HARDKORR

PURE SINE WAVE INVERTER
USER MANUAL

June 2020

HARDKORR

LONG LIFE HIGH POWER

PURE SINE WAVE INVERTER

HKPINV300 | HKPINV600 | HKPINV2000

Thank you for purchasing a HARDKORR product. Manufactured to a high standard, this product will, if used according to these instructions and maintained properly, give you years of trouble free performance!

PLEASE NOTE, THIS INVERTER SHOULD NOT BE USED IN CONNECTION WITH LIFE SUPPORT SYSTEMS AND OTHER PRECISE MEDICAL EQUIPMENT OR DEVICES!

BEFORE USING INVERTER, PLEASE READ THIS USER MANUAL!

BATTERY SAFETY

- Beware, lead-acid batteries generate explosive gases during normal battery operation.
- Wash with soap and water immediately if battery acid contacts skin or clothing.
- If acid enters eye, flush immediately with cool,clean running water for at least 15 minutes and seek immediate medical attention.

- Do not allow smoke or a spark/flame in the vicinity of the battery or engine.
- If the battery terminals are corroded or dirty, clean them before attaching the leads.

- To prevent the risk of sparking, short circuit and possible explosion DO NOT drop metal tools in the battery area, or allow them to touch the battery terminals.
- Before attaching to battery, remove personal metallic items such as rings, bracelets, necklaces and watches. A lead acid battery can produce a short-circuit current which is high enough to weld such items and cause severe burns.

BATTERY AND INVERTER SAFETY

- Do not expose inverter to rain, snow, spray, bilge or dust.
- Do not cover or obstruct ventilations.
- Make sure at least 10CM of clearance around inverter for air flow. Minimum air flow of 145CFM is required.
- Make sure existing wiring is in good electrical condition.
- DO NOT operate inverter with damaged or substandard wiring.
- DO NOT install in compartments containing batteries or flammable materials or in locations which require ignition protected equipment.
- DO NOT disassemble this inverter charger. Internal capacitors remain charged after all power is disconnected. Attempting to service this inverter by yourself may cause electrical shock or fire.
- The output side of inverter's AC wiring at no time is to be connected to public power or a generator. Beware the wiring connection.

GENERAL INFORMATION

HKPINV inverters are a pure sine wave inverter.
Pure sine wave inverters are best for use on medical equipment and sensitive electrical appliances.
Unlike the modified sine wave inverter, pure sine wave allows you to watch television without static, play games on consoles and run a fluroescent light, all of which may not operate properly on a modified sine wave inverters
Safety is paramount and in particular with inverters which is why HARDKORR electrically isolates the DC current from the 240VAC circuit.

APPLICATIONS

Power tools- circular saws, drills, grinders, sanders, buffers, weed and hedge trimmers, air compressor etc.
Office equipment- computers, printers, monitors, facsimile machines, scanners etc.
Household appliances- vacuum, fans, lights, TV, refrigerator, microwave, coffee machine, toaster, blender etc.
Industrial equipment- metal halide lamp, high pressure sodium lamp etc.

ELECTRICAL PERFORMNCE

- Inverter: Full bridge technology
- HKPINV series inverter surges 2x rated power to support the induction loads such like air compressor, residential refrigerator, blender or coffee maker.
- Peak efficiency of HKPINV series is 93.5%.

REMOTE CONTROL

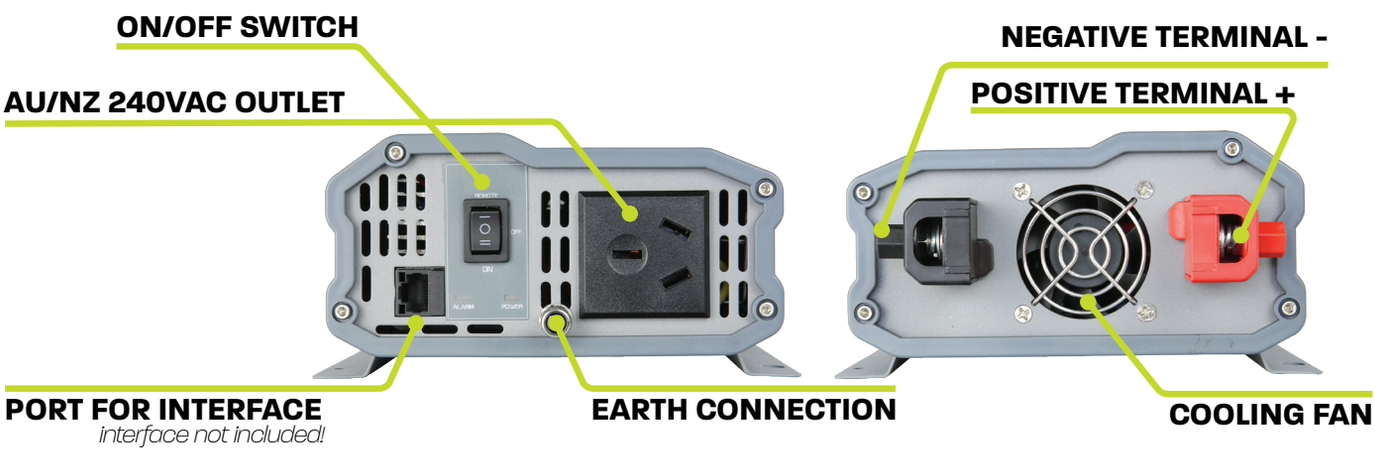
- The HKPINV300, HKPINV600 and HKPINV2000 can connect to an optional remote control (P/No. HKPINVRC) which will allow the inverter to be turned on / off remotely. Ideal for use in caravans, motor homes and boats.

PROTECTION

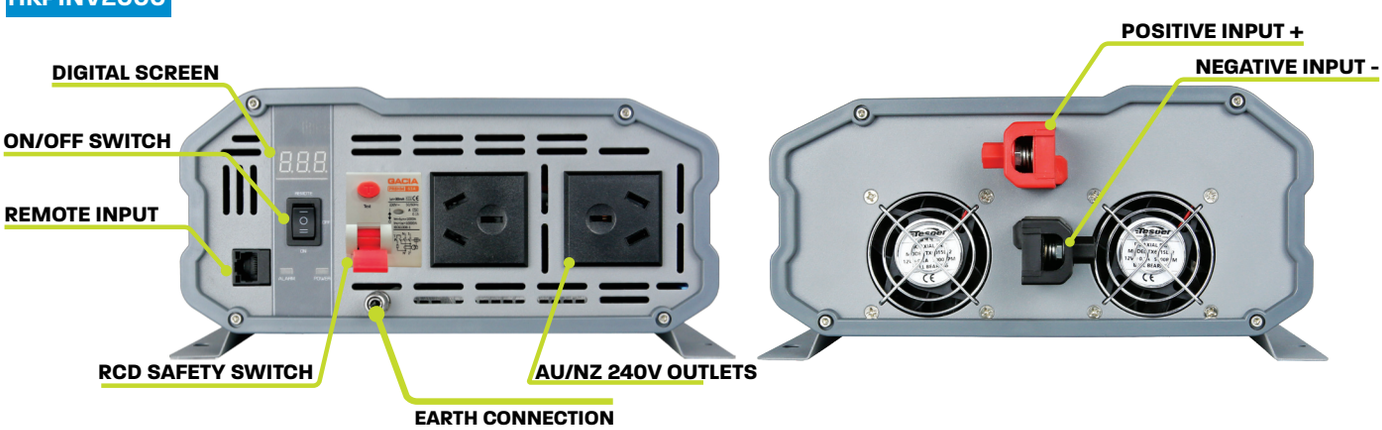
- Low input voltage
- High input voltage
- Low battery alarm
- Over temperature
- Overload protection

FEATURES

HKPINV300 | HKPINV600



HKPINV2000



GETTING STARTED

When a motorized appliance or a tool turns on, there is an initial surge of power to start. This surge of power is referred to as the "starting load" or "peak load." Once started, the tool or appliance requires less power to operate. This is referred to as the "continuous load" in terms of power requirements. You will need to determine how much power your tool or appliance requires to start up (starting load) and its continued running powerrequirements (continuous load).Power consumption is rated in watts, or it can be calculated from amperes (amps). This information is usually stamped or printed on most appliances and equipment. If this information is not indicated on the appliance or equipment, check the owner's manual.

Multiply: AC AMPS X 240 (AC voltage) = WATTS * This formula yields a close approximation of the continuous load of your appliance.
Multiply: WATTS X 1.5 = Starting Load * This formula yields a close approximation of the starting load of most appliances. **Exceptions are motorized appliances such as pumps, freezers and air conditioners.**
These appliances can have startup loads of up to three to eight times the rated watts.

DETERMINING THE DC POWER REQUIREMENT

Powering multiple appliances from the high-power HKPINV300 | HKPINV600 | HKPINV2000 inverter requires a 12V bank of batteries to calculate the approximate power in amps a 12V battery bank has to supply.

To know the current, or amps required for powering the continuous AC load, a shortcut method is to divide the continuous AC load wattage by 10.
For example, the continuous AC load is 1500 watts. The current (amps) is: 1500/10 or 150 amps at 12 VDC. Similarly for the 24 VDC and 48 VDC battery(batteries), divide the continuousAC load wattage by 24 or 48.

SIZING THE BATTERY BANK

To determine the minimum battery bank amperage-hour rating that you will need to operate appliances from the inverter, and any DC appliances powered by the battery bank, follow these steps:

1. List the maximum wattage that the inverter has to provide (as above).

2. Estimate the number of hours the appliances will be in use between battery recharges. This will differ depending on appliances. As an example, a typical home-use coffeemaker draws 500 watts during its brew time of 5 minutes; it maintains the temperature of the pot at about 100 watts. Typical use of a microwave oven is only for a few minutes. Some longer operating time appliances are lamps, TVs, computers and refrigerator / freezers.

3. Determine the total watt-hours of energy needed. Then multiply the average power consumption in watts by the number of hours of run time. For example: 1500 watts for 10 hours = 15,000 watt hours. Using the 1500 watts (or 150 Amps) for 10 hours example as above, then 150 amps is needed for 10 hours. This provides us with the basic amp-hours (AH) of battery that is required. Ten hours at 150 amps equals 1500 Amp Hours (AH). This answer is just a beginning because there are other conditions that determine actual run time.

These include:
- AC appliance load and time in use (basic Amp Hour)
- Cable gauge and length (cable losses)
- Charge level of the batteries (between use, chargers have to be able to fully charge the batteries)
- Temperature of the batteries (colder batteries provide fewer amps)
- Age and condition of the batteries (older batteries lose capacity/amp hours)
- Compliance with turning off unnecessary AC and DC loads.If there is any doubt about sizing the battery bank, it is safe to overestimate the amp hour requirements of the battery bank.

Note: The type of battery required to power your inverter is important. Operating the inverter will routinely discharge batteries at a high capacity and they will require frequent recharging. Batteries used to start engines are not designed to repeatedly charge and discharge. ***HARDKORR recommends using high capacity deepcycle lithium or marine rated batteries, we suggest the HARDKORR Lithium high discharge (HKBATL100P or HKBATL200P) batteries.***

CABLE GAUGES

When connecting the inverter to a battery bank use the thickest stranded insulated copper wire available, in the shortest length practical. Recommended cable gauges are as follows:

MODEL	RECOMMENDED GUAGE
HKPINV300:	10 AWG / 6mm2 (up to 1.8m / 40A inline ANL Fuse)
HKPINV600:	6 AWG / 16mm2 (up to 1.8m / 80A inline ANL Fuse)
HKPINV2000:	0 AWG / 53.5mm2 (up to 1.8m / 250A inline ANL Fuse)

WARNING

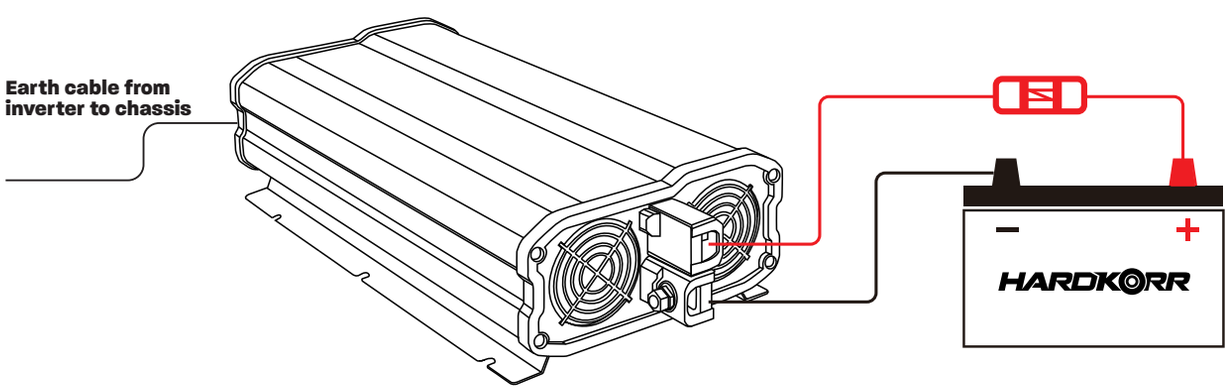
DANGER OF BATTERY EXPLOSION – INSTALL A FUSE
Battery banks can deliver very high levels of current that can vaporize metal, start fires and cause explosions. HARDKORR recommends installing a ANL fuse and fuse holder (supplied with your purchase) as close to the positive battery bank terminal as possible. This fuse protects the batteries from accidental DC cable shorts, which can cause batteries to explode.

MOUNTING INSTRUCTIONS

Your HARDKORR Inverter should not be mounted under the hood of a vehicle. If installing in a vehicle, choose a dry, cool, ventilated area closest to the battery as practical. Before drilling any mounting holes, make sure that-there are no wires, fuel lines, or tanks directly behind the surface to be drilled.
To mount the inverter:
1. Inverter must be OFF.
2. Position the inverter against the mounting surface and mark locations of the mounting screw openings.
3. Remove the inverter and drill four mounting holes.
4. Fasten the inverter to the mounting surface using corrosion-resistant fasteners sized M6 or larger.

CONNECTING INVERTER

1. Prepare all cable ends with cable lugs.
2. Install a circuit breaker or high current fuse in the positive line as close to the battery as possible.
3. Make sure the inverter is turned OFF.
4. Connect the cables to the DC input terminals on the rear of the inverter. The red terminal is positive (+) and the black terminal is negative (-).
4. Connect the positive cable to the inverter and battery positive terminals.
5. Connect the negative cable to the inverter and battery negative terminals.
6. Connect an insulated wired from the chassis-ground terminal at the front panel of the inverter to the vehicle's chassis or any other ground point.



NOTE: Sparking is normal for the first connection. Make sure you have good secure connections – But do not over-tighten.

OPERATION

1. Turn OFF the inverter.
2. Plug an appliance cord into the front panel of the inverter.
3. Turn ON the inverter.
4. Turn the appliance on.
5. Plug in additional appliances and turn them on.

LED LIGHT INDICATIONS

HARDKORR inverters are equipped with two status LED's and audible alarm. During normal operation, the green LED will illuminate solid green. In the event of a fault or error, the alarm will sound and a red LED will illuminate.

STATUS	LED INDICATION	ALARM
NORMAL	GREEN	NO
LOW BATT VOLTAGE	GREEN	YES
LOW BATT VOLTAGE SHUTDOWN	RED	YES
OVER TEMPSHUTDOWN	RED	YES
OUTPUT SHORT CIRCUIT	RED	YES
OVERLOAD SHUTDOWN	RED	YES
HIGH BATT VOLTAGE SHUTDOWN	RED	YES

RESTARTING AFTER AN AC OUTPUT SHUTDOWN

1. Press the unit's power switch to turn it off.
2. **Remove all AC loads or let the unit cool down for 15 minutes.**
3. Press the unit's power switch to turn it on.

OPERATION CONDITION	VOLTAGE RANGE	COMMENTS
NORMAL	11.0V- 14.0V	-
PEAK PERFORMANCE	13.0V- 14.0V	-
LOW VOLTAGE ALARM	10.5±0.3V	The audible low battery alarm sounds.
LOW VOLTAGE SHUTDOWN	10.0±0.3V	The unit shuts down to protect the battery from being over-discharged
HIGH VOLTAGE SHUTDOWN	≥15.5V	The unit shuts down to protect itself from excessive input voltage. Note: The inverter has over-voltage protection, but it can still be damaged if input voltage is over 16V
RESTART AFTER LOW VOLTAGE SHUTDOWN	12.0±0.3V	The unit will not restart unless the battery voltage is acceptable for running the load.

TROUBLE SHOOTING

Symptom	Possible cause	Solution suggested
Inverter will not turn on during initial power up	Batteries are not connected; loose battery--side connections or low battery voltage	Check batteries and cable connection. Check DC fuse and breaker; Charge Battery
NO AC output voltage and no indicator lights ON	Inverter has been manually transitioned to OFF mode	Press the switch to ON position; Switch to Remote position and turn on by controller
AC output cut, red LED light on and alarm buzz ON	Low battery voltage and low capacity level	Check battery condition and recharge if possible
	Inverter is over temperature or overload	Turn off inverter and allow inverter cool; Reduce the load on inverter to rated power
	Too high battery voltage	Check battery voltage and ensure inverter connect to the 12V battery(batteries).
Appliance power is less than rated power but inverter red LED light on and alarm buzz on	Low battery capacity cause short DC input power although the battery voltage is higher than rated voltage.	Use amperemeter check the DC input amp; Recharge the battery. Or contact the dealer for assistance.
Motored appliances cannot fully run	Motored appliances required big start power that is over inverter surge power	Choose the higher power inverter

FREQUENTLY ASKED QUESTIONS

Q. Why does the inverter turn itself off?
A. If the inverter's audible alarm sounds and a fault LED illuminates, this indicates that there is a fault or error, and the inverter may turn off. Most commonly this would be caused by an appliance that is drawing too much power (overloading), low battery voltage or voltage drop due to insufficient size cables or poor connections.

Q. The Inverter will not run my appliance even though the appliance draws less power than the size of the inverter?
A. The appliance draws more start up power than the inverter is able to produce.

Q. Why does it damage the inverter if the battery leads are reverse-connected?
A. Your inverter uses sophisticated electronics to convert DC battery power to AC mains power. If you accidentally connect the inverter to the battery incorrectly (reverse polarity) a large current will be drawn by the inverter which will blow the protection fuse. As this occurs some of the highcurrent could damage sensitive electronic components. Because of this risk it is important to always double-check the battery polarity before making any connections.

Q. How do I check or change the fuses?
A. HARDKORR inverters have internal fuses and should only be checked or replaced by an approved electrical appliance repairer by HARDKORR. Any tampring of the warranty seal on the inverter will void warranty!

Q. Can I run laptop computers and other sensitive electrical appliances?
A. Yes. HARDKORR's pure sine wave output is suitable for sensitive electrical appliances. They allow you to watch television without static, operate computers and gaming consoles and run fluorescent lights.

SPECIFICATIONS

	HKPINV300	HKPINV600	HKPINV2000
Input voltage	12VDC	12VDC	12VDC
Input Current (MAX DC Amps)	30A	60A	200A
No Load Current Draw	500mA	500mA	900mA
Remote Standby Current Draw	1mA	1mA	1mA
Output Voltage	240vac		
Continuous Power (Watts)	300W	600W	2000W
Peak Power (Watts)	600W	1200W	4000W
Input DC range (Volt)	10.5 ~ 15 VDC		
Output Waveform	Pure Sine Wave (THD ← 3%)		
Efficiency	89%	92%	94%
Low Battery Voltage Alarm/ Shutdown	Alarm 10.5 VDC; Shutdown 10.0 VDC (±0.3 VDC)		
Cooling Fan	Automatic Temperature Controlled		
Thermal Shutdown	65℃ (±5℃)		
Replacement Fuse	Blade Fuses		
Fuse Size	50A (2x25A)	80A (4x20A)	240A (4x60A)
Fuse Location	Internal		
Size (mm)	195x166x83	225x166x83	242x463x118
Weight (kg)	1	1.5	4.3

WARRANTY

WHAT DOES THIS WARRANTY COVER?
This Limited Warranty is provided by HARDKORR and covers defects in workmanship and materials in your HKPINV300 / HKPINV600 / HKPINV2000. This warranty period lasts for 24 months from the date of purchase at the point of sale to you. Proof of purchase is required to make warranty claims.

WHAT WILL HARDKORR DO?
HARDKORR will, at its option, repair or replace the defective product free of charge, provided that you notify HARDKORR of the product defect within the Warranty Period, and provided that HARDKORR, through inspection, establishes the existence of such a defect and that it is covered by this Limited Warranty. HARDKORR will, at its option, use new and or reconditioned parts in performing warranty repair and building replacement products. HARDKORR reserves the right to use parts or products of original or improved design in the repair or replacement. If HARDKORR repairs or replaces a product, its warranty continues for the remaining portion of the original Warranty Period or 90 days from the date of the return shipment to the customer, whichever is greater.

HOW DO YOU GET SERVICE?
If your product requires troubleshooting or warranty service, contact your dealer. If you are unable to contact your dealer, or the dealer is unable to provide service, contact HARDKORR directly at:
PH: 07 3801 8332
WEB: WWW.HARDKORR.COM
EMAIL: INFO@HARDKORR.COM

WHAT DOES THIS WARRANTY NOT COVER?
This Limited Warranty does not cover normal wear and tear of the product or costs related to the removal, installation, or troubleshooting of the customer's electrical systems. This warranty does not apply to, and HARDKORR will not be responsible for, any defect in or damage to:

1. The product if it has been misused, neglected, improperly installed, physically damaged or altered, either internally or externally, or damaged from improper use or use in an unsuitable environment.

2. The product if it has been subjected to fire, water, generalized corrosion, biological infestations, or input voltage that creates operating conditions beyond the maximum or minimum limits listed in the HARDKORR product specifications including high input voltage from generators and lightning strikes.

3. Appliances used with the HKPINV200 / HKPINV300 / HKPINV2000 and incurs damage.

4. The product if repairs have been done to it other than by HARDKORR or its authorized service centers.

5. The product if it is used as a component part of a product expressly warranted by another manufacturer.

6. The product if its original identification (trade-mark, serial number) markings have been defaced, altered, or removedfrom the inverter.

RETURN AUTHORIZATION POLICY

Before returning a product directly to HARDKORR you must obtain a Return Authorization number. Products must also be shipped prepaid. Product shipments will be refused and returned at your expense if they are unauthorized, returned without a Return Authorization number clearly marked on the outside of the shipping box, or if they are shipped to the wrong location.

When you contact HARDKORR to obtain service, please have your instruction manual ready for reference and be prepared to supply:
- The serial number of your product
- Information about the installation and use of the unit
- Information about the failure and / or reason for the return
- A copy of your dated proof of purchase.

RETURN PROCEDURE

1. Package the inverter safely, preferably using the original box and packing materials. Please ensure that your product is shipped fully insured in the original packaging or equivalent. This warranty will not apply where the product is damaged due to improper packaging.

2. Include the following:
   - The Return Authorization number supplied by HARDKORR clearly marked on the outside of the box.
   - A return address where the unit can be shipped. Post Office Boxes may not be acceptable.
   - A contact phone number where you can be reached during work hours.
   - A brief description of the problem.

3. Ship the unit prepaid to the address provided by your HARDKORR customer service representative. If you are returning a product, in addition to the above, you MUST include return freight funds and are fully responsible for all documents, duties, tariffs, and deposits.