Pure Sine wave Inverter

User Manual

SP1500 SERIES

SP2000 SERIES

SP2500 SERIES

SP3000 SERIES

CONTENTS

1. Important Safety Instructions

As an AC power supply equipment, the inverter's AC output is the same as the household power plug's. The inverter's AC output should be treated with caution; otherwise, there will be a risk of electric shock! When using, please note the following:

Attentions:

- Connect the DC input according to the requirement strictly. The Power inverter has a relatively wide DC input range. Still, too high or too low DC input may cause problems even destroy the inverter.
- A reverse polarity connection will blow the fuses in the inverter and damage the unit.
- Do not expose the inverter to a humid, flammable, explosive, or dust environment.
- Keep the inverter out of children's touch.
- It is recommended to connect the inverter input terminal to the battery. Calculate the minimum capacity of the battery (expressed in AH) in the following way: 5times of the rated power of the inverter/battery voltage. If for testing purposes, the user should select DC power supply current at least twice greater than that of the inverter rated input to keep normal inverter operation. Using a DC power supply for testing may cause damage to the inverter.
- When the inverter works continuously, its surface may become very hot; please ensure the air ventilation clearance around the inverter is more than 10cm. Keep away from the material or device which may suffer from high temperature when the inverter is working. Do not install the inverter in an airproof location and keep enough space around the inverter.
- Connect the protective grounding to the ground. The cross-section of the wire should not be less than $4mm^2$.
- The wire connection between the battery and the inverter should be less than 3m, and the current density should be less than $3.5A/mm^2$. At this time, the inverter is running at full load. If the wire length exceeds 3m, please reduce the current density.
- A fuse or breaker should be used between the battery and the inverter. The value of the fuse or breaker should be twice the inverter's rated input current.
- Do not connect the battery charger or similar devices to the inverter's input terminal.
- Do not put the inverter close to the floodedlead-acidbattery because the terminals' sparkle may ignite the hydrogen released by the battery.

- It's an off-grid inverter. Do not connect the AC output terminals to the grid or electrical source; otherwise, the inverter may be damaged.
- This inverter can only be used singly in parallel connections. The series connection will damage the inverters.
- Risk of electric shock, don't touch the output port when the inverter is working. The output is forbidden to connect to other power sources or grids; otherwise, the inverter will be damaged. The inverter must be turned off when connecting the load.
- Please do not attempt to repair the fault inverter by yourself; otherwise, it may lead to a severe accident. Don't hesitate to get in touch with the manufacture's engineer.
- SP power series is only suitable for civil applications, not for industrial applications.

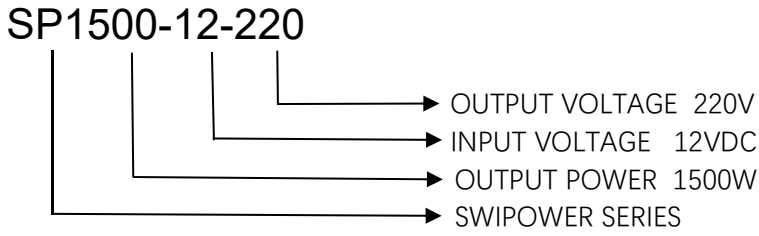
2. Introduction

SP Power series is a pure sine wave inverter that can convert 12/24/48VDC to 220/230/240VAC (or100V/110/120VAC). Industrial design has a wide operating temperature, high reliability, and high efficiency compared with civil design. Simple appearance and lightweight make it easy to install and operate. The wide input voltage range is ideal for solar system applications. This inverter is especially suitable for civil applications, such as household emergency lighting systems, vehicle-mounted systems, small field power supply, etc.

Features:

- Safe design with input and output electrical isolation
- Adoption of advanced SPWM technology, pure sine wave output
- LED &LCD indicators for fault status and working status
- Lower No-load consumption
- Max. efficiency up to 95%
- Input protection: Over voltage protection, low voltage protection
- Output protection: Overload protection, short circuit protection
- Over-temperature protection: Temperature-controlled Fan Ventilation; Inverter turns off automatically when overheating

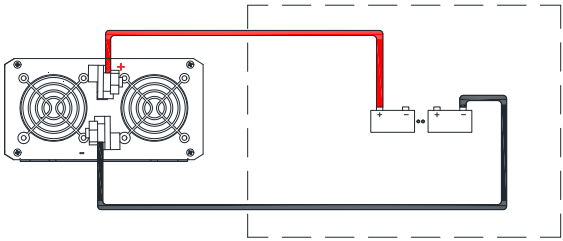
3. Designations of models



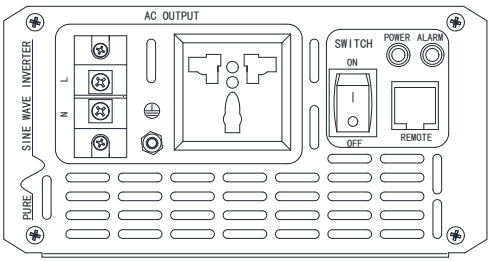
Model	Input Rated Voltage	Output Voltage	Maximizing Power Output
SP1500-12-220	12VDC	220/230/240 VAC	1500W
SP1500-24-220	24VDC	220/230/240 VAC	1500W
SP1500-48-220	48VDC	220/230/240 VAC	1500W
SP1500-12-110	12VDC	100/110/120 VAC	1500W
SP1500-24-110	24VDC	100/110/120 VAC	1500W
SP1500-48-110	48VDC	100/110/120 VAC	1500W
SP2000-12-220	12VDC	220/230/240 VAC	2000W
SP2000-24-220	24VDC	220/230/240 VAC	2000W
SP2000-48-220	48VDC	220/230/240 VAC	2000W
SP2000-12-110	12VDC	100/110/120 VAC	2000W
SP2000-24-110	24VDC	100/110/120 VAC	2000W
SP2000-48-110	48VDC	100/110/120 VAC	2000W
SP2500-12-220	12VDC	220/230/240 VAC	2500W
SP2500-24-220	24VDC	220/230/240 VAC	2500W
SP2500-48-220	48VDC	220/230/240 VAC	2500W
SP2500-12-110	12VDC	100/110/120 VAC	2500W
SP2500-24-110	24VDC	100/110/120 VAC	2500W
SP2500-48-110	48VDC	100/110/120 VAC	2500W
SP3000-12-220	12VDC	220/230/240 VAC	3000W
SP3000-24-220	24VDC	220/230/240 VAC	3000W
SP3000-48-220	48VDC	220/230/240 VAC	3000W
SP3000-12-110	12VDC	100/110/120 VAC	3000W
SP3000-24-110	24VDC	100/110/120 VAC	3000W
SP3000-48-110	48VDC	100/110/120 VAC	3000W

4. Wiring

(1)12/24/48Vsystem DC input



(2) 220/230/240V AC(or 100/110/120V) output



Operation Steps:

Step 1: Turn the power switch of the inverter to OFF

Step 2: Disconnect the input breaker or the fuse between the inverter and battery. Connect the battery terminals ('+' with the red line and '-' with the black line). Do not connect the poles by contraries.

Step 3: Use the cable no less than 4mm^2 to connect the inverter's grounding terminal to the ground.

Step 4: Connect the plug of AC load to the inverter AC outlet

Step 5: Switch on the input breaker or the fuse between the inverter and battery; turn on the power switch to start the inverter. If the blue indicator is ON, turn on the loads one by one. Check the operation state of the inverter and loads.

Step 6: If there are different loads, the loads with higher startup current should be turned on first, such as television. After the loads work stably, turn on the loads with a lower startup current, such as an incandescent lamp.

Step 7: If the Fault indicator is red and the buzzer alarms when turning on the devices, please immediately switch off the loads and inverter.

5. Functions

(1) Input rated voltage

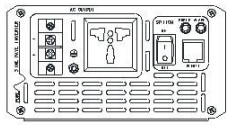
12V system input voltage range is 10~15.5V；
24V system input voltage range is 20~31V；
48V system input voltage range is 40~62V。

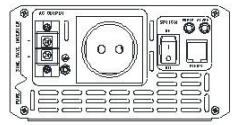
(2) Fan Ventilation

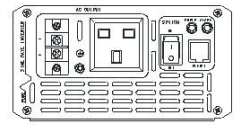
When the heat sink temperature is higher than 50℃ or the internal temperature is higher than 50℃ , the fan will turn on automatically.

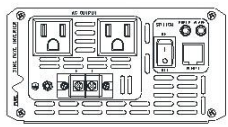
When the heat sink temperature is lower than 40℃, and the internal temperature is lower than 40℃ , the fan will turn off automatically.

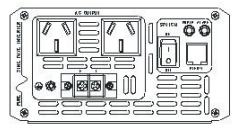
(3) AC Outlet (optional)

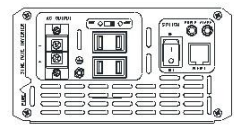

Universal


European


UK


America

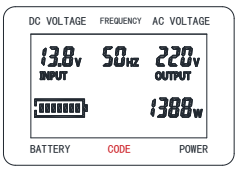

Australia/New Zealand


Japan

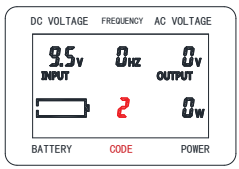
(4) LED& LCD indicator and Buzzer

LCD CODE indicator	LED indicator	Buzzer	Status
NONE	BLUE ON Red OFF	No Sounding	Output is normal
2	Blue ON Red ON	2 beeps	Low DC Voltage
3	Blue ON Red ON	3 beeps	High DC Voltage
4	Blue ON Red ON	4 beeps	Overload
5	Blue ON Red ON	5 beeps	Over-temperature
6	Blue ON Red ON	6 beeps	Output voltage abnormal

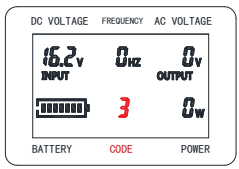
For example , SP1500-12-220 running in different states as below:



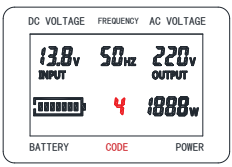
Working normal



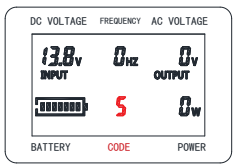
Low DC Voltage



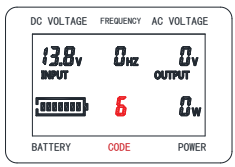
High DC Voltage



Overload



Over temperature



Output voltage abnormal

6. Protection

Protection and recover	Condition				Phenomenon
	Parameter	12V SERIES	24V SERIES	48V SERIES	
Over voltage protection and recover	Input Voltage (T)	>15.5V	>31V	>62V	Red indicator ON Output is OFF Buzzer sounds 3 Beeps
Low voltage protection and recover	Input Voltage (T)	<10V	<20V	<40V	Red indicator ON Output is OFF Buzzer sounds 2 Beeps
Over-tempera protection and recover	Tem(T)	T＞100C	T＞100C	T＞100C	Red indicator ON Output is OFF Buzzer sounds 5 Beeps
Overload protection and recover	S: Output power Pe : Rated power	S>1.1Pe			The output is OFF after 10S Red indicator ON Buzzer sounds 4 Beeps
		S>1.3Pe			The output is OFF after 3S Red indicator ON Buzzer sounds 4 Beeps
		S>1.5Pe			The output is OFF after 1S Red indicator ON Buzzer sounds 4 Beeps
AC OUTPUT Abnormal (low voltage\high voltage\short circuit)					Red indicator ON Output is OFF Buzzer sounds 6 Beeps

7. Troubleshooting

Faults	Possible reasons	Troubleshooting
LCD CODE indicator “2” Red indicator on Output is OFF Buzzer sounds 3 Beeps	DC input under-voltage	Measure the DC input voltage if the voltage is lower than 10/20/40V. Adjust the input voltage to restore normally.
LCD CODE indicator “3” Red indicator on Output is OFF Buzzer sounds 3 Beeps	DC input Over-voltage	Measure the DC input voltage if the voltage is higher than 15.5/31/62V. Adjust the input voltage to restore normally.
LCD CODE indicator “4” Red indicator on Output is OFF Buzzer sounds 4 Beeps	Overload	• Reduce the number of AC loads. • Restart the inverter.
LCD CODE indicator “5” Red indicator on Output is OFF Buzzer sounds 5 Beeps	Over-temperature	When the heat sink temperature . exceeds 90℃ the inverter resumes work.

8. Maintenance

The following inspections and maintenance tasks are recommended at least two times per year for best performance.

- Make sure no block on airflow around the inverter. Clear up any dirt and fragments on the radiator.
- Check all the naked wires to ensure insulation is not damaged for serious solarization—frictional wear, dryness, insects or rats, etc. Repair or replace some wires if necessary.
- Check and confirm that indicator and display are consistent with required. Pay attention to any troubleshooting or error indication. Take corrective action if necessary.
- Confirm that all the terminals have no corrosion, insulation damage, high temperature, or burnt/discolored sign, tighten terminal screws to the suggested torque.
- Check for dirt, nesting insects, and corrosion. If so, clear up in time.
- Check and confirm that the lightning arrester is in good condition. Replace a new one in time to avoid damaging the inverter/charger and even other equipment.

 **WARNING： Risk of electric shock!**

Risk of electric shock! Before the above operations, ensure that all the power is turned off. The electricity in the capacitance is completely discharged, then follows the corresponding inspections.

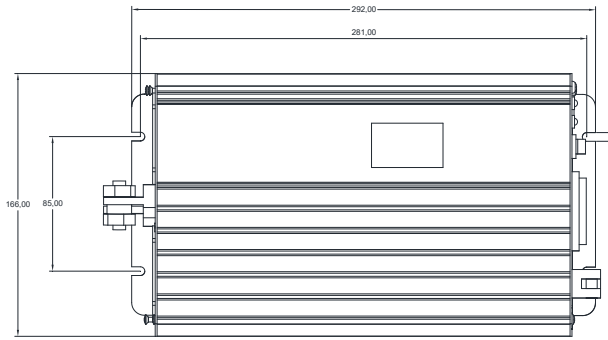
9. Disclaimer

The warranty does not apply under the following conditions:

- Damage caused by improper use or use in an inappropriate environment
- Battery voltage exceeds the input voltage limit of the inverter
- Damage caused by working environment temperature exceeds the rated range
- Unauthorized dismantling or attempted repair
- Damage occurred during transportation or handling
- Damage caused by force majeure

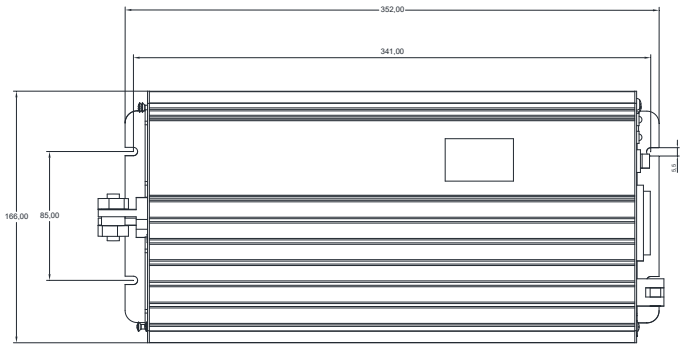
10. Technical Specification

Item	SP1500-12-110	SP1500-12-220	SP1500-24-110	SP1500-24-220	SP1500-48-110	SP1500-48-220
Rated Input Voltage	12VDC		24VDC		48VDC	
Input Voltage Range	10~15.5VDC		20~31VDC		40~61VDC	
Input surge voltage	＜32VDC		＜44VDC		＜80VDC	
Output Voltage	100VAC(±5%) 110VAC(±5%) 120VAC(±5%)	220VAC(±5%) 230VAC(±5%) 240VAC(±5%)	100VAC(±5%) 110VAC(±5%) 120VAC(±5%)	220VAC(±5%) 230VAC(±5%) 240VAC(±5%)	100VAC(±5%) 110VAC(±5%) 120VAC(±5%)	220VAC(±5%) 230VAC(±5%) 240VAC(±5%)
Output Frequency	50/60±0.1Hz					
Output Continuous Power	1500W					
Surge power	3000W					
Output Wave	Pure sine wave					
Distortion THD	THD≤5% ①	THD≤3% ①	THD≤5% ①	THD≤3% ①	THD≤5% ①	THD≤3% ①
Max. Efficiency	90%	91%	91%	92%	94%	95%
No- load current	＜0.3A	＜0.6A	＜0.2A	＜0.3A	＜0.1A	＜0.2A
Binding post	Φ8mm					
Dimension	292×166×87mm					
Mounting size	281×85mm					
Mounting hole size	Φ5.5mm					
Net weight	2.9kg					

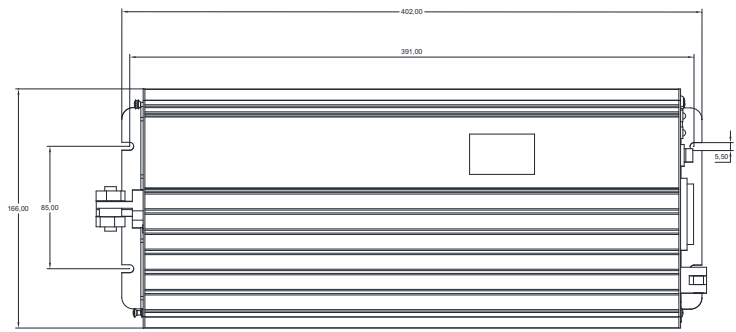


Dimension

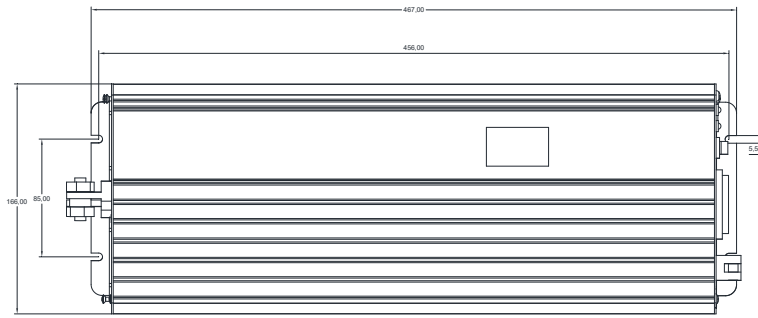
Item	SP2000-12-110	SP2000-12-220	SP2000-24-110	SP2000-24-220	SP2000-48-110	SP2000-48-220
Rated Input Voltage	12VDC		24VDC		48VDC	
Input Voltage Range	10~15.5VDC		20~31VDC		40~61VDC	
Input surge voltage	<32VDC		<44VDC		<80VDC	
Output Voltage	100VAC(±5%) 110VAC(±5%) 120VAC(±5%)	220VAC(±5%) 230VAC(±5%) 240VAC(±5%)	100VAC(±5%) 110VAC(±5%) 120VAC(±5%)	220VAC(±5%) 230VAC(±5%) 240VAC(±5%)	100VAC(±5%) 110VAC(±5%) 120VAC(±5%)	220VAC(±5%) 230VAC(±5%) 240VAC(±5%)
Output Frequency	50/60±0.1Hz					
Output Continuous Power	2000W					
Surge power	4000W					
Output Wave	Pure sine wave					
Distortion THD	THD≤5% ①	THD≤3% ①	THD≤5% ①	THD≤3% ①	THD≤5% ①	THD≤3% ①
Max. Efficiency	90%	91%	91%	92%	94%	95%
No- load current	<0.35A	<0.65A	<0.2A	<0.35A	<0.15A	<0.25A
Binding post	Φ8mm					
Dimension	352×166×87mm					
Mounting size	341×85mm					
Mounting hole size	Φ5.5mm					
Net weight	3.5kg					



Item	SP2500-12-110	SP2500-12-220	SP2500-24-110	SP2500-24-220	SP2500-48-110	SP2500-48-220
Rated Input Voltage	12VDC		24VDC		48VDC	
Input Voltage Range	10~15.5VDC		20~31VDC		40~61VDC	
Input surge voltage	＜32VDC		＜44VDC		＜80VDC	
Output Voltage	100VAC(±5%) 110VAC(±5%) 120VAC(±5%)	220VAC(±5%) 230VAC(±5%) 240VAC(±5%)	100VAC(±5%) 110VAC(±5%) 120VAC(±5%)	220VAC(±5%) 230VAC(±5%) 240VAC(±5%)	100VAC(±5%) 110VAC(±5%) 120VAC(±5%)	220VAC(±5%) 230VAC(±5%) 240VAC(±5%)
Output Frequency	50/60±0.1Hz					
Output Continuous Power	2500W					
Surge power	5000W					
Output Wave	Pure sine wave					
Distortion THD	THD≤5% ①	THD≤3% ①	THD≤5% ①	THD≤3% ①	THD≤5% ①	THD≤3% ①
Max. Efficiency	90%	91%	91%	92%	94%	95%
No- load current	＜0.5A	＜0.9A	＜0.3A	＜0.45A	＜0.2A	＜0.3A
Binding post	Φ8mm					
Dimension	402×166×87mm					
Mounting size	391×85mm					
Mounting hole size	Φ5.5mm					
Net weight	4.1kg					



Item	SP3000-12-110	SP3000-12-220	SP3000-24-110	SP3000-24-220	SP3000-48-110	SP3000-48-220
Rated Input Voltage	12VDC		24VDC		48VDC	
Input Voltage Range	10~15.5VDC		20~31VDC		40~61VDC	
Input surge voltage	<32VDC		<44VDC		<80VDC	
Output Voltage	100VAC(±5%) 110VAC(±5%) 120VAC(±5%)	220VAC(±5%) 230VAC(±5%) 240VAC(±5%)	100VAC(±5%) 110VAC(±5%) 120VAC(±5%)	220VAC(±5%) 230VAC(±5%) 240VAC(±5%)	100VAC(±5%) 110VAC(±5%) 120VAC(±5%)	220VAC(±5%) 230VAC(±5%) 240VAC(±5%)
Output Frequency	50/60±0.1Hz					
Output Continuous Power	3000W					
Surge power	6000W					
Output Wave	Pure sine wave					
Distortion THD	THD≤5% ①	THD≤3% ①	THD≤5% ①	THD≤3% ①	THD≤5% ①	THD≤3% ①
Max. Efficiency	90%	91%	91%	92%	94%	95%
No- load current	<0.5A	<1A	<0.4A	<0.6A	<0.2A	<0.4A
Binding post	Φ8mm					
Dimension	467×166×87mm					
Mounting size	456×87mm					
Mounting hole size	Φ5.5mm					
Net weight	5.1kg					



① **Test condition: Rated Input Voltage, Output Continuous Power, Resistive load.**

Environmental Parameters

Working Temperature	-20℃~ +45℃
Storage Temperature	-35℃ ~ +70℃
Humidity	< 95%(N.C.)
Enclosure	IP20
Altitude	< 5000 m (Derating to operate according to IEC62040 at a height exceeding 1000 m)

Others

Dielectric Strength	Between DC input terminals and metal case: Test voltage AC500V, 1 minute Between AC output terminals and metal case: Test voltage AC1500V, 1 minute