

# T1000 SERIES

## Installation and Operation Manual

### Single-Phase 1-2 kVA



Part Number: 94086-000

Date: August 2016

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The instructions contained in this manual are not intended to cover all of the details or variations in equipment, or to provide for every possible contingency concerning installation, operation, or maintenance. Should further information be required or if problems arise which are not covered sufficiently, contact your Toshiba sales office.

The contents of this instruction manual shall not become a part of or modify any prior or existing agreement, commitment, or relationship. The sales contract contains the entire obligation of Toshiba International Corporation's UPS Division. The warranty contained in the contract between the parties is the sole warranty of Toshiba International Corporation's UPS Division and any statements contained herein do not create new warranties or modify the existing warranty.

Any electrical or mechanical modifications to this equipment without prior written consent of Toshiba UPS will void all warranties and may void the UL/CUL listing. Unauthorized modifications can also result in personal injury, loss of life, or destruction of the equipment.

### QUALIFIED PERSONNEL ONLY

Qualified Personnel are those who have the skills and knowledge relating to the construction, installation, operation, and maintenance of the electrical equipment and have received safety training on the hazards involved (Refer to the latest edition of NFPA 70E for additional safety requirements).

## UNINTERRUPTIBLE POWER SYSTEM (UPS)

Please complete the following information and retain for your records.

Unless otherwise specified, the warranty period for the UPS or UPS part is 36 months from the shipment date (see Toshiba International Corporation bill of lading).

Unless otherwise specified, the warranty period for a UPS battery is 24 months from the shipment date (see Toshiba International Corporation bill of lading).

Please complete the following information and retain for your records.

Job Number: \_\_\_\_\_

Model Number: \_\_\_\_\_

Serial Number: \_\_\_\_\_

Application: \_\_\_\_\_

Shipment Date: \_\_\_\_\_

Installation Date: \_\_\_\_\_

Inspected By: \_\_\_\_\_

## MANUAL'S PURPOSE

This manual provides information on how to safely install your Toshiba International Corporation power electronics product. This manual includes a section of general safety instructions that describes the warning labels and symbols that are used throughout the manual. Read the manual completely before installing, operating, or performing maintenance on this equipment.

This manual and the accompanying drawings should be considered a permanent part of the equipment and should be readily available for reference and review. Dimensions shown in the manual are in metric and/or the English customary equivalent.

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### **Customer Support Center**

8 a.m. to 5 p.m. (CST) – Monday through Friday

USA Toll Free (877) 867-8773 – Field Service Tech Support

USA Toll Free (855) 803-7087 – Pre-sales Application Support

You may also contact Toshiba International Corporation by writing to:

### **Toshiba International Corporation**

#### **Power Electronics Division - UPS**

13131 West Little York Road

Houston, Texas 77041-9990

Attn: T1000 UPS Product Manager

For further information on Toshiba International Corporation's products and services, please visit our website at [www.ToshibaUPS.com](http://www.ToshibaUPS.com)

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## 1 GENERAL SAFETY INSTRUCTIONS

**DO NOT** attempt to install, operate, maintain or dispose of this equipment until you have read and understood all of the product safety information and directions that are contained in this manual.

### Safety Alert Symbol

The **Safety Alert Symbol** indicates that a potential personal injury hazard exists. The symbol is comprised of an equilateral triangle enclosing an exclamation mark.



### Signal Words

Listed below are the signal words that are used throughout this manual followed by their descriptions and associated symbols. When the words **DANGER**, **WARNING** and **CAUTION** are used in this manual they will be followed by important safety information that must be carefully adhered to.

The word **DANGER** preceded by the safety alert symbol indicates that an imminently hazardous situation exists that, if not avoided, will result in death or serious injury to personnel.



**DANGER**

The word **WARNING** in capital letters preceded by the safety alert symbol indicates that a potentially hazardous situation exists that, if not avoided, could result in death or serious injury to personnel.



**WARNING**

The word **CAUTION** or **ATTENTION** in capital letters preceded by the safety alert symbol indicates a potentially hazardous situation exists which, if not avoided, may result in minor or moderate injury.



**CAUTION/ATTENTION**

The word **CAUTION** in capital letters without the safety alert symbol indicates that a potentially hazardous situation exists which, if not avoided, may result in equipment or property damage.

**CAUTION**

## Special Symbols

To identify special hazards, other symbols may appear in conjunction with the **DANGER**, **WARNING** and **CAUTION** signal words. These symbols indicate areas that require special and/or strict adherence to the procedures to prevent serious injury to personnel or death.



## Electrical Hazard Symbol

A symbol which indicates a hazard of injury from electrical shock or burn. It is comprised of an equilateral triangle enclosing a lightning bolt.

## Explosion Hazard Symbol



A symbol which indicates a hazard of injury from exploding parts. It is comprised of an equilateral triangle enclosing an explosion image.

## Equipment Warning Labels

**DO NOT** attempt to install, operate, maintain, or dispose of this equipment until you have read and understood all of the product warnings and user directions that are contained in this instruction manual.

Labels attached to the equipment are there to provide useful information or to indicate an imminently hazardous situation that may result in serious injury, severe property and equipment damage, or death if the instructions are not followed.

## 2 IMPORTANT SAFETY INSTRUCTIONS

This manual contains important instructions that should be followed during the installation, maintenance, and operation of the UPS and its batteries to assure safe and proper operation.

- 1) Turn off, lockout, and tagout all power sources before connecting the power wiring to the equipment or when performing maintenance.
- 2) Hardwire type UPS units are not equipped with an over-current protection device, nor do they have an output disconnect for the ac output. Therefore, a user-installed circuit breaker should be provided between the UPS output and the load input.
- 3) The maximum ambient operating temperature is 104° F (40° C).
- 4) Battery servicing should be performed by a qualified Toshiba Representative only.
- 5) Unauthorized personnel should not service batteries.
- 6) Contact your nearest Toshiba authorized service center for battery replacement.

### **Qualified Personnel ONLY!**

**Qualified Personnel** is one that has the skills and knowledge relating to the construction, installation, operation, and maintenance of the electrical equipment and has received safety training on the hazards involved (Refer to the latest edition of NFPA 70E for additional safety requirements).

**For further information on workplace safety visit [www.osha.gov](http://www.osha.gov).**

## Qualified Personnel shall:

- 1) Have read the entire operation manual.
- 2) Be trained and authorized to safely energize, de-energize, ground, lockout and tag circuits and equipment, and clear faults in accordance with established safety practices.
- 3) Be trained in the proper care and use of protective equipment such as safety shoes, rubber gloves, hard hats, safety glasses, face shields, flash clothing, etc., in accordance with established safety practices.
- 4) Be trained in rendering first aid.
- 5) Be knowledgeable of batteries and the required handling and maintenance precautions.



## WARNING

Misuse of this equipment could result in injury and equipment damage. In no event will Toshiba Corporation be responsible or liable for either indirect or consequential damage or injury that may result from the misuse of this equipment.



## CAUTION



Do not dispose of the batteries in a fire. The batteries may explode.



## CAUTION

Do not open or mutilate the batteries. Released electrolyte is harmful to the eyes and skin and could also be toxic.



## DANGER



A battery can present a risk of electrical shock and high short circuit current.

\*Strict adherence to the following precautions is a requirement when working with batteries

To be performed by **Qualified Personnel** only.

- 1) Verify that the UPS is off and that the power cord is disconnected from the power source.
- 2) Remove watches, rings or other metal objects.
- 3) Use tools with insulated handles to prevent inadvertent shorts.
- 4) Wear rubber gloves and boots.
- 5) Do not place tools or any metal parts on top of batteries.
- 6) Determine if the battery is inadvertently grounded. If inadvertently grounded, remove source of ground.



## WARNING

**Contact with any part of a grounded battery can result in electrical shock.**

The likelihood of shock will be reduced if such grounds are removed prior to installation or maintenance.



## CAUTION

- Risk of electric shock – Refer to cautionary markings at top, or rear, or bottom of UPS.
- Risk of electric shock – Heat-sinks are live. Disconnect unit before servicing.
- **(UPS has internal batteries):** Risk of electric shock – Hazardous live parts inside this unit is energized from the battery supply even when the input AC power is disconnected.
- **(No user serviceable parts):** Risk of electric shock – do not remove cover, no user serviceable parts inside. Refer service to qualified service personnel.
- **(Non-isolated battery supply):** Risk of electric shock – battery circuit is not isolated from AC input. Hazardous voltage may exist between battery terminals and ground. Test before touching.
- When replacing batteries, replace with the same type and number of batteries: **One Sealed lead acid battery, rated 12V, 9 AH max.**
- To reduce risk of fire, use only No. 26 AWG or larger telecommunication line cable.
- Do not apply for uses in a computer room as defined in the Standard for the Protection of Electronic Computer/Data Processing Equipment, ANSI/NFPA 75.
- This UPS is not applicable for motors, hair dryers, speakers, and fluorescent lamps.
- Do not disconnect battery connector under load.





## WARNING

- To reduce risk of fire, replace only with the same type and rating of fuse.

To reduce risk of electric shock, disconnect the UPS from the mains supply before installing a computer interface signal cable. Reconnect the power cord only after signaling interconnections have been made.

Servicing of batteries should be performed or supervised by personnel with knowledge of batteries and the required precautions. Keep unauthorized personnel away from batteries.

The instructions contained within this safety manual are deemed important and should be closely followed at all times during installation and follow-up maintenance of the UPS and batteries.









## CAUTION

**The unit has a dangerous amount of voltage. If the UPS indicator is on, the unit's outlets may have a dangerous amount of voltage even when not plugged into the wall outlet because the battery may continue to supply power.**

**Ensure installation is indoors, free from electrically-conductive particles, temperature and humidity controlled in order to reduce the risk of electric shock. It is best to disconnect the device using the power supply cord. Ensure that the equipment is placed in a position near the outlet where easily accessible. Except when replacing the batteries, all service on this equipment must be carried out by qualified service personnel. Before conducting any maintenance, repair or shipment, first ensure that all components turned off completely and disconnected.**

## Special Symbols

The following symbols used on the UPS warn you of precautions:

-  RISK OF ELECTRIC SHOCK – Please observe the warning that a risk of electric shock is present.
-  CAUTION: REFER TO OPERATOR'S MANUAL – Refer to the operator's manual for additional information, such as important operating and maintenance instructions.
-  SAFE GROUNDING TERMINAL - Indicates primary safe ground.
-  LOAD ON/OFF - Pressing this button turns on/off the output receptacles and the Indicator light.
-  RJ-45 RECEPTACLE – The receptacle provides network interface connections and telephone or telecommunications equipment should not be plugged into it.
-  Please do not discard the UPS or UPS batteries as the UPS may have valve regulated, lead–acid batteries. Please recycle batteries.

## 3 EMC STATEMENTS

The products have been tested and thereby comply with the condition of a Class C1 (1000VA) and Class C2 (2000VA), which has been established for offering sufficient protection against dangerous interference for installation in a residential area. Installation and use of the equipment should comply with the instructions provided in order to avoid such interference due to the amount of radio frequency energy that is radiated and generated by the equipment. In spite of this, we cannot assure that a certain amount of interference may not occur in some installations. If, by turning on and off, it can be deduced that your radio or television reception is found to be influenced by harmful interference from the equipment, it is recommended to use one of the following preventive measures:

- . Place the receiving antenna in a separate location or orientation.
- . Ensure a greater distance is achieved between the receiver and the equipment.
- . Ensure that your equipment is connected to an outlet on a separate circuit than the receiver.
- . Contact a technician experienced with radio and TV or a dealer for further assistance.

## 4 DECLARATION OF CONFORMITY REQUEST

Units labeled with a CE mark comply with the following standards and directives:

- . Harmonic Standards: EN 62040-1, EN62040-2
- . EU Directives: 2014/30/EU, 2014/35/EU

The EC Declaration of Conformity is available upon request for products with a CE mark.

## 5 INTRODUCTION

The information provided in this manual covers single phase 1000 – 2000 VA, uninterruptible power systems, their basic functions, operating procedures, and emergency situations, also including information on how to ship, store, handle and install the equipment. Only detailed requirements of the UPS units are described herein, and installation must be carried out in accordance with this manual. Electrical installations must also carefully follow local legislation and regulations. Only qualified personnel should conduct these installations as failure to acknowledge electrical hazards could prove to be fatal.

## 6 SYSTEM DESCRIPTION

Several different kinds of sensitive electrical equipment stay protected by a UPS (Uninterruptible Power System) including computers, workstations, process control systems, telecommunications systems, sales terminals, other critical instrumentation, etc. The purpose of the UPS is to protect these systems from poor quality utility power, complete loss of power, or other associated problems.

Electrical interference abounds in many forms causing problems in AC power, from lightning, power company accidents and radio transmissions to motors, air conditioners, and vending machines, among others. So protection of sensitive electrical equipment is vital to protect against power outages, low or high voltage, slow voltage fluctuations, frequency variations, differential and common-mode noises, transients, etc.

In order to prevent power line problems reaching critical systems causing damage to software, hardware and causing equipment to malfunction, the UPS helps by maintaining constant voltage, isolating critical load output if needed, and cleaning the utility AC power.

## 6.1 GENERAL DESCRIPTION

As a double conversion on-line UPS, it is able to supply uninterrupted, clean single-phase power to your critical systems while keeping batteries charged continuously, regardless of whether utility power fails or not.

In event that a power failure lasts longer than a UPS backup time, it will shut down avoiding battery discharge, and as soon as power comes back, the UPS will automatically charge up and start recharging the batteries. As shown in Figure 1 block diagram:

- An input filter reduces transients on the mains
- For maintaining full battery charge, AC-power is rectified and regulated in the rectifier feeding power to the inverter and battery converter.
- DC power is converted to AC in the inverter passing it on to the load.
- Power is maintained from the battery during a power failure.
- The converter increases voltage appropriately for the inverter.

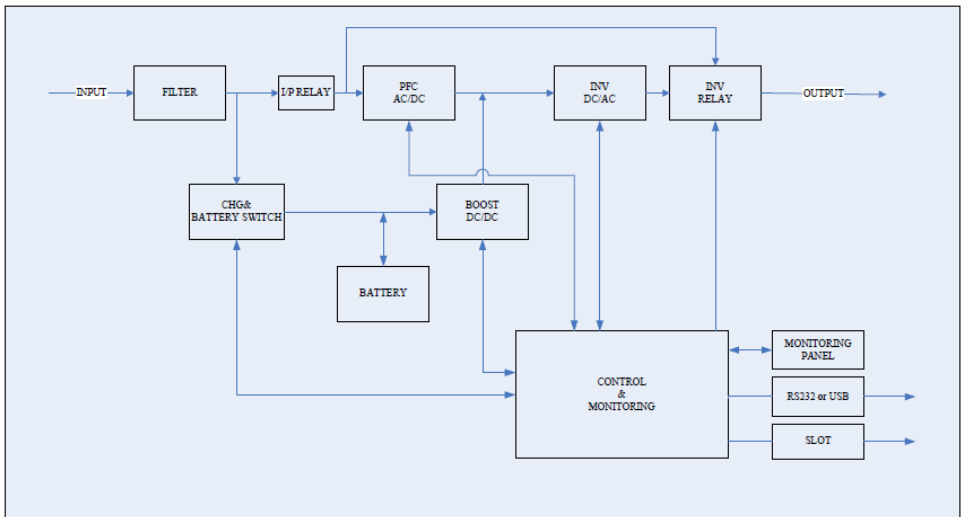


Figure 1: Block diagram

## Efficiency Optimizer Function

The Efficiency Optimizer Function is a new feature for the UPS adding cost effectiveness, minimizing power loss and reducing power consumption. Alternating between bypass and on-line modes is achieved automatically and in accordance with the conditions of the utility power. On-line mode may be used during times of intermittent power supply, and bypass mode when power flows smoothly in order to obtain greatest efficiency. Irregularities can be detected in less than a second, and on-line mode reactivated immediately. Switching back to online mode occurs when input voltage is outside  $\pm 10\%$  or nominal ( $\pm 15\%$  selectable), when input frequency is outside of  $\pm 3\text{Hz}$  or when no input line is available.

Although high efficiency is standard, the default operation is in on-line mode. Bypass can be activated in the LCD panel though on-line can be run permanently if preferred.

## Free Run Mode

The UPS operates in free run mode when input frequency is outside of the selected input frequency range. Free run mode is when output frequency does not match input frequency. When starting the UPS, the frequency regulation detected is 50 or 60 Hz  $\pm 0.25\text{Hz}$ . Please refer to section 13 if you want bypass available while running in free run mode.

## Diagnostic tests

When you start the UPS, a diagnostic test is automatically executed that checks electronics, battery, and reports any problems on the LCD display.

An advanced battery management system always monitors the conditions of the batteries sends any fore warnings if replacement is needed. Otherwise every 30 days of normal mode operation, a battery discharge test is performed and any problems reported on the LCD display.

Except during the first 24 hours after startup while the UPS is in charging mode (please see section 13), diagnostic tests can be performed manually from the front panel at any time.

## 6.2 SYSTEM CONFIGURATION

The UPS device and the internal backup battery make up the system. Depending on the site and load requirements of the installation, certain additional options are available as a tailored solution.

The following items should be taken into consideration when planning a UPS system:

- The total demand of the protected system shall dictate the output power rating (VA). Allow a margin for future expansion or calculation inaccuracies from measuring power requirements.
- Backup time needed defines the battery size needed. If load is less than the UPS nominal power rating then actual backup time is longer.
- The following options are available:
  - ◆ External Battery Cabinets
  - ◆ Connectivity options (dry contact card, network monitoring card)

The following UPS models are available

**Table 1 T1000 UPS Model - Backup and Recharge times**

Model	Backup time for 100% load with internal batteries	Recharge time to 90% capacity
UPS 1kVA	6 min	<4 hours
UPS 2kVA	6 min	<4 hours

Additional External Battery Cabinet is available if more back-up time is needed. Please see section 15.8 for detail information on the External Battery Cabinet.

## 7 SAFETY INFORMATION

Information presented here is vital to all personnel; please read the UPS safety manual.

### Storage and Transportation

Please handle the unit with extreme caution since a high amount of energy is contained with the batteries. Always keep the unit in position as marked on the packaging and never drop the unit.

### Installation

If flammable substances such as gases or fumes are present or if the room is airtight, a safety hazard situation exists, in which no electrical equipment should be operated.

The instructions in this manual explain how to install the UPS safely. Not acknowledging such electrical hazards may be fatal, so keep this manual for all future reference.



### **WARNING!**

**It is strongly advisable not to open the UPS cabinet as the components have very high voltage and touching them may be fatal. Only a technician from the manufacturer or an authorized agent may service the unit. This UPS unit's output receptacles carry live voltage even when not connected to a power supply as it has its own energy source.**

### **User's operations:**

The only operations that users are permitted to do are:

- Turn the UPS unit on and off.
- Operating the users interface.
- Connecting data interface cables.
- Changing the batteries.

All such operations are to be performed exactly as instructed in this manual. The greatest care possible must be taken for any of these operations and any change thereof may prove very hazardous to the operator.



## 8 INSPECTION/STORAGE/DISPOSAL

### Inspection

Upon receipt of the UPS, an inspection for shipping damage should be performed. Use caution when removing the unit from the pallet. Refer to labels or documentation attached to packing material.

### Unpacking

Check the unit for loose, broken, bent or otherwise damaged parts. If damage has occurred during shipping, keep all original crating and packing materials for return to the shipping agent. The warranty does not apply to damage incurred during shipping. Ensure that the rated capacity and the model number specified on the nameplate conform to the order specifications.

### Storage

During periods of non-use, the following guidelines are recommended for storage.

### Storage Preparation

1. Power up the UPS and allow it to operate with no load for 24 hours to fully charge the batteries.
2. Stop the unit.
3. Disable the COLD START function prior to storing the unit by following the instructions in section 13.6
4. Ensure all switches are in the Off position.

## Storing Conditions

- For best results, store the UPS in the original shipping container and place on a wood or metal pallet.
- Storage temperature: 5 – 122 °F (-15 to 50 °C).
- The recommended storage temperature is 59 to 77 °F (15 to 25 °C). A higher ambient temperature will require recharging the batteries more frequently during storage.

Avoid the following storage locations:

- Locations that are subject to extreme temperature changes or high humidity.
- Locations that are subject to high levels of dust or metal particles.
- Locations that are subject to excessive vibration.
- Inclined floor surfaces.

## Storage Maintenance

- If stored at an ambient temperature less than 68 °F (20 °C), recharge the batteries every 9 months.
- If stored at an ambient temperature of 68 – 86 °F (20 – 30 °C), recharge the batteries every 6 months.
- If stored at an ambient temperature of 86 – 104 °F (30 – 40 °C), recharge the batteries every 3 months.

## Disposal

Please contact your local or state environmental agency for details on disposal of electrical components and packaging in your particular area.

***It is illegal to dump lead-acid batteries in landfills or dispose of improperly.***

Please help our Earth by contacting the environmental protection agencies in your area, the battery manufacturer, or call Toshiba toll-free at (877) 867-8773 for more information about recycling.

## 9 INSTALLATION PRECAUTIONS



### CAUTION

1. Install the unit in a well-ventilated location; allow at least 4 inches (10 cm) on all sides for air ventilation and for maintenance.
2. Install the unit in a stable, level and upright position that is free of excessive vibration.
3. Install the unit where the ambient temperature is within the range specified.
4. Do not install the UPS in areas that are subject to high humidity.
5. Do not install the UPS in areas that allow exposure to direct sunlight.
6. Do not install the UPS in areas that allow exposure to high levels of airborne dust, metal particles, or flammable gases.
7. Do not install the UPS in areas near sources of electrical noise. Ensuring a proper earth ground will reduce the effects of electrical noise and will reduce the potential for electrical shock.
8. Do not install the UPS in areas that would allow fluids or any foreign object to get inside the UPS.
9. The UPS generates and can radiate radio-frequency energy during operation. Although RFI noise filters are installed inside of the unit, there is no guarantee that the UPS will not influence some sensitive devices that are operating nearby. If such interference is experienced, the UPS should be installed farther away from the affected equipment and/or powered from a different source than that of the affected equipment.
10. The user should provide output over-current protection for hardwired UPS systems.
11. After ensuring that all power sources are turned off and isolated in accordance with established lockout/tagout procedures, connect the power source wiring of the correct voltage to the input terminals of the UPS.

12. Connect the output terminals of the UPS to the load (refer to NEC Article 300 – Wiring Methods and Article 310 – Conductors For General Wiring). Size the branch circuit conductors in accordance with NEC Table 310.16.

## **Conductor Routing and Grounding**

1. Use separate metal conduits for routing the input power, output power, and control circuits.
2. Follow the wire size and tightening torque specifications.
3. Always ground the unit to reduce the potential for electrical shock and to help reduce electrical noise.
4. A separate ground cable should be run inside the conduit with the input power, output power, and control circuits.



## **CAUTION**

**THE METAL OF CONDUIT IS NOT AN ACCEPTABLE GROUND.**

## 10 OPERATING PRECAUTIONS



### CAUTION

1. The UPS should not be powered up until the entire operation manual has been read.
2. The voltage of the input power source must be within the range of +10% to -30% of the rated input voltage. The input frequency must be within the rated input frequency range. Voltages and frequencies outside of the permissible range may activate the internal protection devices.
3. The UPS should not be used with a load that has a rated input that is greater than the rated output of the UPS.
4. Do not use the UPS to provide power to motors that require high starting current or with motors that require a long starting time, such as vacuum cleaners and machine tools (oversizing the UPS for lock rotor current would be required).
5. Do not insert metal objects or combustible materials in the ventilation slots of the UPS.
6. Do not place, hang, or paste any objects on the exterior surfaces of the UPS.
7. The capacitors of the UPS maintain a residual charge for a while after turning the UPS off. The required discharge time for each UPS model is provided via a cabinet label and a CHARGE LED. Wait for at least the minimum time indicated on the label and ensure that the CHARGE LED has gone out before opening the door of the UPS once the UPS power has been turned off.
8. Do not attempt to disassemble, modify, or repair the UPS. Call your Toshiba sales representative for repair information.
9. Turn the power on only after attaching ALL of the covers.
10. Do Not remove any covers of the UPS when the power is on.

11. If the UPS should emit smoke or an unusual odor or sound, turn the power off immediately.
12. The heat sink and other components may become extremely hot to the touch. Allow the unit to cool before coming in contact with these items.
13. Warning signs should be placed on or near the load as a notification that the load is being powered by the UPS.
14. Additional warnings and notifications shall be posted at the equipment installation location as deemed required by Qualified Personnel.



## WARNING

While operating in the inverter mode, placing the breaker in the OFF position will switch the UPS to the battery backup mode. The output of the UPS will continue uninterrupted to the load. The unit must be in the bypass mode at the time that the breaker is placed in the OFF position for the UPS to shut down power to the load.



## CAUTION

After an Emergency Power Off (EPO), do not reset the breaker until the UPS has been fully discharged. The UPS could be damaged if the unit is not fully discharged before the breaker is reset.

## MAINTENANCE NOTE

The T1000 Series UPS is not designed for field-level service. All repairs will be done at the Depot-level.

## 11 INSTALLATION

### 11.1 ENVIRONMENT

*Ensure that all environmental concerns and requirements are met according to these technical specifications, otherwise the safety of installation personnel cannot be guaranteed and the unit may malfunction.*

Follow below instructions when locating the UPS system and battery options:

- Avoid extreme temperature and humidity. Maximal battery life can be attained with a recommended temperature range of 15 °C to 25 °C.
- Protect the equipment from moisture.
- Space and ventilation requirements must be met. Ensure there are 100mm behind and 50mm on the sides of the UPS for ventilation.
- Ensure that the front of the UPS remains clear for user operation.

The External Battery Cabinets has to be installed next to the UPS or under the UPS.

## 11.2 REAR PANEL VIEW

- 1KVA rear panel

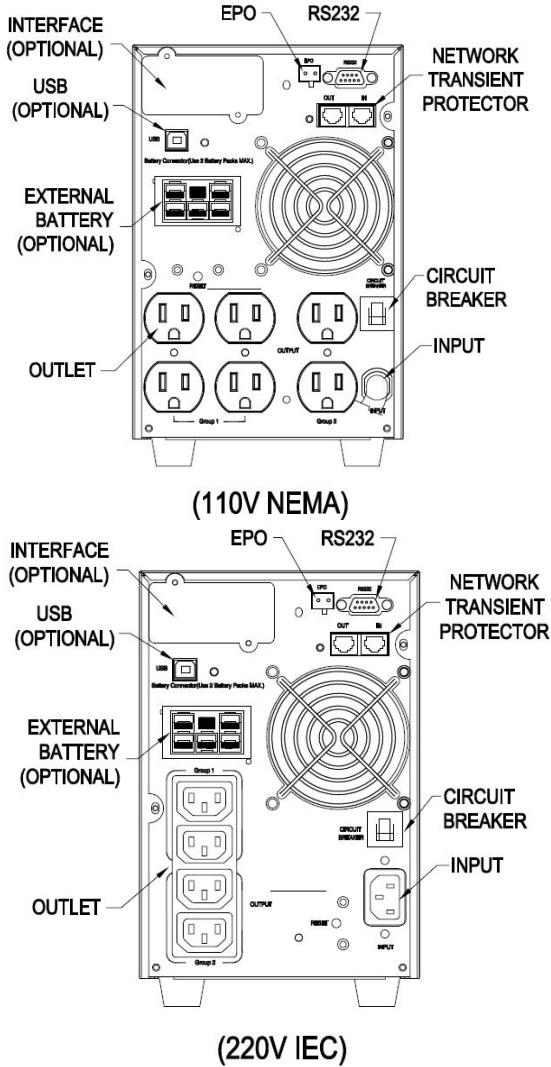
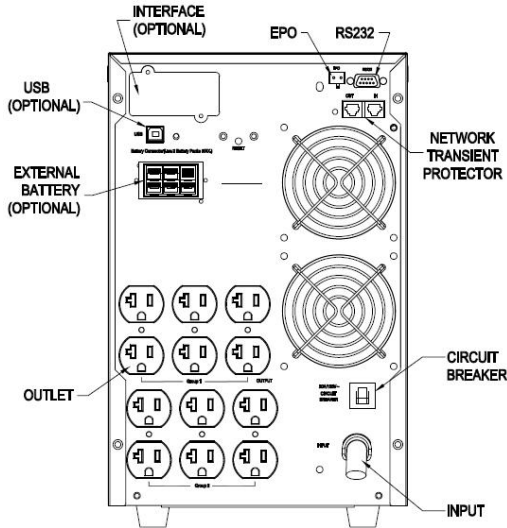


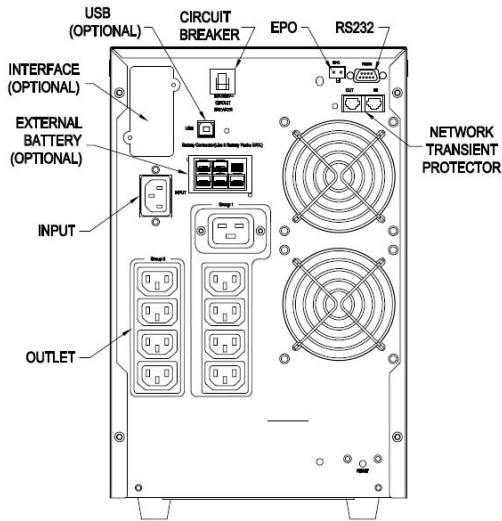
Figure 2 1KVA Tower Rear Panel View



- 2KVA rear panel



(110V NEMA)



(220V IEC)

**Figure3 2KVA Tower Rear Panel View**

- RM(2U) 1KVA rear panel

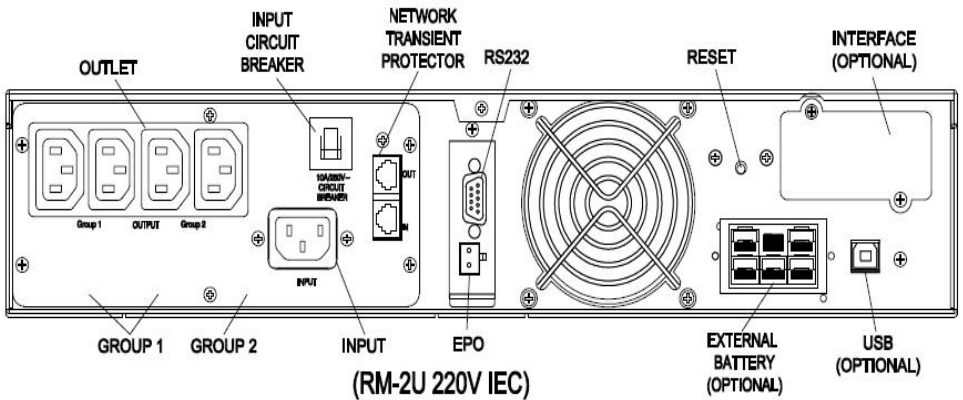
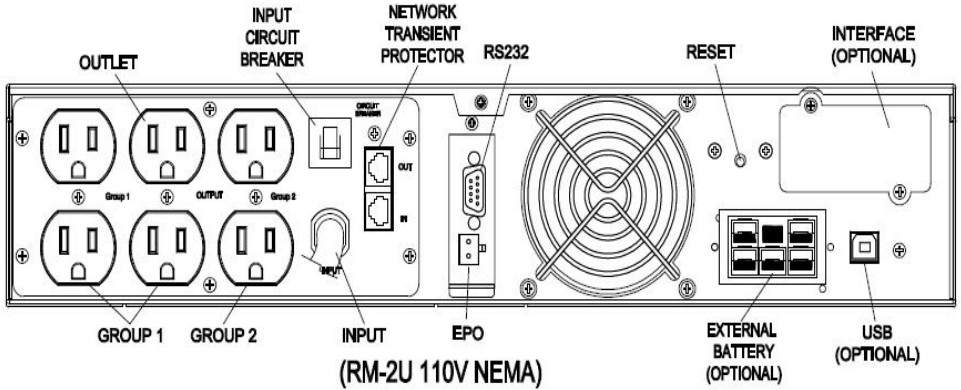


Figure 4 1KVA Rackmount Rear Panel View

- RM(2U) 2KVA rear panel

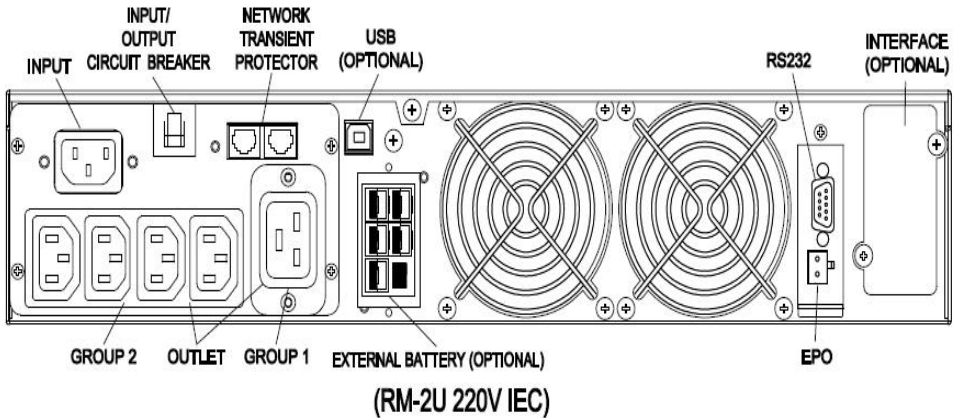
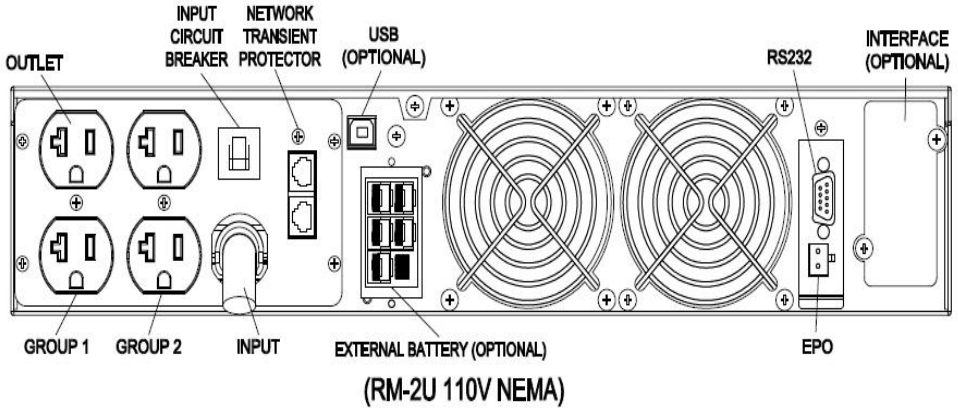
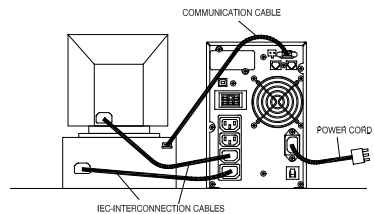


Figure 5 2KVA Rackmount Rear Panel View

### 11.3 CONNECTION TO MAINS AND LOADS (1KVA TO 2KVA)

- Ensure that the UPS is disconnected from mains and loads while connecting the External Battery Cabinet, if needed.
- Use the battery cable that comes with the External Battery Cabinet to connect the External Battery Cabinet to the UPS. Connect a second battery cabinet to the first one with the cable provided if more than one is to be installed.
- Be aware of UPS parameters and changing the battery pack quantity when using the External Battery Cabinet (see Section 13)
- Connect the input cable to the UPS and connect the other end to a grounded outlet. The batteries will automatically charge when connected to the mains. Please realize that although you may start using the UPS immediately, maximum back-up time will still not be available, so it is recommended to charge the batteries for a minimum of 8 hours before use.
- If unit instantly shows a “Site Wiring Fault”, rotate the connector (see Section 0).
- After charging the UPS, connect the load to the UPS.
- Do not connect any devices that have the possibility of overloading the UPS or drawing half-wave rectified current, such as hair dryers or vacuum cleaners.
- Should computer or alarm connections be used, use connections according to Section 12 of the manual provided with that option. The connections can be referred to on the rear panel.
- The installation is now complete.

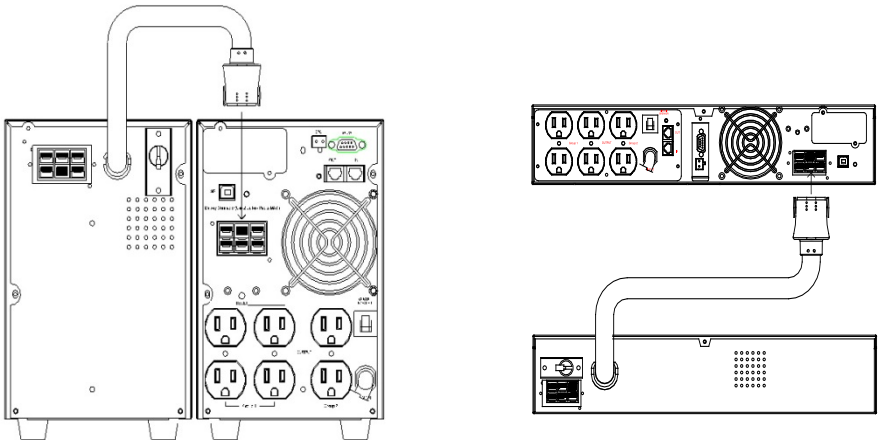


**Figure 6 Example of Installation of Plug & Play Product**

## 11.4 CONNECTION TO MATCHING EXTERNAL BATTERY CABINET

Please follow below instructions for external battery cabinet connections:

- Ensure that the UPS is disconnected from mains and loads while connecting the External Battery Cabinet. Use the battery cable that comes with the External Battery Cabinet to connect the External Battery Cabinet to the UPS. Connect a second battery cabinet to the first one with the cable provided if more than one is to be installed.
- This UPS may be provided with maximum two extension battery cabinets.



**Figure 7 Connecting External Battery Cabinet**

## 12 COMPUTER AND ALARM CONNECTIONS

At the back of the UPS is an interface allowing direct communication with your computer system, the location of which can be found in figure 2. There is a RS232 serial data interface, one USB data interface and an emergency power off switch supplied. However, the RS232 port cannot be used when the USB interface is in use.

In addition, there is an optional interface slot that allows you to install different communications cards. It can be used parallel with either the RS232 or USB ports.

Currently there are two cards available for the optional interface slot. An multi-protocol network card allows management and monitoring over a network or internet, and the remote contact card allows voltage free relay contacts.

### **Connecting the UPS to a Computer**

The communication device for the UPS and PC comes as a complete package with power management software. Only the communication cable provided with UPS may be used to connect to your computer, which is accomplished through the UPS RS232 port. Also ensure that the operating system on your computer is supported. Instructions provided in the power management software will help with this installation.

### **RS-232 Standard Interface port**

The RS-232 interface uses a 9-pin female D-sub connector. This information consists of data about utility, load and the UPS. The interface port pins and their functions are identified in the following table.

Table 2 RS-232 Pin Assignments

Pin #	Signal name	Direction (re UPS)	Functions
2	TxD	Output	TxD Output
3	RxD	Input	RxD / Inverter Off Input
5	Common		Common
6		Output	Ac Fail Output
8		Output	Low Battery Output
9		Output	12 VDC Power

**Caution! Max rated values 12Vdc**

### USB port (option)

Connecting the UPS to your computer is accomplished through the USB port on the back of your computer. USB compliant hardware and operating system will be necessary including installation of a UPS driver. The serial port cannot be used when using the USB port. The USB cable is standard and can be bought separately.

### 12.1 EPO PORT (EMERGENCY POWER OFF)

A customer-supplied switch located remotely can be used to open the EPO connection and allows UPS output receptacles to be switched off. Since the EPO shuts down the equipment immediately, orderly shutdown procedures are not followed and not by any power management software. The UPS will have to be manually restarted in order to regain power to the outlets.

### Network Transient protector (1KVA to 2KVA)

The network transient protector, located on the back panel, has both IN and OUT jacks, and houses a single RJ-45 (10BaseT) network connector. Connect the input connector to the jack labeled IN, and the output connector to the jack labeled OUT.

## 12.2 LOAD SEGMENTS (1KVA TO 2KVA)

The power management software controls the sets of receptacles known as load segment which provides organized shutdown and startup of the equipment. Less critical equipment can be turned off during power outages saving battery power for critical loads. The power management software manual has more details regarding this. The load group status can be viewed from the LCD display and can be changed if necessary. These load segments are usually handled with the UPS management software.




## 13 USER'S GUIDE TO OPERATIONS


Necessary information for operation of the unit is covered in this chapter. Normally the UPS runs automatically, but on those few occasions such as just after installation, all the starting and shutting down procedures are described herein.

### 13.1 START UP AND SHUT DOWN THE UPS

#### Start up the UPS


- Ensure that installation was correct and successful and that the input power cable is connected to a well-grounded outlet.
- To start the UPS press and hold the  button on the front panel for about 3 seconds.
- The UPS should now start its inspection of: internal functions, main synchronization and inverter startup. Then power should start to be supplied via the outlets.
- During this inspection, the LCD will display "Ready on". The LED shall light up when output power has commenced and the LCD will display "Line mode".
- Switch on the loads.



#### Shut down the UPS


- Shut down and turn off all the loads.
- Press and hold the  button on the front panel for five seconds. The alarm will sound and the UPS will shut down.
- The LCD will display UPS OFF for a few seconds.
- In emergency situations, the EPO located on the back of the unit should be used.


## 13.2 BUTTON OPERATION


Please note the three operating buttons on the front panel:






1. “  ” is a ON/ OFF button :

- (a). Press and hold the  button (at least 3 seconds) to turn on the UPS.
- (b). When UPS is working, press and hold the  button (at least 5 seconds) to turn off the UPS.

2. “  ” is the Enter button. Use this button to check content of UPS using the method listed below:






- (a). Press and hold the  button (at least 2 seconds) to check content of UPS. Each content can be displayed by pressing at once, and it has fifteen kinds of function to be checked.
- (b). If not pressed within 10 seconds, it will return to original status.

3. “  ” is a Function button . Each function can be enabled by pressing this button.

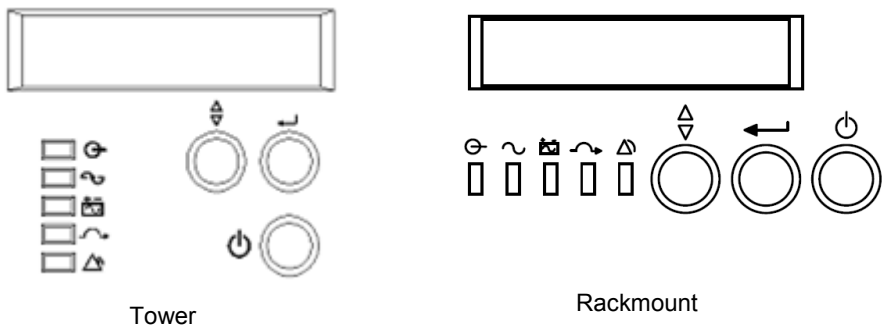
- (a). Press and hold the  button (at least 2 seconds) to choose the function you want. Each content can be displayed by pressing at once, and it has fourteen kinds of functions to be checked.
- (b). After choosing the function, push the  button to enter the function that you want.
- (c). Push the  button to choose other function again.
- (d). Push the  button to enable your function.
- (e). Push the  button to confirm and enable your function.
- (f). If not pressed within 10 seconds, it will return to original status.

### 13.3 CONTROL PANEL FUNCTIONS

Operation of the UPS is indicated on the monitor panel with five LED indicators and an LCD screen. This display is also capable of alerting the user with audible alarms.

- ON/  This green LED is lit when UPS has been turned on.
- ON-LINE/  When the UPS is in normal or static bypass modes, there is voltage at the output terminals and this LED will light up in green.
- ON-BAT/  While operating in battery mode.
- BYPASS/  While operating in bypass mode, this LED will light up in yellow.
- FAULT/  If any internal error occurs in the UPS, this LED will light up in red and sound an audible alarm. Press any of the buttons on the front panel to turn off the alarm.

Status of the UPS, measurements and alarms are all displayed on the LCD screen.



**Figure 8 Control Panel Layout**

## Normal display

The UPS status is shown in normal display mode. From here you have a choice to go to UPS Meters display or the Setting display by pushing the button.











## UPS Meters display


Various measurements are available through the UPS Meters display; pressing the button will scroll through the following Meters:


**Table 3 Meters Display Options**

LCD message	Description
O/P VOLT= xxx. xV	Shows Output AC voltage
O/P FREQ= xx. x Hz	Shows Output Frequency
I/P VOL T= xxx. xV	Shows Input AC voltage
I/P FREQ= xx. x Hz	Shows Input Frequency
BAT VOLT= xx. xV	Shows Battery Voltage
O/P LOAD%= xx%	Shows Load % of max load
O/P W= xW	Shows Output Watts
O/P VA= xVA	Shows Output VA
O/P CURR= xA	Shows Output Current
BACKUP TIME= xx min	Shows Estimated Backup time in minutes
BAT CHARG= xx%	Shows approximate percentage of Battery capacity
TEMPERATURE= xxC	Shows approximate ambient temperature
BAT PACK NUM= x	Shows External Battery Pack Number
RATING = xxxxVA	Shows UPS Rating
CPU VERSION xx.x	Shows CPU Version

## UPS Configurations

-  Various settings that have been chosen are shown in the UPS setting display.
-  To enter configuration mode, press and hold the  button for one second. The first configuration parameter will be shown on the LCD display.
-  Press the  button to scroll through the parameters.
-  Press the  button to select the parameter.
-  Press the  button to scroll through the options for the selected parameter; Press the  button to select the option.

You may be prompted to save the selection, if so press the  button to either confirm or save your selection. Other options are saved and started automatically. See the table below for further details.

 If no buttons are pressed (or user inactivity) for ten seconds, the UPS exits the configuration mode and returns to normal mode displaying Line mode.

While the factory default settings do not necessarily have to be changed, the user is free to tailor the UPS to their specific needs.

**Table 4 Default UPS Settings**

Settings	LCD display	Explanation	Selection	Factory default
Output Volt Setting	O/P V Setting	Select Nominal Voltage	100/110/115/120 V	120V
Input/Frequency	I/P F Setting	Select input frequency range when UPS goes into free run mode	±2% ±5% ±7%	±5%
Input/Bypass Voltage	I/P Bypass Set	Select Input Voltage range when bypass is available	±10% +10/-15% +15/-20%	+10/-15%
Free Run Mode	Free Run Set	Select if UPS can run in Free run mode (unsynchronized)	ON/OFF	ON
Bypass Enable/Disable at Free run mode	Bypass disable	If Enable is chosen, the UPS can go to bypass when unsynchronized.	Disable/Enable	Disable
He mode Setting	HE Mode Set	Select if UPS runs in high efficiency mode	ON/OFF	OFF
Force Manual Bypass	Manual bypass	Permanently force UPS to bypass. For service only.**	ON/OFF	OFF

Settings	LCD display	Explanation	Selection	Factory default
Management of Load groups	Outlet Setting	You can put the two load groups on and off from front panel	1 ON & 2 ON 1 OFF & 2 ON 1 OFF & 2 OFF 1 ON & 2 OFF	Both load segments ON
Do Battery Test	Battery Test	Detect battery is normal or not.		
Silence Function	Silence Set	Enable or disable silence function	ON/OFF	OFF
Number of External battery Packs	Bat Cabinet Set	This setting is needed For UPS to predict Backup time	0 (only internal batteries) 1 (one external cabinet) 2 (two external cabinets)	0
Site wiring alarm	Sit Fault Set	You can enable or disable the site wiring alarm	Enable /Disable	Disable
Select Language	Language	Select load language	English, German, French, Spanish,	English
Set Generator Mode	Generator	Set unit in generator mode. ***	ON/OFF	OFF
Set RS232 communication	RS232 Control	Set RS232 communication enable or disable	Enable/Disable	Enable

## Manual test of the UPS

Manual UPS or Manual Battery tests can be conducted from the UPS configuration as well and are functional even when the UPS is not charging the battery.

Manual Battery test: Scroll the parameters until Manual Bat test displays on the LCD.

Press the  button twice.

\*\*\*) Note: In order for the UPS and power management software to operate normally, Manual Bypass should always be set to OFF as the load will not be protected by the unit

when Manual Bypass is ON. This is aimed for operating an external maintenance bypass switch.

\*\*\*) Note: You should turn UPS off and keep the AC power before you use “Generator” function. (Even you want to select “\Generator\OFF” to back to normal mode).

## 13.4 INTERPRETING UPS MESSAGES

Troubleshooting procedures described here give simple instructions in determining UPS malfunctions.

Start the troubleshooting procedure if you witness any alarm indication on the control panel.

### Alarm indicators

The UPS gives the following audible alarms:

- If UPS is on battery and the ON BATTERY LED is on, UPS will beep every 5 seconds.
- If the battery capacity is low and the ON BATTERY LED is flashing, the UPS will beep twice every 5 seconds.
- If UPS is on bypass and the BYPASS LED is on, UPS will not beep.
- If UPS has an internal fault and the ALARM LED is on, the UPS will give a constant audible alarm displaying the cause on the LCD display.

### Silencing an alarm

By pressing any of the three buttons on the front panel, the alarm can be turned off, except when the battery is low, which will cause the alarm to resound.

On the LCD display, you can also choose silent alarm mode which will not warn you of any malfunction audibly

## 13.5 TROUBLESHOOTING

**Table 5 Troubleshooting Guide**

Displayed on LCD	Audible Alarm	Alarm Description	What You Should Do
Output Overload	2 Beeps per second	The UPS is overloaded (in Line Mode). Your equipment needs more power than the UPS can provide. The UPS operates in bypass.	Shut off the least important equipment connected to the UPS. If this solves the overload problem, the UPS will switch from bypass back to normal operation.
Battery Test	No Beeps	The UPS is doing a battery test.	No action needed. The UPS will return to normal operation when it successfully completes the battery test.
Over-Charge	Constant beep	Batteries are overcharged.	Turn off protected loads. Turn off UPS and Call Service
Low Battery	2 beeps every 5 seconds	The unit is operating on Battery Power and will shut down soon due to very low battery voltage	The unit will restart Automatically when acceptable power returns.
On-Battery	1 beep every 5 seconds	The unit is operating on Battery Power.	Save your data and perform a controlled shutdown.
Charger Failure	Constant beep	Charger has failed.	Call Service
Over-Temperature	Constant beep	High ambient Temperature.	Make sure the unit's fans and vent holes are not blocked, and make sure the ambient surrounding temperature is not above 40 degree C. If these conditions did not solve the problem, call service.
Output Short	Constant beep	Output short circuit	Call Service
High output Voltage	Constant beep	High output voltage	Call Service
Low Output Voltage	Constant beep	Low output voltage	Call Service
Bus Fault	2 Beeps per second	High internal DC bus Voltage.	Turn off protected loads. Turn off UPS and Call Service



Displayed on LCD	Audible Alarm	Alarm Description	What You Should Do
Site wiring Fault	1 Beep per second	Voltage detected Between Neutral and Ground	UPS mains connector polarity Wrong. Rotate the connector. UPS installed to mains supply without ground. See page 15 on how to disable the Site wiring alarm
Line abnormal	1 Beep per second	Wrong AC Line backed up during auto restart	

## 13.6 COLD START DISABLE PROCEDURE

- a) Ensure the UPS is switched OFF.
- b) Plug In AC Power.
- c) Press and hold the Function Key while pressing the “Enter” key 3 times.
- d) After a beep sounds, unplug the AC power cord and wait for UPS to shutdown automatically.

**\*\* Note:** Cold start will be automatically re-enabled when the UPS is plugged into commercial power and switched ON.

## 14 MAINTENANCE

You can expect the UPS to function with a minimal amount of maintenance. Consider changing the batteries at the recommended intervals help insure a long life free of trouble. The most critical issues affecting UPS reliability are environmental issues. Ensure that the temperature and humidity are always according to specifications and keep the area around the unit clean and dust free.

At a temperature of 25°C, the typical battery lifetime is 4 years.

The backup batteries will degrade with time. The rate of degradation, or wearing out, is affected by the environment and usage in backup mode. Check the back-up battery at regular intervals of 6 to 12 months to determine whether the back-up time of the battery is adequate for its intended purpose.



### **WARNING!**

**Batteries may cause electrical shock or burns from high short circuit currents. Please observe the following precautions: 1. Remove jewelry and metal objects such as watches and rings. 2. Use tools that have insulated handles. 3. Keep tools and other metal objects from contacting and away from the batteries.**

**ELECTRIC ENERGY HAZARD: Do not attempt to rewire, alter, or change any battery wiring or connectors. Attempting to make such alterations can cause injury.**

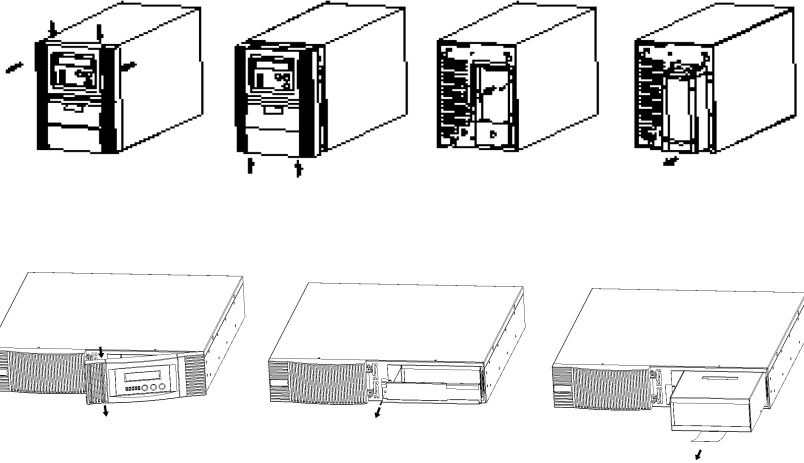
**Replace the batteries with the same number and type as originally installed batteries.**

**DO NOT DISCONNECT the batteries while UPS is in Battery mode.**

## 14.1 REPLACING BATTERIES

The batteries may be replaced without having to turn the UPS off or disconnecting the load due to the hot-swappable battery feature.

### Replacing batteries (1000 - 2000 VA)



#### The following is a step-by-step tutorial for replacing the batteries:

1. The front panel of the UPS can be removed by pushing where the arrows indicate in the pictures above. Next, unscrew the screws and remove the metal battery cover.
2. Remove the battery cartridge from the UPS. The voltage in all models will be less than 48Vdc once the battery is disconnected from the UPS.
3. Replace the batteries.
4. Push the cartridge with the new batteries back into the UPS.
5. Re-install the metal plate and the front panel.

**15 TECHNICAL SPECIFICATIONS****15.1 POWER RANGE 1KVA & 2KVA (120V MODEL)**

<b>GENERAL</b>	<b>1000VA</b>	<b>2000VA</b>
Rated power	1000VA	2000VA
Technology	On-line, double conversion topology with automatic bypass	
<b>INPUT</b>		
Phase:	Single phase with ground	
Bypass voltage	96-138 VAC (user selectable)	
Input voltage range:	100-120 VAC	120 VAC
	60V at 25% load, 70V at 50%, 80V at 75%, 90V at 100%	
Frequency:	50/60 Hz. Auto-sensing	
Frequency window from mains	45-65 Hz	
Synchronization window	± 5%	
Input Power factor:	0.97	
<b>OUTPUT</b>		
Output Power Factor	0.9	
Output Voltage:	100/110/115/120 VAC selectable from LCD panel	
Voltage regulation:	± 2%	
Rated Current @ 120 VAC	8.3 A	16.6 A
Voltage distortion:	< 5% THD at full non-linear load, < 2.5% THD at full linear load	
Frequency regulation	± 0.25 Hz (battery or free running mode)	
Dynamic response:	± 9 % max from 100% to 20 % or from 20% to 100 % linear load	
Overload capacity:	106-120% 30sec.; 121-150% 10sec.	
Efficiency:	> 86%	

**WARNING:**

When power is supplied by batteries, output towards load should be less than 90% of overall power generation.

## 15.2 POWER RANGE 1KVA & 2KVA (230V MODEL)

GENERAL	1000VA	2000VA
Rated power	1000VA	2000VA
Technology	On-line, double conversion topology with automatic bypass	
<b>INPUT</b>		
Phase	Single phase with ground	
Bypass voltage:	184-265 VAC (user selectable)	
Input voltage range:	120/140/160/180 VAC-276 VAC 120V at 25% load, 140V at 50%, 160V at 75%, 180V at 100%	
Frequency:	50/60 Hz. Auto-sensing	
Frequency window from mains	45-65 Hz	
Synchronization window	±5 %.	
Input Power factor:	0.97	
<b>OUTPUT</b>		
Output Voltage:	208/220/230/240 VAC, selectable from LCD panel	
Voltage regulation:	± 2%	
Rated Current @ 230 VAC	4.3 A	8.7 A
Voltage distortion:	< 5% THD at full non-linear load, < 2.5% THD at full linear load	
Frequency regulation	± 0.25 Hz (battery or free running mode)	
Dynamic response:	± 9 % max from 100% to 20 % or from 20% to 100 % linear load	
Overload capacity:	106-120% 30 sec, 121-150% 10 sec	
Efficiency:	>86%	

### WARNING:

When power is supplied by batteries, output towards load should be less than 90% of overall power generation.

## 15.3 ENVIRONMENTAL AND STANDARDS – 1KVA & 2KVA

ENVIRONMENTAL	1000VA	2000VA
Ambient temperature:	+0 °C to +40 °C	
Recommended temperature:	+15 °C to +25 °C	
Storage temperature:	-15 °C to +50 °C	
Cooling:	Forced air-cooling	
Humidity:	0-95%, non-condensing	
Audible noise: (Normal and Battery Mode)	<45 db	<50 db

STANDARDS	
Safety:	EN62040-1 (for 230V); UL1778 (for 120V)
Emissions:	EN62040-2 (for 230V); FCC Part 15 (for 120V)
EMI:	FCC

## 15.4 OUTPUT POWER – 120V TOWER MODELS

OUTPUT POWER	1000VA/900W	2000VA/1800W
Connection Input	5-15P	5-20P
Connection Output	6 x 5-15R (US)	12 x 5-20R (US)
Battery type	Lead-acid 9AH/12V (FR)	
Number of batteries	3	6
Backup time/full load	6 min	
Recharge time	<4 hours to over 90%	
Dimensions W x D x H	(6.0" x 16.5" x 9.4")	(8.9" x 16.5" x 14.1")
Net Weight	(33.4 lbs.)	(63.4 lbs.)

## 15.5 OUTPUT POWER – 120V RACKMOUNT MODELS

OUTPUT POWER	1000VA/900W	2000VA/1800W
Connection Input	5-15P	5-20P
Connection Output	6 x 5-15R (US)	4 x 5-20R (US)
Battery type	Lead-acid 9AH/12V (FR)	
Number of batteries	3	6
Backup time/full load	6 min	
Recharge time	<4 hours to over 90%	
Dimensions W x D x H	(16.9" x 16.7" x 3.3")	(16.9" x 25" x 3.3")
Net Weight	(35.9 lbs.)	(65.6 lbs.)

**15.6 OUTPUT POWER – 230V TOWER MODELS**

<b>OUTPUT POWER</b>	<b>1000VA/900W</b>	<b>2000VA/1800W</b>
Connection Input	IEC 320	
Connection Output	4 x IEC C13	8 x IEC C13 1 x IEC C19
Battery type	Lead-acid 9AH/12V (FR)	
Number of batteries	3	6
Backup time/full load	6 min	
Recharge time	<4 hours to 90%	
Dimensions W x D x H	(6.0" x 16.5" x 9.4")	(8.9" x 16.5" x 14.1")
Net Weight	15.2 kg (33.4 lb.)	28.8 kg (63.4 lb.)

**15.7 OUTPUT POWER – 230V RACKMOUNT MODELS**

<b>OUTPUT POWER</b>	<b>1000VA/900W</b>	<b>2000VA/1800W</b>
Connection Input	IEC 320	
Connection Output	4 x IEC C13	4 x IEC C13 1 x IEC C19
Battery type	Lead-acid 9AH/12V (FR)	
Number of batteries	3	6
Backup time/full load	6 min	
Recharge time	<4 hours to 90%	
Dimensions W x D x H	(16.9" x 16.7" x 3.3")	(16.9" x 19.7" x 3.3")
Net Weight	(35.9 lbs.)	(65.6 lbs.)

## 15.8 EXTERNAL BATTERY CABINETS

		1000VA	2000VA
Model Number	Tower	T1B01000025	T1B02000025
	Rackmount	T1B01000025R2	T1B02000025R2
Battery type		Lead-acid 9AH/12 V (FR)	
Number of batteries	Tower	6	12
	Rackmount	6	12
Backup Runtime (full load)	UPS	6 min	6 min
	UPS + 1 BC	25 min	25 min
	UPS + 2 BC	47 min	47 min
Dimensions W x D x H	Tower	(6.0" x 16.5" x 9.4")	(8.9" x 16.5" x 14.1")
	Rackmount	(16.9" x 16.7" x 3.3")	(16.9" x 25" x 3.3")
Net Weight	Tower	(44 lbs.)	(77 lbs.)
	Rackmount	(46 lbs.)	(96 lbs.)

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## 16 INSTRUCTIONS IMPORTANTES CONCERNANT

### LA SÉCURITÉ CONSERVER CES INSTRUCTIONS

Cette notice contient des instructions importantes concernant la sécurité.



*ATTENTION*

Une battery peut présenter un risque de choc électrique, de brûlure par transfert d' énergie.



*ATTENTION*

**L' ÉLIMINATION DES BATTERIES EST RÉGLEMENTÉE. CONSULTER  
LES CODES LOCAUX À CET EFFET.**

## INSTRUCTIONS DE SÉCURITÉS IMPORTANTES

### CONSERVER CES INSTRUCTIONS

- Le présent manuel contient des instructions importantes qui devraient être suivies durant l'installation et l'entretien de l'UPS et de la batterie.
- Ces appareils sont conçus pour être installés à l'intérieur, dans un endroit à température contrôlée et à environnement non conducteur.
- Toute intervention sur les batteries devra être effectuée ou surveillée par un personnel qui connaît les batteries et qui prend les précautions requises.
- Interdire à tout personnel non autorisé de toucher aux batteries.
- Pour le remplacement, utiliser le même nombre de batteries du modèle.
- **ATTENTION** – Eviter de jeter la batterie dans un feu, car elle risque d'exploser.
- **ATTENTION** – Ne jamais ouvrir ou endommager la batterie, l'électrolyte libéré est nocif pour la peau et les yeux.
- **ATTENTION** – Les batteries peuvent causer un choc électrique ou provoquer des courants élevés de court-circuit. Veuillez observer les précautions suivantes:
  - A. Enlever montres, bagues et tout objet métallique.
  - B. Utiliser des outils à poignée isolée.
  - C. Porter des gants et des bottes en caoutchouc.
  - D. Éviter de déposer des outils ou des pièces métalliques sur le dessus de la batterie.
  - E. Débrancher la source de charge avant de brancher ou de débrancher les bornes de batterie.
- **ATTENTION** – Ne convient pas aux utilisations dans une salle d'ordinateurs tel que spécifié par la norme ANSI/NFPA 75 relative à la protection des ordinateurs et des équipements de traitement des données.
- **ATTENTION** – Pour réduire les risques d'incendie, utiliser uniquement des conducteurs de télécommunications 26 AWG au de section supérieure.
- **ATTENTION** – Afin de réduire les risques d'incendie, ne raccordez qu'à un circuit muni d'une protection de surintensité du circuit de dérivation maximum de 30 ampères conformément au Code Électrique National (National Electrical Code) des États-Unis, ANSI/NFPA 70.
- **ATTENTION** – (3000VA) -Afin de réduire les risques d'incendie, ne raccordez qu'à un circuit muni d'une protection de surintensité du circuit de dérivation maximum de 30 ampères conformément au Code Électrique National (National Electrical Code) des États-Unis, ANSI/NFPA 70.

La protection de surintensité de sortie ainsi que le sectionneur doivent être fournis par des tiers

# TOSHIBA

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