User's Manual

PWM Solar Charge Controller

CC-PWM-HV-32

Models available: 48V to 240V in 20A or 40A

Systellar Innovations

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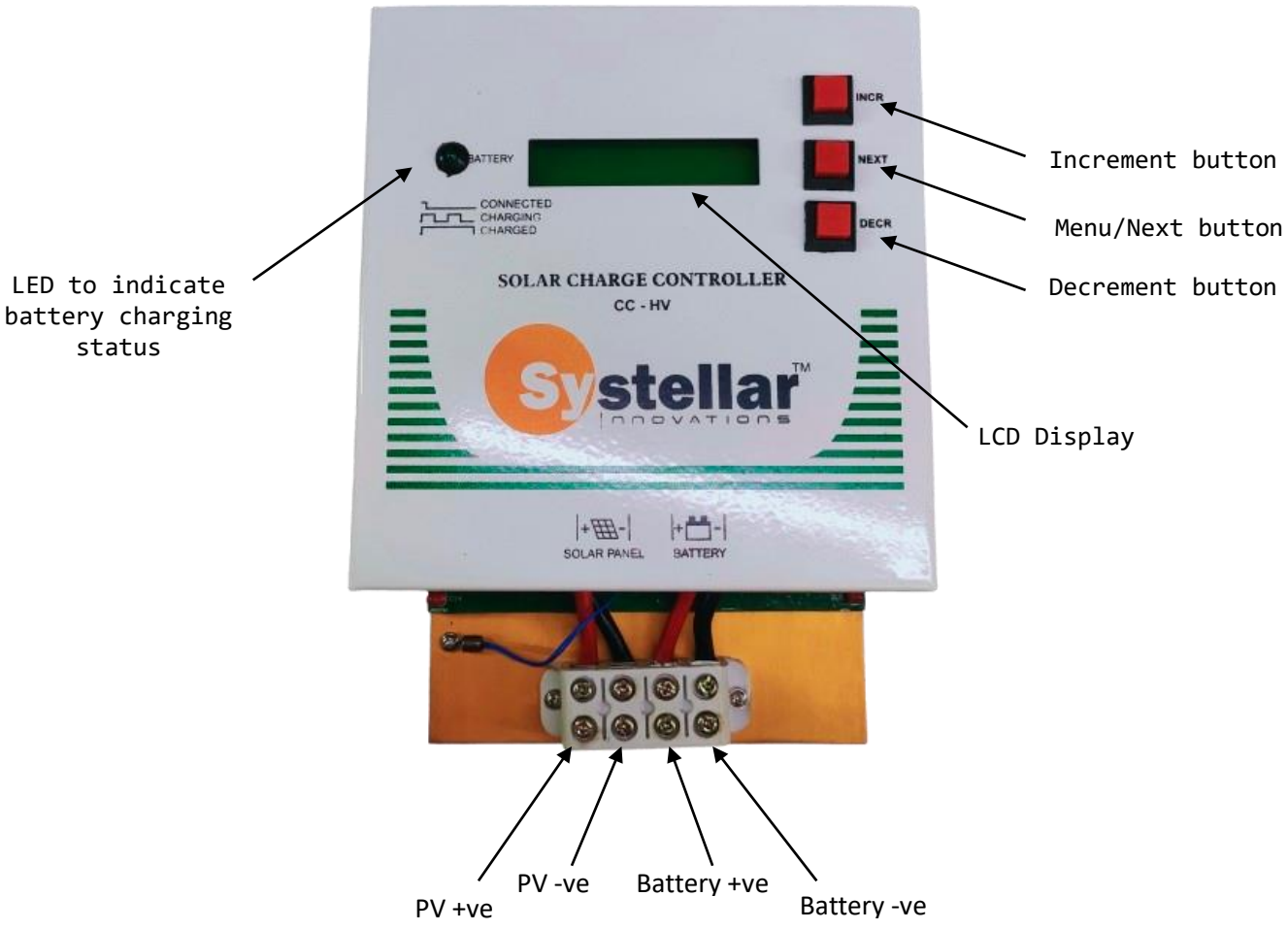
Introduction

Congratulations! You are the proud owner of one of the best PWM charge controllers available in India. Please read this manual carefully before installing and operating the charge controller.

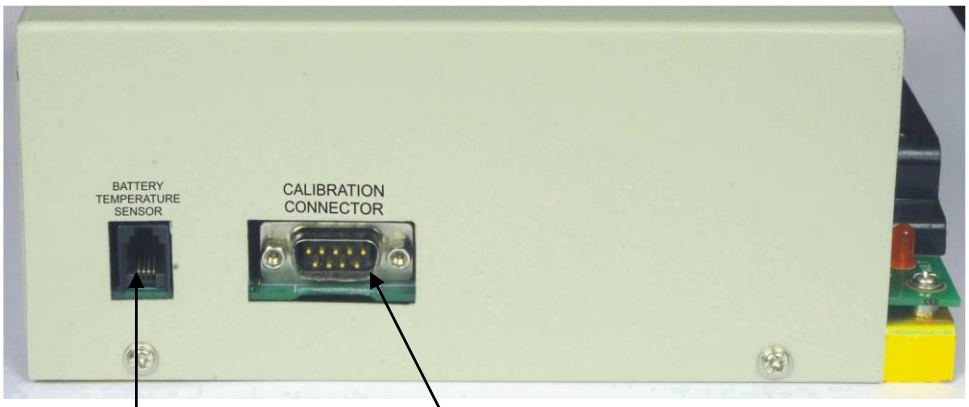
PWM charge controller model HV is advanced charge controllers and provide maximum current up to 20Amps or 40Amps (depending on model). This charge controller can work with Solar Photo Voltaic Panels with wide power and voltage range. A three stage battery charging algorithm is implemented which can charge battery with precise current and voltage to achieve fast battery charging yet ensuring long battery life.

Product description



Front View

Left Side View



For connecting external Battery temperature sensor (Optional accessory)

For system calibration only. Do not connect anything here

Right Side View

Power Saver (Optional Accessory)

Installing the Charge Controller

1. Install the Charge Controller indoors near the battery bank at eye level. This will make it easy to read the LCD display and make any changes in the settings.
2. Connect the battery using minimum 4 mm sq cables for 20A model and 10 mm sq cables for 40A model. Keep cable length small to minimize losses in the cable. Observe correct polarity while connecting wires from battery and Solar panels. If the wrong polarity is connected, the Batt. Connection fault LED / Solar Panel (SP) connection fault LED will start glowing. Correct the polarity before proceeding further.

3. As soon as the battery cables are connected, the Charge Controller will start working and its display will start showing various messages. The green LED beside LCD display will also blink slowly

4. Connect solar panel to the charge controller in correct polarity. **Take care not to touch solar panel cable ends or the battery bank cable ends with bare hand. There is high DC voltage on these cables which is very DANGEROUS and CAN EVEN BE FATAL**. Once connections are made, if it is day time, the battery charging will start after about 10 seconds.

LCD Display Messages: Messages in the table below are as per 96V model. The displayed battery voltage will change according to your particular model.

		LCD line 1	LCD line 2
Initial display message:	Message 1: Company name	Systellar	Innovations
	Message 2: CC-PWM Model name	CC-PWM-HV-32	96V-20A
	Message 3: FW version and Cell type	SW version: 2.00	Cell: Lead Acid OR Cell: LiIon OR Cell: LiFePo4
	Message 4: System Calibration status	System	Calibrated
	Message5: Programmable parameters status	Prog parm is	Ok Or Corrupt. Reset..
	Message6: Kwhr data status	Kwhr data is	Ok Or Corrupt. Reset...
DAY time messages when the battery is being charged	Message 1: Line 1 displays Battery voltage and charging current. Line 2 displays the charging mode. In case Equalizing mode has been set, line 2 displays 'E' in the last column.	Batt:98.4V 10.2A	Bulk Chg

	Message 2: Line 1 displays Solar panel power. Line 2 displays the HS temperature and battery temperature one by one. In case an optional battery temperature sensor is installed, it displays the battery temperature else it displays the ambient temperature.	PV Power: 1200W	HS Temp: 30 degC
	Message 3: Line 1 displays 'Day' and the Day time. Line 2 displays Power saver relay status.	DAY 02:30Hr	Power Saver: Off
	Message 4: Line 1 displays the Today generation in Kwhr units. Line 2 displays the Total units generated in Kwhr units.	Day: 0.230Kwhr	Tot: 0.230KWHr
Night time messages	Message 1: Line 1 displays present Battery voltage. Line 2 displays the energy collected by the solar panels during the day which has just ended.	Batt: 99.4V	Day: 1.526KWHr
	Message 2: Line 1 displays 'Night' and the night time. Line 2 displays Power saver relay status.	NIGHT 02:30Hr	Power Saver: Off

PROGRAMMING MODE: By pressing **NEXT** key for 2 sec, you can enter the programming mode to change various parameters. Changes to current values can be made using **INCR** and **DECR** keys and stored in program memory by pressing **NEXT key**. To exit programming mode, press NEXT button for 2 seconds again. If no key is pressed for 20 seconds, it automatically exits programming mode. *Note: The voltages in setting mode are displayed with respect to 12V battery. However, the product will convert and use this for appropriate battery bank size depending upon product model. For example for MODEL_96 (8 x 12V batteries), if end of charge voltage is set as 14.4V, it implies end of charge voltage of 8 x 14.4 = 115.2 Volts for the entire battery bank.*

Adjust Parameters messages	Max. Charging current: (In 20A Model , Default: 20A, Range: 5A – 20A, Step 5A) (In 40A Model, Default: 40A, Range: 5A – 40A, Step 5A)	Max chg curr:	20A
	End of Charging Voltage: For LA Battery: (Default: 14.4V, Range: 13.98 –14.7V) For LiIon Battery: (Default: 12.6V, Range: 12.54 –12.66V) For LiFePo4 Battery: (Default: 14.20V, Range: 14.20 –14.20V)	V batt EOC:	14.4V
	Absorption time: For LA Battery: (Default: 60, Range: 5 –120) For LiIon Battery: (Default: 15, Range:5 –30) For LiFePo4 Battery: (Default: 0, Range: 0 –0) This is the time for which the battery voltage is held at its end of charge voltage while charging before it is reduced to the trickle charge voltage. Recommended values for this	Absorption time:	(5-120): 060Min

	parameter are: Flat plate battery: 60 minutes Tubular battery: 150 minutes SMF (Sealed Maintenance Free) Battery: 5 minutes		
	Trickle Charging voltage: For LA Battery: (Default: 13.8V, Range: 13.20 –14.1V) For LiIon Battery: (Default: 12.54V, Range: 12.45 –12.60V) For LiFePo4 Battery: (Default: 14.20V, Range: 14.2 –14.2V)	V batt Trkl chg:	13.6V
	Equalize charge voltage: For LA Battery: (Default: 14.58V, Range: 14.34 –14.82V) Equalize charging mode is only applicable for LA Batteries.	V batt Eq chg:	14.8V
	Equalizing time: Default: 60 minutes, Range 5 – 150 minutes. This is the time for which the battery voltage is held at Equalizing charge voltage, before it is reduced to the trickle charge voltage.	Equalizing time:	(5-120): 060Min
	Power saver on voltage: For LA Battery: (Default:13.80V, Range: 13.20 –14.10V) For LiIon Battery: (Default:12.54V, Range: 12.45 –12.60V)	V PSaver on:	13.8V

	For LiFePo4 Battery: (Default:13.80V, Range: 13.64 –13.96V)		
	Power saver off voltage: For LA Battery: (Default:12.36V, Range: 11.40 –12.6V) For LiIon Battery: (Default:10.5V, Range: 10.2 – 10.62V) For LiFePo4 Battery: (Default:13.40V, Range: 13.20 –13.60V)	V PSaver off:	11.5V

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Setting Equalizing charging mode:

When several batteries are connected in series (like 96V battery bank), it is useful to "overcharge" the battery bank for a limited period of time once every month. It helps in equalizing the charge in all the cells of the battery bank by bringing them to full charge. The electrolyte in the batteries is also homogenised by agitation during gassing at the time of "overcharge". In Systellar PWM HV charge controller, equalizing charge can be set by pressing the NEXT key twice in quick succession. To confirm that equalization charging mode has been set, check the day time display message 1. If equalizing mode is set, 'E' is displayed in the last column. In case NEXT key is pressed twice in quick succession, when equalizing mode is already set, the equalization mode is reset.

***Note: When equalization mode is set, it does not go to equalization mode immediately. Equalization charging is the last leg of battery charging. In equalizing charging mode, instead of stopping the battery voltage at "end of charge" voltage, the system will allow the battery to go up to "Equalizing Charge voltage" and once this voltage is achieved, it maintains it there for a total period of 60 minutes. Once this time period is over, the battery will go into "Trickle charging mode" and equalizing mode will be automatically reset.

Setting programmable parameters

To enter "Adjust Parameter" mode, keep the NEXT key pressed for 2 seconds. It will turn on the back light of the LCD and display the first parameter with its present value. To increase the value, press

INCR key. To decrease the value, press DECR key. Note that the value of the parameter will not go beyond its preset limits. When NEXT is pressed, the displayed value of the parameter is written in the MEMORY and the display goes to the next parameter. Press NEXT key for 2 seconds to come out of 'Adjust parameter mode'. If no key is pressed for 20 seconds, it automatically comes out of Adjust parameter mode. Note that in this case, the value of the last parameter is not written in MEMORY.

Optional Accessories

1. **Battery Temperature sensor:**

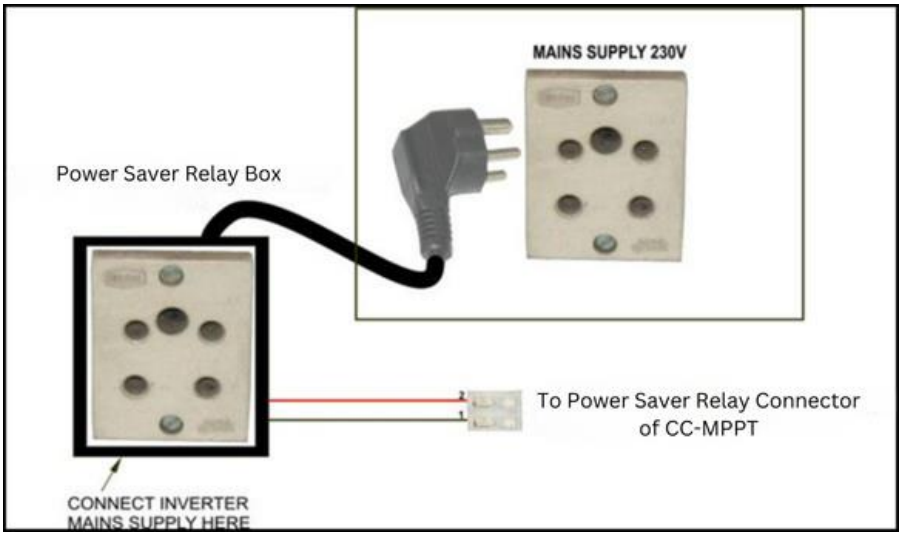
External Battery Temperature Sensor

Battery temperature sensor is supplied as an accessory. Paste the temperature sensor on the battery side using double sided tape. Insert the 4 pin RJ11 connector at the end of the temperature sensor cable in the socket provided on the left side of the charge controller.

2. Power Saver:

Power Saver

For use as power saver:



Power Saver Connection Diagram

Set appropriate Power Saver Off voltage. If you want to use maximum solar energy set this voltage nearer to 11.4V. However if you want to minimize the possibility of battery getting discharged (in case of grid supply failure) then set it nearer to 12.6V

Inside the relay box the tag going to the output socket should come from the N/C contact of the relay. This will cause the mains supply to the inverter to be cut when relay is on.

Connect the power plug of the relay box in a power socket. Connect inverter mains cord to the socket provided on the Relay box. Connect the 2 pin PV connector to the power saver connector on the right side of the charge controller.

Now when the battery charge voltage is more than 13.8V (Default) per battery, the relay will turn on. This will cut-off the mains supply to the inverter and thus save electricity. Note that in this condition, the load connected from the inverter will be driven by the battery while the battery is being charged by the solar panels.

Technical specifications

Technology	PULSE WIDTH MODULATION
Battery bank voltage	48V/60V / 72V / 96V / 120V / 144V / 180V / 192V / 240V
Maximum charging current:	20 Ampere / 40 Ampere
Appropriate solar panel voltage:	Should match battery bank voltage. For best results solar panel voltage should be 1.4 times nominal battery bank voltage.
Idle current from battery (typical)	Typically 15 mA

Note: For product enhancement, product parameters can be changed without notice

Company Contact details:

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