GIANDEL®

DC to AC
PURE SINE WAVE
POWER INVERTER

USER MANUAL

MODEL: PS-2200KAR

USER MANUAL

SPECIFICATIONS

Item	Data	
Continuous power	2200W	
Peak Power	4400W	
Rated input voltage	12V	24V
Input voltage range	9.5~16VDC	19~32VDC
Input over voltage shutdown	16V	32V
Input low voltage shutdown	9.8V	19.6V
Input low voltage alarm	10.1V	20.2V
Output Voltage	110~120V / 220V / 230V / 240V AC±10% (Subject to the label)	
Frequency	60Hz ±1Hz	
Wave form	Pure Sine Wave(THD≤3%)	
Efficiency	Approximate 90%	
Over heat protection	65±5℃	
Over load protection	2200~2500W	
Short Circuit protection	Yes	
USB output	5V, 2.4A	
No load current(12/24VDC)	2A	1.6A
Intelligent heat radiation	Working only when temperature reaches 104°F± 41°F or load reaches above 800W.	
Working temperature	0 ~ 40℃	
Storage temperature	-10 ~ 45℃	
Size (L×W×H)	400×240×96mm	
Weight	5.2Kg	

A. INSTRUCTION

The GIANDEL Power inverter product line is used for back-up power. The pure sine product line is ideal for sensitive equipment and provides clean power, which is more efficient for back-up power applications. It converts DC (direct current/car battery) power into AC (alternating current) power that can be used for running a wide variety of tools and appliances under rating power. This inverter is perfect for providing mobile power in cars, boats and work trucks. The inverter can also be utilized as a back-up source of electricity in the event of an electrical failure or for several off-grid applications such as camping or in your RV.

B. Please read this instruction manual carefully and make sure your inverter is installed properly before using.

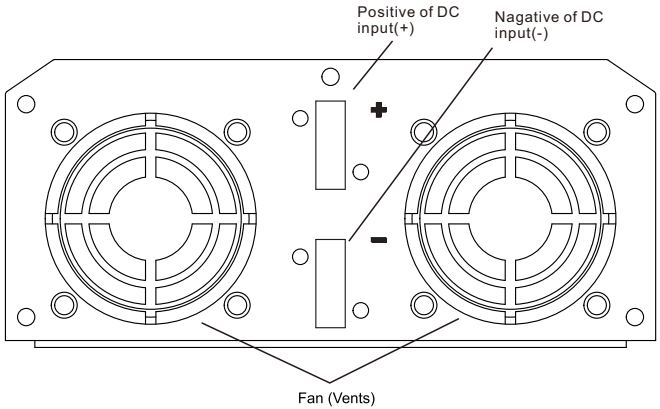
C. Warning and safety

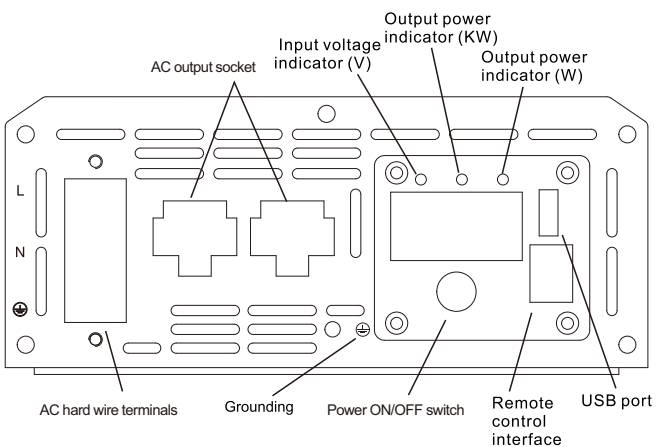
1) Read the manual before connecting this inverter and keep it for future reference.
2) Don't put the inverter under sunlight, near a heating source, wet or humid environment.
3) The case housing of inverter will be hot while using. Do not allow flammable materials to contact the inverter, such as clothing, sleeping bags, carpet or any other flammable materials. The heat from the inverter can damage these items.
4) The power inverter is designed to be used with a negative ground electrical system! Don't use with positive ground electrical systems (the majority of modern automobiles, RVs, trucks and boats are negative ground).
5) Do not disassemble the unit: it may cause fire or electric shock.
6) This device should only be serviced by a qualified technician. This item does not have any serviceable parts.
7) Prevent body contact with grounded surfaces such as pipes, radiators, ranges, and refrigerator enclosures during installation.
8) Do not operate the inverter if under the influence of alcohol or drugs. Read warning labels on prescriptions to determine if your judgement or reflexes are impaired while taking drugs. If there is any doubt, do not operate the inverter.
9) People with pacemakers should consult their physician(s) before using this product. Electromagnetic fields in close proximity to a pacemaker could cause interference to or failure of the pacemaker.
10) Keep the inverter well-ventilated. Do not place any objects on top of or next to the inverter or allow anything to cover the cooling fans; doing so can cause the inverter to overheat, causing a potential fire hazard and/or damage to the inverter. Leave adequate ventilation space underneath the inverter as well; thick carpets or rugs can obstruct air flow, causing the inverter to overheat.
11) Avoid unintentional starting. Be sure the switch is in the OFF position when not in use and before plugging in any appliance.
12) Keep inverter away from children. Don't install the inverter where it is accessible to children.
13) The power inverter will output the same AC power as utility power, please treat the AC outlets as carefully as you would your home AC outlets. Do not put anything other than an electrical appliance into the output terminal. It may cause shock or fire.
14) Disconnect the battery and inverter when not in use.

Note: Performance of this unit may vary depending on the available battery power or appliance wattage.

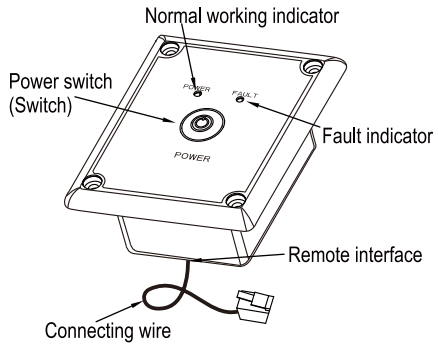
Warning: The warnings, cautions, and instructions discussed in this instruction manual cannot cover all possible conditions and situations that may occur. It must be understood by the operator that common sense and caution are factors which cannot be built into this product, but must be supplied by operator. Guard against electric shock. Do not open the metal case; risk of electric shock.

3. PARTS LIST





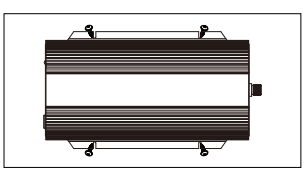
Remote controller box



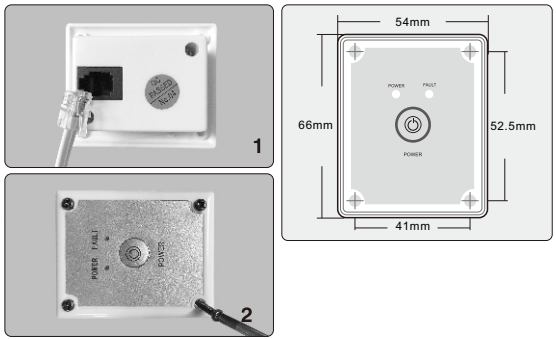
4. INSTALLATION

Ensure there is enough space for the installation, and the location should be meet the following requirements:

1. Water should not access the inverter.
2. The ambient temperature should be 32~104°F, and the preferred temperature is 50-77°F. The lower the better in this range of ambient temperature.
3. Allow for 12 inches around the inverter for adequate air flow.
4. Do not mount the inverter upside down.
5. We recommend mounting the inverter on something stable to prevent it from bouncing. Impact shock could result in damage to your unit. Be sure to use all four mounting screws for optimal stability. Mount in a location that can support the weight of the inverter.
6. Allow 12 inches of space around the inverter to prevent objects from blocking the vents and to provide enough air to circulate.
7. Do not install the inverter in an environment with high dust, saw dust residue or other particles that may get sucked into the inverter increasing internal temperature.
8. There will be some electrical arcing or spark when the inverter connects with the battery. Combustible materials such as gasoline, alcohol, etc. should not be around the inverter.



2). Assemble the remote control box



1) Fixed on the plane with an opening, four screws can be fixed directly on the four mounting holes of the remote control box.
2) Connect the remote control cable between the box and the inverter.

5. BATTERY

1. The battery is designed to supply the inverter with DC input voltage and the rated voltage should be in accordance with the rated input voltage of the inverter. Any voltage exceeding the range of the input voltage of the inverter will cause the inverter to go into overload and could possibly damage the inverter. The battery should supply enough current for the load. The load is the amp or watt rating of the equipment being powered by the inverter. A small capacity battery cannot provide enough power for a large electrical equipment. In this case, the battery will cause the inverter to go into under voltage protection because of the load put on the battery. A simple way to calculate the load or amps required from your battery is to divide watts of equipment by battery voltage. Due to the consumption of the inverter itself, the actual current will be about 10%. For example, the voltage of lead acid battery is 12VDC, and load of the equipment is 1000W, therefore, the actual current needed from the battery is about 1000W / 12V = 83.3 amps per hour. Add 10% for efficiency loss and you get 83.3 * 110% = 91.6 amp per hour needed. If you don't know the wattage of your equipment, you can figure the wattage by multiplying AC amps by AC voltage. For example, a refrigerator is 8 AC amps * 120 Volts AC = 960 watts.
   Remember, all equipment has a start-up requirement 3-5x its running wattage. In this example, 960 watts * 3 = 2880 watts needed from the inverter so don't size your inverter too small.
2. Battery operating time
   The battery operation time depends on battery capacity and load. The formula for operating time is: battery capacity divided by the value of the load divided by battery voltage times 110%. For example, using the numbers from above, the batter

specification is 12V, 200Ah capacity and the load is 1000W. Take battery capacity 200Ah / 91.6 amps = 2.18 hours of run time if you fully deplete the battery. This is NOT recommended. Deep cycle batteries last longer when they are only depleted to 50% of capacity.

6. CONNECTION

1) Grounding
   The power inverter has a terminal on the rear panel marked " Grounding "or " ⏚ ". This is used to connect the chassis of the power inverter to ground. The ground terminal has already been connected to the ground wire of the AC output receptacle through the inverter.
   The ground terminal suggested be connected to the ground wire, which will vary depending on where the power inverter is installed. In a vehicle, connect the ground terminal to the chassis of the vehicle. In a boat, connect it to the boat's ground system. In a fixed location, connect the ground terminal to earth.
2) Battery terminals
   Before you connect the battery cables, make sure the power switch is in the off position. Connect Red (+) battery cable to Red (+) inverter terminal. Connect Black (-) battery cable to Black (-) inverter terminal. Connect Red (+) battery cable to Red (+) battery terminal. Connect Black (-) battery cable to Black (-) battery terminal. Alligator clamp cables may be used but only to connect to the battery. Do not use clamps on inverter terminals. Alligator clamps are not a permanent solution. You may see a spark during connection. Do not reverse the polarity. This may damage the inverter and void warranty.
   Cross-sectional cable must be thick enough to avoid too much voltage drop . Refer to below table to choose cables.

Rated voltage of inverter	Current max. load power	Max. current of wire	Specification of wire length≤1m	Specification of wire length≤1m	Specification of wire length≤N m
12V	1200W	100A	6AWG (13.3mm²)	3AWG (26.67mm²)	N×6AWG (N×13.3mm²)
	1500W	150A	4AWG (21.15mm²)	1AWG (42.41mm²)	N×4AWG (N×21.15mm²)
	2000W	200A	3AWG (26.67mm²)	0AWG (53.49mm²)	N×3AWG (N×26.67mm²)
	2500W	250A	2AWG (33.62mm²)	00AWG (67.43mm²)	N×2AWG (N×33.62mm²)
	3000W	300A	1AWG (42.41mm²)	000AWG (85.01mm²)	N×1AWG (N×42.41mm²)
24V	1200W	50A	9AWG (6.63mm²)	6AWG (13.3mm²)	N×9AWG (N×6.63mm²)
	1500W	75A	7AWG (10.55mm²)	4AWG (21.15mm²)	N×7AWG (N×10.55mm²)
	2000W	100A	6AWG (13.3mm²)	3AWG (26.67mm²)	N×6AWG (N×13.3mm²)
	2500W	125A	5AWG (16.77mm²)	2AWG (33.62mm²)	N×5AWG (N×16.77mm²)
	3000W	150A	4AWG (21.15mm²)	1AWG (42.41mm²)	N×4AWG (N×21.15mm²)

7. USING THE POWER INVERTER

1. Check the output voltage and capacity of the battery. The battery (s) should match the voltage of the inverter and have enough capacity for the load. See Section E for more information.
2. Connect your inverter to your battery bank and do not to reverse the polarities of the connection. See Section F.
3. Press the power switch button on your inverter for 0.5 seconds and a green LED will light up indicating that the inverter is on.
4. Before plugging anything into your inverter, make sure the appliance you are trying to power is shut OFF, then plug it into the AC outlet of your inverter and power on your appliance.
5. Once finished using the inverter, turn off your electrical appliance and the inverter. The indicator lights should be off.
6. The cooling fans inside the inverter do not work until the case temperature reaches approximately 104°F.
7. If you do not plan to use the inverter for a long period of time, disconnect it from your battery bank. Leaving the inverter on and connected for long periods of time may harm the equipment and over discharge the battery.
8. The USB port on this unit can provide a stable line of 5V DC current. It will auto detect your device's max charging current from 0 to 2.4A current. Be sure to double check your device to make sure it doesn't exceed these requirements.

8. SOFT START TECHNOLOGY

The soft start technology built into this inverter protects the unit from delivering too much AC power at once by gradually increasing the AC voltage pushed out. To make sure that you are utilizing this feature, turn on the appliance being used before turning on the inverter. This is especially necessary for equipment that has an inductive load or electrical motor.

9. OUTPUT VOLTAGE & WAVEFORM

The electrical waveform output of this inverter is a pure sine wave, which has the same quality as utility and/or domestic power. This type of waveform is suitable for most electrical devices, appliances and tools. This pure sine wave unit provides more capabilities than modified sine wave inverters because it is a cleaner form of power.

The pure sine wave also effectively reduces the noise produced while using appliances.

10. LED DISPLAY

While the inverter is working, the input voltage and output power will be shown on the LED display screen by turns. When the inverter goes into protection, the following code may be shown:

1. LO means the inverter is in under voltage protection.
2. HI means the inverter is in over voltage protection.
3. OL means the inverter is in overload protection or short-circuits protection.
4. OH means the inverter is in OVER HEAT protection.

11. PROTECTION FEATURES

1. Input under-voltage alarm: When the input DC voltage is lower than 10.1V (20.2V), the buzzer will whistle intermittently to remind that the inverter will go into the under voltage protection. Pay attention to save the data if you are using computer.
2. Under voltage protection: The inverter will automatically shut down when the input DC voltage is lower than 9.8V(19.6V).The buzzer will whistle continuously and the green light is off, red light is on. Please turn off the inverter and use it after recharging the battery.
3. Over voltage protection: The inverter will automatically shut down when the input DC voltage is higher than 16V(32V).The buzzer will whistle continuously and the green light is off, red light is on. Please turn off the inverter and adjust the input voltage to the admissible range.
4. Overload protection: The inverter will automatically shut down when the load is higher than the rated power. The buzzer will whistle continuously. Turn off the inverter and resume to normal operation after taking away the excessive load.
5. Short-circuit protection: The AC output will be automatically shut down when short circuited. It will automatically reset after the problem is solved.
6. Thermal protection: The unit will get bot during operation. If the temperature is higher than 149°F, the inverter will automatically shut down. Then the buzzer will whistle continuously and the green light is off, red light is on. Please turn off the inverter, and continue using it after the temperature goes back to normal naturally. Meanwhile find out the factors causing the fault, such as ventilation, ambient temperature, vent, load power and so on. It can avoid similar things from happening again.

   NOTE The numbers in the parenthesis are for 24V models. In the case of over voltage, under voltage and thermal protection, the inverter will shut down. When the inverter is in the OFF position, the inverter doesn't consume battery current.

12. HOW TO CHANGE FUSE

1. Firstly disconnect the inverter and external batteries, solar panels, load etc all the connections.
2. Unscrew the side plate screws and pull out the bottom plate.
3. Use pliers to clamp car fuse inside the product, and pull out .
4. Replace the same specifications of the car fuse, and then install the bottom and side panels, and screw well.

13. TROUBLESHOOTING TIPS

Fault/Display	Cause	Solutions
No output voltage, buzzer sounds continuously	Low input DC voltage	Recharge or replace the battery
	High input DC voltage	1. Do not use when the battery is charging. 2. Check the rated voltage of the battery and make sure that it is in the allowable range of the input voltage.
	Overload	Reduce the load power.
	Over temperature	1. Cut off the load and allow to cool for 10 to 30 minutes. Restart after it reaches to normal temperature. 2. The load power is too large. Reduce the total load power to the range of rated power. 3. Avoid blocking the vent and improve the ventilation condition. 4. Reduce the ambient temperature.
No output voltage	1. The switch is off. 2. The battery lead doesn't connect well	1.Turn on the power switch. 2.Check the joint and make sure it's well connected.
Incorrect output voltage	1.Measured using true RMS multimeter. 2.The battery power of RMS Multimeter is low. 3.The input voltage is too high or too low.	1. Use a true RMS multimeter to measure, such as the model FLUKE 177/179. 2.Try to maintain the input voltage in the range of rated power 3.Change the battery of the multimeter then test again.
Cannot drive the load	1. Load power is too large, or the actual power of the appliance exceeds nominal power. 2. The starting power is larger than rated power (such as motor)	Reduce a load power,or turn on the appliance first, then turn on the inverter. The inverter internal soft-start circuit to buffer start the appliances.
When using with TV or audio, There snowflake on the screen or noise of the audio	Disturbance	1.Separate the inverter and antenna. 2.Use screened antenna

If all of the above methods have been tried, the product still not work properly. The internal circuit of the product may be out of order. Please return the product to the supplier for maintenance.

WARRANTY

This product is designed using the most modern digital technology and under very strict quality control and testing guidelines.If,however, you feel this product is not performing as it should, please contact us: **support@giandel.com.au**

We will do our best to resolve your concerns. If the product needs repair or replacement, make sure to keep your receipt/invoice, as that will need to be sent back along with the package and prepaid to GIANDEL. You have a full 36 months warranty from date of purchase.

This warranty is valid worldwide with the exception that freight and duty charges incurred outside the contiguous 48 United States will be prepaid by customer.

Except as noted above, GIANDEL makes no warranty of any kind, express or implied, including without limitation the implied warranties of merchantability and fitness for a particular purpose. In no event shall GIANDEL be liable for indirect, special or consequential damages. This warranty only applies to GIANDEL branded products. All other name brand products are warranted by and according to their respective manufacturer. Please do not attempt to return non-GIANDEL branded products to us.

The following situations will void warranty:
1. The box is distorted, damaged or changed, and interior parts damaged because of an exterior hit or drop not reported at time of delivery.
2. Connect the DC power incorrectly reversing the polarity.
3. Dismantled or repaired the unit by an unauthorized person.
4. The unit was damaged by incorrect installation or operating method.

For additional products, please visit our web site: www.giandel.com.au

-Modified sine wave inverters from 100W to 5000W
-Pure sine wave inverters from 200w to 5000W

To find out where to buy any of our products, you may also e-mail:

support@giandel.com.au