

## Pure Sine Wave Inverter

Item	CP	SP	Efficiency	THD	NL	CH
LSP300	300W	600W	>90%	≤3%	≤0.4A	5A/10A
LSP600	600W	1200W	>85%	≤3%	≤0.6A	5A/10A
LSP800	800W	1600W	>85%	≤3%	≤0.6A	5A/10A
LSP1000	1000W	2000W	>85%	≤3%	≤0.8A	10A/20A
LSP1500	1500W	3000W	>85%	≤3%	≤0.9A	10A/20A
LSP2000	2000W	4000W	>85%	≤5%	≤1.0A	10A/20A
LSP3000	3000W	6000W	>82%	≤5%	≤1.2A	10A/20A
LSP4000	4000W	8000W	>82%	≤5%	≤1.5A	10A/20A
LSP5000	5000W	10000W	>82%	≤5%	≤1.5A	10A/20A
LSP6000	6000W	12000W	>82%	≤5%	≤1.5A	10A/20A

CP = Continuous Power

SP = Surge Power

THD = Total Harmonic Distortion

NL = No load Current Draw

CH = Charging

Specifications subject to change without notice

Note: Actual product purchasing, product information and images will not be modified without notice.

DC to AC

Pure Sine Wave Power

Inverter with LCD Display

# USER MANUAL

## Safety First...

Incorrect installation or misuse of the inverter may result in danger to the user or hazardous conditions. We urge you to pay special attention to all CAUTION and warning statements. Caution statements identify conditions or practices that may result in damage to the inverter or to other equipment. WARNING statements identify conditions that may result in personal injury or loss of life.

**WARNING!** Shock hazard. Keep away from children.



- The inverter generates the same potentially lethal AC power as a normal household wall outlet. Treat it with the same respect that you would any AC outlet.
- Do not insert foreign objects into the inverter's AC outlets, fan or vent openings.
- Do not expose the inverter to water, rain, snow or spray.
- Do not under any circumstances, connect the inverter to utility power AC distribution wiring.

**WARNING!** Heated surface.



- The inverter housing may become uncomfortably warm, reaching 140°F ( 60°C ) under extended high power operation. Allow at least 2 inches ( 5cm ) of air space on all sides of the inverter. During operation, keep away from materials that may be affected by high temperatures.

**WARNING!** Explosion hazard.



- Do not use the inverter in the presence of flammable fumes or gases, such as in the bilge of a gasoline

powered boat, or near propane tanks. Do not use the inverter in an enclosure containing automotive-type, lead-acid batteries. These batteries, unlike sealed batteries, vent explosive hydrogen gas, which can be ignited by sparks from electrical connections.

- When working on electrical equipment always ensure someone is nearby to help you in an emergency.

### CAUTION!



- Do not connect live AC power to the inverter's AC outlets. The inverter will be damaged even if it is switched OFF.
- Do not expose the inverter to temperatures exceeding 104°F ( 40°C ).

### CAUTION!



- Connect inverter only to batteries with a 12V/24V/48V DC nominal output. Wrong DC input will not supply enough voltage or damage the inverter.

**CAUTION!** Do not use the modified inverter with the following equipment:



- Small battery operated products such as rechargeable flashlights, some rechargeable shavers, and night-lights that are plugged directly into an AC receptacle to recharge.
- Certain battery chargers for battery packs used in hand powered tools. These chargers will have warning labels stating that dangerous voltages are present at the charger's battery terminals.
- Connect inverter only to batteries with a 12V/24V/48V DC nominal output. A battery with

6V/12V/24V nominal output will not supply voltage and a battery with 24V/48V/96V nominal output will damage the inverter.

**CAUTION!** Any internal adjustment on the inverter is prohibit!

## Safety Features

These advanced safety features are built into the inverter:

Electronic overload protection with automatic shutdown.

- Built-in internal backup DC fuse provides added safety.
- Low battery voltage warning followed by automatic shutdown.
- High input voltage protection with automatic shutdown.
- Over temperature protection with automatic shutdown.
- Output short circuit protection.

Some of the items may have the standby function. The standby works when the power of the inverter is ON, and with no load or load less than 15W.

## 1 Introduction

The inverter is a compact and portable for all mobile application ( up to rated wattage ), the leader in the field of high frequency inverter design. From the 12V/24V/48V DC outlet in your vehicle or boat, or directly from a dedicated 12V/24V/48V DC battery, the inverter will efficiently and reliably power a wide variety of household

AC products, such as TVs, computers, VCRs, and many more. The inverter is designed to provide years of trouble-free operation and includes automatic safety monitoring circuitry to protect the inverter, and your battery, from inadvertent overload conditions.

Read this guide before installing or using the inverter and save it for future reference.

## 2 Installation Guidelines

### Selecting a Suitable Location

For safe and optimum performance, install the inverter in a location that is...

- **Dry.** Do not expose to water drip or spray.
- **Cool.** Operate only in ambient temperatures between 32F ( 0°C ) and 104F ( 40°C ). Keep away from furnace heating vents or other heat producing equipment.
- **Well ventilated.** Allow at least 2 inches ( 5cm ) of clearance above and on all sides of the unit for proper cooling.
- **Safe.** Do not install inverter in a compartment with non-sealed batteries or flammable liquids, liquids, such as gasoline, or explosive vapors.
- **Clean and free of dust and dirt.** This is especially important if the inverter is used in a work environment. Due to limitations in the common 12V/24V/48V outlet in a vehicle or boat, the inverter should only be use to supply AC power to products that require 180 Watts or less. If your application requires more than 180 Watts and the

inverter has a higher rating, see “ Using the DC Cable-clips on page 6 “.

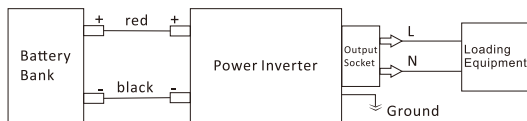
1. Before connecting your new inverter, you should make a visual inspection to ensure no visible damage has been caused by shipping. Then make sure the Main Power Switch of the inverter is Off ( O ).

**CAUTION!** A reverse polarity connection ( positive to negative ) may damage the inverter. Damage caused by a reverse polarity connection is not covered under warranty.



2. Tighten the nut on each DC terminal by hand until it is snug. Do not over tighten.
3. Insert the plug of this cable into the 12V/24V/48V DC outlet and switch the unit ON.
4. When the inverter is not in use, unplug it from the 12V/24V/48V DC outlet to prevent slight discharge of the battery.

#### Instruction of operation



For the big power inverter ( 2000W and higher ), we have AC hardware terminal block.

L	N	G
⊕	⊕	⊕
⊕	⊕	⊕

L: Live  
N: Neutral  
G: Ground

Using the DC cable clips or Direct Connect Cables.

By directly connecting the inverter to a 12V/24V/48V DC battery with the DC Cable-Clips, you can operate products with power requirements up to the rated continuous output power.

1. The display will alternate between the battery voltage and % of maximum inverter load. This is for the big power, such as 2000W and higher.
2. If your inverter has been shipped with a wireless remote, the receiver is built-into your inverter. We include 1 of 4 different wireless remotes matched to the receivers: A, B, C, or D. the remote and receiver must have the same letter to work together. You can see the receivers letter by the S/N on the bottom sticker. If you have multiple inverters using the same remote system, you may operate all inverters with a single remote, if the letters match. For example: if you have 3 inverters and all of the S/N are labeled A, then 1 single remote labeled A will control all 3 inverters as long as Main Power Switch to each inverter is ON. If you like you may have up to 4 different remotes, please ensure each remote and inverter have a unique letter.
3. All inverters may be turned ON and OFF using the main power switch, if a remote was included and you plan on using it, the inverter's Main Power Switch must be ON for the remote to operate. You may always leave the Main ON and control the inverter using the Remote. Lock symbol will turn inverter OFF, unlock will turn it ON.



4. The fan is thermally controlled and will only turn on as needed.
5. Now that you have confirmed the inverter is operating as expected, it is time to connect your equipment to the inverter. You may use the AC outlets or the AC direct connect terminal block ( on larger models only ).
6. You are now ready to enjoy the use of your new inverter and may turn it on.

### 3 Using the Inverter

The inverter is capable of continuously powering most 100-120V/220-240V AC products that use the rated continuous output power or less. Its AC output waveform, called Pure sine wave

It is designed to function as the sine wave shape of utility power.

The power, or ' wattage ', rating of AC products is average power they use. When many AC products are first switched on, they initially consume more power than their power rating.

For loading such as motor rectifier, there is a surge current when starting. Please note the starting current can't exceed the maximum rated current. ( The starting current of motor may be 7-12 times the rated current. )

**CAUTION!** Modified sine wave inverter can't take above mentioned load.



It is normal that the output voltage drops when a heavy load is present. You must take action in case below conditions.

- When the battery DC voltage is reduced below 11.5/21/42 volts.

Solution:

- Increase the battery capacity.
- Reduce the load on inverter.
- When output AC voltage drops below acceptable levels ( 106V/210V AC ).

Solution:

- Increase the battery capacity.
- Reduce the load.

Although the inverter can supply momentary surge power, occasionally some products rated less than the rated continuous output power may exceed its surge capabilities and trigger its safety overload shut down feature. If this problem occurs when attempting to operate several AC products at the same time, try first switching on the inverter with all AC products switched off. Then one by one switch each on, starting with the high surge product first.

### Indicators and Controls

- The AC outlets are provided on one end of the inverter. Any combination of 100-120V/220-240V AC products with a total continuous power consumption of the continuous power or less may be plugged in.
- The ON/OFF switch enables output AC power at the AC outlets when switched ON. The green POWER light indicates AC power is present at the AC outlets and the inverter is operating normally.

- The red FAULT light indicates inverter shutdown caused by low or high voltage, overload or excessive temperature.

### **Inverter Operation**

1. When properly connected to a 12V/24V/48V DC outlet or battery, turning the ON/OFF switch ON, will illuminate the green POWER light, and deliver AC power to the outlets.
2. Plug the AC product ( s ) you wish to operate into the AC outlet ( s ) and switch them on, one at a time.
3. As the battery is used up, battery voltage begins to fall. When the inverter senses that the voltage at its DC input has dropped to 10.9-11.5V/21.5-23.0V/43.0-46.0V, 0V, an audible alarm sounds. This allows time for computers or other sensitive devices to be shut down.
4. If the audible alarm is ignored the inverter will automatically shut down when the battery voltage drops to 10.3-11.0V/20.5-22.0V/41.0-44.0V. this prevents battery damage from excessive discharge. After auto shut down, the red FAULT light illuminates.

**IMPORTANT:** Vehicle batteries are designed to provide



brief periods of very high current needed for engine starting. They are not intended for constant deep discharge. Regularly operating the inverter from a vehicle battery until the low voltage alarm sounds will shorten the life of the battery. Consider connecting the inverter to a separate deep discharge type battery if you will be frequently running electrical products for extended period or time .

5. If an AC product rated higher than the rated continuous power ( or which draws excessive surge power ) is connected, the inverter will shut down. The red FAULT light will turn on.
6. If the inverter exceeds a safe operating temperature, due to insufficient ventilation or a high temperature environment, it will automatically shut down. The red FAULT light will turn on and the audio warning will sound.
7. Should a defective battery charging system causes the battery voltage to rise to dangerously high levels, the inverter automatically shuts down.

**CAUTION!** Although the inverter incorporates protection



against over-voltage, it may still be damaged if the input voltage exceeds 16/32/62V Volt DC.

8. The cooling fan is designed to operate only when the temperature is higher than 104°F ( 40°C ).
9. In the event of an overload, low battery voltage or overheating, the inverter will automatically shut down (See Section 4 Troubleshooting ).
10. The inverter will need to be manually reset when shut down by overload.

### **Battery Operating Time**

Operating time will vary depending on the charge level of the batter, its capacity and the power level drawn by the particular AC load.

When using a vehicle ad a power source, it is strongly recommended to start the vehicle every hour or two to charge the battery before its capacity drops too low.

The inverter can operate while the engine is running, but the normal voltage drop that occurs during starting may trigger the inverter's low voltage shutdown feature. Because the inverter draws less than the no load current draw with the ON/OFF switch in ON position and with no AC products connected, it has minimal impact on battery operating times.

### **Interference with Electronic Equipment**

Generally, most AC products operate with the inverter just as they would with household AC power. Below is information concerning two possible exceptions.

**Buzzing Sound in Audio Systems and Radios**—Some inexpensive stereo systems, boom boxes, and AM-FM radios have inadequate internal power supply filtering and “buzz” slightly when powered by the inverter. Generally, the only solution is audio product with a higher quality filter.

**Television Interference**—The inverter is shielded to minimize its interference with TV signals. However, with weak TV signals interference may be visible in the form of lines scrolling across the screen. The following should minimize or eliminate the problem:

- Use an extension cord to increase the distance between the inverter and the TV, antenna and cables.
- Adjust the orientation of the inverter, television, antenna and cables. Maximize TV signal strength by using a better antenna and use shielded
- Antenna cable where possible. Try a different TV. Different models of televisions vary considerably in

- Their susceptibility to interference.

### **Frequently Asked Question about Power Inverter**

Q: Are there any disadvantages of using “Modified Sine Wave” inverter?

“Square Modified Sine Wave” inverters will run most tools and appliances without any problem and are the most common type of inverter on the market. Below are the advantages of “Pure Sine Wave” (also called True Sine Wave) inverters over modified sine wave inverters:

1. Reduces audible and electrical noise in fans, audio amplifiers, TV and some sensitive audio system.
2. Inductive loads like microwave ovens and motors might run faster, quieter and cooler.
3. The following devices that might not work with modified sine wave inverters:
  - Some battery chargers for cordless tools
  - Some new furnaces and pellet stoves with microprocessor control
  - Sensitive electrical or electronic items such as certain medical equipment

## **4 Troubleshooting**

**PROBLEM: AC product will not operate, no inverter lights are ON.**

### Possible Cause

Battery is defective.

Inverter has been connected with reverse DC input polarity.

Loose cable connections

### Suggested Remedy

Check battery and replace if required.

Check connection to battery.

Probable inverter damage has occurred. Have unit repaired ( not covered by warranty ).

Check cables and connections.

Tighten as required.

**PROBLEM: Inverter will run some small loads, but not larger ones.**

### Possible Cause

Voltage drop across DC cables.

### Suggested Remedy

Shorten cables or use heavier cables.

**PROBLEM: Measured inverter output is too low.**

**PROBLEM: Alarm is sounding.**

Standard" average-reading " AC voltmeter used to measure output voltage, resulting in an apparent reading below 80/180V AC too low.

Battery voltage is too low.

### Suggested Remedy

Inverter's 'pure sine wave' Output

Requires 'true RMS' voltmeter, such as Fluke 87 series multimeter, for accurate measurement.

Recharge battery

### Possible Cause

Low voltage shutdown or thermal shutdown has occurred.

### Suggested Remedy

Shorten cables or use heavier cables.

Recharge battery. Allow unit to cool.

Improve air circulation around unit.

Locate unit to a cooler environment.

Reduce load if continuous operation is required.

**PROBLEM: Battery run time is less than expected.**

### Possible Cause

AC product power consumption is higher than rated.

Battery is old or defective.

Battery is not being properly charged.

Power dissipation in DC cables.

### Suggested Remedy

Use a larger battery to make up for increased power requirement.

Replace battery.

Many simple chargers are unable to charge a battery fully.

Replace charger with better model such as a TRUECHARGE smart charger.

Use shorter/heavier DC cables.

**PROBLEM: AC product will not operate, red FAULT light ON.**

### Possible Cause

AC product ( s ) connected are rated at more than the rated continuous output power; overload shutdown has occurred.

AC product is rated less than the rated continuous output power; high starting surge has caused overload shutdown.

Battery is discharged ( alarm is sounding ).

Inverter has overheated due to poor ventilation and has caused over temperature shutdown.

Input voltage is greater than 15/30/60V

### Suggested Remedy

Use product with a power rating less than the rated continuous output power.

Product exceeds inverter's surge capability. Use a product with starting surge power within the inverter's capability.

Recharge battery

Switch inverter OFF and allow to cool for 15 minutes.

Clear blocked fan or remove objects covering unit. Locate unit to a cooler environment. Reduce load if continuous operation is required, restart.

Verify charging system is properly regulated and battery is 12/24/48V DC nominal.

## **5 Specifications**

DC input voltage range      11-15V/22-30V/44-60V DC

AC output voltage ( nominal )    100-120V/220-240V AC

AC output frequency ( Pure sine wave )    50/60 $\pm$ 1Hz

Output                      Outlets & AC hardwire terminal block  
                                    ( for 2000W and higher )

AC output waveform    Pure sine wave

Ambient operating temperature range    32°F-104°F  
                                                            0°C--40°C

Low battery alarm trigger range ( nominal )

10.9-11.5V/21.5-23.0V/43.0-46.0V DC

Low battery shut down range ( nominal )

10.3-11.0V/20.5-22.0V/41.0-44.0V DC

High battery shut down range ( nominal )

15.5V/31.0V/61.0V DC