

Hybrid Wind & Solar MPPT Charge Controller

User Manual

Models: HSP-1240 / SSWC-04-12-C, HSP-2460 / SSWC-06-24-C



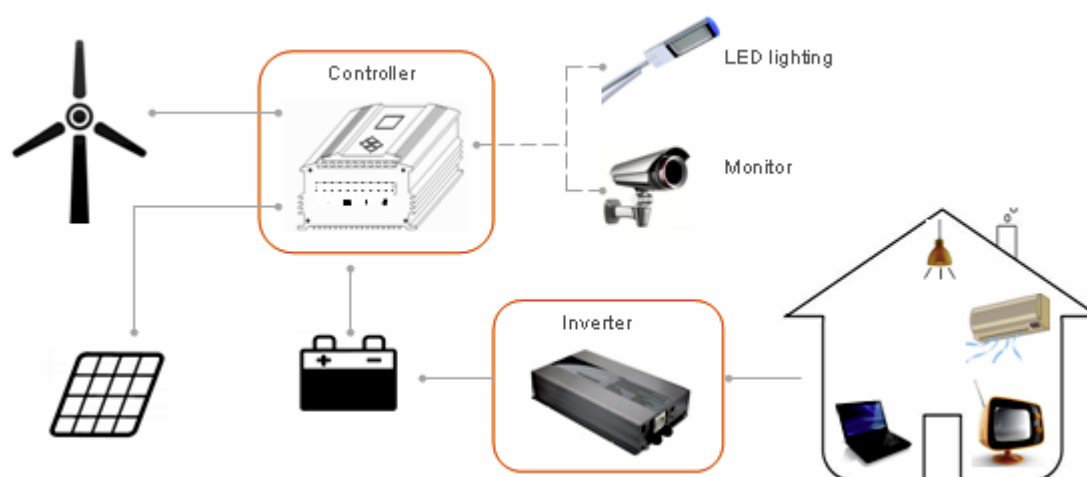
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1 Product overview

Thank you for purchasing our wind and solar hybrid MPPT charge controller. This manual offers important information and suggestions with regards to installation, use, troubleshooting and more. Please read this manual carefully before using the product.

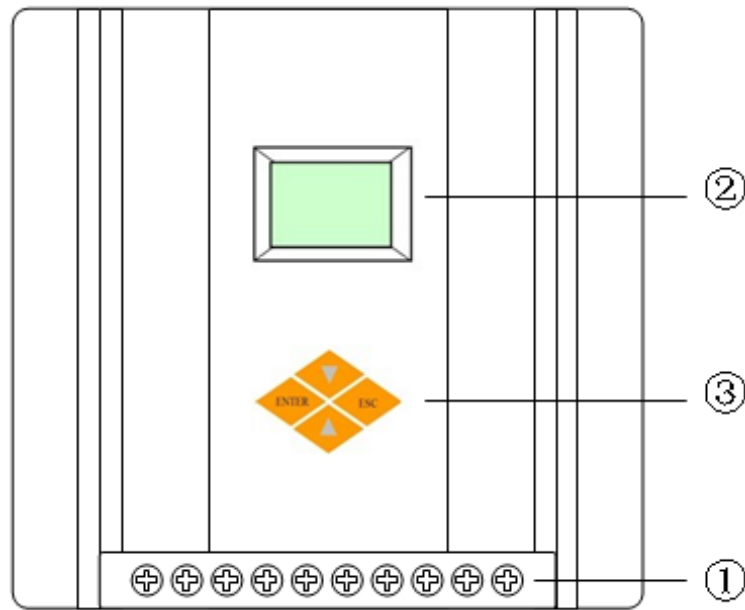
This controller is designed for high-end wind and solar hybrid systems, and is especially suitable for hybrid lighting or CCTV systems.



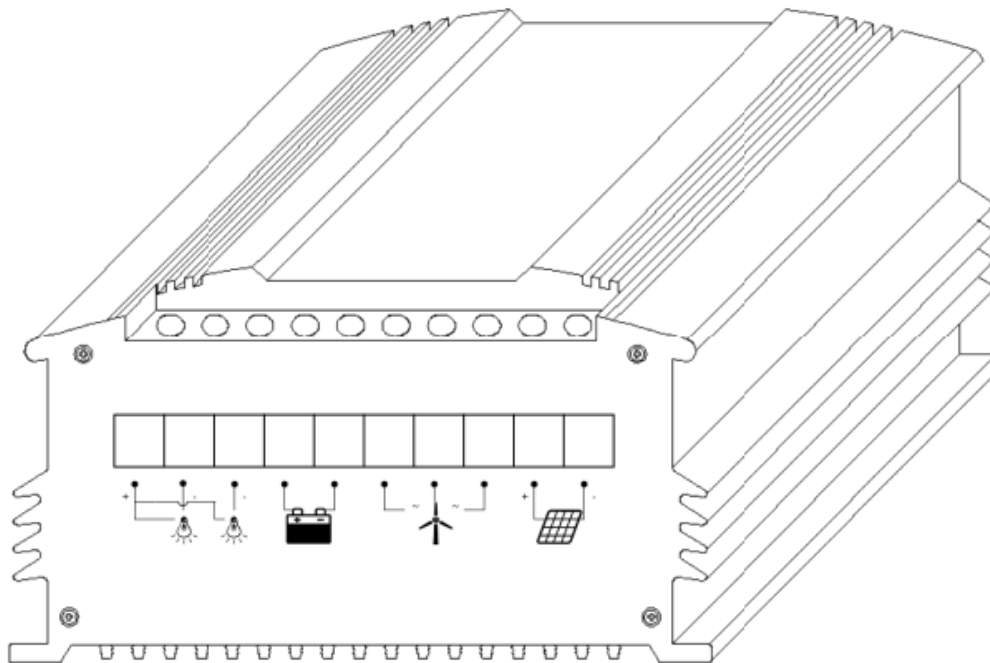
1.1 Key Features

- MPPT charge conversion for high efficiency wind charging
- Voltage boosting for wind power in low wind speeds
- Two output lines with light sensor and timer functions
- Adjustable voltage settings
- Protection against over-charging, reverse polarity and output overload
- Turbine braking system for protection during high winds

1.2 Controller Diagram



1. Connection terminals for system wiring
2. LCD display screen with backlight
3. Keypad



2 Safety

2.1 WARNINGS

- Do not connect any terminals using incorrect polarity of positive and negative
- Do not short-circuit any terminals
- Only connect system components as outlined in this guide
- Do not exceed the rated power, current or voltage for any terminals
- Do not connect batteries of below 9V (18V for 24V systems)

2.2 General Safety Information

- Do not use low quality, damaged or decaying batteries as this may cause leakage and corrosion
- Do not use thin or low-quality cable as this may cause overheating or short-circuiting
- Do not open the controller case
- Keep electrical components away from moisture, dust, vibration, strong electromagnetic sources, or any corrosive materials
- Do not install near any flammable, explosive or dangerous goods
- Keep all symbols and labels on the controller intact and well-maintained
- Keep out of reach of children

3 Installation

3.1 General Installation Notes

- Read through the entire installation section before beginning work.
- Be cautious when working with batteries. Wear eye protection. Have fresh water available in case of contact with battery acid.
- Use insulated tools and avoid placing metal objects near the batteries which may bridge the terminals.
- Batteries may release explosive gases during charging. Allow for sufficient ventilation in the battery installation site.
- Loose power connections and/or corroded wires can cause resistance and heating, which can melt wire insulation, scorch surrounding materials or even cause a fire. Ensure tight connections and that cables are secured and prevented from moving in mobile applications.
- Avoid direct sunlight and water contact with the controller, batteries or wires.
- Use with gel, sealed, or flooded batteries only.
- Battery connection instructions refer to a singular battery, but a battery bank formed of multiple batteries can also be used - provided that the overall voltage is correct.
- When mounting the controller, ensure free air flow through the controller heat sink fins. There should be at least 150mm of clearance above and below the controller to allow for cooling. If mounted in an enclosure, ventilation is highly recommended.

3.2 Mounting

1. Choose a suitable mounting location. The controller should be mounted on a vertical surface protected from sunlight, heat, water and other exposure risks.

⚠ WARNING: Risk of explosion! Never install the controller in a sealed enclosure with flooded batteries. Do not install in a confined area where battery gas can accumulate.

2. Check for clearance. Hold the controller in the position that it will be mounted. Verify that there is sufficient room to run the necessary wires and that there is 150mm above and below the controller to allow for air flow.
3. Mark holes. Use a pencil or pen to mark the mounting hole locations on the mounting surface.
4. Drill holes. Remove the controller and drill holes in the surface the correct size for the screws being used.
5. Secure the controller. Place the controller on the surface and align with the holes. Secure the controller in place using the mounting screws.

3.3 System Connection

1. Check the battery voltage. This must be 9-15V for a 12V system or 18-30V for a 24V system.
2. Connect the battery wires. Ensure they are connected with correct polarity. Avoid short-circuiting the wires. An in-line fuse must be installed no more than 150mm from the positive battery terminal.
3. Connect the load wiring. The two load connections use a common positive terminal. Power may be immediately supplied to these loads so short-circuit contact should be avoided at all times.
4. Connect the solar array. Ensure the solar panels are monocrystalline silicon, polycrystalline silicon or thin-film

type. The open circuit voltage of the entire array must be no more than 2x the battery rated voltage. The operating/maximum power voltage of the entire array must be no less than 1.2x the battery rated voltage. The maximum current of the entire array must be no more than 12.5A.

5. Connect the wind turbine. The rated voltage should be equal to the battery bank voltage. If the wind turbine produces DC power, any two of the three terminals can be used. If the turbine produces 3-phase AC power all three terminals must be used.
6. Check all the wiring. Confirm polarity at each terminal and that all the terminals have been tightened.
7. Switch on each component of the system in the order it was connected. Check the display and that all values meet your expectations for the current setup and weather conditions.

If you need to turn off or disconnect the system, do so in reverse order to the installation.

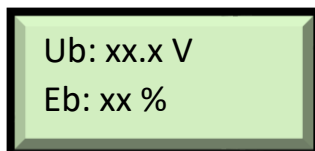
4 Using the controller

4.1 Browsing the Display

Pressing any key will illuminate the backlight for 15 seconds. After 15 seconds of inactivity, the backlight will power off.

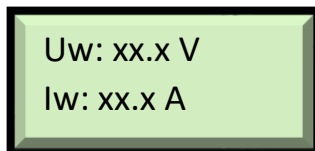
Press the “▲” key to go back to the previous page of content. Press the “▼” key to go to the next page of content. After 60 seconds of inactivity, the display will return to the first screen.

Display screens:



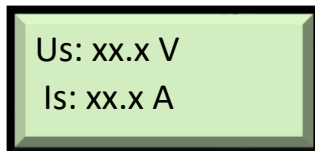
Ub: xx.x V
Eb: xx %

Ub: battery voltage
Eb: battery charge percentage




Uw: xx.x V
Iw: xx.x A

Uw: wind turbine DC voltage
Iw: turbine DC charging current



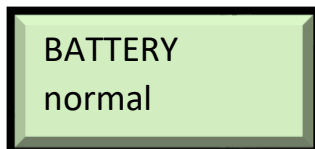
Us: xx.x V
Is: xx.x A

Us: mean solar panel voltage
Is: solar panel charging current



Output
ON night

If the output is on, this screen will display “ON night”, if the output is off it will display “OFF day”



BATTERY
normal

The display will show “normal” for a good battery or “float” if the controller is in the float charging stage

4.2 Error Messages

Ub: xx.x V
Over_v

Overcharged battery. Please check charging sources.

Ub: xx.x V
Low_v

Low battery voltage. Disconnect loads and allow the battery to recharge.

LOAD
over_A

Overload or short-circuit in output. Check output is wired correctly.

W_T
Brake


Wind turbine braking activated. This will stop when wind speed reduces.

4.3 Settings

Press the “Enter” key to enter the settings menu. In the settings menu, press the arrow keys to adjust the value then press “Enter” again to confirm the choice and move on to the next setting. Press “Esc” to return to cancel the setting and return to the viewing display without saving the new parameters.

Once new parameters have been entered, restart the system by disconnecting the battery for 10 seconds.

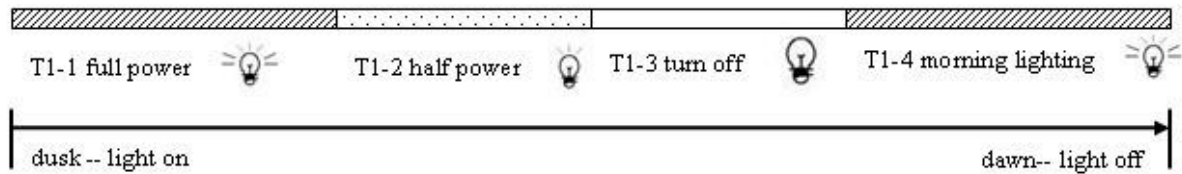
⚠ CAUTION: disconnect the turbine and solar panel before changing settings.

V1: xx.x V V2: xx.x V	V1: battery low voltage disconnect threshold V2: battery low voltage reconnect threshold
V3: xx.x V V4: xx.x V	V3: battery over-voltage disconnect threshold V4: battery over-voltage reconnect threshold
V5: xx.x V T1-1: 15 h	V5: float charging voltage T1-1: load 1 length of time set at 100% power
T1-2: 00 h T1-3: 05 h	T1-2: load 1 length of time set at 50% power T1-3: load 1 length of time set at 0% power
T2-1: 15 h T2-2: 00 h	T2-1: load 2 length of time set at 100% power T2-2: load 2 length of time set at 50% power
T2-3: 05 h VsTH: 06 V	T2-3: load 2 length of time set at 0% power VsTH: solar panel voltage day/night threshold
VwCH: XX V MODE: X	VwCH: the DC voltage increase the controller will use to charge the battery from the turbine Mode: A – night timer on / C – timer off
Break: XXVAC	Break: Wind turbine braking activation voltage (AC)  CAUTION: <i>Only to be adjusted by qualified individuals</i>
Save? Y / N	Save the current settings and exit? Yes / No

Additional feature: wind turbine braking

Press and hold both arrow keys simultaneously to manually activate wind turbine brake. The braking will last until the buttons are released.

4.4 Timer Control



When the controller is in mode A, “street lighting mode” is active. This will turn on the load outputs after sunset for durations determined by the time settings. The function works as follows:

1. When the solar panel voltage falls below “VsTH” the controller will determine that the sun has set
2. The load will turn on at full power for a length of time determined by T1-1
3. The load will reduce to 50% power for a length of time determined by T1-2
4. The load will turn off for a length of time determined by T1-3
5. The load will turn on until the solar panel voltage rises above “VsTH”

Note:

- The above uses the settings for load output 1. To set the timers for the second load output, use T2-1 to T2-3 instead.
- When the controller is in mode C, the loads will be supplied with constant DC power and the timer will be deactivated.

5 Maintenance

It is recommended to inspect the controller and perform the following maintenance tasks at least twice per year.

- Check the controller is securely mounted
- Check the enclosure is clean and dry
- Clean any dirt or fragments from the heat sink, ensure good airflow is possible
- Check all wires for wear and tear to the core or insulation, maintain or replace as necessary
- Inspect terminals for any signs of heat damage caused by corrosion or loose connection
- Tighten all terminals
- Check LCD display is showing values and settings as expected
- Check that any ground connections are tight
- Check lightning conductors and surge protectors

⚠ CAUTION: Risk of electric shock. Ensure all power is turned off before performing maintenance on any electrical components.

6 Troubleshooting

Problem	Reason	Solution
Connected to the battery, screen does not activate	Battery voltage too low	Recharge or replace the battery
System on, no output	Battery voltage too low	Wait for battery to recharge
	Output in street lighting mode	Disconnect panels, change mode settings
	Controller is in 1-minute setup delay	Wait 1 minute
No charging	Charging voltage too low and	Check again under higher wind or sun conditions
	Battery fully charged or overvoltage	Charging will resume when battery has discharged
No output after recharging from low voltage	Controller is in 2-minute safety delay	Wait 2 minutes
Wind turbine speed very low	Low wind speed	Check under higher wind conditions
	Battery is not properly connected, controller in open-circuit protection mode	Securely connect the battery
	Battery voltage too high, controller has activated brake	Check after discharging the battery

7 Warranty and Technical Support

This controller is covered by a one (1) year workmanship warranty from the date of shipment to the original end user. The warranty covers repair or replacement, at the seller's option, of any defective products.

The warranty does not apply under the following conditions:

- Product is damaged by negligence or improper use
- Ratings of connected system components exceeding the ratings of the controller
- Unauthorised modification or repair
- Damage occurring during shipment
- Damage from acts of nature such as lightning or extreme wind
- Irreclaimable mechanical damage

Before requesting warranty service, check the manual to ensure installation is correct and undertake basic troubleshooting. Contact the seller for technical support, be prepared to provide full details of the system and installation, as well as a description of the fault and when it occurred. Details of the original order will be required to confirm warranty status.

8 Specifications

Where two values or ranges are given separated by a “/”, these are the values for a 12V controller followed by the values for a 24V controller.

8.1 Wind Turbine

Rated power	100W-400W / 200W-600W	
Brake voltage	15Vac / 30Vac	Adjustable
Brake current	23A	

8.2 Solar Panel

Max PV power	150W / 300W	
Max open-circuit voltage	24V / 48V	
Max PV current	12.5A	

8.3 Battery

Over-discharge voltage	10.5V / 20V	Adjustable
Over-discharge recovery voltage	12V / 24V	Adjustable
Over-charge voltage	14V / 28V	Adjustable
Over-charge recovery voltage	13.5V / 27V	Adjustable
Float charge voltage	14V / 28V	Adjustable

8.4 Load Output

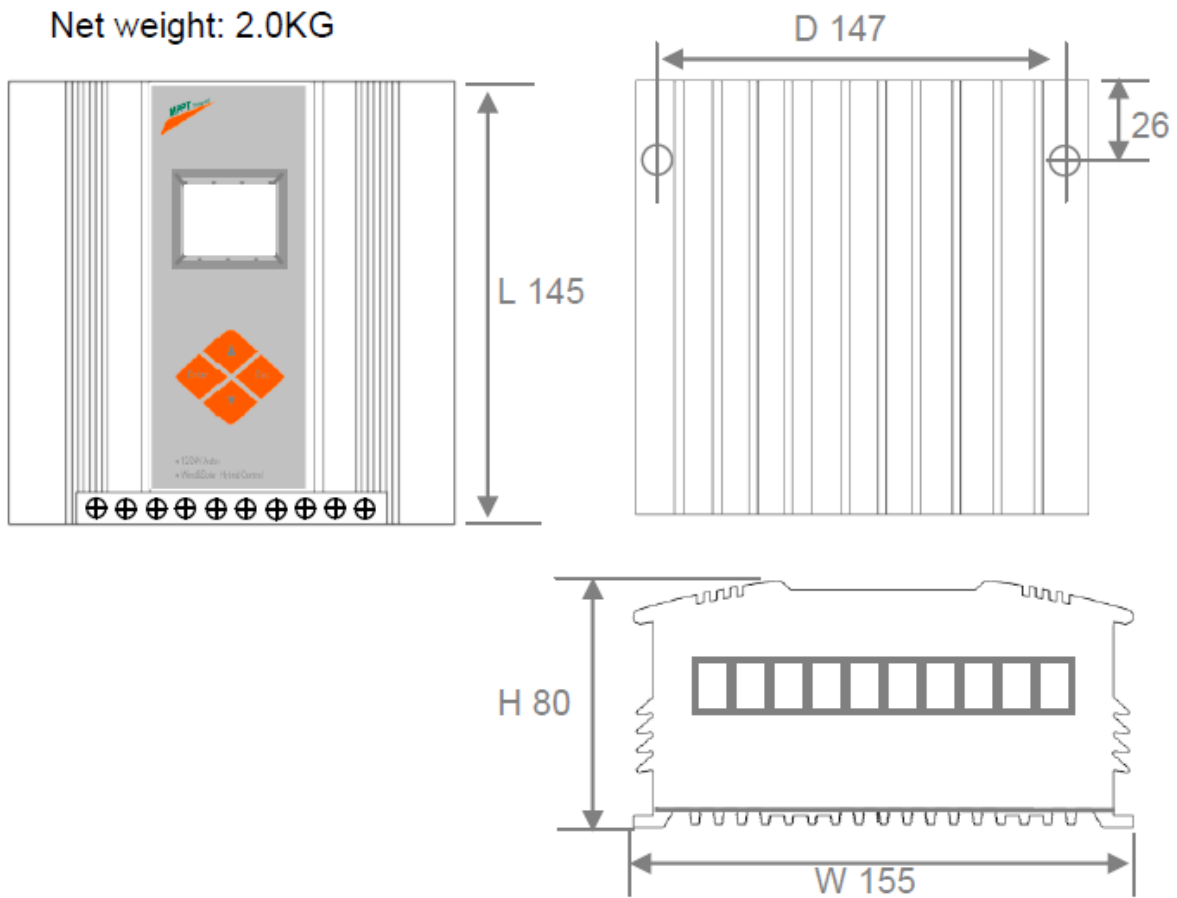
Rated current	5A	
Rated power	60W / 120W	
Timer dusk and dawn threshold	6V	Adjustable

8.5 Additional Specifications

Self-consumption	≤30mA (without backlight)	
Temperature-compensation	-35mV/°C (25°C reference)	
Usage temperature range	-30°C – +55°C	
Storage temperature range	-35°C – +80°C	
Humidity	10% – 90% (non-condensing)	
Altitude	≤2000m	
Protection class	IP55	

8.6 Dimensions (mm)

Net weight: 2.0KG



9 Declaration

This product is patent pending. Counterfeiting will be subject to legal action.

We reserve the right to update the product and manual without notice.