the voltage type of the first connected battery will be set as that of the system when it starts.
- When lithium battery is selected, the system voltage has no automatic identification function and needs to be manually set.

14. Error Code Table

Menu Interface	LCD display codes	Descriptions	
Battery 1 error code 	E0	Battery 1 has no error	
	E1	Battery 1 over discharge	
	E2	Battery 1 over voltage	
	E3	Battery 1 under-voltage warning	
	E6	Controller internal over-temperature	
	E8	Battery 1 charging current is too large	
	E10	PV module over voltage	
	E20	Battery 1 voltage type and system voltage type do not match	
	Battery 2 error code 	E0	Battery 2 has no error
		E1	Battery 2 over discharge
E2		Battery 2 over voltage	
E3		Battery 2 under-voltage warning	
E6		Controller internal over-temperature	
E8		Battery 2 charging current is too large	
E10		PV module over voltage	
E20		Battery 2 voltage type and system voltage type do not match	

15. Common Problems and Solutions

Phenomena	Problems and Solutions
LCD screen does not light up	Check if the battery connection is correct
LCD screen incomplete in display or has no update	Check if the ambient temperature is too low and display recovers when the temperature rises
When it is sunny, it does not charge	Check if the solar panel connection is correct and if the contact is reliable; check if the voltage of solar panel is less than the battery voltage
Battery icon quick flash	System over voltage, check if the battery voltage is too high
Battery icon slow flash	Battery over discharge; it will automatically recover when fully charged
Other phenomena	Check if the connection is reliable and if the system voltage identification is correct
Charging AH display: 99.99k Ah	The decimal point flashes, indicating that the count has reached the upper limit; press and hold $\leftarrow \rightarrow$ to reset
One battery is charged while the other battery is not charged	Check if the battery voltage types are the same

16. Technical Parameters

Model	HP2420_ND				Remarks
Rated current	20A				
System voltage	12V/24V Automatic Identification				Defaulted is Automatic Identification
	Manual set				
Rate power	12V/300W 24V/600W				
Zero load loss	< 25mA/12V ; < 15mA/24V				The higher the system voltage, the smaller the no-load loss.
Solar input voltage	<55V				
Maximum allowable voltage of the battery	<34V				
Battery type	Parameters				Default: SLD
	FLD	SLD	GEL	LI	
Over voltage protection	16.0V				×1/12V ; ×2/24V ;
Equalizing charge voltage	14.8	14.6	-	-	
Boost charge voltage	14.6	14.4	14.2	14.4	
Floating voltage	13.8	13.8	13.8	-	
Charge return voltage	13.2V				
Over discharge return voltage	12.6V (Settable via button)				
Over discharge voltage	11.0V (Settable via button)				
Equalizing charge interval	30 days	-	-	-	
Equalizing charge time	1H	-	-	-	
Boost charge time	2H				
Temperature compensation	-3.0mV/°C/2V				
Operating temperature	-25°C ~ +55°C ;				
Over-temperature protection	When the temperature is higher than 60°C, turn off charging function and it will restore below 55°C.				
IP rating	IP30				
Weight	700g				
Protections	Solar panel reverse connection protection, battery reverse connection protection, battery open circuit protection, charging over-current protection, and controller over-temperature protection.				
Dimensions	166.0×118.2×52.6(mm)				