samlexpower®

Pure Sine Wave Power Inverter

NTX-1000-12
NTX-1500-12
NTX-2000-12
NTX-3000 -12
NTX-3000S-12

NTX-1000-24
NTX-1500-24
NTX-2000-24
NTX-3000-24
NTX-3000S-24

Owner's Manual

Please read this manual BEFORE installing your inverter.

OWNER'S MANUAL | Index

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SECTION 1 | Important Safety Instructions

1.1 THIS MANUAL CONTAINS IMPORTANT INFORMATION REGARDING SAFETY, OPERATION, MAINTENANCE AND STORAGE OF THIS PRODUCT. BEFORE USE, READ AND UNDERSTAND ALL CAUTIONS, WARNINGS, INSTRUCTIONS AND PRODUCT LABELS, PLUS YOUR VEHICLE'S BATTERY MANUFACTURER GUIDELINES. FAILURE TO DO SO COULD RESULT IN INJURY AND/OR PROPERTY DAMAGE.

1.2 To ensure reliable service, your power inverter must be installed and used properly. Please read the installation and operating instructions thoroughly prior to installation and use. Pay particular attention to the WARNING and CAUTION statements in this manual. The CAUTION statements advise against certain conditions and practices that may result in damage to your inverter. The WARNING statements identify conditions or practices that may result in personal injury. Read All Instructions Before Using This power inverter!

1.3 WARNINGS!

TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, EXPLOSION OR INJURY

1. The AC output of the unit should never be connected directly to an Electrical Breaker Panel / Load Center which is also fed from the utility power / generator. Such a direct connection may result in parallel operation of the different power sources and AC power from the utility / generator will be fed back into the unit which will instantly damage the output section of the unit and may also pose a fire and safety hazard. If an Electrical Breaker Panel / Load Center is fed from this unit and this panel is also required to be fed from additional alternate AC sources, the AC power from all the AC sources (like the utility / generator / this inverter) should first be fed to an Automatic / Manual Selector Switch and the output of the Selector Switch should be connected to the Electrical Breaker Panel / Load Center. Samlex America, Inc. Automatic Transfer Switch Model No. STS-30 is recommended for this application.

2. Working with the unit may produce arcs or sparks. Thus, the unit should not be used in areas where there are flammable materials or gases requiring ignition protected equipment. These areas may include spaces containing gasoline-powered machinery, fuel tanks, battery compartments and engine compartments.

3. In NTX-3000-12/24 and NTX-3000S-12/24, the Neutral terminal of the receptacles are electrically isolated from its Ground terminal and also from the metal chassis of the inverter. Hence, the Neutral terminal will be at elevated voltage of around 66 VAC with respect to the Ground terminal and with respect to the metal chassis of the inverter. DO NOT TOUCH THE NEUTRAL TERMINAL!

4. In NTX-1000-12/24, NTX-1500-12/24 and NTX-2000-12/24, the Neutral terminals of the Dual NEMA5-20R GFCI AC outlets are bonded to their Ground terminals and also to the metal chassis of the inverter. Hence, the Neutral terminals of the outlets will be at 0V with respect to their Ground terminals and with respect to the metal chassis of the inverter.

5. DC input is non-isolated from AC output.

6. Before working on an AC load connected to the inverter, switch OFF the inverter or, remove the power cord of the AC load from the inverter or from the multiple outlet power strip connected to the inverter. Switching OFF the AC load or the power strip disconnects only the "Line / Hot" line. However, the Neutral line remains connected. As indicated above, in NTX-3000-12/24 and NTX-3000S-12/24, the Neutral will be at 66V with respect to Ground/chassis. Hence, touching any section of the load connected to the Neutral will produce electrical shock!

7. Do not make any electrical connections or disconnections in areas designated as IGNITION PROTECTED. This includes 12 VDC cigarette plug connections, and terminal connections.

8. This is not a toy - keep away from children.

9. Do not insert any object into the ventilation slots or the fan opening(s).

SECTION 1 | Important Safety Instructions



MISE EN GARDE!

POUR RÉDUIRE LES RISQUES D'INCENDIE, DE DÉCHARGE ÉLECTRIQUE, D'EXPLOSION OU DE BLESSURE

1. La puissance AC de l'unité ne doit jamais être connecté directement à un disjoncteur électrique / Centre de charge qui est également alimentée par l'utilitaire d'alimentation / le générateur. Un tel lien peut résulter en fonctionnement en parallèle des différentes sources d'alimentation et cordon d'alimentation de l'utilitaire / générateur va être réinjectées dans l'unité qui va instantanément des dommages de la section des sorties de l'unité et peuvent également poser un danger d'incendie et de sécurité. Si un disjoncteur électrique / Centre de charge est alimentée par cette unité et ce panneau est également requis pour être alimenté à partir d'secondaires supplémentaires AC sources, le cordon d'alimentation de toutes les sources de courant AC (comme l'utilitaire / generateur / cet onduleur) devraient d'abord être transmise à un sélecteur automatique/ manuel et la sortie du sélecteur doit être connecté à l'disjoncteur électrique / Centre de charge. Samlex America, Inc. No de modèle de commutateur de transfert automatique STS-30 est recommandé pour cette application.
2. Travailler avec l'unité peut produire des arcs ou d'étincelles. Ainsi, l'unité ne doit pas être utilisé dans des zones où il y a des matériaux inflammables ou les gaz nécessitant une protection contre l'inflammation de l'équipement. Ces domaines peuvent inclure des espaces contenant des machines fonctionnant à l'essence, les réservoirs de carburant, les compartiments de batterie et les compartiments moteur.
3. Dans NTX-3000-12/24, la borne neutre des NEMA L5-30R outlet est R5-12 isolée électriquement de sa borne de masse et aussi du châssis métallique de l'onduleur. Par conséquent, la borne neutre sera à tension élevée d'environ 66 ACC en ce qui concerne la borne de masse et avec respect au châssis métallique de l'onduleur. NE TOUCHEZ PAS LA BORNE NEUTRE!
4. Dans NTX-1000-12/24, NTX-1500-12/24 et NTX-2000-12/24, les bornes neutres de la double NEMA prises AC GFCI R5-20 sont collés à leurs bornes de masse et aussi au châssis métallique de l'onduleur. Par conséquent, les bornes neutres des établissements seront à 0V à l'égard de leurs bornes de masse et avec respect au châssis métallique de l'onduleur.
5. L'entrée CC est non-isolés de production AC.
6. Avant de travailler sur une charge CA connectés à l'onduleur, éteindre l'onduleur, ou retirez le cordon d'alimentation de l'AC la charge du convertisseur ou de la plaquette multiprises de sortie multiples connectés à l'onduleur. Couper la charge CA ou de la multiprise disjoncte uniquement la "ligne / Hot" ligne. Cependant, la ligne neutre reste connecté. Comme indiqué ci-dessus, dans la position neutre, NTX-3000-12/24 sera à 60V par rapport à la masse/ châssis. Par conséquent, le toucher n'importe quelle section de la charge connectée au point mort va produire un choc électrique !
7. Ne pas effectuer des branchements électriques quelconques ou de déconnexions dans les zones désignées comme protégées contre l'incendie. Cela comprend 12 VCC cigarette les connexions, et les connexions de borne.
8. Ce n'est pas un jouet - Tenir hors de portée des enfants.
9. N'insérez aucun objet dans les orifices de ventilation ou dans l'ouverture du ventilateur(s).

SECTION 1 | Important Safety Instructions

1.4 CAUTION!

1. The metal chassis and the input Negative terminal of the inverter are internally connected to the Ground terminals of the AC outlets. **Hence, the input Negative terminal should be used as the grounding terminal.** Do not use with Positive Grounded Electrical Systems (the majority of modern automobiles, RVs and trucks are Negative Grounded Electrical Systems).
2. Use specified fuse in the Positive supply connection within 7" of the Positive battery post. See Table 4.1 and Fig 4.2.
3. Observe correct polarity when connecting the DC input terminals of the inverter to the battery. Connect Positive of the battery to the Positive input connector of the inverter and the Negative of the battery to the Negative input terminal of the inverter. **Reverse polarity connection will result in a blown fuse and may cause permanent damage to the inverter. Damage due to reverse polarity is not covered under warranty.**
4. This inverter will not operate high wattage appliances that exceed the output power limit or the surge power limit.
5. Grounding the Neutral terminal of the AC outlet in NTX-3000-12/24 and NTX-3000S-12/24 will shut down the inverter. Similarly, grounding the Neutral terminal of the GFCI outlet in NTX-1000-12/24, NTX-1500-12/24 and NTX-2000-12/24 will trip the GFCI. **Hence, do not connect the AC output to a Load Center / Distribution Panel where the Neutral is bonded to the Earth Ground.**
6. **Installation Environment**
   - The inverter should be installed indoor only in a well ventilated, cool, dry environment.
   - Do not expose to moisture, rain, snow or liquids of any type.
   - To reduce the risk of overheating and fire, do not obstruct the suction and discharge opening of the cooling fan(s).
   - To ensure proper ventilation, do not install in a low clearance compartment.
7. **Precautions When Working With Batteries**
   - Batteries contain very corrosive diluted Sulfuric Acid as electrolyte. Precautions should be taken to prevent contact with skin, eyes or clothing.
   - Batteries generate Hydrogen and Oxygen during charging resulting in evolution of explosive gas mixture. Care should be taken to ventilate the battery area and follow the battery manufacturer's recommendations.
   - Never smoke or allow a spark or flame near the batteries.
   - Use caution to reduce the risk of dropping a metal tool on the battery. It could spark or short circuit the battery or other electrical parts and could cause an explosion.
   - Remove metal items like rings, bracelets and watches when working with batteries. The batteries can produce a short circuit current high enough to weld a ring or the like to metal and, thus, cause severe burn.
   - If you need to remove a battery, always remove the ground (Negative) terminal from the battery first. Make sure that all the accessories are off so that you do not cause a spark.
8. This inverter is not tested for use with medical devices.

SECTION 1 | Important Safety Instructions

ATTENTION!

1. Le châssis métallique et la borne négative d'entrée de l'inverseur sont connectés en interne à la masse les bornes de l'AC outlets. **Par conséquent, la prise négative du terminal devrait être utilisée comme borne de terre.** Ne pas l'utiliser avec la prise positive des systèmes électriques de mise à la terre (la plupart des voitures modernes, les véhicules de camping et les camions et ont des systèmes électriques de mise à la terre négative).
2. Utiliser spécifié fusible dans le liaison alimentation positive au sein de 7" de la borne positive de la batterie. Voir le tableau 4.1 et la figure 4.2.
3. Lorsque vous connectez les bornes aux prises CC du convertisseur vers la batterie, observez une polarité appropriée. Connectez le pôle positif de la batterie à la prise de connexion positive du convertisseur et le pôle négatif de la batterie à la prise de connexion négative du convertisseur. **Une connexion à polarité inversée ferait sauter le fusible et pourrait causer des dommages irréparables au convertisseur. Les dommages causés par une polarité inversée ne sont pas couverts par la garantie.**
4. Ce convertisseur ne pourra faire fonctionner des appareils de forte puissance qui dépassent la limite de courant de la prise ou la limite de surtension.
5. Si la borne Neutre de la prise CA du NTX-3000-12/24 est mise à la terre, l'onduleur se ferme. Semblablement, si la borne Neutre de la prise du disjoncteur des onduleurs NTX-1000-12/24, NTX-1500-12/24 ou NTX-2000-12/24 va déclencher le disjoncteur. Donc, connectez pas la sortie CA à une centre de charge/ panneau de distribution si le neutre est mis à la terre.
6. **Environnement d'installation**
   - Le convertisseur doit être installée en intérieur uniquement dans un local bien ventilé, cool, environnement sec.
   - Ne pas exposer à l'humidité, la pluie, la neige ou les liquides de tout type.
   - Afin de réduire le risque de surchauffe et d'incendie, ne pas obstruer l'ouverture d'aspiration et de décharge du ventilateur de refroidissement(s).
   - Afin de garantir une ventilation correcte, ne l'installez pas dans un compartiment à faible dégagement.
7. **Précautions à prendre lors de travaux avec des batteries**
   - Les piles contiennent très corrosif de l'acide sulfurique dilué comme électrolyte. Des précautions devraient être prises pour prévenir tout contact avec la peau, les yeux ou les vêtements.
   - Les batteries produisent de l'hydrogène et d'oxygène pendant la charge résultant de l'évolution de mélange de gaz explosifs. Le soin devrait être pris pour ventiler la zone de batterie et suivre les recommandations du fabricant de la batterie.
   - Ne fumez jamais ou permettre à une étincelle ou une flamme à proximité des batteries.
   - Faire preuve de prudence afin de réduire le risque de chute d'un outil métallique sur la batterie. Il pourrait susciter ou court-circuit de la batterie ou d'autres pièces électriques et pourrait provoquer une explosion.
   - Retirer les articles en métal tels que bagues, bracelets et montres lors de travaux avec des batteries. Les batteries peuvent produire un courant de court circuit suffisamment élevé pour souder un anneau ou similaires de métal et, par conséquent, causer de graves brûlures.
   - Si vous devez retirer une batterie, retirez toujours la borne de masse (négative) de la batterie en premier. Assurez-vous que tous les accessoires sont désactivés de sorte que vous n'avez pas provoquer une étincelle.
8. Ce convertisseur n'a pas été testé pour son utilisation avec des appareils médicaux.

SECTION 1 | Important Safety Instructions

1.5  WARNING!

Do not connect directly to AC distribution wiring. This inverter is NOT grid interactive.

 **MISE EN GARDE!**

Ne pas connecter directement à un câblage de distribution CA. Ce convertisseur n'est pas interactif avec le réseau.

1.6 IMPORTANT WIRING INFORMATION

Substantial power loss and reduced battery operating time results from inverters installed with wires that are not sized correctly based on the length and the current required to be carried. Current flowing through a wire produces voltage drop along its length due to the resistance of the wire and due to the value of the current carried through it. The resistance of the wire is inversely proportional to the cross-sectional area of the wire (designated in mm^2 or AWG) and directly proportional to its length i.e. thinner and longer wire has higher resistance and hence, produces higher voltage drop. Similarly, thicker and shorter wire has lower resistance and hence, produces lower voltage drop. Hence, symptoms of low DC input voltage / battery power can result from wires that are either excessively long or have an insufficient cross-sectional area (designated in mm^2 or AWG). **The wires should be sized based on (i) the maximum current they are required to carry based on the temperature rating of their insulation and (ii) the distance between the battery and the inverter to limit the voltage drop to 2% to 5%. Please refer to Table 4.1 for wire sizing.**

Wires are rated based on its insulation, temperature and operating environment. Please ensure that the wire insulation is of the appropriate type for the operating environment.

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 wires and appliance wiring.

SECTION 2 | Design Features And Principle Of Operation

2.1 GENERAL

The inverter converts low voltage DC (Direct Current) from a battery or other DC power source to the standard nominal 115 volt AC (Alternating Current) household power.

2.2 DESIGN FEATURES

- Pure Sine Waveform of AC output voltage
- High efficiency
- Compact size
- Very low Idle current
- Soft Start Technology
- LCD Remote Control Model NTX-RC
- Low noise variable speed fan

SECTION 2 | Design Features and Principle of Operation

2.3 POWER RATINGS

The continuous power ratings of the models are as follows:

- NTX-1000-12, NTX-1000-24 - 1000 Watts
- NTX-1500-12, NTX-1500-24 - 1500 Watts
- NTX-2000-12, NTX-2000-24 - 2000 Watts
- NTX-3000-12, NTX-3000-24 - 3000 Watts
- NTX-3000S-12, NTX-3000S-24 - 3000 Watts

2.4 PRINCIPLE OF OPERATION

The voltage conversion takes place in two stages. In the first stage, the DC voltage of the battery is converted to a high voltage DC using high frequency switching and Pulse Width Modulation (PWM) technique. In the second stage, the high voltage DC is converted to 115 VAC, 60 Hz pure sine wave AC again using PWM technique. This is done by using a special wave shaping technique where the high voltage DC is switched at a high frequency and the pulse width of this switching is modulated with respect to a reference sine wave.

2.5 THE OUTPUT WAVEFORM

The AC output waveform of the NTX-series inverter is known as "Pure Sine Wave" or "True Sine Wave". It is a waveform that has characteristics same as the sine wave shape of utility power (See Fig 2.1). Modified Sine Wave is also shown for comparison.

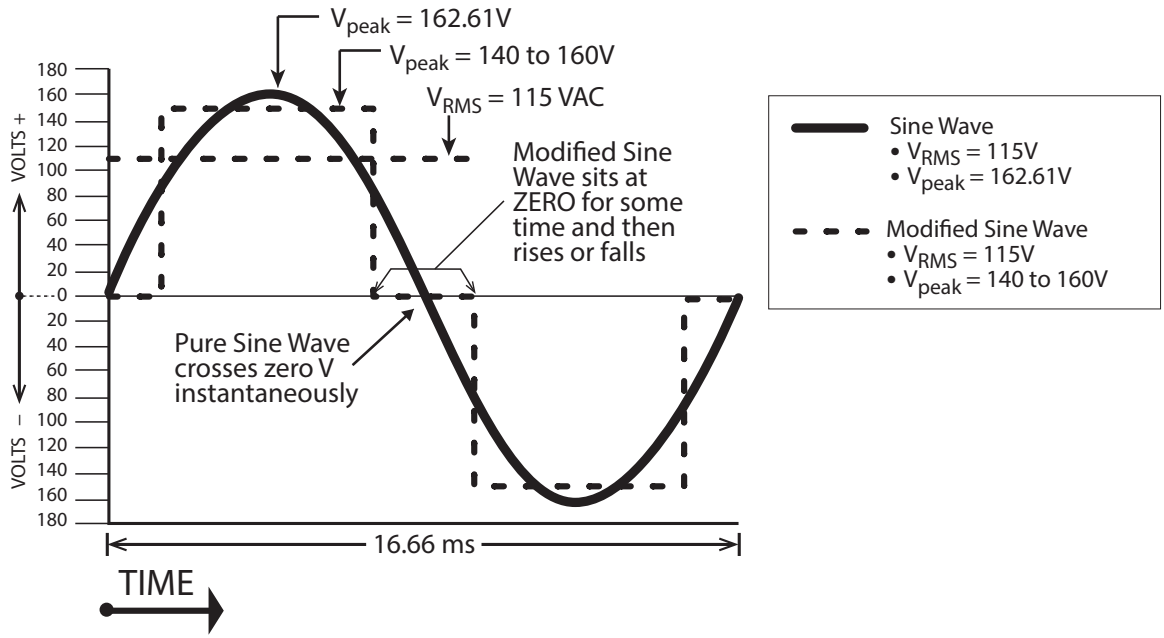


Fig 2.1 Pure and Modified Sine Waveforms for 115V, 60Hz

SECTION 3 | Layout and Dimensions

3.1 NTX-1000-12/24, NTX-1500-12/24 AND NTX-2000-12/24 LAYOUT

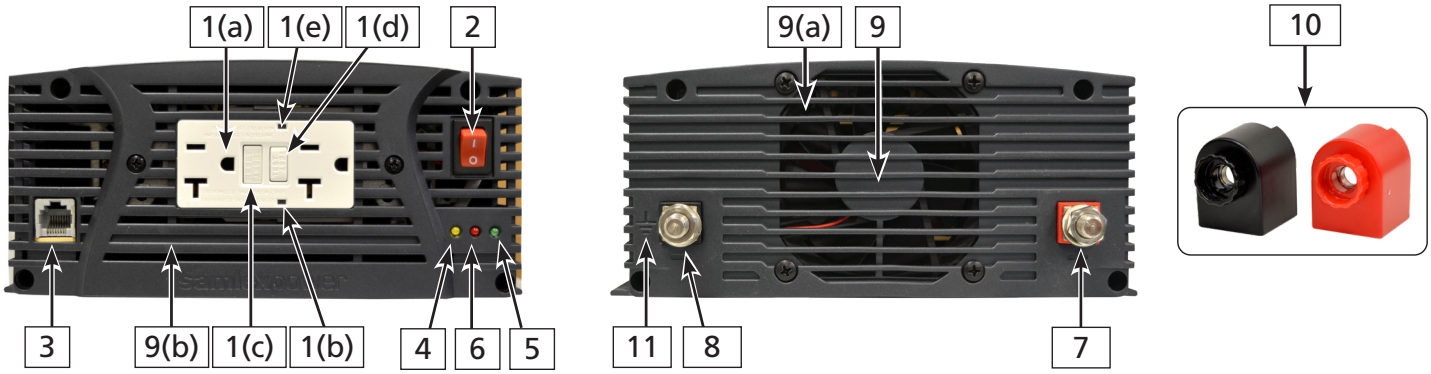


Fig 3.1.1 Front and Back VIEW of NTX-1000/1500/2000-12/24

Legend for Fig 3.1.1

1(a). AC Outlets: NEMA5-20R Duplex GFCI receptacles
1(b). Green indicator light on the GFCI receptacles. Will be ON when normal. Will be OFF when tripped.
1(c). GFCI Reset Button
1(d). GFCI Test Button
1(e). Red LED for end of life alarm for GFCI
2. ON/OFF Switch
3. 8P8C Modular Jack (Also called RJ-45 Jack) for connecting Remote Control Model NTX-RC
4. Yellow LED: Will be ON during (i) Over temperature shutdown, (ii) Shut down due to low DC input voltage and (iii) Shut down due to high DC input voltage.
5. Green LED: Will be ON when DC Section is operating normally
6. Red LED: Will be ON during shut down due to overload / short circuit on the load side.
7. Positive DC Input Connector: Stud and Nut – Size M9
8. Negative DC Input Connector: Stud and Nut – Size M9
9. Cooling fan [behind the fan grille 9(a)]
   9(a).Ventilation grille for fan [Air from fan (9) is exhausted outwards]
   9(b).Ventilation slots for air intake for the cooling fan (9)
10. Plastic covers with Thumb Nuts for protecting DC input terminals – Red for Positive and Black for Negative
11. Earth Ground symbol. The metal chassis of the inverter is internally bonded to the Negative DC input terminal (8). Connect the Negative DC input terminal (8) on the inverter or the battery Negative post on the battery to Earth Ground

SECTION 3 | Layout and Dimensions

3.2 NTX-3000-12/24 AND NTX-3000S-12/24 LAYOUT

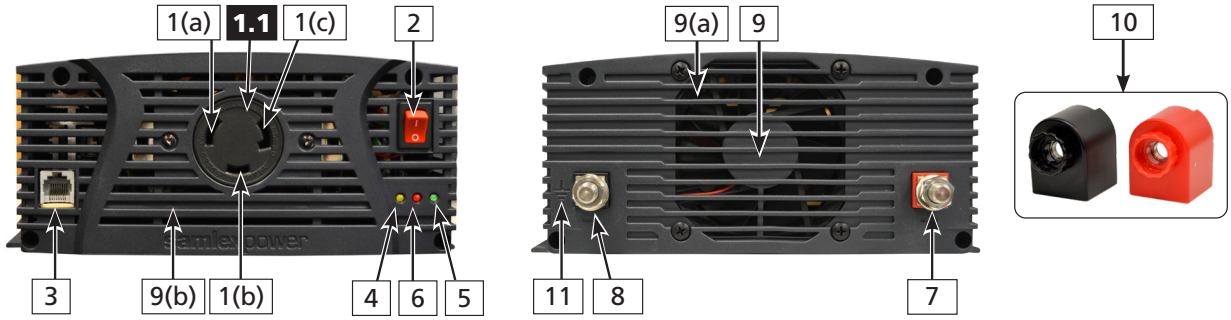


Fig 3.2.1 Front & Back VIEW of NTX-3000-12/24

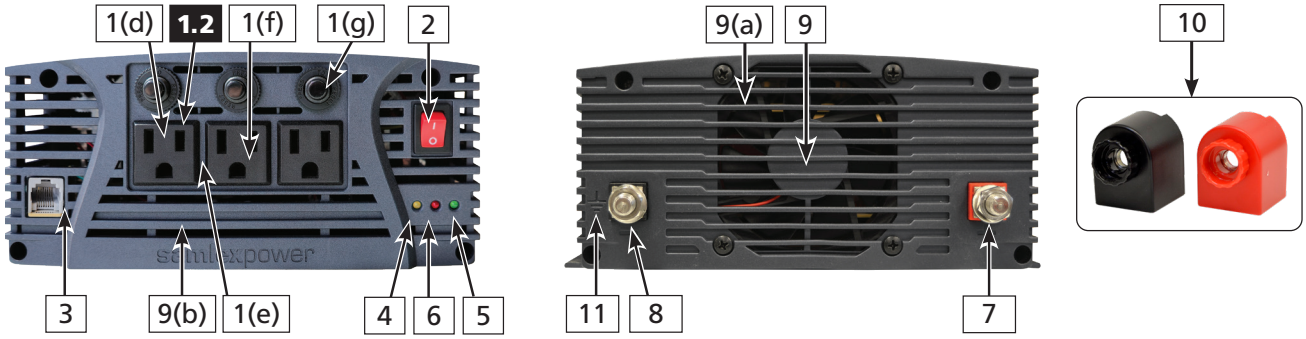


Fig 3.2.2 Front & Back VIEW of NTX-3000S-12/24

Legend for Fig 3.2.1 and 3.2.2

1.1 Receptacle 30A Type NEMA L5-30R*
- 1(a). Line Slot of Receptacle NEMA L5-30R
- 1(b). Neutral Slot of Receptacle NEMA L5-30R
- 1(c). Ground Slot of Receptacle NEMA L5-30R

1.2 Receptacle 15A NEMA 5-15R
- 1(d). Line Slot of Receptacle NEMA 5-15R
- 1(e). Neutral Slot of Receptacle NEMA 5-15R
- 1(f). Ground Slot of Receptacle NEMA 5-15R
- 1(g). Push Button 15A Circuit Breaker

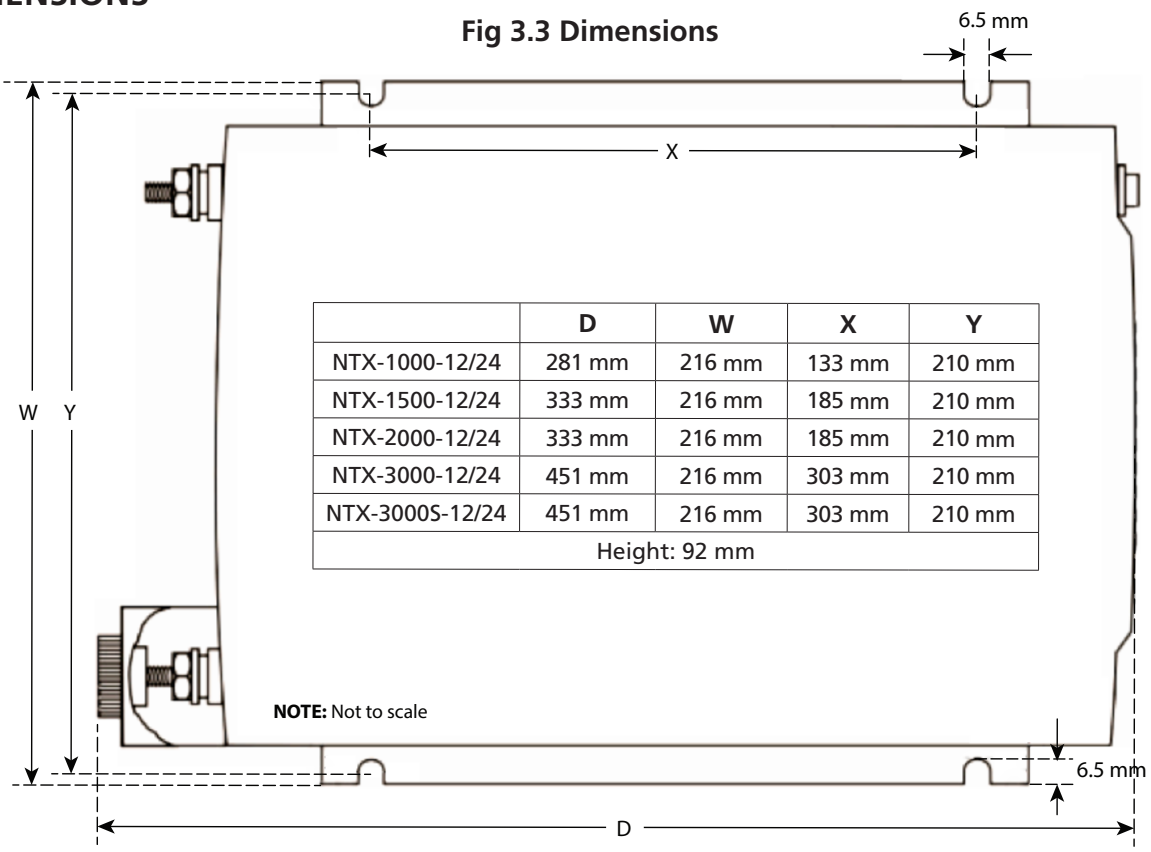
2. ON/OFF Switch
3. 8P8C Modular Jack (Also called RJ-45 Jack) for connecting Remote Control Model NTX-RC
4. Yellow LED: Will be ON during (i) Over temperature shutdown, (ii) Shut down due to low DC input voltage and (iii) Shut down due to high DC input voltage
5. Green LED: Will be ON when DC Section is operating normally
6. Red LED: Will be ON during (i) Shut down due to overload / short circuit on the load side and (ii) Shut down due to Ground fault on the load size.
7. Positive DC Input Connector: Stud and Nut – Size M9
8. Negative DC Input Connector: Stud and Nut – Size M9
9. Cooling fan [behind the fan grille 9(a)]
   - 9(a). Ventilation grille for fan [Air from fan (9) is exhausted outwards]
   - 9(b). Ventilation slots for air inlet for the cooling fan (9)
10. Plastic covers with Thumb Nuts for protecting DC input terminals – Red for Positive and Black for Negative
11. Earth Ground symbol. The metal chassis of the inverter is internally bonded to the Negative DC input terminal (8). Bond the negative to earth or chassis.

* **NOTE:** 125 VAC, 30A Locking Type of Plug (NEMA-30P) has been provided with the unit for wiring to Breaker Panel or Load Center that has Neutral to Ground bond [Refer to Section 4.13.2(c)].

SECTION 3 | Layout and Dimensions

3.3 DIMENSIONS

Fig 3.3 Dimensions



	D	W	X	Y
NTX-1000-12/24	281 mm	216 mm	133 mm	210 mm
NTX-1500-12/24	333 mm	216 mm	185 mm	210 mm
NTX-2000-12/24	333 mm	216 mm	185 mm	210 mm
NTX-3000-12/24	451 mm	216 mm	303 mm	210 mm
NTX-3000S-12/24	451 mm	216 mm	303 mm	210 mm
Height: 92 mm				

WARNING!

1. Before commencing installation, please read the safety instructions explained in Section 1 titled “Important Safety Instructions”.
2. It is recommended that the installation should be undertaken by a qualified, licensed / certified electrician.
3. Various recommendations made in this manual on installation will be superseded by the National / Local Electrical Codes related to the location of the unit and the specific application.

MISE EN GARDE!

1. Avant de faire l’installation, veuillez lire les «Consignes de Sécurité».
2. On recommande que l'installation soit faite par un(e) électricien(ne) CERTIFIÉ(E).
3. Il y a plusieurs consignes trouvées dans ce guide qui ne sont pas toujours appliquables si une norme nationale ou locale en prend place, concernant par example l'endroit d'installation ou à l'usage de l'appareil. Quelques exemples sont écrites ci-dessous.

SECTION 4 | Installation

4.1 LOCATION OF INSTALLATION

Please ensure that the following requirements are met:

Working Environment: Indoor use.

Cool: Heat is the worst enemy of electronic equipment. Hence, please ensure that the unit is installed in a cool area that is also protected against heating effects of direct exposure to the sun or to the heat generated by other adjacent heat generating devices.

Well ventilated: The unit is cooled by convection and by forced air-cooling by a load and temperature controlled variable speed fan (9, Figs 3.1.1, 3.2.1 and 3.2.2). The fan will start running slowly at around 15% loading. At around 70% rated load, it will run at high speed. At any point, if the internal temperature is > 70°C, the fan will run at high speed (temperature control will override load control). The fan draws cool air from air intake openings in the front [9(b) in Figs 3.1.1, 3.2.1 and 3.2.2} and discharges hot air through the exhaust openings next to the fan [9(a) in Figs 3.1.1, 3.2.1 and 3.2.2}. To avoid shut down of the inverter due to over temperature, do not cover or block these intake / exhaust openings or install the unit in an area with limited airflow. Keep a minimum clearance of 10" around the unit to provide adequate ventilation. If installed in an enclosure, openings must be provided in the enclosure, directly opposite to the air intake and air exhaust openings of the inverter.

Dry: There should be no risk of condensation, water or any other liquid that can enter or fall on the unit.

Clean: The area should be free of dust and fumes. Ensure that there are no insects or rodents. They may enter the unit and block the ventilation openings or short circuit electrical circuits inside the unit.

Protection against fire hazard: The unit is not ignition protected and should not be located under any circumstance in an area that contains highly flammable liquids like gasoline or propane as in an engine compartment with gasoline-fueled engines. Do not keep any flammable / combustible material (i.e., paper, cloth, plastic, etc.) near the unit that may be ignited by heat, sparks or flames.

Closeness to the battery bank: Locate the unit as close to the battery bank as possible to prevent excessive voltage drop in the battery cables and consequent power loss and reduced efficiency. However, the unit should not be installed in the same compartment as the batteries (flooded or wet cell) or mounted where it will be exposed to corrosive acid fumes and flammable Oxygen and Hydrogen gases produced when the batteries are charged. The corrosive fumes will corrode and damage the unit and if the gases are not ventilated but allowed to collect, they could ignite and cause an explosion.

Accessibility: Do not block access to the front panel. Also, allow enough room to access the AC receptacles and DC wiring terminals and connections, as they will need to be checked and tightened periodically.

Preventing Electromagnetic Interference (EMI): The unit uses high power switching circuits that generate un-intentional conducted and radiated EMI that can not be eliminated entirely. This EMI is limited to the required standard [FCC Part 15(B), class A]. These limits are designed to provide reasonable protection against harmful interference when this unit is operated in business / commercial / industrial environments. Locate any electronic equipment susceptible to radio frequency and electromagnetic interference as far away from the inverter as possible.

4.2 MOUNTING

Please refer to Fig 3.3 for dimensions, and Fig. 4.1 mounting details.

The inverter has four mounting slots 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 electrically efficient to use longer AC wiring than DC wiring, so install the inverter as close as possible to the DC power source.

The inverter can be operated in any position, however, if it is to be mounted on a wall, mount it horizontally as shown in Fig 4.1(a) so that indicators, switches, outlets and terminal blocks located on the front panel are visible and accessible. Do not mount on wall in positions shown in Figs. 4(b) & 4(c) because small metal objects may fall into the unit through the ventilation slots and cause electrical short circuit.

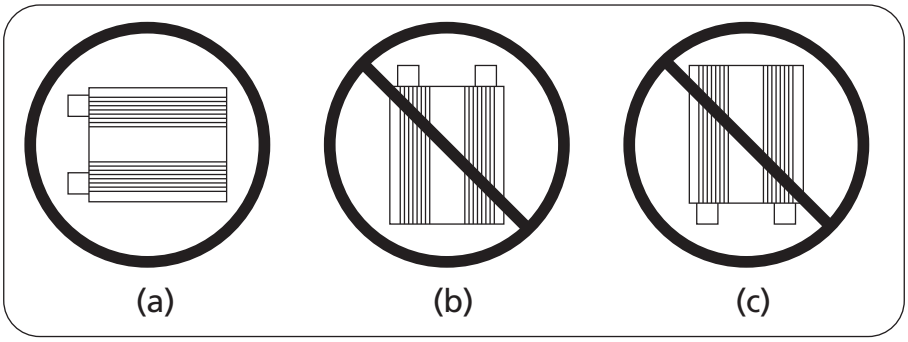


Fig. 4.1 Mounting arrangement on wall

CAUTION!

The 12V models must be connected only to batteries with a nominal output voltage of 12V. The unit will sustain **permanent damage** if connected to a 24V battery.

ATTENTION!

Le convertisseur de courant ne doit être connecté qu'à des batteries ayant une sortie de voltage nominale de 12 V. L'unité ne fonctionnera pas à partir d'une batterie de 6 volts et subira **des dégâts permanents** si elle est connectée à une batterie de 24 volts.

CAUTION!

Loose connectors may cause overheated wires and melted insulation. Check to make sure you have not reversed the polarity of battery input connections. Reverse polarity connection will result in a blown fuse and may cause **permanent damage** to the inverter. **Damage due to reverse polarity is not covered by warranty.**

ATTENTION!
Des connexions mal serrées peuvent provoquer une surchauffe des fils et la fusion de l'isolation. Vérifiez que vous n'avez pas inversé la polarité des connexions d'entrée de la batterie. Une polarité inversée fera sauter le fusible et pourrait causer **des dégâts permanents** au convertisseur. **Les dégâts provoqués par une polarité inversée ne sont pas couverts par la garantie.**

4.3 BATTERY / DC POWER SOURCE REQUIREMENTS

The battery / DC power source must be within 11 VDC to 16.3 VDC for 12V units / 22 VDC to 32 VDC for 24V units, and must be able to supply the necessary current to operate the load. The power source may be a battery or a well-regulated DC power supply. To obtain a rough estimate of the current (in Amperes) the power source must deliver, simply divide the power consumption of the load (in Watts AC) by 10.

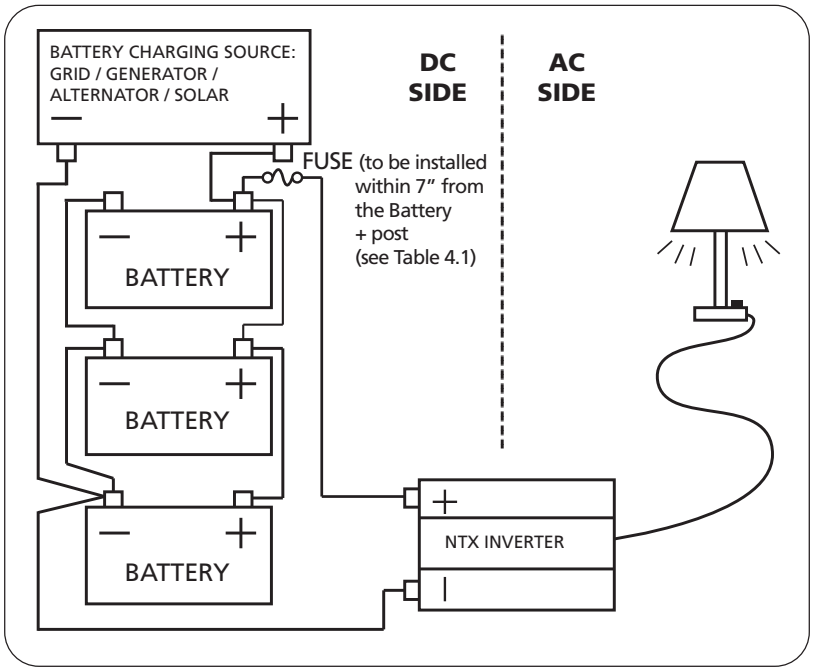


Fig 4.2 Connecting to a Battery Source

4.4 DC INPUT SUPPLY FROM DC POWER SOURCE

WARNING!
It is mandatory to install appropriate size of external DC Fuse as close to the Battery Positive Post as possible, preferably within 7 inches to protect against fire hazard due to short circuit along the battery cable run (See Fig 4.2). A battery is an unlimited current source that can supply thousands of Amperes of current under short circuit conditions. If a short circuit occurs in the cable run at a point between the battery and the inverter, the section of the cable from the battery to the point of short circuit will be fed with thousands of Amperes of current, the section of the cable will overheat / melt and is likely to cause fire. It is, therefore, recommended that the

fuse / fuse assembly should have Ampere Interrupting Capacity (AIC) of at least 10,000 A. Class-T type of fuses are recommended as these fuse provide fast acting, current limited protection.

Please note that internal DC side fuses have been provided to protect against over current in the internal DC input circuitry. **These internal fuses will NOT blow due to external short circuit in the battery cable run.**

MISE EN GARDE!

Il est obligatoire d'installer la taille appropriée des Fusible CC externe comme à proximité de la borne positive de la batterie que possible, de préférence dans un délai de 7 pouces pour protéger contre le risque d'incendie dû à un court-circuit sur le câble de batterie exécuter (voir Fig 4.2). Une batterie est une source de courant qui peut illimité offre des milliers d'ampères de courant en cas de court-circuit. Si un court-circuit survient dans le parcours de câble à un point entre la batterie et le convertisseur, la section du câble allant de la batterie au point de court-circuit seront nourris avec des milliers d'ampères de courant, la section du câble surchauffera / fondre et est susceptible de provoquer un incendie. Il est donc recommandé que le fusible / fusible Assemblée devrait avoir ampère interrompre (AIC) de capacité d'au moins 10 000 A. Class-T type des fusibles sont recommandés comme ces fournir fusible agit rapidement, le courant d'une protection limitée.

Veuillez noter que côté CC interne des fusibles ont été fournis pour protéger contre les surintensités dans les circuits d'entrée CC interne. **Ces fusibles internes ne soufflera pas en raison de court-circuit externe dans le câble de batterie exécuter.**

Table 4.1 provides details of Battery Cables and DC Fuses for connecting the battery to the DC input terminals of the inverter (7, 8 in Figs 3.1.1, 3.2.1 and 3.2.2)

Table 4.1 Sizing of Cables and Fuses for DC Input

Model No. (1)	Rated DC Input Current (2)	NEC Ampacity (3)	Ampere Rating of the Fuse (Note 1) (4)	Cable Size for up to 4 ft from Battery to Inverter (Note 2) (5)	Cable Size for up to 6 ft from Battery to Inverter (Note 2) (6)
NTX-1000-12	100A	125A	150A	AWG#4	AWG#2
NTX-1500-12	150A	187.5A	200A	AWG#2	AWG#1/0
NTX-2000-12	200A	250A	300A	AWG#2/0 or 2X AWG#2	AWG#2/0 or 2X AWG#2
NTX-3000-12	300A	375A	400A	AWG#3/0 or 2X AWG#1	AWG#4/0 or 2X AWG#1/0
NTX-3000S-12	300A	375A	400A	AWG#3/0 or 2X AWG#1	AWG#4/0 or 2X AWG#1/0
NTX-1000-24	50A	62.5A	150A	AWG#6	AWG#4
NTX-1500-24	75A	94A	200A	AWG#4	AWG#2
NTX-2000-24	100A	125A	300A	AWG#4	AWG#2
NTX-3000-24	150A	187.5A	400A	AWG#2	AWG#1/0
NTX-3000S-24	150A	187.5A	400A	AWG#2	AWG#1/0

Notes for Table 4.1

1. Ampere ratings of the fuse (Column 4) is based on the NEC Ampacity (Column 3) = 1.25 times the rated DC input current of the inverter (Column 2).
2. Cable sizing (Columns 5 and 6) is based on: (i) the Ampere rating of the fuse (Column 4) or 2% voltage drop, whichever is thicker (ii) Ambient temperature of 30°C (iii) Wire insulation rated at 105°C (iv) Cables routed in free air.

4.5 DC INPUT TERMINALS

DC input is fed through Stud and Nut – size M9 (7, 8 in Figs 3.1.1, 3.2.1 and 3.2.2).

4.6 CABLE TERMINATION FOR DC INPUT CONNECTORS

The inverter side of the DC input cable has to be terminated with a Ring / Tongue type of terminal lug to fit M9 or 3/8" size of stud on the DC Input terminals (7, 8 in Figs 3.1.1, 3.2.1 and 3.2.2). The terminal lug may be crimped / soldered.

4.7 DC SIDE CONNECTIONS

1. Ensure that appropriate cable size is used as per columns 5 and 6 of Table 4.1. Cable terminal lugs should be properly crimped / soldered at the bare ends of the cables for secure connections. The lugs should fit M-9 stud used for the DC input terminals.
2. Ensure that the bare Positive and Negative terminals of NTX-1000/1500/2000/3000 (7 and 8 in Figs 3.1.1, 3.2.1 and 3.2.2) are protected using plastic covers with Thumb Nuts (10 in Figs 3.1.1, 3.2.1 & 3.2.2).
3. Ensure that the inverter's power switch is turned OFF and that no flammable fumes are present.
4. Identify the Positive (+) and Negative (-) terminals of the battery or the DC source.
5. Install a fuse holder close to the Positive (+) terminal of the battery (or other DC source), preferably within 7" of the terminal (see Fig 4.2).
6. Insert a suitable fuse in the fuse holder. For fuse sizes, please refer to column 4 of Table 4.1.
7. Check to be sure that all connections are secure and tight.
8. Test the inverter by turning it on and plugging in a 100 Watt lamp or equipment.
9. If the inverter does not operate properly, then refer to Section 7, Troubleshooting Guide.



CAUTION!

Loose connectors may cause overheated wires and melted insulation.



ATTENTION!

Connecteurs desserrés peuvent causer la surchauffe de câbles et isolation fondue.

4.8 GROUNDING AND "GROUND FAULT" - GENERAL INFORMATION

Grounding means connecting (bonding) to Earth Ground or to the other designated Ground. For example, in a motorhome / RV, the metal frame of the motorhome / RV is normally designated as the Negative DC Ground / RV Ground. Grounding is required for (i) protection against damage due to lightning strike and (ii) protection against electric shock due to "Ground Fault". "Ground Fault" may occur due to inadvertent contact between an energized ungrounded current carrying conductor and

exposed metal surface resulting in voltage getting fed to (i) the metal chassis of the inverter or (ii) to the metal chassis of the devices connected to inverter or (iii) to the metal frame/ chassis in an RV / motorhome. When this energized exposed surface is touched, the voltage will drive current through the human body to Earth Ground producing electric shock. When properly grounded to Earth Ground (or Frame / Chassis Ground in motorhome or RV), the Ground Fault Circuit Interrupter (GFCI) or, the Over Current Protection Device (like Circuit Breaker or Fuse) will trip and interrupt the circuit feeding power from the AC source or the DC source (12V battery). Proper grounding will ensure that all exposed metal surfaces will have equal potential and will be bonded to (i) a single common Earth Ground point i.e. the Ground Rod / buried metallic water / gas pipe at the premises or (ii) the Frame / Chassis Ground in a motorhome / RV.

Internally, an inverter consists of a DC Section and an AC Section that are isolated through a transformer. Both these sections are required to be grounded appropriately.

INFO

Please read following on-line White Papers at www.samlexamerica.com (Home > Support > White Papers) for complete understanding of Grounding:

- "Grounded Electrical Power Distribution"
- "Grounding System and Lightning / Ground Fault Protection

4.9 GROUNDING ARRANGEMENT IN NTX-1000-12/24 / NTX-1500-12/24 / NTX-2000-12/24

4.9.1 DC Side Grounding in NTX-1000-12/24 / NTX-1500-12/24 / NTX-2000-12/24

DC side grounding involves bonding of the metal frame/chassis of inverter and the Battery Negative Terminal to Earth Ground in shore based installation or to the metal frame / "Chassis" of the motorhome / RV. This ensures that in case of a ground fault in the DC circuit, the fuse in the +Battery line blows to clear the fault (Please see Section 4.8 for more information on "Ground Fault"). This fuse in the +Battery line has Ampere capacity based on the rated DC input current of the inverter (Refer to Column 4 of Table 4.1). The wire size used for DC side grounding should be minimum AWG #6 or of the same size as the battery cable, whichever is thicker. This recommendation on sizing of the DC Side Grounding Wire will be superseded by the National / Local Electrical Codes.

4.9.2 AC Side Grounding in NTX-1000-12/24 / NTX-1500-12/24 / NTX-2000-12/24

AC output of the inverter is supplied through NEMA 5-20R, 20A Duplex GFCI Receptacles [1(a) in Fig 3.1.1]. The round Grounding Slot and the rectangular T-shaped Neutral Slot of the receptacles are internally bonded to the metal chassis of the inverter.

4.9.3 Grounded Neutral in NTX-1000-12/24 / NTX-1500-12/24 / NTX-2000-12/24

The T-shaped Neutral Slot is internally bonded to the metal chassis of the inverter / the round Grounding Slot. *Hence, there will be no AC voltage between the T-shaped Neutral Slot and the chassis of the inverter / round Grounding Slot.*

4.10 GROUNDING ARRANGEMENT IN NTX-3000-12/24 and NTX-3000S-12/24

4.10.1 DC Side Grounding

DC side grounding involves bonding of the metal frame/chassis of inverter and the Battery Negative Terminal to Earth Ground in shore based installation or to the metal frame / "Chassis" of the motorhome / RV. This ensures that in case of a ground fault in the DC circuit, the fuse in the +Battery line blows to clear the fault. This fuse in the +Battery line has Ampere capacity based on the rated DC input current of the inverter (Refer to Column 4 of Table 4.1). The wire size used for DC side grounding should be minimum AWG #6 or of the same size as the battery cable, whichever is thicker. This recommendation on

sizing of the DC Side Grounding Wire will be superseded by the National / Local Electrical Codes.

4.10.2 AC Side Grounding

AC output of the inverter is supplied through NEMA L5-30R, 30A Locking Receptacle. The Grounding Slot [1(c) & 1(f) in Fig 3.2.1 and 3.2.2] is internally **NOT** bonded to the metal chassis of the inverter. It is internally wired to built-in GFCI circuitry to shut down the AC output of the inverter in case of any ground fault on the AC load side.

4.10.3 Floating Neutral

The Neutral Slot [1(b) in Fig 3.2.2] is floating i.e. it is internally **NOT** bonded to the metal chassis of the inverter / Grounding Slot [1(c) & 1(f) in Fig 3.2.1 or 3.2.2]. *Hence, there will be around 66 VAC between the Neutral Slot and the metal chassis of the inverter / the Grounding Slot. See CAUTION! below:*

CAUTION!

As the Neutral of the Receptacle in NTX-3000-12/24 and NTX-3000S-12/24 is floating i.e. it is internally **NOT** bonded to the metal chassis of the inverter / the Grounding Slot, there will be a voltage of around 66 VAC between the Neutral Slot and the L-shaped Grounding Slot. Do not touch the Neutral Slot or bare conductor connected to the Neutral Slot!

ATTENTION!

Comme l'emplacement neutre du réceptacle NTX-3000-12/24 et NTX-3000S-12/24 est flottant, c'est-à-dire qu'il n'est PAS lié intérieurement au châssis métallique de l'onduleur / emplacement de mise à la terre, tension d'environ 66 VCA entre la fente neutre et la fente de mise à la terre en forme de L. Ne touchez pas le connecteur neutre ou le conducteur nu connecté au connecteur neutre!

4.11 PARALLEL OPERATION IS NOT PERMITTED

WARNING! Preventing Paralleling of the AC Output

a) The AC output of these inverters cannot be synchronized with another AC source and hence, it is not suitable for paralleling. The AC output of the inverter should never be connected directly to an electrical breaker panel / load center which is also fed from utility power/ generator. Such a connection will result in paralleling of AC output of the inverter and AC power from utility / generator. AC power from utility / generator will be fed back into the inverter which will instantly damage the output section of the inverter and may also pose a fire and safety hazard. If an electrical breaker panel / load center is being fed from utility power / generator and the inverter is also required to feed this panel as backup power source, the AC power from the utility power/ generator and the inverter should first be fed to a manual selector switch / Automatic Transfer Switch and the output of the manual selector switch / Automatic Transfer Switch should be connected to the electrical breaker panel / load center.

b) To prevent possibility of paralleling and severe damage to the inverter, never use a simple jumper cable with a male plug on both ends to connect the AC output of the inverter to a handy wall receptacle in the home / RV.

MISE EN GARDE! Parallèlement à la prévention de la production AC

a) La sortie AC de ces onduleurs ne peut pas être synchronisé avec une autre source de courant AC et par conséquent, il n'est pas adapté pour le parallèle. La sortie AC de l'onduleur ne doit jamais être connecté directement à un panneau de disjoncteur électrique / centre de charge qui est également alimentée par l'alimentation/ générateur. Un tel cadre permettra de couplage de sortie AC de l'onduleur et l'alimentation secteur du service public / générateur. L'alimentation secteur du service public / générateur sera réinjectée dans l'onduleur qui sera instantanément endommager la section de sortie de l'onduleur et peut également présenter un danger d'incendie et de sécurité. Si un disjoncteur électrique / centre de charge est chargé à partir d'alimentation secteur / générateur et l'onduleur est également nécessaire pour l'alimentation de ce groupe en tant que source d'alimentation de secours, l'alimentation de l'alimentation du générateur/ et l'onduleur doit d'abord être nourris à un sélecteur manuel / commutateur de transfert automatique et la sortie de l'interrupteur de sélection manuelle / commutateur de transfert automatique doit être connecté à l'équipement électrique panneau de disjoncteur / centre de charge.

b) To prevent possibility of paralleling and severe damage to the inverter, never use a simple jumper cable with a male plug on both ends to connect the AC output of the inverter to a handy wall receptacle in the home / RV.

4.12 AC SIDE INSTALLATION FOR MODELS NTX-1000-12/24 / NTX-1500-12/24 / NTX-2000-12/24

AC output for Models NTX-1000-12/24 / NTX-1500-12/24 / NTX-2000-12/24 is provided through NEMA5-20R, 20A Duplex GFCI protected receptacles [1(a) in Fig 3.1.1]. The two, NEMA5-20R, 20A outlets are protected through integrated, self monitoring GFCI (Ground Fault Circuit Interrupter). This type of GFCI receptacle is available commercially in electrical / hardware stores. Function, features and operation of Self Monitoring GFCI protection used are explained at Section 4.12.1.

4.12.1 Function of Ground Fault Circuit Interrupter (GFCI) in Models NTX-1000-12/24 / NTX-1500-12/24 / NTX-2000-12/24

An un-intentional electric path between a source of current and a grounded surface is referred to as a “Ground Fault” (Refer to Section 4.8 for additional details on grounding and ground fault). Ground faults occur when current is leaking somewhere. In effect, electricity is escaping to the ground. How it leaks is very important. If your body provides a path to the ground for this leakage (dry human body has a low resistance of only around 1 K Ohm), you could be injured, burned, severely shocked or electrocuted. A Ground Fault Circuit Interrupter (GFCI) protects people from electric shock by detecting leakage and cutting off the AC source. In the Self-Monitoring GFCI used in Models NTX-1000 / NTX-1500 / NTX-2000 (See further details at Section 4.12.2), the leakage detection circuit compares the current sent to the load and returned back from the load. If the returned current is less by 4 to 6 mA due to leakage, the GFCI trips. The GFCI also trips if it sees Neutral to Ground bond on the load side of the GFCI. The AC output of this inverter is available through a NEMA5-20R, 20A GFCI Duplex Receptacle [1(a) in Fig 3.1.1]. The T-shaped Neutral slot of the GFCI Receptacle used in Models NTX-1000 / NTX-1500 / NTX-2000 is internally bonded to the metal chassis of the inverter (Refer to Section 4.9.3)

4.12.2 Integrated Self-Monitoring GFCI in Models NTX-1000-12/24 / NTX-1500-12/24 / NTX-2000-12/24

Integrated GFCI protection used in Models NTX-1000/1500/2000 is “Self Monitoring Type” as per UL

Standard UL-943. As soon as the Inverter is switched ON and 115 VAC is available on the internal Line Side of the GFCI, the Green LED [1(b) in Fig 3.1.1] will switch ON indicating that AC power is available at the Load Side outlets. The self monitoring circuit of the GFCI constantly tests the operation of the internal ground fault protection. If self testing fails at any time, Red LED marked "Life End Alarm" [1(e) in Fig 3.1.1] will be switched on and the Green LED [1(b) in Fig 3.1.1] will be switched off. *Under this condition, the entire NEMA5-20R Duplex GFCI Receptacle will be required to be replaced*

4.12.3 Monthly Testing of GFCI Function in Models NTX-1000-12/24 / NTX-1500-12/24 / NTX-2000-12/24

Test the operation of the GFCI monthly as follows:

- Switch ON the inverter. As soon as 115 VAC output from the inverter is available on the internal Line Side of the GFCI, the Green LED [1(b) in Fig 3.1.1] will switch ON indicating that AC power is available at the NEMA5-20 outlets.
- Plug a test lamp into the outlet and switch ON the test lamp.
- Press the "Test Button" [1(d), Fig 3.1.1]. The "Reset Button" [1(c) in Fig 3.1.1] will pop out. The GFCI will be forced to trip and cut off AC power to the outlets. Green LED [1(b) in Fig 3.1.1] will switch OFF. The test lamp will also switch OFF.
- Press the "Reset Button" [1(c) in Fig 3.1.1]. The GFCI will reset and AC power to the load side outlets will be restored. Green LED [1(b) in Fig 3.1.1] will switch ON. The test lamp will also switch ON.
- If the above test / reset operation cannot be carried out, replace the GFCI.

4.12.4 GFCI Tripping and Reset in Models NTX-1000-12/24 / NTX-1500-12/24 / NTX-2000-12/24

If there is a leakage of 4 to 6mA due to ground fault on the load side or, there is a Neutral to Ground bond on the load side, the GFCI will trip and the "Reset Button" [1(c) in Fig 3.1.1] will pop out. AC power to the two NEMA5-20R outlets (on the Load Side of the GFCI) will be cut off. Green LED [1(b) in Fig 3.1.1] will switch OFF. Remove the ground fault in the load circuit. Reset the tripped GFCI as follows:

a) Remove the cause of ground fault on the load side
b) Ensure that the inverter is in ON condition so that 115VAC power is available to the internal Line Side of the GFCI [Green LED (5 in Fig 3.1.1) will be ON.
c) Press the "Reset Button" [1(c) in Fig 3.1.1]. The GFCI will reset and AC power to the NEMA5-20R outlets (on the Load Side of the GFCI) will be restored. Green LED [1(b) in Fig 3.1.1] will switch ON.

INFO

For the Reset Button [1(c) in Fig 3.1.1] to operate, the Inverter has to be in ON condition so that 115 VAC power is available to the internal Line Side of the GFCI [When the inverter is ON and is feeding 115 VAC to the internal Line Side of the GFCI, Green LED (5 in Fig 3.1.1) will be ON]. *Tripped GFCI can be reset only if AC power is available on the internal Line Side of the GFCI.*

CAUTION!

a) Do not feed the output from the GFCI receptacle to a Breaker Panel / Load Center where the Neutral is bonded to the Earth Ground. *This will trip the GFCI.*
b) If an extension cord is used, please ensure that the cord is 2-Pole Grounding Type (3 pin).

ATTENTION!

a) N'alimentent pas la sortie de la prise GFCI à un Panel de sélection / Charger Centre où la position neutre est lié à la terre. *Ce qui déclenche le disjoncteur.*
b) Si une rallonge est utilisée, veuillez vous assurer que le cordon est de type mise à la terre bipolaire (3 broches).

4.13 AC SIDE INSTALLATION FOR MODEL NTX-3000-12/24 and NTX-3000S-12/24

4.13.1 Ground Fault Circuit Interrupter (GFCI) in Model NTX-3000-12/24 and NTX-3000S-12/24

An un-intentional electric path between a source of current and a grounded surface is referred to as a "Ground Fault" (Refer to Section 4.8 for additional details on grounding and ground fault). Ground Faults occur when current is leaking somewhere. In effect, electricity is escaping to the ground. How it leaks is very important. If your body provides a path to the ground for this leakage (dry human body has a low resistance of only around 1 K Ohm), you could be injured, burned, severely shocked or electrocuted. A Ground Fault Circuit Interrupter (GFCI) protects people from electric shock by detecting leakage and cutting off the AC source

In NTX-3000-12/24 and NTX-3000S-12/24 models, a customized, built-in GFCI circuitry has been used. The Grounding Slot receptacle is NOT connected to the chassis of the inverter but to the input section of a customized GFCI circuitry. If a "Ground Fault" occurs in the load side (*Please see Section 4.8 regarding information on "Ground Fault"*), fault current from the load will travel along the Grounding Conductor from the load to the Grounding Slot of the Receptacle. A fault current of 4 to 5 mA will activate the built-in GFCI circuit and the AC output of the inverter will be shut down and Red Fault LED (6 in Fig 3.2.1) will be lighted. The unit will be required to be reset manually as follows:

- Remove the cause of Ground Fault in the load side
- Switch off the unit using the On/Off Switch (2 in Fig 3.2.1 & 3.2.2)
- Wait for 2 minutes and switch the unit on again

AC Side Grounding

The Grounding Slot [1(c) & 1(f) in Fig 3.2.1] is internally NOT bonded to the metal chassis of the inverter. It is internally wired to built-in GFCI circuitry to trip the inverter in case of any ground fault on the AC load side. See Section 4.13.5 for more details.

Floating Neutral

The Neutral Slot [1(b) & 1(f) in Fig 3.2.1] is floating i.e. it is internally NOT bonded to the metal chassis of the inverter / Grounding Slot [1(c) & 1(f) in Fig 3.2.1 & 3.2.2]. Hence, there will be around 66 VAC between the Neutral Slot and the metal chassis of the inverter / the Grounding Slot [1(c) in Fig 3.2.1 & 3.2.2]. See CAUTION! below:

CAUTION!

As the Neutral slot of the Receptacle in NTX-3000-12/24 [1(b) & 1(f)in Fig 3.2.1 & 3.2.2] is floating i.e. it is internally NOT bonded to the metal chassis of the inverter / the Grounding Slot, there will be a voltage of around 66 VAC between the Neutral Slot and the L-shaped Grounding Slot. Do not touch the Neutral Slot or bare conductor connected to the Neutral Slot!

ATTENTION!

Comme l'emplacement neutre de la prise du NTX-3000-12/24 [1(b) de la figure 3.2.1 et 3.2.2] est flottant, c'est-à-dire qu'il n'est PAS lié en interne au châssis métallique de l'onduleur/à l'emplacement de mise à la terre, il y aura un tension d'environ 66 VAC entre l'emplacement neutre et l'emplacement de mise à la terre en forme de L. Ne touchez pas la fente neutre ou le conducteur nu connecté à la fente neutre!

4.13.2 Floating Neutral and Monitoring Voltage on NEMA L5-30R and NEMA L5-15P Connections

AC output of NTX-3000-12/24 and NTX-3000S-12/24 is supplied through Receptacles as shown in Figures (3.1.1, 3.2.1 and 3.2.2). Internal conductors connected to the 3 slots of the outlet are as follows:

a) **The longer "Line" Slot [1(a)]:** This in internally connected to the first current carrying conductor
b) **The shorter "Neutral" Slot [1(b)]:** This in internally connected to the second current carrying conductor. Internally, this slot is **NOT** connected to the metal chassis of the inverter and hence, technically, it cannot be considered as "Neutral" (A "Neutral" is a current carrying conductor that is intentionally bonded to Earth Ground). *The Neutral Slot is, therefore, floating.*

CAUTION!

As the Neutral Slot [1(b)] & 1(f) in Fig 3.2.1 & 3.2.2 is floating i.e. it is internally **NOT** bonded to the metal chassis of the inverter / the Grounding Slot, *there will be a voltage of around 66 VAC between the Neutral Slot and the L-shaped Grounding Slot*. Do not touch the Neutral Slot or bare conductor connected to the Neutral Slot!

ATTENTION!

Comme l'emplacement neutre [1(b) et 1(f) sur la Fig. 3.2.1 et 3.2.2] est flottant, c'est-à-dire qu'il **n'est PAS** lié de manière interne au châssis métallique de l'onduleur / de l'emplacement pour la mise à la terre, *il existera une tension d'environ 66 VAC entre l'emplacement neutre et Fente de mise à la terre en forme de L*. Ne touchez pas le connecteur neutre ou le conducteur nu connecté au connecteur neutre!

c) **L shaped "Grounding" Slot [1(c)]:** This is internally **NOT** connected to the metal chassis of the inverter. It is wired to a customized Ground Fault Circuit Interruption (GFCI) circuitry (Refer to Section 4.13.1 for details).

CAUTION!

As the L-shaped Grounding Slot is wired to a customized Ground Fault Circuit Interruption (GFCI) circuitry (See Section 4.13.1), the AC output of the inverter will be shut down due to Ground Fault on the load side. Hence, if a power cord with standard NEMA Plug is used to feed AC output of this inverter to an Electrical Breaker Panel / Load Center where the Neutral is bonded to Earth Ground, the inverter will trip immediately due to activation of the internal customized Ground Fault Circuit Interruption (GFCI) circuitry. *To circumvent this protection and power an electrical panel with the NTX-3000-12/24, a NEMA L5-30P Plug has been provided. Use this plug on the inverter side of the 30A cord as per wiring connections described in Section 4.13.2 (c).*

ATTENTION!
Comme la mise à la terre en forme de L'emplacement est relié à un circuit de défaut à la terre (GFCI) Interruption des circuits (voir Section 4.13.5), la sortie AC de l'onduleur sera éteint en raison d'un défaut de masse sur le côté charge. Par conséquent, si un cordon d'alimentation de 30 A à la norme NEMA L5-30P est utilisé pour l'alimentation AC de sortie de ce convertisseur d'un disjoncteur électrique / Centre de charge où le neutre est relié à la masse de la Terre, de l'inverseur se déclenche immédiatement dû à l'activation de la mesure interne à la terre (GFCI) Interruption des circuits. *Pour contourner cette situation, NEMA L5-30P a été fournie. Utilisez ce connecteur sur le côté de l'onduleur du cordon 30A selon les connexions de câblage décrit à la section 4.13.2 (c).*

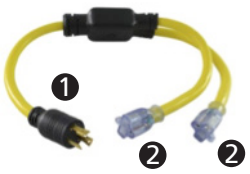
4.13.3 Connecting AC Loads to NTX-3000S-12/24 through 3 xNEMA 5-15R Receptacles

AC output for the NTX-3000S-12 and NTX-3000S-24 is provided through three receptacles. Each 15 amp receptacle is protected by it's own push button circuit breaker. All three receptacles are protected by a single GFCI protection circuit (as described in Section 4.13.1).

4.13.4 Connecting AC loads to NTX-3000-12/24 through NEMA L5-30R, 30A Locking Receptacle

A suitable power cord will be required to feed AC loads as follows:

a) **Loads that use 30A power cord with NEMA L5-30P Locking Plug**: Plug directly into the Receptacle
b) **Loads that use 15A power cord with NEMA5-15P Plug or 20A Power Cord with NEMA5-20P Plug:** Use appropriate Adapter Type of Power Cord that has NEMA L5-30P Locking Plug for mating with the NEMA L5-30R Locking Receptacle on the NTX-3000-12/24 end and NEMA5-20R Adapter Receptacles on the other end for connecting to the loads. Example is shown at Fig 4.3:



❶ **NEMA L5-30P Plug:** Insert this into the NEMA L5-30R Receptacle on NTX-3000-12/24.

❷ **NEMA5-20R Plug:** For loads provided with 15A power cord with NEMA5-15P Plug or 20A cord with NEMA5-20P Plug.

Fig 4.3 Adapter to convert NEMA L5-30R outlet to NEMA5-15 / NEMA5-20 outlets

c) **Hard wiring to 30A Breaker Panel or Load Center that has Neutral to Ground Bond:** As the L-shaped Grounding Slot of the NEMA L5-30R outlet ([1(c) & 1(f)in Fig 3.2.1 & 3.2.2] is wired to a customized Ground Fault Circuit Interruption (GFCI) circuitry (See Section 4.13.1), the AC output of the inverter will be shut down due to Ground Fault on the load side (Please refer to Section 4.8 for more information on Ground Fault). *Hence, if a 30A pre-wired power cord with molded NEMA L5-30P Plug is used to feed AC output of this inverter to a Breaker Panel / Load Center where the Neutral is bonded to Earth Ground, the inverter will trip immediately due to activation of the internal customized Ground Fault Circuit Interruption (GFCI) circuitry. To circumvent this situation, a NEMA L5-30P Plug has been provided to connect the 3 wires of the inverter end of the 30A Cord as shown in Fig 4.4 and described on next page:*

i. Connect the "Line" conductor (Black wire) to the Line Prong of the NEMA L5-30P Plug (Terminal for Line Prong has brass screw)
ii. Join the "Neutral" conductor (White wire) and the "Grounding" Conductor (Green wire) together and connect both the wires to the same Neutral Prong (W) of the NEMA L5-30P

Plug (Terminal for Neutral Prong has steel screw)

iii. The "Grounding"Prong of the NEMA L5-30P Plug is **NOT** connected [Terminal for Grounding Prong (G) has Green colored screw]

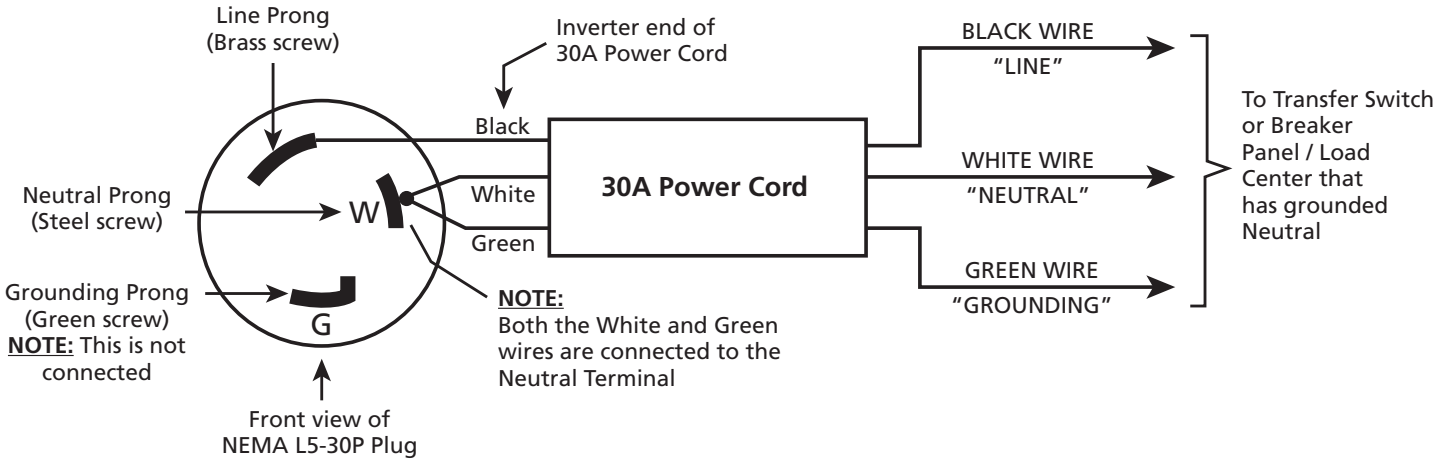


Fig 4.4 NEMA L5-30P Plug connection for 30A Power Cord that will feed AC output of NTX-3000-12/24 to Transfer Switch or Breaker Panel / Load Centre that have Neutral to Ground Bond

Wiring arrangement shown in Fig 4.4, the NTX-3000-12/24 will result in the following:

- The Grounding Conductor (Green wire) from the Transfer Switch or Electrical Panel / Load Center will NOT be connected to the Grounding Terminal (G) of the inverter side NEMA L5-30P Plug. Hence, the built-in customized GFCI will not trip despite the fact that the Neutral and Ground in the Transfer Switch or Breaker Panel / Load Center are bonded (See details of operation of this GFCI at Section 4.9).
- The internal GFCI of NTX-3000-12/24 will be disabled.

4.14 REMOTE CONTROL

Remote Control Model NTX-RC has been provided with the unit. Please refer to separate manual provided for this remote control.

CAUTION!

When using Remote Control NTX-RC, the ON/OFF Switch on the inverter (2, Fig 3.1.1, 3.2.1 and 3.2.2) should be in OFF position. If this switch is left in ON condition and the Remote Control is switched OFF using the ON/OFF Button on the Remote control, the inverter will not switch OFF completely. This will result in draining of the battery due to (i) self consumption of the inverter and (ii) continuous running of the cooling fan at slow speed.

ATTENTION!

Lors de l'utilisation de Télécommande NTX-RC, l'interrupteur ON/OFF sur l'inverseur (2, Fig 3.1.1, 3.2.1 et 3.2.2) doit être en position ARRÊT. Si ce commutateur est laissé en l'état et sur la télécommande s'éteint à l'aide du bouton ON/OFF de la télécommande, le convertisseur s'éteint pas complètement. Cela se traduira dans le drainage de la batterie en raison de (i) la consommation de l'inverseur et (ii) un fonctionnement continu du ventilateur de refroidissement à vitesse lente.

SECTION 5 | Operation

5.1 OPERATING ENVIRONMENT

Before operating the inverter, please ensure that all installation requirements given in Section 4 and safety requirements given in Section 1 have been met.

5.2 SWITCHING ON AND SWITCHING OFF ON LOAD

Please ensure that the following procedure is used for switching ON and switching OFF the inverter when a load is already connected to the inverter:

5.2.1 Switching ON

1. Switch OFF the load connected to the inverter
2. Switch ON the inverter
3. Wait for a few seconds
4. Switch ON the load

5.2.2 Switching OFF

1. Switch OFF the load connected to the inverter
2. Switch OFF the inverter

5.3 CONNECTING LOADS

1. Make sure that the single load or the combined load requirement of your equipment does not exceed the inverter's output rating.
2. Switch OFF the inverter
3. Switch OFF the load
4. Plug the cord(s) from the load(s) into the AC receptacle(s) of the inverter
5. Switch on the inverter. Wait for a few seconds
6. The Green LED indicator (5 in Figs 3.1.1, 3.2.1 and 3.2.2) will be lighted to indicate that the inverter is functioning. Green LED on the GFCI Receptacle on NTX-1000/1500/2000 [1(b) in Fig 3.1.1] will also be lighted if the GFCI is not in tripped condition.
7. Switch on the load(s)

5.4 RATED VERSUS ACTUAL CURRENT DRAW OF EQUIPMENT

Most electrical tools, appliances and audio/video equipment have labels that indicate the power consumption in Amps or Watts. Be sure that the power consumption of the item(s) you wish to operate is less than inverter's power. (If the power consumption is rated in Amps AC, simply multiply by the AC Volts (115) to determine the Apparent Input Power in Volt Amps (VA). The inverter will shut down if it is overloaded. The overload must be removed before the inverter will restart. Resistive loads are the easiest for the inverter to run. However, larger resistive loads, such as electric stoves or heaters, usually require more power than a smaller inverter can deliver. Inductive loads, such as TV's and stereos, etc. require more current to operate than do resistive loads of the same power rating. Induction motors, as well as some televisions, may require 2 to 6 times their power rating to start up. The most demanding in this category are those that start under load, such as compressors and pumps. To restart the unit after a shutdown due to overloading, remove the overload if necessary, turn the power switch OFF, **wait for 2 to 3 minutes** and then switch ON again (Refer to Sections 6.4 and 7 for more details regarding overload symptoms and protections).

5.5 SIZING CHART FOR TYPICAL LOADS THAT REQUIRE HIGH STARTING SURGE

The manufacturers' specifications of the appliances and devices indicate only the running power required.

The surge power required by some specific types of devices has to be checked with the manufacturer, actually tested or guessed at best.

Table 5.1 lists some common loads that require high surge power on start up. A "Sizing Factor" has been recommended against each which is a Multiplication Factor to be applied to the rated running Watt rating of the load to arrive at the continuous power rating of the inverter (Multiply the running Watts of the device / appliance by the Sizing Factor).

Table 5.1 Sizing of Inverter for Loads with Starting Surge

Type of Device or Appliance	Sizing Factor
Air conditioner	5
Refrigerator / Freezer (Compressor based)	5
Air Compressor	4
Sump Pump / Well Pump / Submersible Pump	3
Dishwasher	3
Clothes Washer	3
Microwave (In cases where the rated output power is the Cooking Power)	2
Furnace Fan	3
Industrial Motor	3
Portable Kerosene / Diesel Fuel Heater	3
Circular Saw	3
Bench Grinder	3
Incandescent / Halogen / Quartz Lamps	3
Laser Printer / Other Devices using Infrared Quartz Halogen Heaters	4
Switched Mode Power Supplies (No Power Factor correction)	2
Photographic Strobe / Flash Lights (with respect to its Watt Sec rating)	4*

*** In the case of photographic strobe / flash unit, the RMS surge power of the inverter should be more than 4 times the Watt Sec rating of the photographic strobe / flash unit.**

5.6 DETERMINING BATTERY SIZE

The power inverter will require DEEP CYCLE Lead Acid Batteries of appropriate capacity.
The automotive SLI (Starting/lighting/Ignition) battery is not designed for repeated deep discharges.
The SLI battery may not supply enough energy and its service life may be reduced.

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

1. Determine the Active AC Input Power in Watts for each appliance and / or tool you will need to simultaneously operate from the inverter. To do this, read the label on the equipment to be operated. Usually, the label will specify the Active Power drawn in Watts. Sometimes the label will specify the current draw in Amperes (A). Multiply this value of current draw in Amperes (A) by the AC input voltage (V) to determine the Apparent AC Input Power in Volt Amperes (VA). The Active Input Power will be equal to the Apparent Input Power (VA) multiplied by the Power Factor (PF) of the load. Depending upon the type of load, the Power Factor (PF) may range from 1 (Resistive type of load) to 0.6 (Reactive type of load). For practical purposes, the Power Factor (PF) may be

considered as 1. Hence, Active Power in Watts will be equal to the Apparent Power (VA).

2. For each appliance, estimate the number of hours the appliance will be in use between battery recharges.
3. For each appliance, determine the Watt-Hours of energy required by multiplying the AC wattage by the number of hours of use.
4. Add the Watt-Hours of energy for each appliance to get the total Watt-Hours of energy for all appliances to be used.
5. Divide the total Watt-Hours of energy on the AC side by 10 to get the total Ampere-Hour of energy on the 12 VDC side to support the operation of the appliances.
6. The Ampere-Hour (Ah) capacity of the battery should be 2 times the total Ampere-Hour energy required on the 12 VDC side to support the operation of the devices (as calculated at step 5 above). Two times factor is necessary because batteries are normally not discharged below 50% capacity.

To get an estimate of the current (in Amps) that the battery is delivering to power a particular AC side load, divide the load's AC consumption power (in Watts) by (10).

Keep in mind that most appliances are not operating for long periods of time. For example, a typical home-use coffee maker draws 500 Watts during its brew time of 5 minutes, but it maintains the temperature of the pot at about 100 Watts. Typical use of a microwave is only for a few minutes, sometimes at low power. Similarly, refrigerator compressor does not remain ON at full rated power at all times but switches ON and OFF based on its thermostat setting, ambient temperature, frequency of opening/closing and the temperature of food item(s) when first stored. As a Rule of Thumb, its operating Duty Cycle [ON Time ÷ (ON Time + OFF Time)] is around 30%. Hence, a refrigerator rated at say 100W will draw Watt-Hour Energy of 720 Watt Hour in a 24 Hour cycle [(100W x 24Hrs) x 30% = 720W]. Some exceptions to brief operating times are TVs, computers etc.

In most instances, the inverter can be left connected to the battery when not in use. However, make sure that the inverter is switched OFF using the ON/OFF Switch (2 in Fig 3.1.1, 3.2.1 and 3.2.2) or using the ON/OFF Button on the Remote Control Model NTX-RC (Section 4.14). This will prevent unnecessary drain on the batteries due to self consumption and operation of cooling fan(s).

Battery performance drops in low temperature environment. Higher capacity batteries should be installed if the environmental temperature is below 20°C.

5.7 MONITORING OF ALARMS & FAULTS

Please refer to Section 6.8 for monitoring of alarms and faults through front panel LEDs and buzzer.

5.8 PROTECTIONS

Please refer to Section 6 for details on various protections.

5.9 TROUBLESHOOTING

Please refer to Section 7 for Troubleshooting Guide.

SECTION 5 | Operation

6.1 OVER TEMPERATURE PROTECTION

In case the fan fails or if the cooling is inadequate due to higher ambient temperature or restricted air flow, the temperature inside the inverter will rise. Temperature rise is sensed at a critical internal hot spot. If this temperature is around 105°C, the AC output will be switched OFF temporarily. The unit will reset automatically after the internal hot spot has cooled down. The unit may be reset manually by switching off the ON/OFF Switch (2 in Figs 3.1.1, 3.2.1 and 3.2.2), waiting for 15 minutes for the unit to cool down and then, switching ON again.

Refer to Table 6.1 for front panel indications for this condition.

Refer to Section 7 - Troubleshooting Guide for more details of symptoms, causes and remedies related to this protection.

6.2 LOW BATTERY VOLTAGE PROTECTION

This condition is not harmful to the inverter but could reduce life of the batteries. The inverter automatically shuts down when input voltage drops below 10.5V (12V units) / 21V (24V units). The unit will automatically turn ON when the voltage rises above 11.5V (12V untis) / 23V (24V units).

Refer to Table 6.1 for front panel indication for this condition.

Refer to Section 7 - Troubleshooting Guide for more details of symptoms, causes and remedies related to this protection.

6.3 OVER VOLTAGE PROTECTION

The inverter will automatically shut down when the input voltage exceeds 16.3V (12V units) / 32V (24V units). The unit will reset automatically when the voltage drops to 16V (12V units) / 32V (24V units).

Refer to Table 6.1 for front panel indications for this condition.

Refer to Section 7 - Troubleshooting Guide for more details of symptoms, causes and remedies related to this protection.

6.4 OVERLOAD PROTECTION

The inverter will automatically shut down under overload of 115% to 125% lasting for 3 to 5 sec. Refer to Table 6.1 for front panel indications under this condition.

The inverter will remain latched in shut down condition and will require manual reset as described below:

a) **From the Front Panel of the unit:**
   i. Switch off the On/Off Switch (2 in Figs 3.1.1, 3.2.1 and 3.2.2).
   ii. Wait for around 2 minutes (Internal latching circuit does not de-energize immediately after switching off)
   iii. Switch on using the On/Off Switch

b) **From Remote Control Model No. NTX-RC**
   i. Ensure that the On/Off Switch (2 in Figs 3.1.1, 3.2.1 and 3.2.2) on the front panel of the unit is in off position. (**NOTE:** When Remote Control NTX-RC is being used to operate the inverter, the On/Off Switch on the front panel of the inverter is required to be in off condition. If the front panel On/Off Switch is in on condition, the inverter cannot be switched off (Please refer to the manual for the Remote Control NTX-RC)
   ii. Press the On/Off Key to switch off the inverter
   iii. Wait for around 3 minutes
   iv. Press the On/Off Key to switch on the inverter

Refer to Section 7 – Troubleshooting Guide for more details of symptoms, causes and remedies related to this protection.

6.5 SHORT CIRCUIT PROTECTION

During a short circuit, abnormally high current is drawn by the inverter. The inverter will automatically shut down under short circuit condition within a very short period of around 0.1 sec. Refer to Table 6.1 for front panel indications under this condition.

The inverter will remain latched in shut down condition and will require manual reset as described below:

a) **From the Front Panel of the unit:**
   i. Switch off the On/Off Switch (2 in Figs 3.1.1, 3.2.1 and 3.2.2).
   ii. Wait for around 3 minutes (Internal latching circuit does not de-energize immediately after switching off)
   iii. Switch on using the On/Off Switch

b) **From Remote Control Model No. NTX-RC**
   i. Ensure that the On/Off Switch (2 in Figs 3.1.1, 3.2.1 and 3.2.2) on the front panel of the unit is in off position. (**NOTE:** When Remote Control NTX-RC is being used to operate the inverter, the On/Off Switch on the front panel of the inverter is required to be in off condition. If the front panel On/Off Switch is in on condition, the inverter cannot be switched off (Please refer to the manual for the Remote Control NTX-RC)
   ii. Press the On/Off Key to switch off the inverter
   iii. Wait for around 3 minutes
   iv. Press the On/Off Key to switch on the inverter

6.6 GROUND FAULT PROTECTION

6.6.1 Ground Fault Circuit Interrupter (GFCI) Protection in Models NTX-1000-12/24 / NT X-1500-12/24 / NTX-2000-12/24

Please see Sections 4.12.1 to 4.12.4 for complete details of function, features and operation of GFCI protection in Models NTX-1000-12/24 / NTX-1500-12/24 / NTX-2000-12/24.

If there is a leakage of 4 to 6mA due to ground fault on the load side or, there is a Neutral to Ground bond on the load side, the GFCI will trip and the “Reset Button” [1(c) in Fig 3.1.1] will pop out. AC power to the two NEMA5-20R outlets (on the Load Side of the GFCI) will be cut off. Green LED [1(b) in Fig 3.1.1] will switch OFF. Remove the ground fault in the load circuit. Reset the tripped GFCI as follows:

a) Remove the cause of ground fault on the load side
b) Ensure that the inverter is in ON condition so that 115VAC power is available to the internal Line Side of the GFCI [Green LED (5 in Fig 3.1.1) will be ON].
c) Press the “Reset Button” [1(c) in Fig 3.1.1]. The GFCI will reset and AC power to the NEMA5-20R outlets (on the Load Side of the GFCI) will be restored. Green LED [1(b) in Fig 3.1.1] will switch ON.

INFO

For the Reset Button [1(c) in Fig 3.1.1] to operate, the Inverter has to be in ON condition so that 115VAC power is available to the internal Line Side of the GFCI. Tripped GFCI [When the inverter is ON and is feeding 115 VAC to the internal Line Side of the GFCI, Green LED (5 in Fig 3.1.1) will be ON] can be reset only if AC power is available on the Load Side of the GFCI

6.6.2 Ground Fault Circuit Interrupter (GFCI) Protection in Model Models NTX-3000-12/24 and NTX-3000S-12/24. Please see Section 4.13.1 for complete details on function, features and operation of GFCI protection in NTX-3000-12/24 and NTX-3000S-12/24 models.

NTX-3000-12/24 and NTX-3000S-12/24, a customized, built-in GFCI circuitry has been used. The Grounding Slot of the receptacle is NOT connected to the chassis of the inverter but to the input section of a customized GFCI circuitry. If a "Ground Fault" occurs in the load side, fault current from the load will travel along the Grounding Conductor from the load to the Grounding Slot of the Receptacle. A fault current of 4 to 5 mA will activate the built-in GFCI circuit and the AC output of the inverter will be shut down and Red Fault LED (6 in Fig 3.2.1 and 3.2.2) will be lighted. The unit will be required to be reset manually as follows:

- Remove the cause of Ground Fault in the load side
- Switch off the unit using the On/Off Switch (2 in Fig 3.2.1 and 3.2.2)
- Wait for 2 minutes and switch the unit on again

6.7 LOW INPUT VOLTAGE ALARM

An alarm will sound when the voltage at the input terminals of the inverter drops below the low voltage alarm point. This is an indication that either the battery terminal voltage has dropped due to its discharged condition and needs to be re-charged OR there is an excessive voltage drop across the wires connecting the inverter to the battery (due to use of thinner and longer length of wires that will produce higher voltage drop at higher loads OR due to loose connections). The user should stop operation of the load at this time since the inverter will shut down automatically shortly thereafter, when the input voltage at the inverter further drops to the low voltage shudown point. In case the alarm is due to the discharged condition of the battery, start your engine to recharge the battery / use an appropriate battery charger.

The alarm resets automatically when the DC input voltage rises to 1V above the alarm point.

Refer to Section 7 - Troubleshooting Guide for more details of symptoms, causes and remedies related to this protection.

SECTION 6 | Protections

NOTE: It is normal for the alarm to sound while the unit is being connected to or disconnected from the power source. This is not indicative of a problem.

6.8 MONITORING OF ALARMS AND FAULTS THROUGH FRONT PANEL LEDS AND BUZZER

Table 6.1 below shows operation of Green, Yellow and Red monitoring LEDs in the front panel (4,5 and 6 in Figs 3.1.1, 3.2.1 and 3.2.2), Green and Red LEDs on the GFCI for NTX-100/1500/2000 [1(b) and 1(e) in Fig 3.1.1] and internal Buzzer under various alarm / fault conditions. Refer to Troubleshooting Guide under Section 7 for additional details.

Table 6.1 Alarm & fault monitoring through Front Panel LEDs, GFCI LEDs and internal buzzer

Description of Fault / Alarm	Buzzer	LED			GFCI Green LED [1(b), Fig 3.1.1]	GFCI Red LED [1(e), Fig 3.1.1]	AC Output
		Green	Yellow	Red			
Low voltage shutdown	On	On	On	Off	Off	Off	No
Low voltage alarm	On	On	Off	Off	On	Off	Yes
High voltage shutdown	Off	On	On	Off	Off	Off	No
Over temperature shutdown	Off	On	On	Off	Off	Off	No
Overload shutdown	Off	On	Off	On	Off	Off	No
Short circuit shutdown	Off	On	Off	On	Off	Off	No
Ground fault on load side (Only for NTX-1000/1500/2000)	Off	On	Off	Off	Off	Off	No
Ground fault on load side (Only for NTX-3000)	Off	On	Off	On	-	-	No
GFCI end of life (Only for NTX-1000/1500/2000)	Off	On	Off	Off	Off	On	No

SECTION 7 | Troubleshooting Guide

TROUBLE / SYMPTOMS	POSSIBLE CAUSE(S)	SUGGESTED REMEDIES
NO AC OUTPUT ***On the Inverter Front Panel*** • Green LED is ON • Yellow LED is ON • Red LED is OFF • There is no buzzer alarm ***On Remote Control NTX-RC*** • DC input voltage is being displayed • Power Bar Graph is OFF • Message "Input Fault" is flashing	**Over Temperature Shutdown** In case the fan fails or if the cooling is inadequate due to higher ambient temperature or restricted airflow, the temperature inside the inverter will start rising. Temperature rise is sensed at a critical hot spot. If this temperature is around 105°C, the AC output will be switched OFF.	1. The inverter will remain latched in this shut down condition and will be required to be reset manually by switching OFF, waiting for 15 minutes and switching ON again. 2. Before using the inverter again, please ensure that the cause of over temperature has been removed
NO AC OUTPUT ***On the Inverter Front Panel*** • Green, Yellow & Red LED are OFF • There is no buzzer alarm ***On Remote Control NTX-RC*** Remote Control display is OFF and cannot be switched ON	**No activity due to loss of DC input power to the inverter** 1. If there is no voltage at the DC input terminals: • Battery is dead • External DC input fuse is blown • Loose connection along the circuit from the battery to the DC input terminals 2. If there is voltage at the DC input terminals: • Internal DC input fuses have blown	1. Check DC side wire connections and fuses OR contact Technical Support
NO AC OUTPUT ***On the Inverter Front Panel*** • Green LED is ON • Yellow LED is OFF • Red LED is ON • There is no buzzer alarm ***On Remote Control NTX-RC*** • DC input voltage is being displayed • Power Bar Graph is OFF • Message "Output Fault" is flashing	**Shut down due to overload or short circuit or ground fault / leakage** 1. Inverter has shut down because the power drawn by the load is more than the continuous / surge ratings or there is a short circuit on the load side. 2. In Model NTX-3000-12, this shut down could also be due to ground fault / leakage on the load side (This model has built in Ground Fault Protection Circuit. Refer to Section 6.6.2 for details).	1. Reduce the load or disconnect the load that is causing overloading 2. Check for short circuit and remove the short. Also, check for ground fault on the load side 3. When the inverter shuts down due to overload / short circuit, it will be latched in shutdown condition and will require a manual reset as follows: a) From the front panel of the unit: • Switch the On/Off Rocker Switch to off position • Wait for 2 to 3 minutes for the internal latching circuit to de-energize completely • Switch the On/Off Rocker Switch to on position b) From the Remote Control NTX-RC • Switch off the inverter by pressing the On/Off Key on the remote (**NOTE**: The inverter cannot be switched off through the Remote Control NTX-RC if the On/Off Rocker Switch on the front panel of the inverter is in on condition. When NTX-RC is being used, the On/Off Switch on the front panel of the inverter should be in off condition) • Wait for 2 to 3 minutes for the internal latching circuit to de-energize completely • Press the On/Off Key on the remote to switch on the inverter
NO AC OUTPUT ***(For NTX-1000 / 1500 / 2000)*** ***On the NEMA5-20R Duplex GFCI outlet*** • The small Green LED light on the GFCI outlet is OFF • The "Reset Button" has popped out ***On the Inverter Front Panel*** • Green LED is ON • Yellow LED and Red LED are OFF • There is no buzzer alarm ***On the Remote Control NTX-RC*** • Power Bar Graph is OFF • Backlight is dimmed • DC input voltage is being displayed	**GFCI has tripped due to ground fault / leakage on the load side (Refer to Section 6.6.1 for more details)** 1. Due to ground fault / leakage on the Load Side of the GFCI, the Load Side has been mechanically disconnected from its AC input side by the relay inside the GFCI. 2. Internally, the inverter will still be working normally and the rated AC output voltage will be available on the internal Line Side of the GFCI but not on the external Load Side of the GFCI due to tripped relay in the GFCI.	Press the "Reset" button on the GFCI outlet to reset the GFCI after removing the cause of the ground fault / leakage.

SECTION 7 | Troubleshooting Guide

TROUBLE / SYMPTOMS	POSSIBLE CAUSE(S)	SUGGESTED REMEDIES
AC OUTPUT IS AVAILABLE ***On the Inverter Front Panel*** • Green LED is ON • Red LED is OFF • Buzzer alarm sounds intermittently when DC input voltage drops to Low DC Input Voltage Alarm Threshold of 11V +/- 0.3V when delivering high power loads • Yellow LED comes ON when buzzer alarm is sounded. ***On the Remote Control NTX-RC*** • DC input voltage is being displayed and intermittently drops to Low DC Input Voltage Alarm Threshold of 11V +/- 0.3V when delivering high power loads • Message "Input Fault" intermittently flashes whenever DC input voltage drops to Low DC Input Voltage Alarm Threshold of 11V +/- 0.3V • Power Bar Graph will be ON if the output power is > 50W to 100W	**Intermittent buzzer alarm due to intermittent high AC loads** 1. DC input wire size is not adequate for higher capacity loads OR there is loose connection between the battery and the inverter leading to DC input voltage falling below the Low DC Input Voltage Alarm Threshold 2. The battery has developed sulfation due to undercharging. In this condition, the internal resistance of the battery rises above normal and hence, causes abnormal voltage drop on its terminals at higher discharge current consumed by higher capacity load	1. Use thicker wires between the battery and the inverter and tighten all DC input circuit connections 2. Check internal resistance of the battery and remove sulfation by equalizing the battery or replace the battery 3. Alarm resets automatically when battery voltage rises to 11.5 VDC (12V units) / 23 VDC (24V units)
NO AC OUTPUT ***On the Inverter Front Panel*** • Green LED is ON • Red LED is OFF • Buzzer alarm sounds all the time • Yellow LED is ON ***On the Remote Control NTX-RC*** • DC input voltage is being displayed and has dropped to Low DC Input Voltage Shutdown Threshold of 10.5V +/- 0.3V • Message "Input Fault" is flashing • Power Bar Graph is OFF • LCD is dimmed	**Shutdown due to low DC input voltage** 1. DC input wire size is not adequate for the capacity of the AC load OR there is loose connection between the battery and the inverter leading to DC input voltage falling below the Low DC Input Voltage Shutdown Threshold 2. The battery has developed sulfation due to undercharging. In this condition, the internal resistance of the battery rises above normal and hence causes abnormal voltage drop on its terminals at higher discharge current consumed by higher capacity load	1. Use thicker wires between the battery and the inverter and tighten all DC input circuit connections 2. Check internal resistance of the battery and remove sulfation by equalizing the battery or replace the battery 3. Alarm resets automatically when battery voltage rises to 11.5 VDC (12V units) / 23 VDC (24V units)
AC OUTPUT IS AVAILABLE ***On the Inverter Front Panel*** • Green LED is ON • Red LED is OFF • Buzzer alarm sounds when DC input voltage drops to Low DC Input Voltage Alarm Threshold of 11V +/- 0.3V even on low AC loads • Yellow LED is OFF. ***On the Remote Control NTX-RC*** • DC input voltage is being displayed and drops to Low DC Input Voltage Alarm Threshold of 11V +/- 0.3V even at low loads • Power Bar Graph is ON if the output power is > 50W to 100W	**Buzzer alarm due to low DC input voltage even at low AC loads** The battery is almost discharged	1. Recharge the battery. 2. Alarm resets automatically when DC input voltage rises to > 11 VDC (12V units) / > 22 VDC (24V units)

SECTION 7 | Troubleshooting Guide

TROUBLE / SYMPTOMS	POSSIBLE CAUSE(S)	SUGGESTED REMEDIES
NO AC OUTPUT ***On the Inverter Front Panel*** • Green LED is ON • Red LED is OFF • Buzzer alarm is OFF • Yellow LED is ON ***On the Remote Control NTX-RC*** • DC input voltage is being displayed and has risen to High DC Input Voltage Shutdown Threshold of 16.3V +/- 0.3V • Message "Input Fault" is flashing • Power Bar Graph is OFF • LCD is dimmed	**Shutdown due to high DC input voltage** DC input voltage has risen to High DC Input Voltage Shutdown Threshold of 16.3 V (12V units) / 32 VDC (24V units)	1. Switch OFF the AC load and the inverter 2. Disconnect the DC input to the inverter 3. Check the output voltages of the battery and charging source and ensure these are below the High DC Input Voltage Shutdown Threshold of 16.3V +/- 0.3V 4. Check that a 24V battery is not being used instead of 12V battery for 12V units 5. The unit will reset automatically once the voltage drops to 16V (12V units) / 32V (24V units)
INVERTER DOES NOT SHUT DOWN WHEN IT IS SWITCHED OFF USING REMOTE CONTROL *NTX-RC*	**The ON / OFF switch on the front panel of the inverter is in ON condition**	When using the remote control NTX-RC, ensure that the ON / OFF switch on the inverter is in OFF position
MOTORIZED POWER TOOL WILL NOT START	Excessive start-up current from the load is activating the Soft Start Circuit and is reducing the output voltage and consequently, the current to a level where the starting torque required by the motor is not sufficient to turn the motor. (Starting torque in a motor is proportional to Voltage and the Current)	If appliance does not start, then the appliance is drawing excessive power and will not work with the inverter
MOTORIZED POWER TOOL DOES NOT OPERATE AT CORRECT SPEED	Purely inductive load with higher reactive power and lower Power Factor is activating the soft start circuitry and reducing the output voltage resulting in reduced speed	Make the load not purely inductive. Operate an incandescent lamp at the same time as the motor. This will reduce the reactive power and raise the Power Factor so that the Soft Start Circuit is not activated

SECTION 8 | Fuse Replacement

8.1 FUSES INSIDE THE INVERTER

The AC side is protected by an integral electronic overload circuit and will automatically reset in some cases.

The DC side is protected by fuses that are located inside the inverter. Normally, these fuses will not blow unless a serious problem occurs. See Section 9 - Specifications for details of fuses.

Please DO NOT replace the fuses yourself. We recommend you contact technician to find and fix the problems. High voltage and high temperature inside!



CAUTION!

NO USER-SERVICEABLE COMPONENTS INSIDE. DO NOT ATTEMPT TO OPEN THE INVERTER.



ATTENTION!

IL N'Y A PAS DE COMPOSANTES ACCESSIBLES POUR L'UTILISATEUR À L'INTÉRIEUR. NE TENTEZ PAS D'OUVRIR LE CONVERTISSEUR.

SECTION 9 | SPECIFICATIONS

MODEL NO.	NTX-1000-12	NTX-1500-12	NTX-2000-12	NTX-3000-12
INPUT				
DC INPUT VOLTAGE RANGE	10.5 - 16.3 VDC (± 0.3 VDC)			
DC INPUT CURRENT AT RATED LOAD	100A	150A	200A	300A
DC INPUT CURRENT AT NO LOAD	< 0.8A	< 0.9A	< 1.0A	<1.1A
OUTPUT				
AC OUTPUT VOLTAGE	115 VAC (± 5 VAC)			
AC OUTPUT FREQUENCY	60 Hz (± 1Hz)			
AC OUTPUT WAVE FORM	Pure Sine Wave			
CONTINUOUS ACTIVE OUTPUT POWER	1000W	1500W	2000W	3000W
MAXIMUM ACTIVE SURGE POWER (LESS THAN 1 SEC)	2000W	3000W	4000W	6000W
PEAK EFFICIENCY	90.5%	90.5%	90.5%	90.5%
PORTS				
REMOTE CONTROL PORT (RJ-45 JACK, 8P8C)	Yes	Yes	Yes	Yes
PROTECTIONS				
LOW INPUT VOLTAGE WARNING ALARM	11.0 VDC ± 0.3 VDC			
LOW INPUT VOLTAGE SHUTDOWN	10.5 VDC ± 0.3 VDC			
HIGH INPUT VOLTAGE SHUTDOWN	16.3 VDC ± 0.3 VDC			
GROUND FAULT/OVERLOAD/ SHORT CIRCUIT SHUTDOWN	Yes. Manual reset			
OVER TEMPERATURE SHUTDOWN	Yes. Auto reset			
COOLING	Load and temperature controlled variable speed fan			
INTERNAL FUSES	4 x 40A in parallel	8 x 30A in parallel	10 x 35A in parallel	16 x 30A in parallel
	(Automotive Blade Fuses, Type ATO/ATC, 32 VDC)			
CONNECTIONS				
INPUT	NUT AND BOLT (M9)			
OUTPUT	NEMA5-20R Duplex Receptacles			NEMA L5-30R Receptacle
ACCESSORIES INCLUDED				
REMOTE CONTROL NTX-RC	Yes	Yes	Yes	Yes
COMPLIANCE				
SAFETY	Intertek - ETL Listed. Conforms to UL Std. 458 and certified to CSA Std. C22.2 No.107.1			
EMI / EMC	FCC Part 15(B), Class A			
ENVIRONMENT				
OPERATING AMBIENT TEMPERATURE	-25°C to 50°C; -13°F to 122°F			
STORAGE TEMPERATURE	-30°C to 70°C; -26°F to 158°F			
GENERAL				
DIMENSIONS, IN (W X D X H)	8.50 x 11.06 x 3.62	8.50 x 13.11 x 3.62	8.50 x 13.11 x 3.62	8.50 x 17.75 x 3.62
DIMENSIONS, MM (W X D X H)	216 x 281 x 92	216 x 333 x 92	216 x 333 x 92	216 x 451 x 92
WEIGHT, KG	2.5	3.5	3.9	5.5
WEIGHT, LB	5.4	7.8	8.6	12.0

NOTES: 1. All power ratings are specified for resistive load at Power Factor = 1
2. All specifications given above are at ambient temperature of 25°C / 77°F
3. Specifications are subject to change without notice

SECTION 9 | SPECIFICATIONS

MODEL NO.	NTX-1000-24	NTX-1500-24	NTX-2000-24	NTX-3000-24
INPUT				
DC INPUT VOLTAGE RANGE	21.0 - 32.6 VDC (± 0.5 VDC)			
DC INPUT CURRENT AT RATED LOAD	50A	75A	100A	150A
DC INPUT CURRENT AT NO LOAD	< 0.4A	< 0.5A	< 0.6A	<0.6A
OUTPUT				
AC OUTPUT VOLTAGE	115 VAC (± 5 VAC)			
AC OUTPUT FREQUENCY	60 Hz (± 1Hz)			
AC OUTPUT WAVE FORM	Pure Sine Wave			
CONTINUOUS ACTIVE OUTPUT POWER	1000W	1500W	2000W	3000W
MAXIMUM ACTIVE SURGE POWER (LESS THAN 1 SEC)	2000W	3000W	4000W	6000W
PEAK EFFICIENCY	90.5%	90.5%	90.5%	90.5%
PORTS				
REMOTE CONTROL PORT (RJ-45 JACK, 8P8C)	Yes	Yes	Yes	Yes
PROTECTIONS				
LOW INPUT VOLTAGE WARNING ALARM	22.0 VDC ± 0.5 VDC			
LOW INPUT VOLTAGE SHUTDOWN	21.0 VDC ± 0.5 VDC			
HIGH INPUT VOLTAGE SHUTDOWN	32.0 VDC ± 0.5 VDC			
GROUND FAULT/OVERLOAD/ SHORT CIRCUIT SHUTDOWN	Yes. Manual reset			
OVER TEMPERATURE SHUTDOWN	Yes. Auto reset			
COOLING	Load and temperature controlled variable speed fan			
INTERNAL FUSES	2 x 40A in parallel	4 x 30A in parallel	5 x 35A in parallel	8 x 30A in parallel
	(Automotive Blade Fuses, Type ATO/ATC, 32 VDC)			
CONNECTIONS				
INPUT	NUT AND BOLT (M9)			
OUTPUT	NEMA5-20R Duplex Receptacles			NEMA L5-30R Receptacle
ACCESSORIES INCLUDED				
REMOTE CONTROL NTX-RC	Yes	Yes	Yes	Yes
COMPLIANCE				
SAFETY	Intertek - ETL Listed. Conforms to UL Std. 458 and certified to CSA Std. C22.2 No.107.1			
EMI / EMC	FCC Part 15(B), Class A			
ENVIRONMENT				
OPERATING AMBIENT TEMPERATURE	-25°C to 50°C; -13°F to 122°F			
STORAGE TEMPERATURE	-30°C to 70°C; -26°F to 158°F			
GENERAL				
DIMENSIONS, IN (W X D X H)	8.50 x 11.06 x 3.62	8.50 x 13.11 x 3.62	8.50 x 13.11 x 3.62	8.50 x 17.75 x 3.62
DIMENSIONS, MM (W X D X H)	216 x 281 x 92	216 x 333 x 92	216 x 333 x 92	216 x 451 x 92
WEIGHT, KG	2.5	3.5	3.9	5.5
WEIGHT, LB	5.4	7.8	8.6	12.0

NOTES: 1. All power ratings are specified for resistive load at Power Factor = 1
2. All specifications given above are at ambient temperature of 25°C / 77°F
3. Specifications are subject to change without notice

SECTION 9 | SPECIFICATIONS

MODEL NO.	NTX-3000S-12	NTX-3000S-24
INPUT		
DC INPUT VOLTAGE RANGE	10.5 - 16.3 VDC (± 0.3 VDC)	21.0 - 32.6 VDC (± 0.5 VDC)
DC INPUT CURRENT AT RATED LOAD	300A	150A
DC INPUT CURRENT AT NO LOAD	< 1.1A	< 0.6A
OUTPUT		
AC OUTPUT VOLTAGE	115 VAC (± 5 VAC)	
AC OUTPUT FREQUENCY	60 Hz (± 1Hz)	
AC OUTPUT WAVE FORM	Pure Sine Wave	
CONTINUOUS ACTIVE OUTPUT POWER	3000W	3000W
MAXIMUM ACTIVE SURGE POWER (LESS THAN 1 SEC)	6000W	6000W
PEAK EFFICIENCY	90.5%	90.5%
PORTS		
REMOTE CONTROL PORT (RJ-45 JACK, 8P8C)	Yes	Yes
PROTECTIONS		
LOW INPUT VOLTAGE WARNING ALARM	11.0 VDC ± 0.3 VDC	22.0 VDC ± 0.5 VDC
LOW INPUT VOLTAGE SHUTDOWN	10.5 VDC ± 0.3 VDC	21.0 VDC ± 0.5 VDC
HIGH INPUT VOLTAGE SHUTDOWN	16.3 VDC ± 0.3 VDC	32.0 VDC ± 0.5 VDC
GROUND FAULT/OVERLOAD/ SHORT CIRCUIT SHUTDOWN	Yes. Manual reset	
OVER TEMPERATURE SHUTDOWN	Yes. Auto reset	
COOLING	Load and temperature controlled variable speed fan	
INTERNAL FUSES	16 x 30A in parallel	8 x 30A in parallel
	(Automotive Blade Fuses, Type ATO/ATC, 32 VDC)	
CONNECTIONS		
INPUT	NUT AND BOLT (M9)	
OUTPUT	3x NEMA 5-15R Receptacles with 15A Circuit Breaker	
ACCESSORIES INCLUDED		
REMOTE CONTROL NTX-RC	Yes	Yes
COMPLIANCE		
SAFETY	Intertek - ETL Listed. Conforms to UL Std. 458 and certified to CSA Std. C22.2 No.107.1	
EMI / EMC	FCC Part 15(B), Class A	
ENVIRONMENT		
OPERATING AMBIENT TEMPERATURE	-25°C to 50°C; -13°F to 122°F	
STORAGE TEMPERATURE	-30°C to 70°C; -26°F to 158°F	
GENERAL		
DIMENSIONS, IN (W X D X H)	8.50 x 17.75 x 3.62	8.50 x 17.75 x 3.62
DIMENSIONS, MM (W X D X H)	216 x 451 x 92	216 x 451 x 92
WEIGHT, KG	5.5	5.5
WEIGHT, LB	12.0	12.0

NOTES: 1. All power ratings are specified for resistive load at Power Factor = 1
2. All specifications given above are at ambient temperature of 25°C / 77°F
3. Specifications are subject to change without notice

SECTION 10 | WARRANTY

2 YEAR LIMITED WARRANTY

NTX-1000-12/24, NTX-1500-12/24, NTX-2000-12/24, NTX-3000-12/24 and NTX-3000S-12/24 are manufactured by Samlex America Inc. (the "Warrantor") are warranted to be free from defects in workmanship and materials under normal use and service. The warranty period is 2 years for the United States and Canada, and is in effect from the date of purchase by the user (the "Purchaser").

Warranty outside of the United States and Canada is limited to 6 months. For a warranty claim, the Purchaser should contact the place of purchase to obtain a Return Authorization Number.

The defective part or unit should be returned at the Purchaser's expense to the authorized location. A written statement describing the nature of the defect, the date of purchase, the place of purchase, and the Purchaser's name, address and telephone number should also be included.

If upon the Warrantor's examination, the defect proves to be the result of defective material or workmanship, the equipment will be repaired or replaced at the Warrantor's option without charge, and returned to the Purchaser at the Warrantor's expense.
(Contiguous US and Canada only)

No refund of the purchase price will be granted to the Purchaser, unless the Warrantor is unable to remedy the defect after having a reasonable number of opportunities to do so. Warranty service shall be performed only by the Warrantor. Any attempt to remedy the defect by anyone other than the Warrantor shall render this warranty void. There shall be no warranty for defects or damages caused by faulty installation or hook-up, abuse or misuse of the equipment including exposure to excessive heat, salt or fresh water spray, or water immersion.

No other express warranty is hereby given and there are no warranties which extend beyond those described herein. This warranty is expressly in lieu of any other expressed or implied warranties, including any implied warranty of merchantability, fitness for the ordinary purposes for which such goods are used, or fitness for a particular purpose, or any other obligations on the part of the Warrantor or its employees and representatives.

There shall be no responsibility or liability whatsoever on the part of the Warrantor or its employees and representatives for injury to any persons, or damage to person or persons, or damage to property, or loss of income or profit, or any other consequential or resulting damage which may be claimed to have been incurred through the use or sale of the equipment, including any possible failure of malfunction of the equipment, or part thereof. The Warrantor assumes no liability for incidental or consequential damages of any kind.

Samlex America Inc. (the "Warrantor")
www.samlexamerica.com

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Contact Information

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