



## **IC Series** *Low Frequency Inverter Charger*

# PROFESSIONAL GRADE POWER INVERTER



**THIC-1000-12**

**THIC-2000-12**

**THIC-3000-12**

SAVE THIS INSTRUCTION MANUAL FOR FUTURE REFERENCE.

Instruction Manual  
and Warranty Information

## **READ ALL INSTRUCTIONS**

**WARNING:** Read all instructions before operating your inverter. Failure to follow all instructions may result in electric shock, fire and/or serious injury.

- **AVOID DANGEROUS ENVIRONMENTS.** Don't use inverters in damp or wet locations.
- **KEEP CHILDREN AWAY.** Keep away from children. This is not a toy!
- **STORE INDOORS.** When not in use, inverters should be stored indoors in dry, and high or locked-up places – out of reach of children.
- **DON'T ABUSE CORD.** Never carry inverter by cord or yank the cord to disconnect from receptacle. Keep cord from heat, oil, and sharp edges.
- **DISCONNECT INVERTER.** Disconnect the inverter from the power supply when not in use.
- **PROPER COOLING** is essential when operating the inverter. Do not place it near a vehicle's heat vent or in direct sunlight.
- **USE OF ACCESSORIES AND ATTACHMENTS.** The use of any accessory or attachment not recommended by manufacturer for use with this inverter could be hazardous.
- **STAY ALERT.** Use common sense. Do not operate inverter when you are tired.
- **CHECK FOR DAMAGED PARTS.** Any part that is damaged should be properly repaired or replaced by an authorized service center unless otherwise indicated elsewhere in this instruction manual before further use. Do not use inverter if switch does not turn it on and off.
- **DO NOT OPERATE** inverter near flammable liquids or in gaseous or explosive atmospheres. Motors in tools or appliances used with the inverter may spark, and the sparks might ignite fumes.
- **CAUTION:** Equipment damage, Installation should ensure that the inverter's AC output is, at no time connected to its AC input
- The output side of the inverter's AC wiring should at no time be connected to public power or a generator. This condition is far worse than a short circuit. If the unit survives this condition, it will shut down until corrections are made.
- Installation should ensure that the inverter's AC output is, at no time, connected to its AC input.

### **Precautions When Working with Batteries**

- 1-2-1. If battery acid contacts skin or clothing immediately wash with soap and water. If acid enters eyes immediately rinse eyes with running cold water and seek immediate medical attention.
- 1-2-2. Never smoke or allow sparks or flames in the vicinity of a battery.
- 1-2-3. Do not drop a metal tool on the battery. The resulting spark or short-circuit on the battery will cause an explosion.
- 1-2-4. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a battery. A battery produces a short-circuit current high enough to weld any metal objects and will cause a severe burn.
- 1-2-5. To reduce the risk of injury, charge only deep-cycle lead acid, lead antimony, lead calcium gel cell, absorbed mat, or NiCad/NiFe type rechargeable batteries. Other types of batteries may swell or burst causing personal injury and damage.

## **SAFETY GUIDELINES AND DEFINITIONS**

**DANGER:** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

**WARNING:** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

**CAUTION:** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

**CAUTION:** Used without the safety alert symbol indicates potentially hazardous situation which, if not avoided, may result in property damage.

**RISK OF UNSAFE OPERATION.** When using tools or equipment, basic safety precautions should always be followed to reduce the risk of personal injury. Improper operation, maintenance or modification of tools or equipment could result in serious injury and property damage. There are certain applications for which tools and equipment are designed. Manufacturer strongly recommends that this product NOT be modified and/or used for any application other than for which it was designed.

# IMPORTANT SAFETY INSTRUCTIONS

**⚠ WARNING:** This product or its power cord may contain lead, a chemical known to the State of California to cause cancer and birth defect or other reproductive harm. Wash hands after handling.

**⚠ WARNING: TO REDUCE THE RISK OF ELECTRIC SHOCK:**

- DO NOT connect to AC distribution wiring.
- DO NOT make any electrical connections or disconnections in areas designated as IGNITION PROTECTED. This inverter is NOT approved for ignition protected areas.
- NEVER immerse the inverter in water or any other liquid, or use when wet.
- DO NOT insert foreign objects into the inverter's outlets.

**⚠ WARNING: TO REDUCE THE RISK OF FIRE:**

- Do not operate near flammable materials, fumes or gases.
- DO NOT expose to extreme heat or flames.

**⚠ CAUTION: TO REDUCE THE RISK OF INJURY OR PROPERTY DAMAGE:**

- Remove appliance plug from outlet before working on the appliance.
- DO NOT attempt to connect or set up the inverter or its components while operating your vehicle. Not paying attention to the road may result in a serious accident.
- ALWAYS use the inverter where there is adequate ventilation. Do not block ventilation slots.
- ALWAYS turn the inverter off and disconnect it from the power source when not in use.
- The inverter MUST be connected only to batteries with a nominal output voltage of 12 volts. The unit will not operate from a 6 volt battery and will sustain permanent damage if connected to a 24 volt battery.
- When using this unit in a vehicle, check the vehicle owner's manual for maximum power rating and recommended output. DO NOT install in engine compartment — install in a well ventilated area.
- DO NOT use with positive ground electrical systems.\* Reverse polarity connection will result in a blown fuse and may cause permanent damage to the inverter and will void warranty.  
\*The majority of modern automobiles, RVs and trucks are negative ground.
- Keep in mind that this inverter may not operate high wattage appliances or equipment that produce heat, such as hair dryers, microwave ovens and toasters.
- Do not open the inverter — there are no user-serviceable parts inside. Opening the inverter will void manufacturer's warranty.
- Do not use this inverter with medical devices. It is not tested for medical applications.
- Install and operate unit only as described in this Instruction Manual.
- Check inverter periodically for wear and tear. Return to manufacturer for replacement of worn or defective parts immediately.

Read And Understand This Instruction Manual Before Using This Inverter.

# SAVE THESE INSTRUCTIONS

**⚠ WARNING: TO REDUCE THE RISK OF INJURY: FOLLOW THESE INSTRUCTIONS AND THOSE PUBLISHED BY BATTERY MANUFACTURER AND THE MANUFACTURER OF ANY EQUIPMENT YOU INTEND TO USE WITH THIS UNIT. REVIEW CAUTIONARY MARKINGS ON THESE PRODUCTS AND ON ENGINE.**

# TABLE OF CONTENTS

Introduction	4
Features	4
Functions	5
How These inverters work	5
Power Inverter Output Waveform	6
Appliance Power Consumption	7
Rechargeable Devices	7
Power Source and Protective Features	7
Power Source Requirements	7
Battery Configuration	8
Determining Battery Size	8
Protective Features	7
Installation	8
Operating Environment	8
Marine Applications	8
Quick Operational Test or Emergency Use	8
Permanent Installation (Cables and Fuse Not Supplied)	9
Important Cable Information	9
Operating Instructions	11
Reading the DC Input Voltage and Output Power Indicators (back of unit)	11
Notes on Using the Remote Control (sold separately)	11
Troubleshooting Guide	12
Common Audio/Visual Problems	12
Error Protection and Troubleshooting Guide	12
Care and Maintenance	13
Storage	13
Fuse Replacement	13
Preventive Maintenance	13
Accessories	13
Service Information	13
Full One - Year Home Use Warranty	13
Warranty Activation	13
Specifications	14
Checklist	16
Charge Stage Transition Definitions	17
Remote Control	18
Battery Type Selector	19
Transfer Switch	20
LED Indicators	21
Hard Wiring	22

## INTRODUCTION

Thank you for purchasing this THOR MANUFACTURING IC series Inverter Charger. Please read this Instruction Manual carefully before use to ensure optimum performance and to avoid damage to this product.

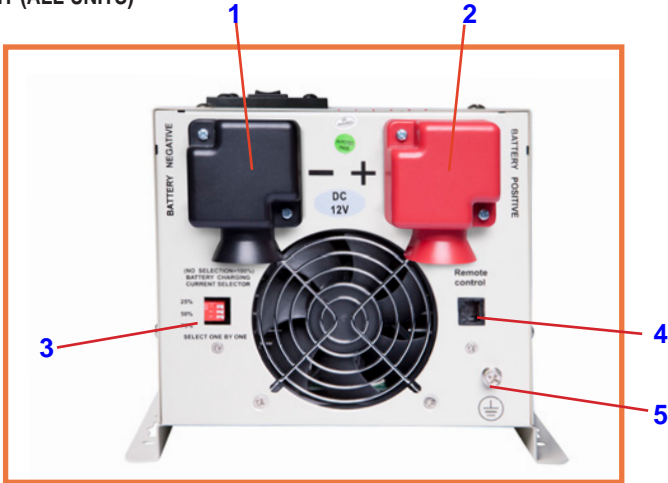
## FEATURES

The unit's display, indicates power and proper operation of the inverter charger. This also indicates a fault, if the inverter charger happens to shut down from over-load or over-temperature condition, or abnormal input voltages. The ON/ OFF Switch turns the inverter charger ON and OFF. The switch can also be used to force reset of inverter chargers circuits by switching it OFF, then back ON again. All models also feature a port to attach a remote control (sold separately).

120 volt AC power is supplied through the inverter chargers Hardwire AC Input/Output Terminals hard wire block.

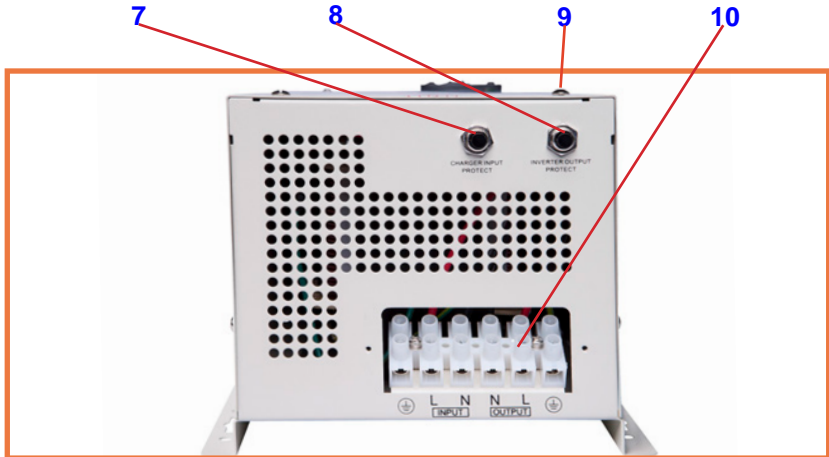
## Controls and Functions

### BACK OF UNIT (ALL UNITS)



- |                                      |                |
|--------------------------------------|----------------|
| 1. - DC Terminal                     | 4. Remote Port |
| 2. + DC Terminal                     | 5. Ground Port |
| 3. Battery Charging Current Selector |                |

### FRONT OF UNIT (ALL UNITS)



- |                            |                              |
|----------------------------|------------------------------|
| 7. Charger Input Breaker   | 9. Inverters On / Off Switch |
| 8. Inverter Output Breaker | 10. AC Hard Wire Block       |

## HOW THESE INVERTERS WORK

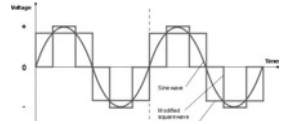
Your inverter converts low voltage DC (direct current) electricity from a battery to 115 volt AC (alternating current) household power in two stages. The first stage is a DC-to-DC conversion process that raises the low voltage DC at the inverter input to 145 volts DC. The second stage converts the high voltage DC into 115 volts, 60 Hz AC.

## Power Inverter Output Waveform

The AC output waveform of your inverter is known as a pure sine wave. It is a stepped waveform that has characteristics similar to the sine wave shape of utility power. This type of waveform is suitable for most AC loads, including linear and switching power supplies used in electronic equipment, transformers and small motors.

The pure sine wave produced by this inverter has an RMS (root mean square) voltage of 115 volts. Most AC voltmeters (both digital and analog) are sensitive to the average value of the waveform rather than the RMS value. They are calibrated for RMS voltage under the assumption that the waveform measured will be a pure sine wave.

These meters will not correctly read the RMS voltage of a pure sine wave. Non-TRUE RMS meters will read about 20 to 30 volts low when measuring the output of this inverter. For accurate measurement of the output voltage of this unit, use a TRUE RMS reading voltmeter such as a Fluke 87, Fluke 8080A, Beckman 4410 or Triplet 4200. 115 VOLT AC OUTPUT



## APPLIANCE POWER CONSUMPTION

Most electrical tools, appliances and electronic equipment have labels that show the unit's power consumption in amps, watts or both. To avoid inverter shutdown and possible damage to the inverter or equipment, do not exceed the inverter's wattage rating. To obtain a rough estimate of the current (in amperes) the power source must deliver where the power consumption of the tool or device is given in watts AC, simply divide the power consumption of the load by 10. For example, if a load is rated at 200 watts AC, the power source must be able to deliver: 200 divided by 10 = 20 amperes.

Your inverter will operate most AC loads within its power rating. Some induction motors used in refrigerators, freezers, pumps and other motor-operated equipment, require very high surge currents to start them. Your inverter may not be able to start some of these motors even though their rated current draw is within specifications for this power inverter.

If a motor refuses to start, observe the battery voltage using a DC voltmeter while trying to start the motor. If the battery voltmeter drops below 11 volts while the inverter is attempting to start the motor, this may be why the motor won't start. Make sure the battery connections are tight and the power source battery (or batteries) is (are) fully-charged. If the connections are good and the power source is charged, but the voltage still drops below 11 volts, you may need to use a larger power source battery (or battery combination).

Your inverter has built-in overload protection so that if you do exceed the inverter's output capacity continuously, the unit will automatically shut down. Once the excess load is removed, the inverter can be restarted and resume normal operation.

**Note:** To restart the inverter, turn it off, and then on again. The ON/OFF Switch is located on the inverter's Front Panel (refer to the "Control and Functions" section of this Instruction Manual).

The inverter powers resistive loads the easiest; however, larger resistive loads, such as electric stoves or heaters, could draw more wattage than the inverter can deliver on a continuous basis.

### CAUTIONS

Ensure that total continuous power consumption of all tools and appliances to be used simultaneously with your inverter does not exceed the inverter's continuous wattage rating. Also ensure that start-up wattage for inductive loads does not exceed peak watts for more than a second.

Appliances such as microwave ovens will normally draw more than their rated current and could possibly overload the inverter when operated simultaneously with other appliances. For example: A 600 watt microwave oven draws approximately 940 watts.

## Rechargeable Devices

### CAUTIONS

- Some rechargeable devices are designed to be charged by plugging them directly into an AC receptacle. These devices may damage the inverter or the charging circuit.
- When using a rechargeable device with your inverter, monitor its temperature for the initial ten minutes of use to determine if it produces excessive heat. If excessive heat is produced, the device should not be used with your inverter.
- This problem does not occur with most battery-operated appliances and tools. Most of these appliances use a separate charger or transformer that is plugged into an AC receptacle.
- Your inverter is capable of running most chargers and transformers.

# POWER SOURCE AND PROTECTIVE FEATURES

## Power Source Requirements

Your inverter will operate from input voltages between 10-16 Volts DC. If the voltage drops below 10 volts, an audible low battery warning alarm will sound. If the input voltage drops below 10 volts DC, the inverter will shut down. This feature protects the battery from being completely discharged.

The inverter will also shut down if the input voltage exceeds 16 volts. This protects the inverter against excessive input voltage. Although the inverter has built-in protection against over voltage, it may still be damaged if the input voltage exceeds 16 volts.

Your inverter is engineered to be connected directly to standard electrical and electronic equipment in the manner described in the "Installation" section of this Instruction Manual. Do not connect the inverter to household or RV AC distribution wiring. Do not connect the inverter to any AC load circuit in which the neutral conductor is connected to ground (earth) or to the negative of the DC (battery) power source.

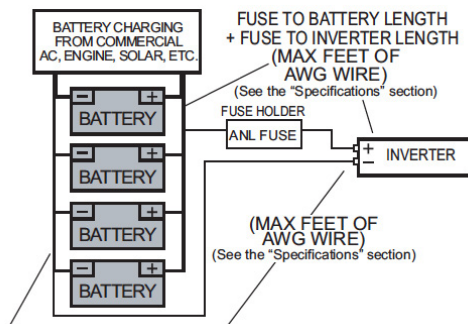
The inverter will operate most AC loads within its power rating. Some induction motors used in refrigerators, freezers, pumps and other motor-operated equipment, require very high surge currents to start them. The inverter may not be able to start some of these motors even though their rated current draw is within specifications for this power inverter. If a motor refuses to start, observe the battery voltage using a DC voltmeter while trying to start the motor. If the battery voltmeter drops below 11 volts while the inverter is attempting to start the motor, this may be why the motor won't start. Make sure the battery connections are tight and the battery (or batteries) is (are) fully-charged. If the connections are good and the battery is charged, but the voltage still drops below 11 volts, you may need to use a larger battery (or battery combination).

Inductive loads, such as TVs and stereos, require more current to operate than resistive loads of the same wattage rating. Induction motors, as well as some TVs, may require two to six times their rated wattage to start up. Because these inverters have a peak watt power rating, many such appliances and tools may be safely operated. The equipment that needs the highest starting wattage are pumps and compressors that start under load. This equipment can be safely tested. If an overload is detected, the inverter will simply shut down until the overload situation is corrected.

## CAUTIONS

- Exceeding recommended voltage limits will void manufacturer's warranty.
- NEVER try to use your inverter with any 12 volt DC power source that uses a positive ground. (Most vehicles and boats use negative ground systems.)
- The Power Inverter must be connected only to batteries with a nominal output voltage of 12 volts. The unit will not operate from a 6 volt battery and will sustain permanent damage if connected to a 24 volt battery.
- Reverse polarity connection will result in a blown fuse and may cause permanent damage to the inverter.

## Battery Configuration



**Note:** For heavy-duty use, manufacturer recommends an ANL fuse be added as close as possible to the power source (battery) positive terminal. The fuse amperage must be appropriate to allow simultaneous operation of all the AC appliances to be powered, with delay characteristics that allow for the momentary high start-up current requirements of inductive loads. Use the recommended fuse block (fuse holder) and fuse, or an electrical equivalent. See the "Specifications" section of this Instruction Manual to determine the proper fuse for your inverter. For full rated and motor start-up surge output, ensure that the installation is configured to handle the full load.

---

## Determining Battery Size

---

To determine the minimum battery size you will need to operate appliances from your inverter, follow these steps:

1. Determine the wattage of each appliance and/or tool you will need to simultaneously operate from the inverter. To do this, read the labels on the equipment to be operated.
2. Estimate the number of hours the equipment will be in use between battery recharges.
3. Determine the total watt-hours of energy use, the total running time and the average power consumption.

Keep in mind that some appliances are not drawing the same power continuously. For example, a typical home-use coffee maker draws 500 watts during brew time (approx. 5 minutes) but maintains the pot temperature at only about 100 watts. Typical use of a microwave is only for a few minutes, sometimes at low power.

---

## Protective Features

---

The inverter has electronic circuit protection against overload and short circuit conditions; and monitors for the following potentially hazardous conditions:

**Low Battery Voltage** — This condition is not harmful to the inverter, but could damage the power source. An alarm will sound when input voltage drops below 10.5 volts, and the inverter will automatically shut down when input voltage drops below 10.0 volts. This indicates that the DC (battery) power source needs to be charged, or there is an excessive voltage drop between the battery power source and the inverter. When the condition is corrected, the inverter will automatically restart.

**Over Voltage Protection** — The inverter will automatically shutdown when input voltage exceeds 16 volts DC.

**Overload Protection** — The unit will automatically shut down when the continuous draw exceeds the inverter's wattage rating. Reduce the load and manually restart.

**Over Temperature Protection** — If the temperature inside the inverter reaches 150°F, the unit will automatically shut down. Allow the inverter to cool for at least 15 minutes before restarting after a heat-related shutdown. Unplug the inverter from the power source and disconnect all appliances or tools from the inverter's outlets while cooling. If the inverter's LED display indicators display a fault follow the steps in the "Troubleshooting" section of this Instruction Manual. The Fault LED will light if there is an excessive voltage drop between the (battery) power source and the inverter.

**Note:** Reverse polarity or short circuit condition may cause external or internal fuses to open and may cause irreversible damage to the Power Inverter. Take extra care to ensure a proper polarity hook-up.

### CAUTION

- If turning the ON/OFF Switch off, then on again does not reset the inverter, DO NOT ATTEMPT TO OPEN THE INVERTER. Opening the inverter for any reason will void the warranty. The unit must be returned to manufacturer for testing and repair by professional factory technicians.

---

# INSTALLATION

Your inverter will provide you with continuous electrical power when powered by a reliable 12 volt DC source, such as a vehicle battery or a multiple battery configuration. This manual does not describe all of the possible configurations.

---

## Operating Environment

---

For best operating results, your inverter should be placed on a flat surface, such as the ground, car floor or seat or other solid surface to help diffuse the heat that is generated. Position the inverter as close to the DC power source as possible.

The inverter should only be operated in locations that meet the following criteria:

**DRY** – Do not allow water and/or other liquids to come into contact with the inverter.

**COOL** – Ambient air temperature should be between 30°F (-1°C) non-condensing and 105°F (40°C). Do not place the inverter on or near a heating vent or any piece of equipment that is generating heat above room temperature. Keep the inverter out of direct sunlight.

**VENTILATED** – Allow at least three inches of clearance from other objects to ensure free air circulation around the inverter. Never place items on or over the inverter during operation.

**SAFE** – Do not locate inverters in an area, room or compartment where explosives or flammable fumes might be present, such as engine rooms, engine compartments and boats or small, unvented battery compartments.

---

## Marine Applications

---

In all marine applications, DO NOT install the inverter below or near the waterline; and keep the inverter away from moisture and water.

---



Use ONLY non-corrosive marine fasteners and fittings for installation. Only connect the inverter's DC input to existing wiring (that has been approved for marine use) at the appropriate gauge, cable and length. The cable, fuse holder and fuse (not supplied) can be purchased at an electrical supply company. Call the manufacturer for additional installation information.

---

## Quick Operational Test or Emergency Use

---

You will need:

- A heavy-duty jumper cable set of the specified AWG wire rating (refer to the "Specifications" section of this Instruction Manual)
- A fully-charged automobile battery
- A common slip joint plier for loosening and tightening terminal nuts

### PROCEDURE

1. Unscrew nuts in input terminal block.
2. Identify the positive and negative terminals on the 12 volt DC battery (or other 12 volt DC power source) and identify the positive and negative terminals on the inverter.
3. Using a set of heavy-duty jumper cables, attach the red cable to the inverter's positive (+) terminal and the black cable to the inverter's negative (-) terminal.
4. Connect the clamps on the other ends of the jumper cables to the corresponding positive (+) and negative (-) terminals on the 12 volt DC vehicle battery (or other 12 volt DC power source). There may be some minor sparking.
5. Turn the inverter ON/OFF Switch on.
6. Plug in a lamp with a 100 watt light bulb and switch the lamp on. If the lamp works normally, the inverter is functioning properly and you can proceed to a permanent installation or continue to use the inverter with low wattage appliances. If the lamp does not light or does not work correctly:
  - A. Check all connections and tighten any that may be loose.
  - B. Ensure that the source battery has adequate charge.
  - C. If steps A and B do not correct the problem, refer to the "Service Information" section of this Instruction Manual for assistance.

---

## Permanent Installation (Cables and Fuse Not Supplied)

---

For permanent installation to heavy-duty battery power you will need:

- Two cables (as indicated in the "Specifications" section of this Instruction Manual)
- Terminals to fit cable ends and stud terminals to inverter
- Hardware and battery connector to connect cables to the battery bank
- A single length of AWG cable multi-stranded, flexible, insulated cable (as indicated in the "Specifications" section of this Instruction Manual) for chassis ground connection when using inverter in a household application.
- A holder and fuse (see the "Specifications" section of this Instruction Manual)
- Mounting screws, bolts and nuts for mounting the inverter and fuse holder
- A drill for mounting the inverter and fuse holder
- Wire stripper/cutting tool

### PRELIMINARY STEPS

The inverter has four slots in its mounting bracket that allow the unit to be fastened against a bulkhead, floor, wall or other flat surface. Ideally, the mounting surface should be cool to the touch. It is more efficient to use longer AC wiring than DC wiring, so install the inverter as close as possible to the 12 volt DC power source.

The inverter should be operated in horizontal position; if it is to be mounted on a wall, mount it horizontally so that indicators, switches, outlets and terminal blocks on the front panel are visible and accessible.

1. If inverter is to be installed in a vehicle, manufacturer recommends that it be shock mounted to either the floor (in a clear, safe area) or on a secure flat surface.
2. Locate a convenient place to mount the inverter and fuse holder.
3. Perform a test routing of the proposed cable length, but don't do any cutting at this time (refer to the diagram in the "Battery Configuration" section of this Instruction Manual).
4. Using an appropriate AWG cable (refer to the "Specifications" section of this Instruction Manual), reposition the inverter and fuse holder if necessary.
5. After you have performed the above preliminary installation steps, proceed with the actual inverter installation. Contact the manufacturer for any further installation information or questions.

## PERMANENT INSTALLATION PROCEDURE

The cables between the power source and inverter should be set up as illustrated in the diagram in the "Battery Configuration" section of this Instruction Manual. Unscrew terminal nuts before beginning permanent installation. Proceed with DC cable and fuse installation as follows:

1. Ensure the inverter's ON/OFF Power Switch is in the off position.
2. Using tools and hardware, mount the inverter to a flat, stable surface.
3. Ensure that mounting hardware does not touch any fuse holder or fuse contacts. Select an appropriate fuse (refer to the "Specifications" section of this Instruction Manual) and ensure that the fuse is removed from its holder.
4. Select appropriate cable (refer to the "Specifications" section of this Instruction Manual). Measure the cable twice before cutting.
5. Cut one cable length to connect the negative (-) battery terminal to the inverter's negative terminal, leaving a little slack in the cable.
6. Cut another cable to connect the positive (+) battery terminal to one side of fuse holder, leaving a little slack.
7. Cut the final cable to connect the other side of fuse holder to the inverter's positive (+) terminal.
8. Strip the end insulation of all three cables to 1-inch (2.45 cm).
9. Connect one end of the negative (-) cable to a ring terminal\* going to the battery(ies).
10. Connect the short end of the positive (+) cable to a ring terminal\* going to the battery(ies).
11. Crimp or clamp ring terminals of the negative (-) and positive (+) cables (going to the battery), but do not connect to the battery yet.
12. Connect the stripped (longer) end of the positive (+) cable to the red stud marked (+) on the inverter and tighten the retaining nut.
13. Connect the stripped end of the negative (-) cable to the black stud marked (-) on the inverter and tighten the retaining nut.
14. Connect the other (long) end of the (+) positive cable to one terminal of the heavy-duty fuse holder.
15. Connect the other conductor of the heavy-duty fuse holder to the (short) positive (+) battery terminal.
16. Connect the other end of the (-) negative cable with the ring terminal to the negative (-) battery terminal.
17. Connect an appropriate insulated wire (refer to the "Specifications" section of this Instruction Manual) between the chassis grounding screw on the inverter's case and a solid electrical ground to minimize possible electrical noise in TV and radio reception. *Do not connect this wire to the negative DC input terminal.*
18. Ensure that all electrical connections have been tightened.
19. Insert the fuse into the fuse holder. THERE MAY BE SOME SPARKING.
20. Ensure the 12 volt DC power source has an adequate charge.
21. Turn the inverter on and apply a test load to the 120 volt AC outlets.

\* Ring terminals are not included and must be supplied by user.

If, after following all of the above steps, the inverter does not perform properly, the source voltage may be too low or the cables may be too long (or the gauge too light). Having checked and corrected these conditions, if necessary, refer to the "Service Information" section of this Instruction Manual for assistance if problems persist.

### CAUTION

- Loose connectors may cause overheated wires and melted insulation.
- Check to make sure you have not reversed the polarity. Damage due to reversed polarity is not covered by manufacturer's warranty.

---

## IMPORTANT CABLE INFORMATION:

---

Substantial power loss and reduced battery operating time results from inverters installed with cables that are not able to supply full power. Symptoms of low battery power can result from cables that are either excessively long or an insufficient gauge. Marine installations are also subjected to vibration and stresses that exceed those of other mobile installations. Therefore, the installer/operator should be especially aware of the requirements to maintain secure, tight, water-resistant electrical connections and to provide for strain relief for DC cables and appliance wiring. Cable insulation must be the appropriate type for the environment.

---

## Connecting the AC Wiring

---

AC connections are made on the terminal block located inside the front panel of the inverter.



### To connect AC wiring:

1. Disconnect the inverter from the battery.
2. Remove the AC wiring compartment cover.
3. Feed the wires through inverter's Compartment Cover.
4. Following the wiring guide located in the AC wiring compartment, connect the **Line** (black) and **Neutral** (white) wires to the terminal block and tighten securely. The safety (green) wire is connected to the ground screw terminal.
5. Replace the AC wiring compartment cover.

---

## OPERATING INSTRUCTIONS

**⚠ CAUTION:** Make sure the combined load requirement of your equipment does not exceed your inverter's maximum continuous power.

---

### Notes on Using the Remote Control (sold separately)

---

The manufacturer offers (as a separate item) a Remote Control specifically designed for this line of inverters. The inverter On/Off Switch must be in the off position when connecting the Remote Control to the unit, or the Remote Control will not operate. Once the unit has been turned on using the Remote Control, inverter operation will continue to be controlled through the Remote Control. Turn the inverter off before disconnecting the Remote Control. For more information about attaching and using the Remote Control, please refer to the Remote Control Instruction Manual.

# TROUBLESHOOTING GUIDE

## Common Audio/Visual Problems

PROBLEM	SOLUTION
"Buzzing" sound in audio systems	Inexpensive stereo systems and "boom boxes" may emit a buzzing sound from their speakers when operated from your inverter. This occurs because the power supply in the electronic device does not adequately filter the pure sine wave produced by the inverter. The only solution to this problem is to use a higher quality sound system.
Television Interference	Your inverter is shielded to minimize interference with TV signals. However, in some instances, some interference may still occur, particularly where TV signals are weak. Try the following corrective measures:
	<ul style="list-style-type: none"><li>Place the inverter as far as possible from the television. Use an extension cable, if necessary.</li></ul>
	<ul style="list-style-type: none"><li>Readjust the orientation of the inverter, the antenna cables and the TV power cord to minimize interference.</li></ul>
	<ul style="list-style-type: none"><li>Make sure the antenna feeding the television provides an adequate ("snow free") signal and that high quality, shielded antenna cable is used.</li></ul>
	<ul style="list-style-type: none"><li>Do not use the inverter to operate high-power appliances or tools at the same time you are using it to operate the TV.</li></ul>
<ul style="list-style-type: none"><li>Make sure the inverter's case is properly grounded (refer to the "Permanent Installation Procedure" section of this Instruction Manual).</li></ul>	

## Resetting the Inverter

After over-voltage or thermal automatic shutdown, your inverter will reset automatically.

## Storage

1. Ideal storage temperature range is 50-68°F (10-20°C).
2. Store and use the inverter in a cool, dry place with adequate ventilation.
3. Avoid locations that are exposed to heating units, radiators, direct sunlight or excessive humidity or dampness.

## Fuse Replacement

Your inverter is equipped with multiple internal fuses. Normally, these fuses will not "blow" unless there is a serious problem inside the unit. *Internal fuses are replaceable; however, only trained personnel should attempt fuse replacement.* Refer to the "Service Information" section of this Instruction Manual.

## Preventive Maintenance

Inverters require minimal maintenance. For optimum performance, the manufacturer recommends periodically performing the following preventive maintenance.

1. Turn the inverter off using the front panel On/Off Switch.
2. Check and tighten all electrical connections, including the ground.
3. Using a non-metallic vacuum cleaner hose, vacuum the air slots and fan area.
4. Clean the outside of the unit using a damp (not wet) cloth.
5. Wipe unit surfaces thoroughly with a dry cloth.
6. Resume operation.

## LIMITED ONE-YEAR HOME USE WARRANTY

The limited warranty program is the only one that applies to this unit, and it sets forth all the responsibilities of THOR Manufacturing. There is no other warranty, other than those described herein. Any implied warranty of merchantability of fitness for a particular purpose on this unit is limited in duration to the duration of this warranty.

This unit is warranted, to the original purchaser only, to be free of defects in materials and workmanship for one year from the date of purchase without additional charge. The warranty does not extend to subsequent purchasers or users.

Manufacturer will not be responsible for any amount of damage in excess of the retail purchase price of the unit under any circumstances. Incidental and consequential damages are specifically excluded from coverage under this warranty.

This unit is not intended for commercial use. This warranty does not apply to damage to units from misuse or incorrect installation/connection. Misuse includes wiring or connecting to improper polarity power sources.

# SPECIFICATIONS

Model	THIC-1000-12	THIC-2000-12	THIC-3000-12
Input Wave form:	Sine wave (utility or generator)		
Nominal voltage:	120VAC		
Low voltage trip:	85v±4%		
Low voltage re engage:	95v±4%		
High voltage trip:	135v±4%		
High voltage re engage:	127v±4%		
Max input AC voltage:	150VAC		
Nominal input frequency:	50Hz or 60Hz ( auto detect)		
Low freq trip:	50Hz +/- 0.3Hz / 60Hz +/- 0.3Hz		
High freq trip:	55 Hz for 50 Hz, 65 Hz for 60 Hz		
Output wave form:	Pure sine wave		
Overload protection:	Circuit breaker		
Short circuit protection:	Circuit breaker		
Transfer switch rating:	30 amp		
Efficiency on line transfer mode:	95%+		
Line transfer time:	10 ms typical		
Bypass without battery connected:	Yes		
Max bypass current:	30 amp		
Bypass over load current:	35 amp : alarm		
<b>Inverter Specification / output</b>			
Output wave form:	Pure sine wave		
Output continuous power watts:	1000	2000	3000
Output continuous power VA:	1000	2000	3000
Power factor:	0.9-1.0		
Nominal output voltage rms:	120Vac(L-N ), 120Vac(N-H)		
Output voltage regulation:	+/-10% rms		
Output frequency:	50Hz ± 0.3Hz or 60Hz ± 0.3Hz		
Nominal efficiency:	0.88		
Surge ratings:	3000	6000	9000
Short circuit protection:	Yes, fault after 10 secs		
Inverter specification / input	12V		
Nominal input voltage:	10V		
Minimum start voltage:	11V		
Low battery alarm:	11V		

Low battery trip:	10V		
High voltage alarm:	16V		
Power saver :	Below 25 watts when enabled		
Power saver:	Same switched on/off on remote		
Charger mode specification			
Input voltage range:	95-127VAC 194-259VAC		
Output voltage:	Dependent on battery type		
Battery initial voltage for start up:	0-15.7v		
Over charge protection shut-down:	15.7v		
Charger curves (4 stage constant current ) battery types			
4 step digital controlled progressive charge			
Battery Type	Fast V	Float V(*2 for 24v; *4 for 48v)	
Gel U.S.A	14	13.7	
A.G.M. 1	14.1	13.4	
A.G.M. 2	14.6	13.7	
Sealed lead acid	14.4	13.6	
Gel euro	14.4	13.8	
Open lead acid	14.8	13.8	
Calcium	15.1	14.6	
De-sulphation	15.5 for 4 hrs		
Remote control/ RS232 / USB	Yes Optional		
Size: in inches	17.4 x 8.58 x 7.04"		
Net Weight:	37.47 Lbs	44 Lbs	48.5 Lbs

# CHECKLIST

- 1) Ensure that the inverter has the correct DC voltage for your boat or vehicle system. ie 12v or 24v /48v.
- 2) Fit as close to the batteries as possible. The shorter the DC cables the better. Voltage drop on long cables will affect the unit's performance
- 3) Do not reverse the cables! Connect the red cable to the positive terminal and the black cable to the negative terminal of the battery. In the event of reverse polarity the unit could be totally destroyed.
- 4) Always use the inverter in an environment which is well ventilated, not exposed to direct sunlight or a heat source, away from water, moisture, oil or grease, away from any highly inflammable substance, out of reach from children.
- 5) The output voltage of this unit must never be on your AC system at the same time as any other AC source such as the 230V external mains line or a generator. All external must go through the R.
- 6) Always switch on the R first, before plugging in any appliance.
- 7) Under new electrical legislation only professional electricians should install this product. Ensure the fitting instructions are fully understood before fitting this product.

---

## INSTALLATION

---

- 1) Position the unit as close to the main battery bank as possible
- 2) Position in a cool, dry & well ventilated space
- 3) Orientation of the unit is not critical.
- 4) Purchasing a THOR Manufacturing inverter installation kit is highly recommended for any installation. Either purchase the standard cable set, or if using your own cable, use the cable size chart provided on the installation drawing to ensure you have thick enough cable for the DC leads. In the event of not being able to get the size requested (it can be hard to get thick cable) then simply add multiple length of thinner cable, i.e. if you cannot get 90mm<sup>2</sup> cable then use 3\* 35mm<sup>2</sup> cable, at the end of the day it's just copper we need.
- 5) Fit a fuse suitable for the job, again look at the installation drawing. We have a full range of high current fuses in the ANL range of products, ranging from 100-500 Amps on the DC side.
- 6) Connect the cables from the batteries to the fuse then to the unit, this way if there is a fault at the unit the fuse is already in place and this will be safe. In the event of an isolation switch being used, please ensure the rating of the switch can handle the power of the unit.
- 7) Ensure the unit is switched off during installation.
- 8) On the AC side ensure the Line power ( all external AC sources) are totally disconnected, connect the output from the inverter to suitable Residual Current Breaker (R.C.D. for earth protection) and current over load trips. Fuse the AC input side depending on through power requirements, the max through power is 30 amps, so fuse at 40A (Allowing also for charger consumption) if you intend to use the full through power for standard 13-16 amps throughput then a 20A fuse would be appropriate.
- 9) We recommend Multi core tri rated AC cable, if used on a boat or vehicle, as this is much safer where vibration is likely. Only use single solid household AC cable if the product is being used as a power source for a house or platform free of vibration.
- 10) Before attempting to switch on the unit, please ensure you have selected the correct battery type on the small battery type selector switch on the front of the main box, rotate the switch to your battery type. The Progressive charge control software will automatically adjust for battery bank size and state.



# CHARGE STAGE TRANSITION DEFINITIONS

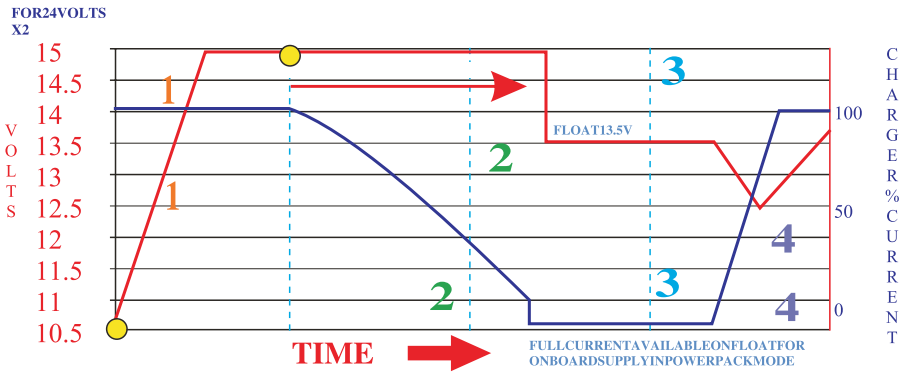
Please turn the charge current control switch gently to avoid breakage due to over-turning.

There are 3 charging stages:

**Bulk Charging:** (fast charge LED solid) this is the initial stage of charging. While Bulk Charging, the charger supplies the battery with controlled constant current. The charger will remain in Bulk charge until the Absorption charge voltage (determined by the Battery Type selection) is achieved. A software timer will measure the time from A/C start until the battery charger reaches 0.3V below the boost voltage, then take this time as T0 and  $T0 \times 10 = T1$ .

**Absorb Charging:** (fast charge LED blinking) This is the second charging stage when the fast charge LED is flashing and begins after the absorb voltage has been reached. Absorb Charging provides the batteries with a constant voltage and reduces the DC charging current in order to maintain the absorb voltage setting. In this period, the inverter will start a T1 timer; the charger will keep the boost voltage in Boost CV mode until the T1 timer has run out. Then drop the voltage down to the float voltage. The timer has a minimum time of 1 hour and a maximum time of 12 hours.

**Float Charging:** (float charge LED solid) The third charging stage occurs at the end of the Absorb Charging time. While Float charging, the charge voltage is reduced to the float charge voltage (determined by the Battery Type selection\*). In this stage, the batteries are kept fully charged and ready if needed by the inverter. If the A/C is reconnected or the battery voltage drops below 12Vdc, the charger will restart the above cycle. If the charge maintains the float state for 10 days, the charger will deliberately reset the cycle to protect the battery.



## De-sulphation

The de-sulphation cycle (switch position 8) is a very dangerous setting if you do not know what you are doing. Before attempting to use this cycle you must clearly understand what it does and when and how you would use it.

What causes sulphation? This can occur with infrequent use of the batteries or if the batteries have been discharged low enough that they will not accept a charge. This cycle is a very high voltage charge cycle designed to try to break down the sulphated crust that is preventing the plates from taking a charge and allowing the plates to clean up and accept a charge once again.

# REMOTE CONTROL

Apart from the switch panel on the front (or top) of the inverter, an extra switch panel connected to the RJ11 port at the DC side of the inverter thru a standard telephone cable can also control the operation of the inverter (sold separately)

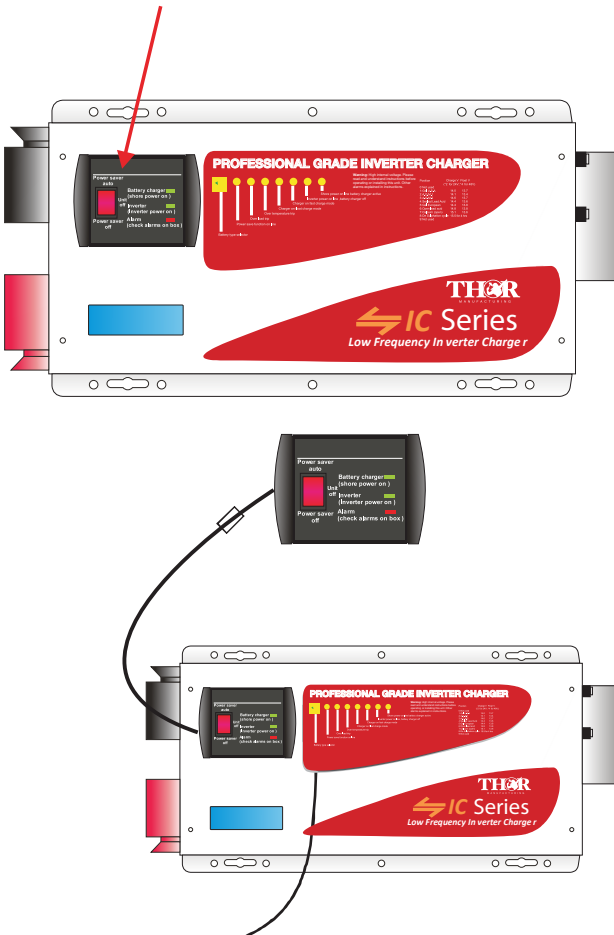
If an extra switch panel is connected to the inverter via "remote control port", together with the panel on the inverter case, the two panels will be connected and operated in parallel.

Whichever first switches from "Off" to "Power saver off" or "Power saver on", it will power the inverter on. If the commands from the two panels conflict, the inverter will operate according to the following priority: Power saver on> Power saver off> Power off

Only when both panels are turned to the "Unit Off" position, will the inverter be powered off. The Max length of the cable is 10 meters.

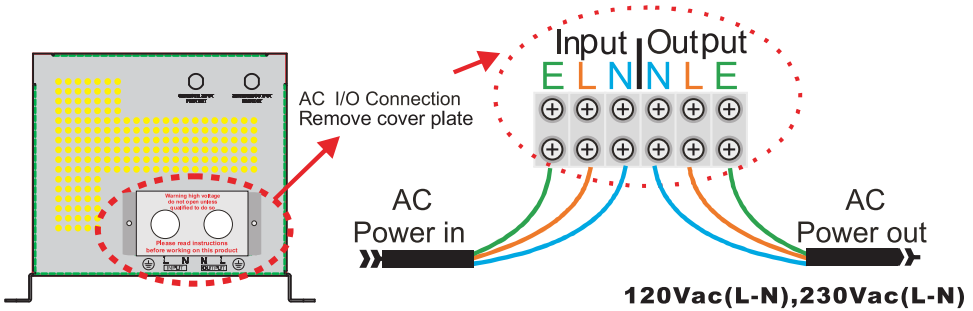
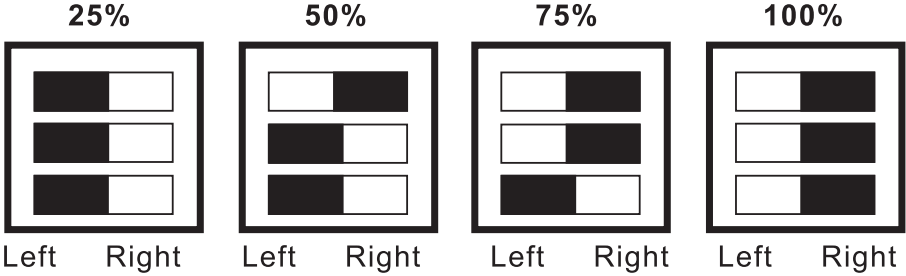
## ⚠ WARNING

- Never cut the telephone cable when the cable is attached to inverter and battery is connected to the inverter. Even if the inverter is turned off, it will damage the remote PCB inside if the cable is short circuited during cutting.



# BATTERY TYPE SELECTOR

For the Battery Charging Current Selector Switch you can choose 25%, 50%, 75% or 100% of the maximum battery charger current as follows (the Selector Switch is factory set in 25%)



Switch setting	Description	Boost / Vdc	Float / Vdc
0	Charger Off		
1	Gel USA	14	13.7
2	AGM 1	14.1	13.4
3	AGM 2	14.6	13.7
4	Sealed lead acid	14.4	13.6
5	Gel EURO	14.4	13.8
6	Open lead acid	14.8	13.3
7	Calcium	15.1	13.6
8	De-sulphation	15.5 (4 Hours then Off) 15.5 (4 Hours then Off)	
9	Not used		

## Transfer Switch

While in the Standby Mode, the AC input is continually monitored. Whenever AC power falls below the VAC Trip voltage (154 VAC, default for 230VAC, 90VAC for 120VAC), the inverter automatically transfers back to the Invert Mode with minimum interruption to your appliances - as long as the inverter is turned on. The transfer from Standby mode to Inverter mode occurs in approximately 10 milliseconds. And it is the same time from Inverter mode to

Standby mode though it is not designed as a computer UPS system, this transfer time is usually fast enough to keep your equipment powered up. There is a 15-second delay from the time the inverter senses that continuously qualified AC is present at the input terminals to when the transfer is made. This delay is built in to provide time for a generator to spin-up to a stable voltage and avoid relay chattering. The inverter will not transfer to generator until it has locked onto the generator's output. This delay is also designed to avoid frequent switching when input utility is unstable.

## Power Saver

There are 2 different working statuses for THOR IC Series of Inverter Chargers :

When the power switch is in "Unit Off" position, the inverter is powered off.

When the power switch is turned to either of "Power Saver Auto" or "Power Saver Off", the inverter is powered on.

Power saver function is designed to conserve battery power when AC power is not or rarely required by the loads.

In this mode, the inverter pulses the AC output looking for an

AC load (i.e., electrical appliance). Whenever an AC load (greater than 30 watts) is turned on, the inverter recognizes the need for power and automatically starts inverting and output goes to full voltage. When there is no load (or less than 50 watts) detected, the inverter automatically goes back into search mode to minimize energy consumption from the battery bank.

In "Power saver on" mode, the inverter will draw power mainly in sensing moments, thus the idle consumption is significantly reduced.

The inverter will detect a load for 250ms every 3 seconds (DOP switch #3 position 1).

When in the search sense mode, the green power LED will blink and the inverter will make a ticking sound.

At full output voltage, the green power LED will light steadily and the inverter will make a steady humming sound. When the inverter is used as an "uninterruptible" power supply the search sense mode or "Power Saver On" function should be defeated.

## Exceptions

Some devices when scanned by the load sensor cannot be detected. Small fluorescent lights are the most common example. (Try altering the plug polarity by turning the plug over.) Some computers and sophisticated electronics have power supplies that do not present a load until line voltage is available. When this occurs, each unit waits for the other to begin. To drive these loads either a small companion load must be used to bring the inverter out of its search mode, or the inverter may be programmed to remain at full output voltage (Power On mode).

## Protections

THOR IC series inverter is equipped with extensive protections against various harsh situations/faults.

AC Input over voltage protection/AC Input low voltage protection Low battery alarm/High battery alarm

Over temperature protection/Over load protection Short Circuit protection (1s after fault)

Back feeding protection

When Over temperature /Over load occur, after the fault is cleared, the master switch has to be reset to restart the inverter.

The inverter will go to Over temp protection when the heat sink temp.  $\geq 105^{\circ}\text{C}$  (221 F), and go to Fault (shutdown Output) after 30 seconds. The switch has to be reset to activate the inverter.

The THOR Manufacturing IC series Inverter has back feeding protection which avoids presenting an AC voltage on the AC input terminal in Invert mode. After the reason for the fault is cleared, the inverter has to be reset to start working.

LED Indicator & RMT LCD	
SHORE POWER ON	GREEN LED lit in AC Mode
INVERTER ON	GREEN LED lit in Inverter Mode
FAST CHARGE	Yellow LED lit in Fast Charging Mode
FLOAT CHARGE	GREEN LED lit in Float Charging Mode
OVER TEMP TRIP	RED LED lit in Over Temperature
OVER LOAD TRIP	RED LED lit in Over Load
POWER SAVER ON	GREEN LED lit in Power Saver Mode (Power Saver Load $\leq 25W$ )

### FAN Operation

For 1-3KW models, there is one multiple controlled DC fan which starts to work according to the below logic. The Operation of the DC fan at the DC terminal side is controlled by the following logic:

Allow at least 6 inches of clearance around the inverter for air flow. Make sure that the air can circulate freely around the unit. Fan noise level <60db at a distance of 1m

Condition	Enter Condition	Leave condition	Speed
HEAT SINK	$T \leq 140^{\circ}F$	$T > 149^{\circ}F$	OFF
TEMPERATURE	$149^{\circ}F \leq T < 185^{\circ}F$	$T \leq 140^{\circ}F$ or $T \geq 185^{\circ}F$	0.5
	$T > 185^{\circ}F$	$T \leq 176^{\circ}F$	1
CHARGER CURRENT	$I \leq 15\%$	$I \geq 20\%$	OFF
	$20\% < I \leq 50\%Max$	$I \leq 15\%$ or $I > 50\%Max$	0.5
	$I > 50\%Max$	$I \leq 40\%Max$	1
LOAD Percentage (INV MODE)	Load < 30%	Load $\geq 30\%$	OFF
	$30\% \leq Load < 50\%$	Load $\leq 20\%$ or Load $\geq 50\%$	0.5
	Load $\geq 50\%$	Load $\leq 40\%$	1

### AC/Battery Priority

Our inverter is designed with AC priority by default. This means, when AC input is present, the battery will be charged first, and the inverter will transfer the input AC to power the load. Only when the AC input is stable for a continuous period of 15 days will the inverter start a battery inverting cycle to protect the battery. After 1 normal charging cycle ac through put will be restored.

### AC Wiring

We recommend using 10 to 6 Awg wire to connect to the AC terminal block.

When in AC mode the AC input power will supply both the loads and AC charger, a thicker wire gauge for AC Input is required. Please consult a qualified electrician about the specific wire gauge required in terms of wire material and inverter power.

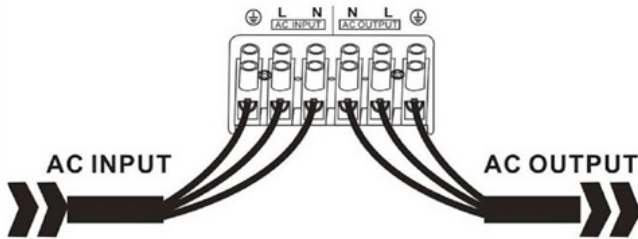
There are 3 different ways of connecting to the terminal block depending on the model. All the wirings are CE compliant.

## Wiring Option

Single Phase /120V Single Phase

Input: Hot line +Neutral +Ground

Output: Hot line +Neutral +Ground



## WARNING

The output voltage of this unit must never be connected in its input AC terminal, overload or damage may result. Always switch on the inverter before plugging in any appliance.

## Grounding

Connect an AWG 8 gauge or greater copper wire between the grounding terminal on the inverter and the earth grounding system or the vehicle chassis.