

DC to AC

PVA Series

Pure Sine Wave Inverter

1KVA-6KVA

USER

MANUAL

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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 AC output to utility power AC distribution wiring.



WARNING! Heated surface.

- The inverter's housing may become uncomfortably warm, reaching 140 °F (60°C) under extended high power operation. Allow at least 2 inches (5 cm) 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 output terminal. The inverter will be damaged even if it is switched OFF.



CAUTION!

- Connect inverter only to 12V/24V48V DC nominal lead-acid batteries. Wrong DC input will not supply enough voltage or damage the inverter.



CAUTION!

- Any internal adjustment on the inverter is prohibit !

SAFETY FEATURES

Unpacking Your Power Inverter

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.

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 Tv, 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, install the inverter in a location that is...

- **Dry.** Do not expose to water drip or spray.
- **Cool.** Operate only in ambient temperatures between 32 °F (0 °C) and 104 °F (40 °C). Keep away from furnace heating vents or other heat production 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, 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.

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!

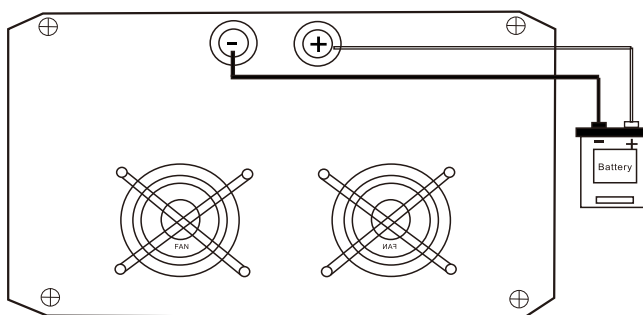
A reverse polarity connection (positive to negative) may damage the inverter. Damage caused by a reverse polarity connection is not covered under warranty.

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. See section 4 if the inverter does not operate properly after being connected.
4. When the inverter is not in use, unplug it from the 12V/24V/48V DC outlet to prevent slight discharge of the battery.

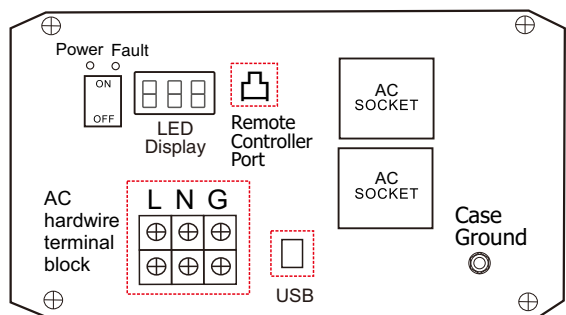
3. Using the inverter

Operating Instruction

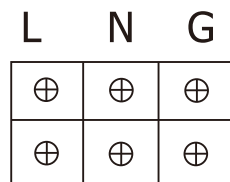
Input panel and connections



Output panel



AC hardware terminal block is for big power inverter (4KVA and above).
USB is for 1KVA/1.5KVA inverter (12v/24v).



L: Live
N: Neutral
G: Ground



Remote Control Transmitter Remote Control Receiver

Remote controller is optional for 2KVA and above inverter.

By directly connecting the inverter to a 12V/24V/48V DC battery with the DC cables, 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.
2. Remote controller is optional accessory for PVA series pure sine wave inverter. The receiver and transmitter of the remote controller are external. One receiver is corresponding to one transmitter. Only 2KVA or above power inverters are available for the remote function.
3. All inverters may be turned ON and OFF using the main power switch. If a remote controller 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 Power Switch ON to control the inverter using the remote controller. Pressing OFF button on the remote controller will turn inverter OFF, Pressing ON button 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.

The inverter is capable of continuously powering most 100V-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.)

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

- When the battery DC voltage is reduced below 11/22/44 Volts.

Solution:

- increase the battery capacity.
- reduce the load on inverter.

- When output AC voltage drops below acceptable levels(90V / 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 (See Figure 1)

- The AC outlets are provided on one end of the inverter. Any combination of 100V~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 10.3~11.3V / 20.6~22.6V / 41.2~45.2V DC, 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 9.7~10.7V / 19.4~21.4V / 38.8~42.8V DC. 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 of 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 battery, its capacity and the power level drawn by the particular AC load.

When using a vehicle as 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.

PROBLEM: Alarm is sounding.

Battery is defective.

Suggested Remedy

Check battery and replace if required.

Inverter has been connected with reverse DC input polarity.

Check connection to battery. Probable inverter damage has occurred. Have unit repaired (not covered by warranty).

Loose cable connections

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 180V AC too low.

Suggested Remedy

Inverter's 'pure sine wave' Output Requires 'true RMS' voltmeter, such as Fluke 87 series multimeter, for accurate measurement.

Battery voltage is too low.

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 aircirculation around unit. Locate unit to a cool 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.

Suggested Remedy

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

Battery is old or defective.

Replace battery.

Battery is not being properly charged.

Many simple chargers are unable to charge a battery fully. Replace charger with better model such as a TRUECHARGE smart charger.

Power dissipation in DC cables.

Use shorter/heavier DC cables.

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

Possible Cause

Suggested Remedy

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

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

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

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

Battery is discharged (alarm is sounding).

Recharge battery.

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

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.

Input voltage is greater than 15/30/60V.

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

5. Specifications

MODEL NO.	UNIV-1KPV	UNIV-1.5KPV	UNIV-2KPV	UNIV-3KPV	UNIV-4KPV	UNIV-6KPV
Output Power (Continuous VA)	1000	1500	2000	3000	4000	6000
Output Power (Peak VA)	2000	3000	4000	6000	8000	12000
Nominal Input Voltage (DC)	12V	24V / 48V	12V	24V / 48V	12V	24V / 48V
Nominal Output Voltage (AC)	110V / 230V, (regulation: 5%~10%)					
Frequency	50Hz / 60Hz					
Output Waveform	Pure Sine Wave (THD<3%)					
Low Battery Alarm (VDC)	10.8+/-0.5(12V); 21.6+/-1(24V); 43.2+/-2(48V)					
Low Battery Shutdown (VDC)	10.2+/-0.5(12V); 20.4+/-1(24V); 40.8+/-2(48V)					
Over Voltage Shutdown (VDC)	15.5+/-0.5(12V); 31.0+/-1(24V); 62.0+/-2(48V)					
Efficiency	85~90%					
Battery Polarity Reverse Protection	By Fuse					
Thermal Protection	65°C±5°C					
Overload Protection	Shutdown					
Output Short Circuit Protection	Shutdown					
With Cooling Fan	Auto-operation fan (temperature control)					
AC Output Outlet	U.S.A. Type: 2 AC Outlets European Type: 1 AC Outlet		U.S.A. Type: 4 AC Outlets European Type: 2 AC Outlets		U.S.A. Type: 4 AC Outlets European Type: 2 AC Outlets AC hardwire terminal block	
Remote Controller	/		Optional			
Product Dimension (LxWxH)(MM)	290X150X74	290X150X74	350X210X103	350X210X103	470X210X130	470X210X130
N.W. (KGS)	3	3	5.5	5.5	9	9
QTY / Carton (PCS)	4	4	4	4	1	1
Carton Size (MM)	450X410X250	450X410X250	590X510X400	590X510X400	640X310X250	640X310X250
Container 20FT (PCS)	2,254	2,254	864	864	524	524