Owner Manual

POWER INVERTERS

HTS300 / HTS600 / HTS1200
HTS300T / HTS600T / HTS1200T

See page 13 for
HTS1800(T) / HTS2500(T) / HTS3000(T) models

ONLY install using appropriate Tundra CM Series installation kit

(http://www.tundrainternational.com/en/pages/cmseries)

Table of contents

1 Introduction

Congratulations! You have purchased one of the most sophisticated and reliable power inverters on the market today. Incorporating some of the latest technological developments, it will give years of trouble free operation for your truck, boat, R.V. or other.

In order to get the most out of your inverter, the installation procedure must be followed carefully and it must also be properly used. Please thoroughly read this manual before installing and using your new inverter. **It is important to pay special attention to the CAUTION and WARNING statements in this manual as well as on the inverter.** Should the inverter be exposed to rain, moisture, or strong impact, have it inspected by a qualified technician before use.

WARNING!	**The electrical current at the entrance and exit of your inverter may cause severe personal injury; make certain that you have read and understand all the parts of this manual before installing and using your inverter.**

WARNING!	**The inverter produces an electrical current similar to that found in most North American homes, with all the accompanying dangers. Be sure to install the product out of the reach of children.**

1.1 Disclaimer

Electrical codes vary depending on location and the type of installation. Electrical installations must meet local and national wiring codes and should be performed by a qualified electrician.

The inverter's specifications are subject to change without notice.

1.2 Output waveform

The AC output of your inverter is regulated to 120 volts and its waveform is called a "Pure Sine Wave." It is a waveform identical to the sine waves delivered by utility power.

2 Front & rear panels

FRONT PANEL

ON/OFF switch: The ON/OFF switch turns the inverter's control circuit ON and OFF. **It does not disconnect power from the inverter; you must disconnect the AC (120 volts) and DC (12 volts) power before working on any circuits connected to the inverter.** When the switch is on but no power is being supplied to a load, the inverter draws less than 500 mA. This is a very low current draw but left in this state the inverter will eventually drain your batteries.

AC Outlets: The maximum output of your inverter can go through any of the two AC outlets.

CAUTION!	**Leave in the OFF position during the installation.**

REAR PANEL

Chassis ground screw: The chassis ground screw must be properly connected to the chassis of your vehicle before operating the inverter.

Fan(s): In order for the inverter to properly operate, the fan(s) opening must never be obstructed. Allow at least six inches of clearance around the inverter for airflow. All fans are thermostatic and operate upon the interior temperature of the inverter.

3 Permanent Installation

The use of the Tundra International installation kit is strongly recommended. This complete installation kit is custom designed to maximize performances. It has been developed to promote safe installation and to help eliminate the difficult task of identifying and shopping for the requisite materials in stores.

CAUTION!	**Before installation, make sure that the inverter is turned "OFF."**

3.1 Recommended material

	HTS 300(T)	HTS 600(T)	HTS 1200(T)
- **Tundra CM series installation kit**	**N/A**	**CM1000**	**CM1200/1500**
OR			
- Welding cable	Awg 10	Awg 6	Awg 2
- 6 Tin plated terminal lugs			
- PVC strain relief for flexible cable		½"	½"
- DC fuse block			
- DC fuse	30A	60 A	150 A
- Plastic « loom » tubing			
- Red and black heat shrinkable tubing			
- Plastic cable ties			
- Clamps and bolts			
- Heavy duty AC power distribution center			

3.2 Recommended tools

- Hand held crimping tool for terminal lugs *** Mandatory**
- Hollow punch or hole saw for metal
- Drill bit set for metal
- Screw driver set
- Open end wrench set
- Side cutters
- Power drill

3.3 Where to install

Your inverter should be installed in a location that meets the following requirements:

- Dry: Keep the inverter away from any water or moisture.

- Cool: Ambient air temperature should be between 32 and 85 degrees Fahrenheit (0 and 30° Celsius).

- Ventilated: Ensure that the unit is located in a well-ventilated compartment. At least 6 inches of clearance are required around the inverter for air flow. Verify that all ventilation openings on the unit (front and rear panels) are not obstructed.

CAUTION!	**To avoid fire hazards and/or overheating, do not cover or obstruct any ventilation openings. Do not install the inverter in a zero clearance compartment.**

- Safe: Do not install the inverter in the same compartment as batteries, or in any compartment capable of storing flammable liquids (such as gasoline). Power inverters may produce sparks that can result in fire if exposed to flammable vapors.

WARNING!	**This equipment contains components that tend to produce arcs or sparks. To reduce the risk of fire or explosion, do not install in a compartment containing batteries or flammable materials, or in a location that requires ignition protected equipment.**

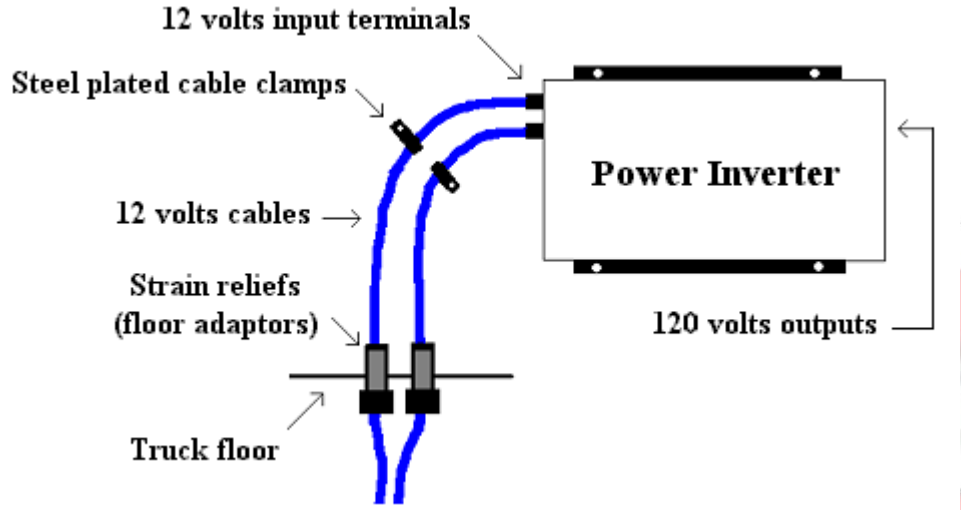
- Close to batteries: Install the inverter as close as possible to batteries (but not in the same compartment) in order to minimize the cable length required to connect the inverter to the batteries. It is better and cheaper to run longer AC wire (between the inverter and your appliances) than DC cables (between the inverter and the batteries).

3.4 Mounting the inverter

When you have decided where to place it, mount the inverter on a flat surface using the mounting flanges. Mounting hardware should be corrosion resistant, and 1/4" or larger. The inverter may be mounted horizontally on a vertical surface (the fans' opening must not point up or down) or on a horizontal surface. Upside down installation is not recommended, as it may put too much stress on the housing of your power inverter.

Close to the inverter, drill two holes in the truck's floor and install the two strain reliefs about 3 inches apart (Figure 3).

Figure 3: Installation schema



3.5 Ground

The inverter has a lug on the rear panel that must be connected, using a #10 AWG copper cable, to the chassis of your vehicle or to a metallic panel connected to the chassis. This grounding procedure conforms to most electrical codes that require deriving AC sources to ground in case of malfunctioning. To make sure that you found a good grounding point, run a 12 volt test light from the positive terminal of your battery to your grounding point. If the light comes on, your installation is more than likely OK.

WARNING!	**Do not operate the inverter if the ground screw of the inverter is not properly connected to the chassis of your vehicle, it may result in electrical shock hazard.**

3.6 Battery cables

Proper wiring is very important for safe and proper operation of the inverter. Since the inverter has a low voltage (12 volts) and a high current input, low resistance wiring and connections between the batteries and the inverter is essential in order to deliver the maximum amount of usable energy to your load. Don't waste the investment you have made in a highly efficient inverter by using cheap and undersized wires!

Use only covered, flexible, copper wires capable of withstanding temperatures in excess of 215° Fahrenheit. We recommend welding cable as the best size & type for connection between the batteries and your inverter. Keep the cable length as short as possible, no longer than 10 feet. This will ensure that the overall system efficiency is as high as possible, and will keep the voltage drop between the batteries and the inverter to a minimum. If the voltage drop is too excessive, the inverter may shut down.

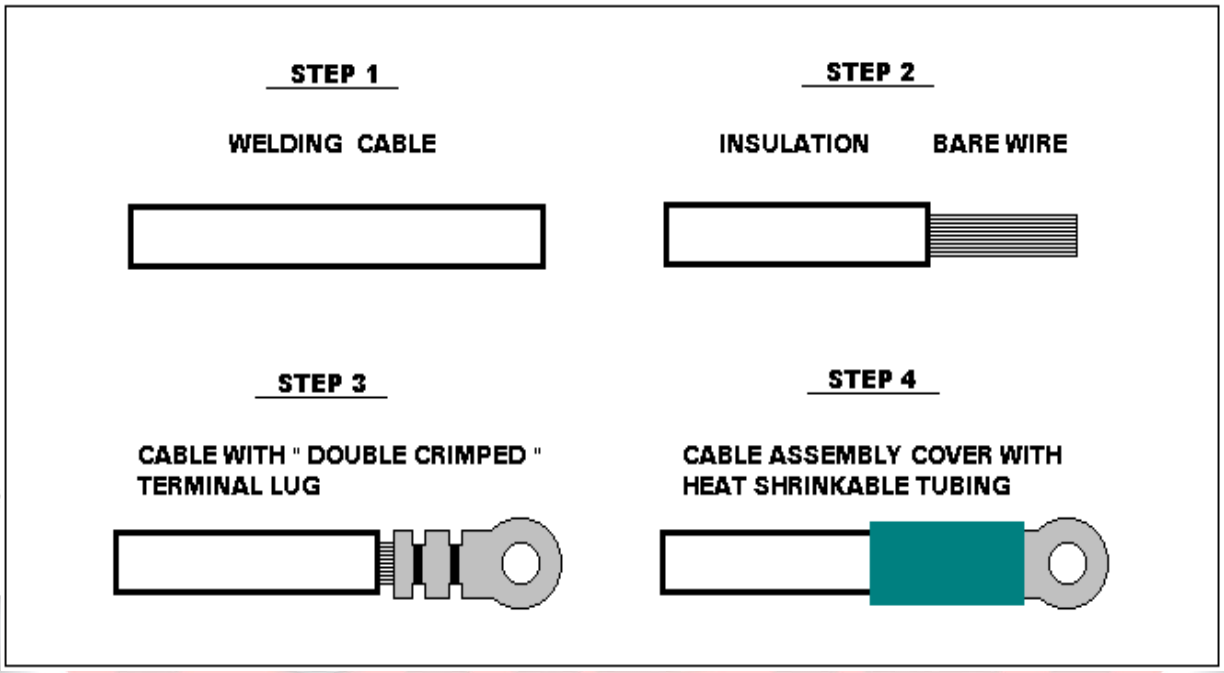
3.6.1 Preparation of the cable connected to the "positive" end

Measure and cut the length of cable necessary to connect the positive (+) end of the battery to that of the inverter, not forgetting the length needed to allow movement due to the suspension of the cabin. The cable must be cut in two pieces, of which the small part must be six inches (Figure 5).

Strip a half-inch off each of the four cable ends, insert the longer section of the cable in a PVC strain relief, and install good quality tin plated terminal lugs on the bare wires. Crimp the terminals with a hand held crimping tool (the use of locked pliers (*Vice-Grip*) is not recommended), until the entire cable is crimped, and then cover each section of bared wire with good quality RED shrinkable tubing (Figure 4).

CAUTION!	**Do not solder the terminal lugs to cables. Solid and low resistance connections to the DC power source are essential in order to properly operate the inverter. The soldering cannot provide such connections.**

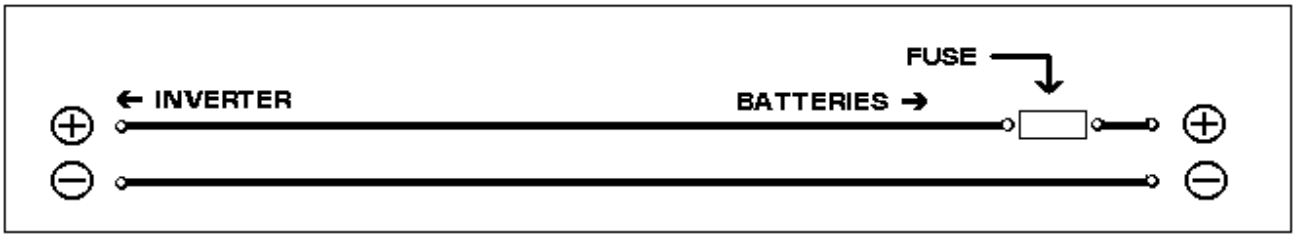
Figure 4: Terminals' crimping procedure



3.6.1.1 Fuse

A main fuse must be installed in the battery casing on the positive cable (+) between the batteries and the inverter, as close as possible to the batteries. In this way (and in the event of cable rupture), the DC current would be cut at the batteries and would not cause a fire.

Figure 5: Fuse schema



We recommend a fuse of type "CNL", mounted on a fuse holder, type "CNL." Plug one terminal of the small and the long cable's sections on the fuse holder, as illustrated in figure 5, and install the fuse. Without tightening them too much, the terminals must be solidly fixed onto the fuse holder, and must not be able to move around.

CAUTION!	**Not installing a fuse can result in fire that may cause severe injuries and/or damages.**

3.6.2 Preparation of the cable connected to the negative side

Determine and cut the length of cable which you need to connect the negative side (-) of the battery to that of the inverter, without forgetting the necessary length to allow movements due to the suspension of the cabin. Strip approximately a half-inch of insulation from the two ends of the cable, insert the cable through the second PVC strain relief, and install good quality tin plated terminal lugs on the stripped sections. Crimp the terminals with a hand held crimping tool (the use of a locked plier (*Vice-Grip*) is not recommended)

until the whole cable is crimped and then cover each section of stripped cable with good quality BLACK shrinkable tubing (refer to Figure 4).

3.7 Connecting the Inverter

The next step is to make sure that the inverter is turned OFF. Insert the rubber insulators (included with the inverter) on the terminal lugs and connect the cables (terminal lugs) to the inverter's DC input terminals: the terminal covered with the RED shrink tube to the positive (+) pole and the terminal covered with the BLACK shrink tube to the negative (-) pole. Make a secure connection using the nuts included with the inverter. The terminal must not move around on the DC terminal, but it must not be too tight either. The rubber insulators will protect the DC connections and will prevent the terminal from being touched by other metallic pieces.

CAUTION!	**Never put a washer or a nut between the terminal lugs and the 12 volts DC input terminals; this results in poor conductivity and may cause the inverter to overheat and cause a fire.**

Tighten the PVC strain relief nut on the cables until the rubber seal is properly compressed and the cables cannot move. Run the cables under your cab and cover them with plastic loom to prevent damage from road debris. Fasten both cables together every 4 inches with plastic cable ties; try to run both DC (12 volts) cables as close as possible together to reduce the risk of interference with your television or CB radio. While keeping in mind to allow cables to move with your cabin air suspension, secure the cables to the chassis from the cabin's floor to the batteries with several metallic clamps covered with rubber. These clamps will prevent the cables from being cut or damaged by the vehicle's vibrations.

3.8 Connection of the batteries

If you are working with a multiple battery bank, choose a battery with no accessory connected, as it will extend your battery's life. Before going further, it is important to correctly identify the cable connected to the positive terminal of the inverter, and the one connected to the negative terminal. **The cables must go from the positive terminal of the inverter to the positive terminal of the battery, and of the negative terminal of the inverter to the negative terminal of the battery. Incorrectly connecting the battery and inverter will damage your inverter permanently and is not covered by the warranty.** Always connect the positive terminals before the negative.

CAUTION!	**Reversing the polarity when connecting the DC cables will permanently damage your inverter. *THIS IS NOT COVERED BY THE WARRANTY.***

3.8.1 Positive Terminal

Always connect the positive terminals before the negative. Plug the small section of the cable connected to the positive terminal of the inverter to the positive terminal of the battery, by solidly fixing the terminal with the nut. Without tightening them too much, the terminals must not be able to move around.

3.8.2 Negative Terminal

The last step is to connect the cable between the negative terminal of the inverter to the negative terminal of the battery, by solidly fixing the terminal with the nut. Without tightening them too much, the terminals must not be able to move around.

WARNING!	**You may observe a spark when making the cable connections since current may flow and charge capacitors in the inverter. This is normal. Do not make cable connections in the presence of flammable fumes; it may result in explosion and/or fire.**

4 Operation

To operate the power inverter, turn it on by using the ON/OFF switch on the front panel. The inverter is now ready to deliver AC 120 volts power to your load. If you are operating several loads from the inverter, turn them on separately after the inverter itself has been turned on. This will ensure that the inverter does not have to deliver the starting power for all the loads at once.

4.1 Operating limits

Power output: Your inverter is designed to deliver its full output power continuously, and has a double power surge capacity for 1 second.

Input voltage: The inverter will operate with input voltages between 10.5 and 15.0 volts. Optimum performance is achieved, however, with input voltages between 12.0 and 14.0 volts. If the voltage drops lower than 11.0 (11.5 for "T" models) volts, the low battery warning alarm will sound.

The inverter will shut down if the voltage drops below 10.5 (11 for "T" models) volts. This protects your batteries from being over-discharged. The inverter will not restart unless the input voltage exceeds 13.0 volts.

The inverter will shut down if the voltage *exceeds* 15.0 volts. This protects the inverter from excessive input voltage. While the inverter incorporates protection against over voltage, it may still be damaged if the input voltage exceeds 16 volts.

5 Maintenance

Very little maintenance is required to keep the inverter operating properly. You should clean the exterior with a dry cloth to prevent dust accumulation. A regular maintenance check is recommended, DC input bolts or screws should be tightened periodically, cables should also be inspected for solidity and exterior condition. You must also keep your batteries as clean as possible to prevent current loss that may affect inverter operation.

CAUTION! **If you work on the DC input terminals of your power inverter, disconnect both wires at the battery side to avoid any short circuit.**

6 Troubleshooting

6.1 Television and CB radio interference

Operating your inverter can interfere with television and CB radio reception. If this occurs, the following steps may help to alleviate the problem:

- Make sure that your inverter is properly grounded to the chassis of your vehicle.
- Reduce power consumption while watching television
- Move the television as far as possible from your inverter
- Run both DC cables as close as possible together with cable ties.

6.2 Troubleshooting guide

Problem	Possible cause	Solution
Fault indicator ON	Low input voltage	Not enough battery capacity Recharge batteries Improper Installation. Check each inverter's installation steps
	High input voltage	Check vehicle's alternator condition
	Short circuit or AC wiring error	Check the AC wiring (120 volts) and test your appliances on an other power supply to validate their functionality
	Inverter overload	Remove or reduce load, switch the inverter OFF at least 5 second and restart the inverter
No output voltage	Inverter off	Turn the inverter on
	No DC power to the inverter	Check the wiring Check battery fuse et check the installation before changing it
	Reverse DC polarity	Replace internal fuses of the inverter. Damage caused by reversed polarity is not covered by the warranty.
Alarm on all the time	Poor battery condition	Charge or change battery
	Poor DC wiring	Use proper cables and make solid connections
	Poor DC terminal lugs connections	Use proper crimping tool
Overheat	Thermal shutdown	Reduce load
	Improper installation	Allow inverter to cool off Improve ventilation Install properly

7 Specifications

HTS-(T) SERIES (Truck)

Electrical Specifications	HTS300T	HTS600T	HTS1200T
Output wave form	Pure sine wave	Pure sine wave	Pure sine wave
Continuous output power	300 watts	600 watts	1200 watts
Peak output power	600 watts	1200 watts	2400 watts
AC output voltage	120 Vac ±5%	120 Vac ±5%	120 Vac ±5%
AC output frequency	60 Hz ±1%	60 Hz ±1%	60 Hz ±1%
AC output efficiency	98+%	98+%	98+%
DC input voltage range	11 ~ 15 Vdc	11 ~ 15 Vdc	11 ~ 15 Vdc
DC input efficiency	90%	90%	90%
Low battery voltage alarm	11.5 Vdc	11.5 Vdc	11.5 Vdc
Low battery voltage shutdown	11 Vdc	11 Vdc	11 Vdc
High battery voltage shutdown	15 Vdc	15 Vdc	15 Vdc
No load current draw	< 0.6 amp	< 0.9 amp	< 1.1 amp
Overload protection	YES	YES	YES
Automatic restart	YES	YES	YES
Reverse polarity protection	By fuses	By fuses	By fuses
High temperature shutdown	131 °F ±5%	131 °F ±5%	131 °F ±5%

General Specifications	HTS300T	HTS600T	HTS1200T
AC receptacle	2	2	2
Cooling fans (thermostatic)	1 fan	1 fan	1 fan
Heat sinks	External	External	External
Housing type	Aluminium (self supporting)	Aluminium (self supporting)	Aluminium (self supporting)
DC connection type	Receptacle / screws	Blocks / studs	Blocks / studs
Unit dimensions (inches)	10.2 x 5.1 x 3.3	11.2 x 7.1 x 3.3	16.7 x 7.0 x 3.3
Unit net weight (lbs)	4.4	6.2	9.7
Packaging dimensions (inches)	13.6 x 6.6 x 5.4	13.5 x 11,0 x 6.9	19,0 x 10.9 x 6.9
Packaging net weight (lbs)	4.9	7.7	11.9
Warranty	1 year	1 year	1 year

* Specifications are subject to change without notice.

HTS SERIES

Electrical Specifications	HTS300	HTS600	HTS1200
Output wave form	Pure sine wave	Pure sine wave	Pure sine wave
Continuous output power	300 watts	600 watts	1200 watts
Peak output power	600 watts	1200 watts	2400 watts
AC output voltage	120 Vac ±5%	120 Vac ±5%	120 Vac ±5%
AC output frequency	60 Hz ±1%	60 Hz ±1%	60 Hz ±1%
AC output efficiency	98+%	98+%	98+%
DC input voltage range	10.5 ~ 15 Vdc	10.5 ~ 15 Vdc	10.5 ~ 15 Vdc
DC input efficiency	90%	90%	90%
Low battery voltage alarm	11 Vdc	11 Vdc	11 Vdc
Low battery voltage shutdown	10.5 Vdc	10.5 Vdc	10.5 Vdc
High battery voltage shutdown	15 Vdc	15 Vdc	15 Vdc
No load current draw	< 0.6 amp	< 0.9 amp	< 1.1 amp
Overload protection	YES	YES	YES
Automatic restart	YES	YES	YES
Reverse polarity protection	By fuses	By fuses	By fuses
High temperature shutdown	131 °F ±5%	131 °F ±5%	131 °F ±5%

General Specifications	HTS300	HTS600	HTS1200
AC receptacle	2	2	2
Cooling fans (thermostatic)	1 fan	1 fan	1 fan
Heat sinks	External	External	External
Housing type	Aluminium (self supporting)	Aluminium (self supporting)	Aluminium (self supporting)
DC connection type	Receptacle / screws	Blocks / studs	Blocks / studs
Unit dimensions (inches)	10.2 x 5.1 x 3.3	11.2 x 7.1 x 3.3	16.7 x 7.0 x 3.3
Unit net weight (lbs)	4.4	6.2	9.7
Packaging dimensions (inches)	13.6 x 6.6 x 5.4	13.5 x 11,0 x 6.9	19,0 x 10.9 x 6.9
Packaging net weight (lbs)	4.9	7.7	11.9
Warranty	1 year	1 year	1 year

* Specifications are subject to change without notice.

8 Limited one-year warranty

TUNDRA INTERNATIONAL INC. warrants its products against defects in material or workmanship for a period of one (1) year from the date of first consumer purchase. This warranty applies to the original purchaser (end-user) of the product only. This limited warranty is voided if the unit is abused, modified, installed improperly, if the housing has been removed, if the serial number is missing, or if the original identification markings have been defaced, altered, or removed or if there is a lack of maintenance. Tundra International Inc. is not liable for any incidental, consequential or other damages arising from the use, misuse, or operation of this product; including, without limitation, damages resulting from loss of use, cost of removal, installation, or troubleshooting of the customer's electrical systems.

A. The end customer must certify that he has read and understood the related **Troubleshooting Guide*** and, to his knowledge, the origin of the problem is not the vehicle or the installation.

FOR TECHNICAL SUPPORT, CONTACT US AT 450-649-2470 or 1-877-964-2582

B. The product should have never been abused or modified.
C. The product should have never been exposed to liquids, heavy dust or corrosive material.

STEPS:

1. The merchant and/or the end customer MUST fill a Warranty Form*
2. The merchant and/or the end customer MUST contact us to get an RMA number.
3. A proof of purchase MUST BE INCLUDED with ALL returned products.
4. The returned product MUST BE PROPERLY PACKAGED to prevent shipping related damages. Shipping related damages are not covered by the warranty.
5. All defective products MUST be sent with all shipping charges PREPAID.
6. Returned products will be evaluated by our technical department where a decision will be made as to whether the product is covered by the warranty will be repaired, replaced or credited.

*** THE "TROUBLESHOOTING GUIDES" AND "WARRANTY FORMS" ARE AVAILABLE IN THE DOWNLOAD SECTION OF OUR WEBSITE**

ALL DEFECTIVE PRODUCTS COVERED BY THE WARRANTY WILL BE RETURNED FREE OF CHARGE.

Owner Manual

POWER INVERTERS

HTS1800 / HTS2500 / HTS3000
HTS1800T / HTS2500T / HTS3000T

See page 1 for
HTS300(T) / HTS600(T) / HTS1200(T) models

ONLY install using appropriate Tundra CM Series installation kit

(http://www.tundrainternational.com/en/pages/cmseries)

Table of contents

1 INTRODUCTION

Congratulations! You have purchased one of the most sophisticated and reliable power inverters of the industry. Incorporating the latest technologies, it will deliver years of trouble free operation for your truck, boat, RV or other "OFF Grid" system.

1) **In order to get the most out of your inverter, the installation procedure must be followed carefully. Please thoroughly read this manual before installing and using your new inverter. It is important to pay special attention to the CAUTION and WARNING statements in this manual as well as on the inverter.**

2) **The electrical current at the input and output of your inverter may cause severe personal injury; make certain that you have read and understood all the sections of this manual before installing and using your inverter.**

3) **The inverter produces an electrical current similar to what's found in most North American homes, with all the accompanying hazards.**

4) **Be sure to install the product out of the reach of children.**

5) **Should the inverter be exposed to rain, moisture, or strong impact, have it inspected by a qualified technician before use.**

1.1 Disclaimer

The electrical code varies depending on location and the type of installation. Electrical installations must meet local and national wiring codes and should be performed by a qualified electrician. Tundra International Inc. is not liable for any incidental, consequential or other damages arising from the use, misuse or operation of this product; including, without limitation, damages resulting from loss of use, cost of removal, installation, or troubleshooting. All Tundra products specifications are subject to change without notice.

1.2 Output waveform

The AC output of your inverter is regulated to 120 volts/60Hz and its waveform is called a "Pure Sine Wave." It is a waveform identical to the sine waves delivered by utility power.

2 FRONT PANEL / REAR PANEL & REMOTE CONTROL

2.1 Front panel

ON/OFF switch: The ON/OFF switch located on the remote control (factory installed on the inverter front panel) turns the inverter's control circuit ON and OFF. **It does not disconnect power from the inverter; you must disconnect the AC (120 Volt) and DC (12 Volt) power before working on any circuits connected to the inverter.** When the switch is ON but no power is being supplied to a load, the inverter draws less than 500 mA. This is a very low current draw but left in this state the inverter will eventually drain your batteries until its automatic shutdown at 10.5 Volt (11 Volt for HTST). When the switch is OFF, the inverter draw is Ø (zero).

AC Outlets: Never exceed 1800w (or 15A) per outlet. It may result in extensive damages to your inverter and lead to injuries.

Hard wire outlet: HTS & HTST models are also equipped with one hard wire outlet which can be used as the only output socket up to the maximum capacity of the inverter.

CAUTION! **Leave inverter in the OFF position during the installation.**

2.2 Rear panel

Chassis ground screw: The inverter has a lug on the rear panel to perform a grounding procedure (when required) to derive AC leaks to ground in case of malfunctioning. Refer to section 3.5 for more details.

Fan(s): In order for the inverter to properly operate, the fan(s) opening must never be obstructed. Allow at least 6 inches (15.2 cm) of clearance around the inverter for airflow. All fans are thermostatic and operate upon the interior temperature of the inverter.

CAUTION! **Fan(s) will continue to run even if the inverter is on shutdown.**

2.3 LCD remote control

Your new inverter is equipped with an LCD remote control. During normal operation of the inverter, the remote will display a number of information to allow its user to better understand the operational limits of the inverter. The information displayed can be used to obtain maximum performances as well as troubleshooting.

On HTS and HTST Series the remote control is factory installed on the front panel, but detachable. It allows mounting of the inverter out of sight. The remote can be mounted remotely using the included hardware and the 19.7 feet cord (6m).

2.3.1 Display

Input DC volt: Displays the voltage at the inverter's input terminal. Usually this voltage is very close to the actual battery voltage and the difference, if any, is caused by the resistance in the cables and connections. A regular maintenance will contribute to minimize the possible resistance.

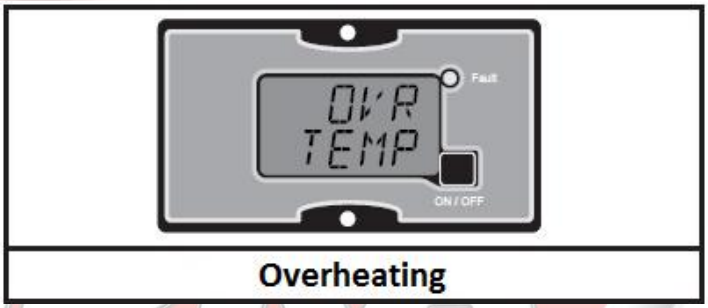
Battery capacity: Displays an estimation of the "state of charge of the batteries" within the operation limits of your inverter (refer to section 4).

Load: Displays "real time" consumption in Watt (when greater than 50W).

Fault light: Announces a faulty condition such as: low or high battery voltage, over temperature and overload. An audible alarm will sound announcing the faulty condition.

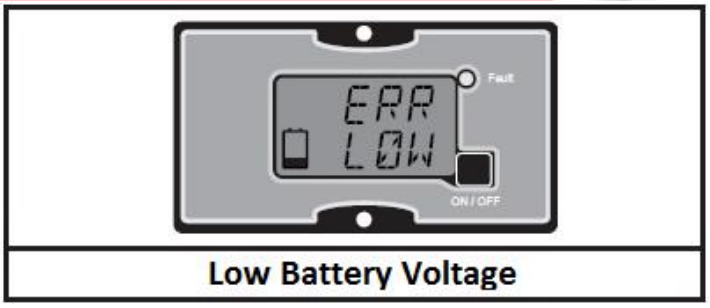
2.3.2 Fault codes (you may refer to section 6 for more details):

OVR TEMP
Indicates the inverter internal circuitry has reached a critical temperature limit and must shutdown. This is likely to happen in very hot temperature periods only. Once the temperature will drop enough to allow a safe operation, the inverter will resume automatically.



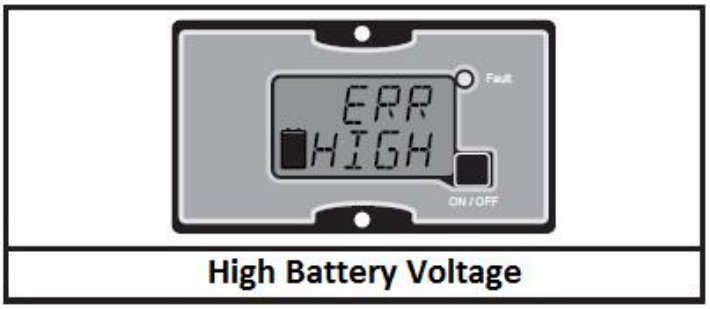
Overheating

ERR LOW
Indicates the battery capacity has reached its lower limit (10.5 Volt for HTS / 11.0 Volt for HTST) and must shutdown. This is likely to happen when batteries are discharged or when the installation is either inappropriate or requires maintenance. Once the battery voltage will rise above 13.2 Volt for at least 2 seconds, the inverter will resume automatically.



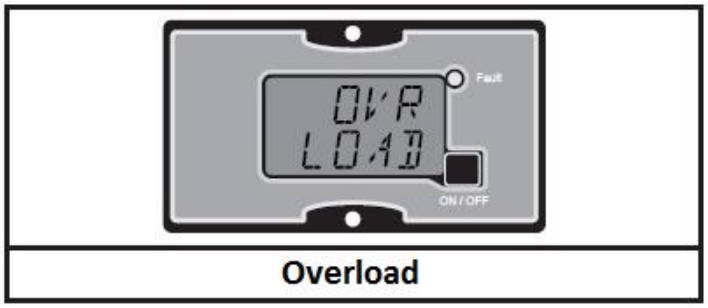
Low Battery Voltage

ERR HIGH
Indicates the battery voltage has reached its higher limit (15 volt) and must shutdown. This is likely to happen when the alternator is faulty and requires maintenance. Once the battery voltage will drop below 15 volt for at least 2 seconds, the inverter will resume automatically.



High Battery Voltage

OVR LOAD
Indicates the inverter has reached its maximum output capacity (Wattage) and must shutdown. This is likely to happen when the total consumption (Wattage) is too high for the model you chose. Once the consumption will back down within the operation limits of your model, the inverter will resume automatically.



Overload

3 PERMANENT INSTALLATION

The use of the Tundra International CM SERIES installation kits is strongly recommended.
These complete installation kits are custom designed to maximize the performances of our inverters and to promote the safest possible installation. It also helps eliminate the difficult task of sourcing the right material and to cut down on installation costs and time.

MAKE SURE TO USE THE RIGHT INSTALLATION KIT – YOU MAY REFER TO THE HEREAFTER SECTION OF OUR WEBSITE TO SELECT THE RIGHT KIT FOR YOUR INVERTER AND YOUR APPLICATION: **http://www.tundrainternational.com/en/pages/cmseries**

**** MORE THAN 30 MODELS ARE AVAILABLE***
CM SERIES installation kit content

- High quality cables - 6 to 12ft./pole (1.83 to 3.7m./pole) depending on the chosen kit
- Tin plated terminal lugs - crimped and color coded from factory
- 2 PVC strain reliefs - to safely run the cables through sheet metal floors
- Fuse kit - 1 CNL fuse rated for the chosen inverter and 1 holder
- Plastic "loom" tubing - to protect the cables from road hazards and other possible wear
- High endurance plastic cable ties - to secure the cables from one end to the other
- Hardware kit - includes all the required metal clamps and screws

Recommended tools
- Hole saw for metal
- Screw driver set
- Side cutters
- Drill bit set for metal
- Open end wrench set
- Power drill

CAUTION! Before installation, make sure that the inverter is turned "OFF."

3.1 Where to install

Your inverter should be installed in a location that meets the following requirements:

- Safe — Power inverters may produce sparks that can result in fire if exposed to flammable vapors. Find a location away from any kind of flammable liquids or flammable material. Never install the inverter in the same compartment as the batteries.

- Safe — A malfunction or accidental liquid spill may result in severe injuries or death. Always install the inverter in an isolated compartment, away from direct contact with persons.

- Dry — Keep the inverter away from any sort of liquid, rain, snow or other sources of moisture. The electricity produced by the inverter may spark which may result in severe injuries or death.

- Cool — Ambient air temperature should be between 32 and 131 degrees Fahrenheit (0 and 55^{o} Celsius). A sudden and heavy load while the inverter's temperature is below the freezing point may result in permanent damages on the inverter. Operating it above 131 degrees Fahrenheit (55°C) may cause the inverter to overheat and shut down.

- Ventilated — Ensure that the unit is located in a well-ventilated compartment. At least 6 inches (15.2cm) of clearance are required around the inverter for air flow. Verify that all ventilation openings on the unit (front and rear panels) are not obstructed.

CAUTION! **To avoid fire hazards and/or overheating, do not cover or obstruct any ventilation openings. Do not install the inverter in a zero clearance compartment.**

- Close to batteries: Install the inverter as close as possible to the batteries (but not in the same compartment) in order to minimize the cable length required to connect the inverter to the batteries. It is better and cheaper to run a longer AC cord (between the inverter and your appliances) than DC cables (between the inverter and the batteries). The distance between your inverter and the batteries should never exceed 12 feet (3.7m).

WARNING! **This equipment contains components that may produce arcs or sparks. To reduce the risk of fire or explosion, do not install in a compartment containing batteries or flammable materials, or in a location that requires ignition protected equipment.**

3.2 Mounting the inverter

The inverter must be mounted on a flat and even surface using the mounting flanges. Mounting hardware should be corrosion resistant, and strong enough to support the weight of the inverter. The inverter may be mounted on a vertical surface (the fans' opening must not point down) or on a horizontal surface. Upside down installation will damage your inverter.

If your inverter is equipped with a remote control, it is the right time to think about where to install it so you can run the jack at this stage of the installation.

3.3 Battery cables

Proper wiring is very important for safe and proper operation of the inverter. Because a power inverter has a low voltage / high current input, low resistance wiring and connections between the batteries and the inverter are essential in order to deliver the maximum amount of usable energy to your loads.

Our CM series installation kits are made with premium quality welding cables and of the proper gauge for maximum connectivity between the batteries and your inverter. Keep the cable length as short as possible by selecting the kit with the required cable length. This will ensure that the overall system efficiency will be as high as possible.

3.4 Strain reliefs installation

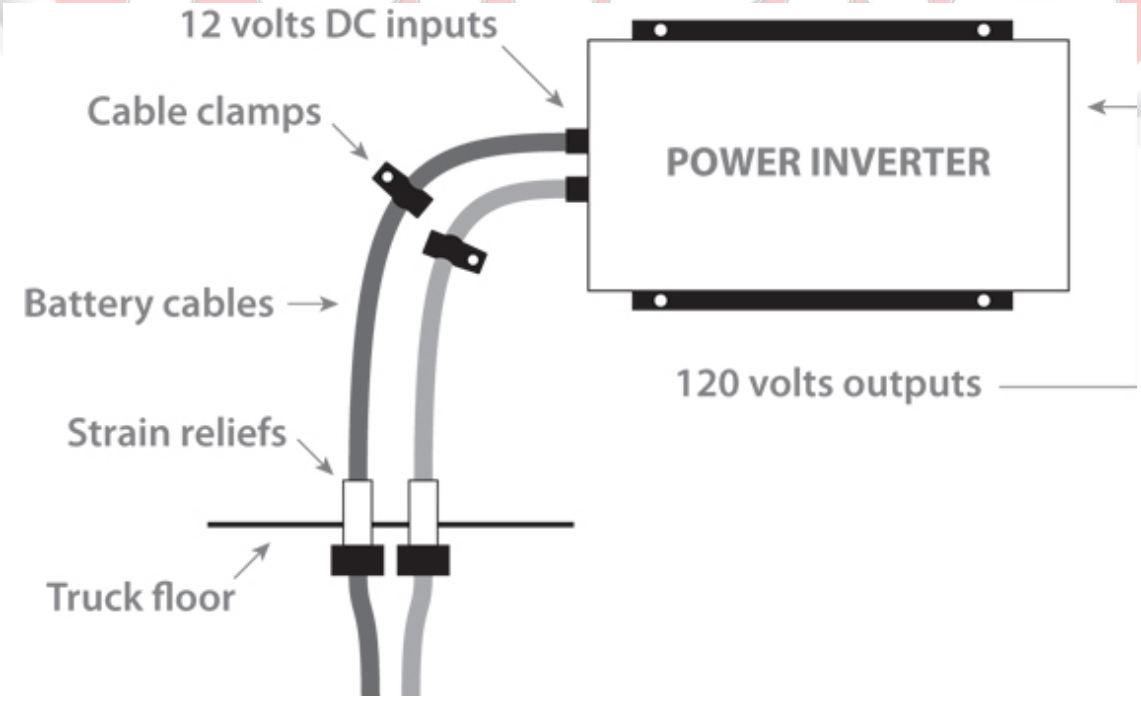
Close to the inverter, prepare to drill two holes (about 3 inches apart (7.6cm) in the truck's floor to install the two strain reliefs already installed on the DC cables. On a truck with a "sleeper"- be careful not to drill on cab cross-members as it may weaken the cabin structure. Also, be careful not to drill into hoses (Coolant or AC). Drill 1/8" pilot holes first to confirm you are in a convenient location to drill the larger holes. Strain reliefs vary in size upon the inverter capacity. Make sure to use the right size hole saw.

3.5 Ground (not the negative)

The inverter housing must be connected to the chassis or to a metallic panel connected to the chassis. This grounding procedure conforms to most electrical codes that require to derived AC sources to ground in case of malfunctioning. Most cab structures allowing for a strong install point for an inverter are generally linked to the chassis of the vehicle. For this reason, NO GROUNDING material is included in the CM Series installation kits. To make sure that your inverter is grounded properly, run a 12 volt test light from the positive terminal of your battery to your inverter mounting point; if the light comes on, your installation is OK. If not, use the lug on the rear panel and a #8 AWG copper cable to connect the inverter to a good grounding point.

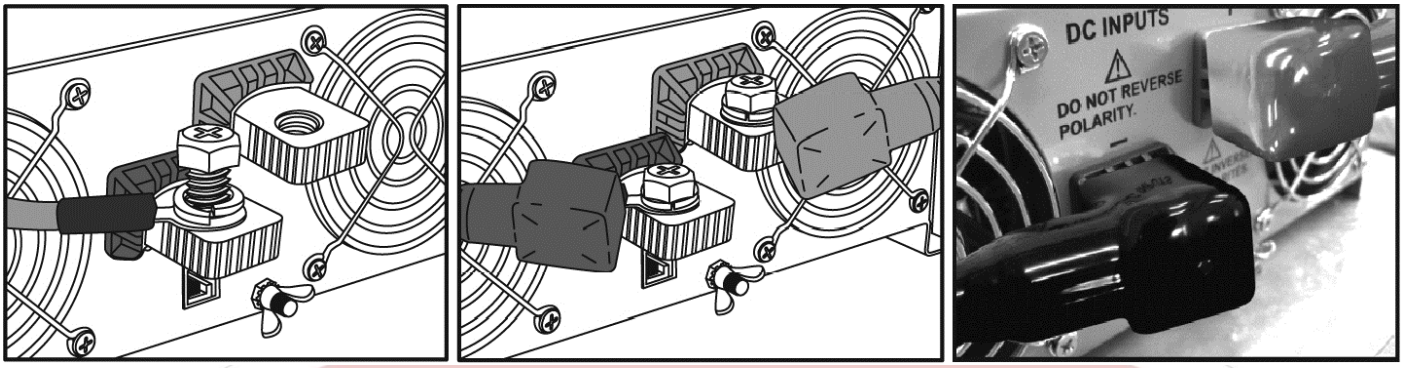
WARNING! Do not connect the ground lug to the negative input of the inverter. It will not provide the adequate level of safety required by most electrical codes.

Installation schema



3.6 Battery cables installation / Inside the cab

Insert the cables through the holes you just drilled in order to permanently install the strain reliefs. Tighten the nuts firmly using pliers or a wrench. Do not over tighten! Insert the include rubber insulators on the cables. Install cables on DC inputs of the inverter respecting the polarities. RED = POSITIVE (+) / BLACK = NEGATIVE (-). Install the rubber insulators. Adjust the cable length between the strain reliefs and the inverter DC input in order to allow minimal movement of the cables and consequently reduce the stress on the inverter's inputs. Install cable clamps to avoid unnecessary vibration.



3.7 Battery cables installation / Outside the cab

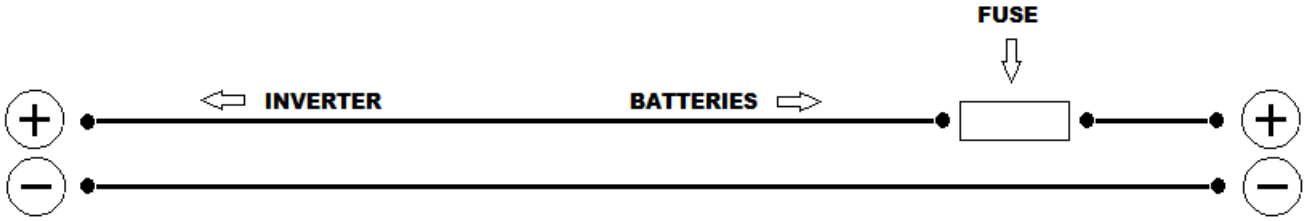
Starting from underneath the cab (from the strain reliefs), insert ALL the remaining portion of the battery cables in the plastic loom tubing. Run both cables together (tied together using the plastic cable ties) toward the batteries using the metal clamps and cross members as support.

CAUTION! **This step requires skill and carefulness. Cables must be strongly attached so they don't rub on anything sharp and away from exhaust pipes, AC lines, coolant lines.**

WARNING! **If your truck is equipped with an Air Ride system, cables must be able to move along with the cab. Make sure to leave a "half a loop" of cable at the intersection where the cables are linked between the cab and the battery box.**

3.8 DC fuse installation

First, assemble the DC fuse onto the DC fuse holder. Connect the positive cable coming from the cab to one side of the fuse, and connect the 1 foot cable (30.5cm) to the other side. Do not over tighten the nuts. The terminals must be solidly fixed onto the fuse holder providing maximum contact. Install the plastic cover.



CAUTION! **Not installing the fuse properly can result in fire that may cause severe injuries and/or damages.**

3.9 Battery connections

Cable connection at the batteries - Positive side

The Positive cable is fitted with a red heat shrink. Connect this cable to battery 1 by making sure the terminal is in full contact with battery link's terminals. If there is an accessory located on this pole, you must place it on top of the inverter terminal, NOT underneath.

Cable connection at the batteries - Negative side

The Negative cable is fitted with a black heat shrink. Connect this cable to the most distant possible battery (i.e.: battery 4) by making sure the terminal is in full contact with battery link's terminals. If there is an accessory located on this pole, you must place it on top of the inverter terminal, NOT underneath.

Attach all the cable on the battery links using the cable ties. Do not cut any excess cable. Just make sure it is properly attached.

CAUTION! **MAKE SURE THE INVERTER IS OFF BEFORE PROCEEDING.**

WARNING! **You may observe a spark when making the cable connections since current will flow for the first time to charge capacitors inside the inverter. This is normal. Always wear safety glasses and do not make cable connections in the presence of flammable fumes or material; it may result in explosion and/or fire.**

CAUTION! **Reversing the polarity when connecting the DC cables will permanently damage your inverter. THIS IS NOT COVERED BY THE WARRANTY.**

4 Operations

To operate the power inverter, turn it ON by using the ON/OFF switch on LCD remote control and/or the front panel. The inverter is now ready to deliver 120 Volt power to your loads. If you intend to operate several loads from the inverter, turn them ON one by one. This will prevent the inverter from having to provide the starting load for all devices simultaneously.

4.1 Operating limits

Power output: Your inverter is designed to deliver its full output capacity on a continuous basis, and has a 200% (double) power surge capacity for ±0.3 seconds. The power surge capacity CANNOT be considered as usable Wattage. It is strictly meant to quickly start the heavy loads.

Input voltage: The inverter will operate with an input voltage ranging between 10.5 and 15 Volt for the HTS (11 to 15 Volt for the HTST).

Optimum performance is achieved with an input voltage between 12.0 and 14.0 Volt.

If the voltage drops lower than 11.0 Volt for HTS (11.5 Volt for HTST), the low battery protection alarm will sound and battery sign on the remote will flash.

If the voltage drops below 10.5 Volt for HTS (11.0 Volt for HTST), ERR LOW code will display on the remote and the inverter will shut down automatically. This protects your batteries from being over-discharged. The inverter will automatically restart when the input voltage will rise above 13.2 Volt for at least 2 seconds.

The inverter also has a high voltage shut down. If the voltage exceeds 15 Volt, the high battery warning alarm will sound, the ERR HIGH code will display on the remote and the inverter will shut down until the input voltage drops below 15 Volt. This protects the inverter from excessive input voltage. While the inverter incorporates protection against over voltage, it may still be damaged if the input voltage exceeds 16 Volt.

4.2 Trouble loads - Television & CB radio interference

CB and television are designed to catch "frequencies" emitted by different devices. Inductive loads such as electric motors (ex: fridge compressor) can emit a magnetic field strong enough to be interpreted as a signal by television and CB radios.

If this occurs, the following steps may help eliminate the problem:

- Disconnect all inductive loads while using the TV or the CB Radio
- Move the television as far as possible from your inverter
- Use an extension cord to help dissipate the strength of the magnetic field.
- Make sure both DC battery cables are tied up together as much as possible (from the inverter to the batteries)

4.3 Trouble loads - Microwave

The power rating advertised on microwave ovens represents the cooking power which refers to the power being delivered to the food being cooked. The actual operating power requirement is approximately 40 to 100% higher than the advertised cooking power (i.e.: 600w microwave could consume +/- 960w). The actual power consumption is usually stated on the back of the microwave. If the operating power requirement cannot be found on the back of the microwave, check the owner's manual or contact the manufacturer.

* NOTE: Amperage x Voltage = Wattage (i.e.: 8A x 120Vac = 960W)

4.4 Trouble loads - Tools

The power rating of certain tools like circular saws or pumps refers to the power required during normal operation. The actual operating power requirement at start up may be up to 300% higher. In a tool application, it is recommended to buy an inverter more powerful than the tools seem to require, in order to be able to support the start-up surge required by certain tools.

5 Maintenance

Very little maintenance is required to keep the inverter operating properly:

- You should clean the immediate environment around the inverter to prevent dust accumulation on the circuitry inside the inverter
- DC input bolts should be tightened periodically
- Cables should be inspected regularly for exterior condition
- Terminals on batteries and the fuse must be cleaned twice a year
- You must also keep your batteries as clean as possible to prevent current loss that may affect inverter operation

CAUTION! If you work on the DC input terminals of your power inverter, disconnect both cables at the battery side to avoid any short circuit.

6 Troubleshooting

Problem	Possible cause	Solution
Fault codes and Alarms ***(alarm ON + inverter OFF)***		
ERR LOW = Low input voltage (Yellow LED flashing & steady alarm)	Discharged batteries	Recharge batteries
	Insufficient battery capacity	Add batteries
	Improper installation	Go through inverter's installation steps / Section 3 above
ERR HIGH = High input voltage (Yellow LED flashing & steady alarm)	Input voltage is higher than 15V.	Check vehicle alternator's condition
OVR LOAD = Overload (Yellow LED flashing & steady alarm)	Total consumption exceeds the inverter's nominal capacity	Remove or reduce loads, switch the inverter OFF at least 5 second and restart the inverter
	A short circuit / damages AC cord (120V)	Check the AC wiring (120 Volt)
	Defective appliances	Test your appliance on another power source to validate its good functioning
OVER TEMP (Yellow LED flashing & steady alarm)	Thermal shutdown	Allow inverter to cool off
		Improve ventilation
	Improper installation	Install according to recommendations / Section 3
Fault codes and alarms ***(alarm ON + inverter ON)***		
Battery symbol flashing (Green LED flashing & intermittent alarm)	Discharged batteries	Recharge batteries
	Poor battery condition	Replace batteries
	Poor DC connections	Clean all connections related to battery cables and DC fuse. Reduce the loads

No output voltage	Inverter OFF	Turn the inverter ON
	No DC power going into the inverter	Check the battery cables
		Check DC fuse on battery side of battery cables
		Check battery cables for corrosion or damages.
	Reverse DC polarity	Refer to the troubleshooting guide.
		Damages caused by reversed polarity are not covered by the warranty.

You may also refer to the troubleshooting guide:
http://www.tundrainternational.com/en/pages/troubleshooting_warranty

7 Specifications

7.1 HTS SERIES

Electrical Specifications	HTS1800	HTS2500	HTS3000
Output wave form	Pure sine wave	Pure sine wave	Pure sine wave
Continuous output power	1800 watts	2500 watts	3000 watts
Peak output power	3600 watts	5000 watts	6000 watts
AC output voltage	120 Vac ±5%	120 Vac ±5%	120 Vac ±5%
AC output frequency	60 Hz ±1%	60 Hz ±1%	60 Hz ±1%
AC output efficiency	98+%	98+%	98+%
DC input voltage range	10.5 ~ 15 Vdc	10.5 ~ 15 Vdc	10.5 ~ 15 Vdc
DC input efficiency	90%	90%	90%
Low battery voltage alarm	11 Vdc	11 Vdc	11 Vdc
Low battery voltage shutdown	10.5 Vdc	10.5 Vdc	10.5 Vdc
High battery voltage shutdown	15 Vdc	15 Vdc	15 Vdc
No load current draw	1.0 amp	1.0 amp	1.0 amp
Overload protection	YES	YES	YES
Automatic restart	YES	YES	YES
Reverse polarity protection	By fuses	By fuses	By fuses
High temperature shutdown	131 °F ±5%	131 °F ±5%	131 °F ±5%

General Specifications	HTS1800	HTS2500	HTS3000
Remote control (LCD display)	LCD / Included	LCD / Included	LCD / Included
AC receptacle	1 + hardwire	1 + hardwire	1 + hardwire
Cooling fans (thermostatic)	2 fans	3 fans	3 fans
Heat sinks	Twin / Internal	Twin / Internal	Twin / Internal
Housing type	Steel (self supporting)	Steel (self supporting)	Steel (self supporting)
DC connection type	Blocks / studs	Blocks / studs	Blocks / studs
Unit dimensions (inches)	20.3 x 10.8 x 4.1	21.7 x 10.8 x 4.1	21.7 x 10.8 x 4.1
Unit net weight (lbs)	15.9	17.6	17.6
Packaging dimensions (inches)	21.6 x 14.4 x 7,0	23.5 x 14.4 x 7,0	23.5 x 14.4 x 7,0
Packaging net weight (lbs)	17.6	19.8	19.8
Warranty	1 year	1 year	1 year

* Specifications are subject to change without notice.

7.2 HTST SERIES (Truck)

Electrical Specifications	HTS1800T	HTS2500T	HTS3000T
Output wave form	Pure sine wave	Pure sine wave	Pure sine wave
Continuous output power	1800 watts	2500 watts	3000 watts
Peak output power	3600 watts	5000 watts	6000 watts
AC output voltage	120 Vac ±5%	120 Vac ±5%	120 Vac ±5%
AC output frequency	60 Hz ±1%	60 Hz ±1%	60 Hz ±1%
AC output efficiency	98+%	98+%	98+%
DC input voltage range	11 ~ 15 Vdc	11 ~ 15 Vdc	11 ~ 15 Vdc
DC input efficiency	90%	90%	90%
Low battery voltage alarm	11.5 Vdc	11.5 Vdc	11.5 Vdc
Low battery voltage shutdown	11 Vdc	11 Vdc	11 Vdc
High battery voltage shutdown	15 Vdc	15 Vdc	15 Vdc
No load current draw	1.0 amp	1.0 amp	1.0 amp
Overload protection	YES	YES	YES
Automatic restart	YES	YES	YES
Reverse polarity protection	By fuses	By fuses	By fuses
High temperature shutdown	131 °F ±5%	131 °F ±5%	131 °F ±5%

General Specifications	HTS1800T	HTS2500T	HTS3000T
Remote control (LCD display)	LCD / Included	LCD / Included	LCD / Included
AC receptacle	1 + hardwire	1 + hardwire	1 + hardwire
Cooling fans (thermostatic)	2 fans	3 fans	3 fans
Heat sinks	Twin / Internal	Twin / Internal	Twin / Internal
Housing type	Steel (self supporting)	Steel (self supporting)	Steel (self supporting)
DC connection type	Blocks / studs	Blocks / studs	Blocks / studs
Unit dimensions (inches)	20.3 x 10.8 x 4.1	21.7 x 10.8 x 4.1	21.7 x 10.8 x 4.1
Unit net weight (lbs)	15.9	17.6	17.6
Packaging dimensions (inches)	21.6 x 14.4 x 7,0	23.5 x 14.4 x 7,0	23.5 x 14.4 x 7,0
Packaging net weight (lbs)	17.6	19.8	19.8
Warranty	1 year	1 year	1 year

* Specifications are subject to change without notice.

8 Limited one-year warranty

TUNDRA INTERNATIONAL INC. warrants its products against defects in material or workmanship for a period of one (1) year from the date of first consumer purchase. This warranty applies to the original purchaser (end-user) of the product only. This limited warranty is voided if the unit is abused, modified, installed improperly, if the housing has been removed, if the serial number is missing, or if the original identification markings have been defaced, altered, or removed or if there is a lack of maintenance. Tundra International Inc. is not liable for any incidental, consequential or other damages arising from the use, misuse, or operation of this product; including, without limitation, damages resulting from loss of use, cost of removal, installation, or troubleshooting of the customer's electrical systems.

A. The end customer must certify that he has read and understood the related **Troubleshooting Guide*** and, to his knowledge, the origin of the problem is not the vehicle or the installation.

   FOR TECHNICAL SUPPORT, CONTACT US AT 450-649-2470 or 1-877-964-2582

B. The product should have never been abused or modified.
C. The product should have never been exposed to liquids, heavy dust or corrosive material.

STEPS:

1. The merchant and/or the end customer MUST fill a Warranty Form*
2. The merchant and/or the end customer MUST contact us to get an RMA number.
3. A proof of purchase MUST BE INCLUDED with ALL returned products.
4. The returned product MUST BE PROPERLY PACKAGED to prevent shipping related damages. Shipping related damages are not covered by the warranty.
5. All defective products MUST be sent with all shipping charges PREPAID.
6. Returned products will be evaluated by our technical department where a decision will be made as to whether the product is covered by the warranty will be repaired, replaced or credited.

*** THE "TROUBLESHOOTING GUIDES" AND "WARRANTY FORMS" ARE AVAILABLE IN THE DOWNLOAD SECTION OF OUR WEBSITE**

ALL DEFECTIVE PRODUCTS COVERED BY THE WARRANTY WILL BE RETURNED FREE OF CHARGE.