



User's Manual

Before using the inverter, you need to read and save the safety instructions.

SHI SERIES

(SHI400, SHI600, SHI1000)

Pure Sine Wave Inverter

The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.

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1. Introduction

Thanks for purchasing SHI series inverters. The product is a pure sine wave inverter which can convert 12/24/48Vdc to 220/230Vac 50/60Hz based on full digital and intelligent design. It features high reliability, high efficiency, concise outline, small volume, full protection functions, easy installation and operation. The inverter can be applied in many fields, such as household appliances, electric tools and industrial devices etc, especially for solar photovoltaic power system.

Features:

- Complete isolation-type inverter technology.
- Adoption of advanced SPWM technology, pure sine wave output.
- Dynamic current loop control technology to ensure inverter reliable operation.
- Wide DC input voltage range.
- Low output harmonic distortion($THD \leq 3\%$).
- LED indicators for input voltage range, load power range, normal output & failure state.
- Optional energy saving mode.
- The output voltage and frequency can be switched.
- Extensive protections: short-circuit, overload, under/over input voltage, over-temperature, and inverter's inner fault identification protections.
- Wide working temperature range (industrial level).
- Continuous operation at full power.

2. Important Safety Instructions

As an AC power supply equipment, the inverter's output voltage is with the same level as that of household power plug. Mind the AC output terminals, or you may get an electric shock and result in life danger!

Attentions:

- Connect the DC input according to the requirement strictly. The power inverter has a relatively wide input range, but too high or too low input may cause problems even destroy the inverter. The surge input voltage can't exceed 20V for the 12V inverters, 40V for 24V inverters, 80V for 48V inverters, or the inverters will be damaged.
- A reverse polarity connection will blow the fuses in the inverter and may damage the unit.
- Do not expose the inverter to humid, flammable, explosive or dust environment.
- Keep the inverter out of children touch.
- Inverter input is recommended to connect to battery, the min. capacity of battery(expressed in AH) should be calculated in the following way: 5times of the rated power of the inverter/battery voltage. If for testing purpose, user should select DC power supply current at least twice greater than that of the inverter rated input to keep inverter normal operation. Use DC power supply for testing may cause the damage of the inverter.
- When the inverter works continuously, its surface may became very hot, please make sure 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 airproof location and keep enough space

around the inverter.

- The protective grounding must be connected to the ground. The cross section of wire should not be less than 4mm^2 .
- A fuse or breaker should be used between battery and inverter, the value of fuse or switch should be twice of the inverter rated input current.
- The wire connects between battery and inverter should be shorter than 3m, the current density should be less than $3.5\text{A}/\text{mm}^2$ while the output of inverter is fully loaded. If the wire longer than 3m, the current density should be reduced.
- Do not connect the battery charger or similar devices to the input terminal of the inverter.
- Do not put the inverter close to the flooded lead-acid battery because the sparkle in the terminals may ignite the hydrogen released by the battery.
- It's an off-grid inverter, if connect to the grid, the inverter may be damaged.
- This inverter can only be used singly, parallel connection or in series will damage the inverters.
- Do not attempt to repair the fault inverter yourself, otherwise it may lead to a serious accident. Please contact the manufacture's engineer.

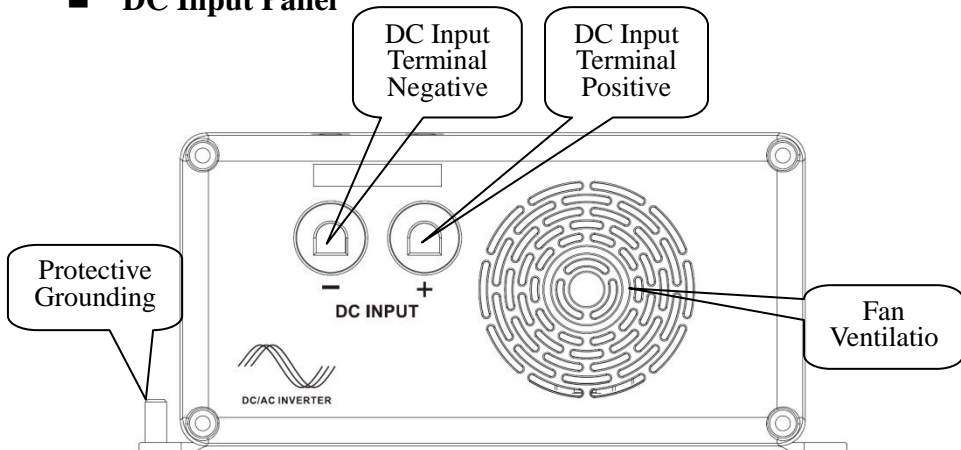
3. Inverter Operation

Connect the input and output terminals accurately. Turn on the power using the ON / OFF switch on the front panel. In order to avoid the protections resulted from the surge power, please turn on AC loads one by one after the output of the inverter is normal. Please check it as below:

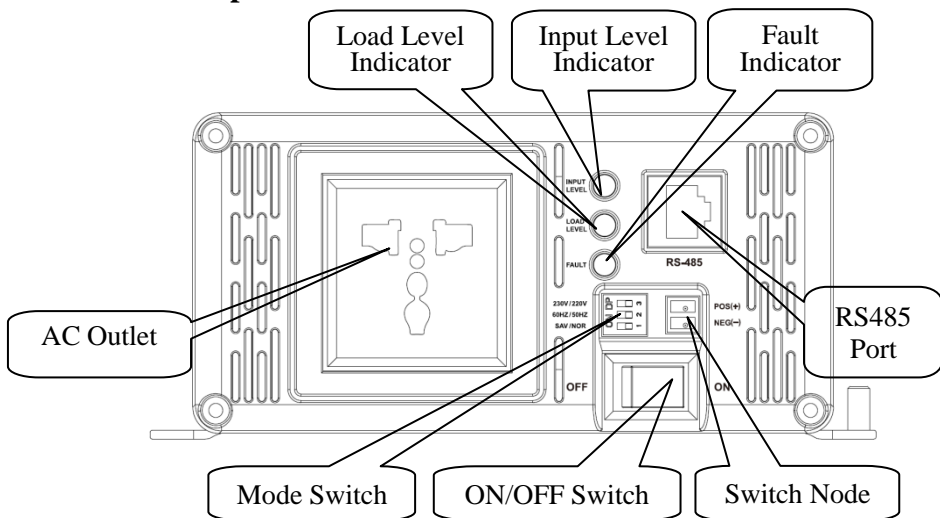
- Set the power switch to the ‘OFF’ position. Insert the load’s plug into the inverter’s output outlet.
- Connect the protective grounding to the ground.
- Make sure the fuse or breaker use between battery and inverter is off.
- Connect the battery (‘+’ terminal with red line, ‘-’ with black line). Do not connect them by contraries, or the power inverter will be damaged.
- Switch on the fuse or breaker. Switch the inverter to ON and then turn on the loads one by one. Check the operation state of both power inverter and loads. ‘Green’ of the failure LED indicator means the state is normal.
- If there are different loads, it is suggested that turn on the load with large startup current first, such as television, then turn on the load such as lamp when the inverter works stable.
- If the failure LED indicator is ‘Red’ and the buzzer alarms or no output when you turn on devices, switch off the loads and power inverter immediately. Check the system by referring to the troubleshooting guide. Turn on the devices again according to the operation methods after the failure is removed.

4. Functions

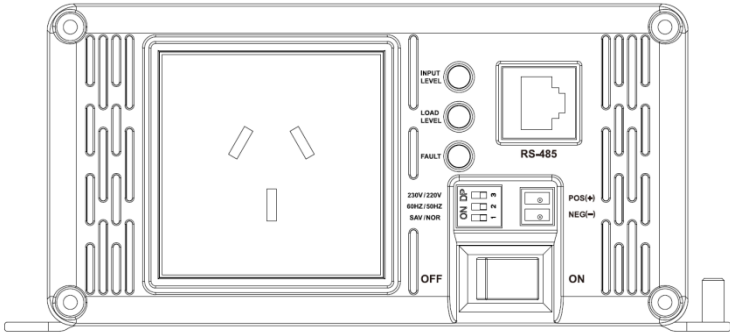
■ DC Input Panel



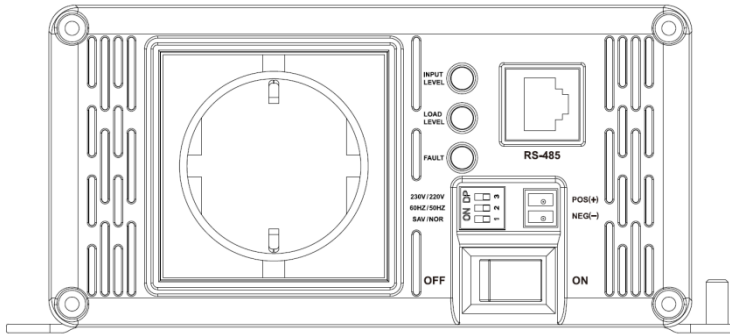
■ AC Output Panel



■ **The Optional Outlet**
Australia/New Zealand



European



■ Input Level: Display Input Voltages

LED Status	12V	24V	48V
RED Slow Blink	<10.5	<21	<42
RED	10.5~11	21~22	42~44
ORANGE	11~12	22~24	44~48
GREEN	12~14.5	24~29	48~58
ORANGE Fast Blink	14.5~16	29~32	58~64
RED Fast Blink	>16	>32	>64

■ Load Level: Display AC Loads

LED Status	AC Load
ORANGE	<20%
GREEN	20%~75%
RED	>75%
RED Slow Blink	Overload
RED Fast Blink	Short Circuit

■ Output & Fault Status

LED Status	Status
GREEN	Output Normal
RED Fast Blink	Overload or Short circuit, No Output
RED Slow Blink	Over or Low input voltage, No Output
ORANGE Fast Blink	Over temperature, No Output
ORANGE OR RED	Inverter Fault, No Output
OFF	Saving mode, Power Off, No Output

■ Alarms

Alarms	Status
Buzzer Sounds	Overload or Short circuit, No Output
	Over or Low input voltage, No Output
	Over temperature, No Output
	Inverter Fault, No Output

The buzzer stops after 20S.

■ Protections

Overload or Output Short Circuit Protection

Overload Character	125%	150%	200%	230%	>250%
Continuance	60S	10S	1.5S	<0.2S	<0.01S
Recover 3 times	Space 5 seconds for the first time, 10 seconds for the second time, and 15 seconds for the third time				

If the overload or short circuit status still remains when the inverter tries to recover for 3 times, you should reduce or clear the loads and then restart the inverter manually. Load over than 250% will be treated as output short circuit.

Input Low Voltage Protection

The output is switched off when the input voltage is lower than low voltage protect value, and auto-switched on when the input voltage reach low voltage recover value. User can also manually restart the inverter to switch on output by the 'ON/OFF switch', when the input voltage is higher than low voltage protect value.

	12V	24V	48V
Low Voltage Protect Value	10.8	21.6	43.2
Low Voltage Recover Value	12.5	25	50

Input Over Voltage Protection

The output is switched off when the input voltage is higher than over

voltage shut off value, also the output is auto-switched on when the input voltage drops below over voltage recover value.

	12V	24V	48V
Over Voltage Shut Off Value	16	32	64
Over Voltage Recover Value	14.5	29	58

Fault Protection

The inverter will shut down when the output voltage is error or when the inverter has inner fault.

Over Temperature Protection

The inverter will shut off when the internal temperature is overheating. And it automatic restarts when the temperature recovers to the normal level.

■ Others

Saving Mode

When the switch is on “Saving” side, the inverter will enter into the Saving Mode. It will shut off the output if the loads value is less than 20VA. Then restart and detect the power of the load again after 10s. If the load is more than 20VA, the inverter will turn on the output .Otherwise it will shut off output again. It cycles like this. So please don’t use the saving mode if the load is smaller than 20VA.

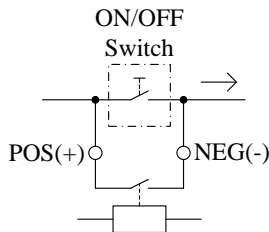
Mode Switch

The output mode can be changed by the mode switch. When the switch No.1 is on the ON side, the inverter will enter into the saving Mode. This mode can be switched online.

When the switch No.2 is on the ON side, the output frequency is 60Hz, otherwise is 50Hz. When the switch No.3 is on the ON side, the output voltage is 230Vac, otherwise is 220Vac. Both the output frequency and the output voltage change availability after restart the inverter.

Switch Node

The inverter can be control by the other equipment through the switch node. When the switch node is link, it equal to ON/OFF switch is on. The connection between the switch node and the ON/OFF switch as follow diagram:



If need to use the switch node, a relay should be used. The rating current of the relay should not be less than 5A. The cross section of wire needs 1mm^2 .

5. Troubleshooting

WARNING:

High voltage is inside the inverter, do not open or disassemble it! Attempting to service the unit yourself may cause the risk of electrical shock or fire!

Problem	Possible Cause	Solution
Input LED blink, fault red LED slow blink	Input voltage is too high or too low	Measure the input voltage. The inverter recovers when the input becomes normal.
Load LED blink, fault red LED fast blink	Overload or load short	Check out if the AC load is within the rated power or whether there is load short.
Fault orange LED fast blink	Over temperature inside the inverter	Improve the quality of ventilation and do not block the vent. Restart the inverter when it is cool down.
Fault red LED	Inverter abnormal	Remove all the connected plugs then restart. If inverter works well, please check the load and line. If the LED keeps red, the inverter has inside faults and should be returned to the factory.

Fault orange LED	Inverter abnormal	Made sure the DC input terminals is tight, the input voltage between 10.8V and 15V (21.6~30V for 24V, 43.2~60V for 48V product) and restart the inverter. If the LED keeps orange the inverter has inside faults and should be returned to the factory.
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6. Maintenance and Warranty

The casing of the inverters may be cleaned regularly with a damp cloth (not wet) to prevent accumulation of dust and dirt. The screws on the DC input terminals must be tightened.

The warranty period of the inverter is 2 year since the date of original shipping. Within the period, we will repair the product or replace the defective product for free. Return the defective with shipping cost prepaid. And provide proof of purchasing date. We will pay the return shipping charges within warranty period.

The warranty doesn't apply under the following conditions:

1. Damaged by accident, negligence, abuse, improper use
2. Input voltage exceed the nominal input voltage of inverter
3. Unauthorized modification or attempted repair

7. Technical Specification

■ Technical Data

Types	SHI400-12	SHI400-22
Nominal Battery Voltage	12V	24V
Input Voltage Range	10.8 ~16Vdc	21.6 ~32Vdc
No Load Current	≤0.8A	≤0.45A
Output Wave	Pure Sine Wave	
Output Voltage	220Vac ±3% / 230Vac ±10%	
Continuous Power	400W	
Power 10 sec	600W	
Power 1.5 sec	800W	
Surge Power	900W	
Frequency	50/60Hz ±0.2%	
Distortion THD	≤ 3%(resistive load)	
Efficiency at Rated Power	≥91%	≥92%
Max. Efficiency	≥92%	≥93%
Terminal	16mm ²	
Dimensions	280×166×74.3mm	
Installation	150×158mm	
Hole Size	Φ5mm	
Net Weight	1.8kg	

Types	SHI600-12	SHI600-22
Nominal Battery Voltage	12V	24V
Input Voltage Range	10.8 ~16Vdc	21.6 ~32Vdc
No Load Current	≤0.7A	≤0.45A
Output Wave	Pure Sine Wave	
Output Voltage	220Vac ±3% / 230Vac ±10%	
Continuous Power	600W	
Power 10 sec	900W	
Power 1.5 sec	1200W	
Surge Power	1350W	
Frequency	50/60Hz ±0.2%	
Distortion THD	≤ 3%(resistive load)	
Efficiency at Rated Power	≥91%	≥92%
Max. Efficiency	≥93%	≥94%
Terminal	25mm ²	
Dimensions	295×186×82mm	
Installation	150×178mm	
Hole Size	Φ6mm	
Net Weight	2.3kg	

Types	SHI1000-22	SHI1000-42
Nominal Battery Voltage	24V	48V
Input Voltage Range	21.6 ~32Vdc	43.2 ~64Vdc
No Load Current	≤0.45A	≤0.35A
Output Wave	Pure Sine Wave	
Output Voltage	220Vac ±3% / 230Vac ±10%	
Continuous Power	1000W	
Power 10 sec	1500W	
Power 1.5 sec	2000W	
Surge Power	2250W	
Frequency	50/60Hz ±0.2%	
Distortion THD	≤ 3%(resistive load)	
Efficiency at Rated Power	≥93%	≥93.5%
Max. Efficiency	≥94%	≥94%
Terminal	25mm ²	
Dimensions	295×208×98mm	
Installation	150×200mm	
Hole Size	Φ6mm	
Net Weight	3.3kg	

■ Environmental Parameters

Working Temperature	-20°C~+50°C
Storage Temperature	-35°C~+70°C
Humidity	< 95%(N.C.)
Altitude	< 5000 m (Derating to operate according to IEC62040 at a height exceeding 1000 m)

■ Others

Insulation Resistance	Between DC input terminals and metal case: $\geq 550\text{M}\Omega$; Between AC output terminals and metal case: $\geq 550\text{M}\Omega$.
Dielectric Strength	Between DC input terminals and metal case: Test voltage AC1500V, 1 minute Between AC output terminals and metal case: Test voltage AC1500V, 1 minute

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