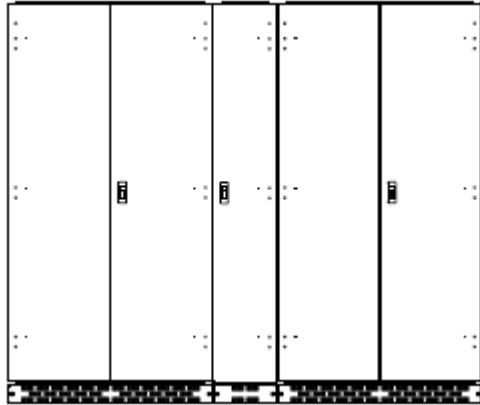


GE Critical Power



Installation – Operation – Maintenance Guide

UL LISTED SERIES TLD BATTERY CABINETS

For use with  
GE TLE Series UPS Systems



imagination at work



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The illustrations and plans describing the equipment are intended as general reference only and are not necessarily complete in every detail.

The content of this publication may be subject to modification without prior notice.

**Dear Customer,**

We thank you for selecting our products and are pleased to count you as one of our most valued customers.

We trust that the use of the GE Battery Cabinet System will result in your complete satisfaction.

This Manual contains important Safety Information concerning the installation, operation and maintenance of your Battery Cabinet System.

Please read carefully.

Thank you for choosing **GE!**

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# 1 BATTERY SAFETY PRECAUTIONS

This Battery System contains its own energy source. The internal wiring and output terminals may carry live voltage even when the UPS is not connected to an AC source.

- The Battery System must be installed in a temperature and humidity controlled environment.
- The average ambient temperature must be maintained as closely to 25°C (77°F) as possible, and must never exceed 40°C (104°F). Do not operate near water or excessive humidity (95% max non-condensing). This Battery System is not intended for outdoor use.
- Ensure all external power sources are disconnected from the Battery System before performing installation or service.
- Keep all battery cabinet doors closed to ensure proper cooling airflow and to protect personnel from the dangerous voltage levels inside the Battery System.
- Do not install the Battery System in close proximity to any source of heat or flammable gas. Do not install in a location with exposure to direct sunlight (such as near a window).
- Keep surroundings uncluttered, clean, free from excess moisture, and free of all conductive contaminants.
- Observe all DANGER, CAUTION, and WARNING notices affixed to the inside and outside of the equipment.
- Installation of batteries should only be performed by persons knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries.
- Be sure to observe proper grounding when installing batteries.
- Use the exact part number replacing batteries.

**CAUTION** - Lead-acid batteries contain hazardous materials. Batteries must be handled, transported and recycled in accordance with federal, state and local regulations. Because lead is a toxic substance, lead-acid batteries must be recycled.

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

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

Do not install any batteries that are cracked, leaking or show other signs of damage. Contact GE Service at 1-800-637-1738 (option #3) for immediate assistance.

Batteries can present a risk of electrical shock and high short circuit current. The following precautions should be observed when working on batteries:

- Disconnect and isolate the battery from all charging sources prior to beginning any maintenance activities.
- Remove watches, rings and other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of batteries.
- Disconnect charging source prior to connecting or disconnecting battery terminals.
- Determine if battery is inadvertently grounded. If inadvertently grounded, remove source of ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock will be reduced if such grounds are removed during installation and maintenance.

Lead-acid batteries can present a risk of fire because they generate hydrogen gas:

**DO NOT SMOKE when near batteries. DO NOT cause flame or sparks in battery area.**

**Discharge static electricity from body before touching batteries by first touching a grounded metal surface.**

After replacing batteries in the cabinet, replace the retaining brackets or straps that hold them in place on the shelves. This will limit accidental movement of the batteries should the cabinet ever need to be repositioned or relocated. Regular maintenance of the batteries is an absolute necessity. Battery voltage and connection resistance should be periodically inspected.

*Do not use cleaners on the batteries. Solvents can make the battery cases brittle. Use only a dry cloth or a cloth moistened in water.*

## 2 PREPARING THE SITE

For the battery system to operate at peak efficiency, the installation site must meet the environmental parameters outlined in this Manual. Contact a GE Sales Representative if the battery system is to be operated at an altitude higher than 1500m (5000 ft.).

The GE TLE Series battery cabinets use convection cooling to regulate internal component temperature. Air inlets are on the front of the cabinet and the outlets are on the top. A minimum clearance must be provided in front (36" minimum), and top (18" minimum) for each cabinet for proper air circulation. Refer to NFPA70 table 110.26(A)(1) for addition clearances required for electrical safety.

### 2.1 ENVIRONMENT CONSIDERATIONS

The life of the battery system is adversely affected if the system is not;

- Installed on a level floor suitable for computer or electronic equipment.
- Installed in a temperature and humidity controlled indoor area free of conductive contaminants. The average ambient temperature must be maintained as closely to 25°C (77°F) as possible, and must never exceed 40°C (104°F).
- Battery service life will be reduced by approximately 50% for each 10°C (18°F) average rise above 25°C (77°F) ambient.

Failure to follow guidelines may void your warranty.

### 2.2 INSPECTING AND UNPACKING THE BATTERY CABINET

The cabinet is shipped bolted to a pallet, and protected with outer protective packaging material.

The battery cabinet is extremely heavy. If unpacking instructions are not closely followed, the cabinet may tip and cause serious injury or death.

1. Carefully inspect the outer packaging for evidence of damage during transit. Do not install a damaged cabinet. Report any damage to the carrier and contact a GE Sales Representative immediately.
2. Use a forklift or pallet jack to move the packaged cabinet to the installation site (or as close as possible), before unpacking. Insert the forklift or pallet jack's forks between the pallet supports on the bottom of the unit. **Do not tilt a battery cabinet more than 10° from vertical or cabinet may tip over.**

**NOTE:** Verify that the forklift or pallet jack is rated to handle the weight of the cabinet:

<u>Description</u>	<u>Maximum Weight</u>
38.5" wide Battery Cabinet	5,000 lbs.
12" wide Bus Cabinet	300 lbs.
20" wide Bus Cabinet	400 lbs.

3. Set the pallet on a firm, level surface, allowing a minimum clearance of 3m (10 ft.) on each side for removing the cabinet from the pallet.
4. Remove the protective covering from the cabinet.
5. Remove the packing material, and discard or recycle them in a responsible manner.
6. After removing the protective covering, inspect the contents for any evidence of physical damage, and compare each item with the Bill of Loading. If damage has occurred or shortages are evident, contact a GE Sales Representative immediately to determine the extent of the damage and its impact upon further installation.

## NOTE

*While waiting for installation, protect the unpacked cabinet from moisture, dust and other harmful contaminants. Failure to store and protect the battery cabinet properly may void your warranty.*

## 2.3 PREPARING FOR WIRING THE BATTERY SYSTEM

The electrical contractor must supply and install both power and control wiring between the UPS Electronics Module and the Battery Cabinet System. Refer to the Battery System Drawings for details.

All internal cabinet-to-cabinet power and control cables are provided by GE **for the standard cabinet lineup configuration** - refer to the Battery System Drawings provided by GE for details. **Other cabinet arrangements may require the customer to provide the cabinet-to-cabinet power and control cables.** If customer provided, they must exactly match the ratings, type and function of the GE supplied cables. Contact a GE representative if additional information is required.

## 3 BATTERY CABINET HANDLING & INSTALLATION

Battery cabinets from GE are available in many configurations, and may or may not include a bus landing cabinet for use in paralleling multiple strings of batteries. The actual support time for your installation will depend on the battery model, number of parallel strings, the UPS model and the actual UPS output load. Refer to the Battery System Drawings for details on your battery configuration.

### 3.1 BATTERY STORAGE

The batteries can be stored indoors in a temperature-controlled environment, for up to three months without any appreciable deterioration. The self-discharge rate of the batteries is approximately 3% per month when the batteries are stored in temperatures of 59°F to 77°F (15-25°C). *If the battery cabinet must be stored for longer than three months, contact GE Sales Representative. The battery cabinet should never be stored outdoors or on a loading dock.*

### 3.2 INSTALLATION

**Battery cabinets must be installed as shown in the battery system drawings.** The internal cabinet-to-cabinet power cables are furnished by GE and are pre-cut and lugged to fit the exact cabinet arrangement shown on the battery system drawings. Other cabinet arrangements may require the use of customer supplied cables.

The front access design eliminates side and rear service clearance requirements. The battery shelves ship disconnected for safety and need to be reconnected before the system is put into service.

### 3.3 REINSTALLATION

If at any time it becomes necessary to move the battery cabinet to another location, contact GE Service Representative to inspect the internal battery at 1-800-637-1738 option 3.

### 3.4 ENVIRONMENT

Locate the battery cabinet in a clean, dry environment that is free from conductive contaminants. The recommended temperature range for optimum performance and lifetime is 68°F to 77°F (20-25°C).

### 3.5 SERVICE CLEARANCE

Allow front access to the battery cabinet at all times for maintenance and servicing. The required service clearance in front of the battery cabinet(s) depends on the installation conditions, and can vary from 36" to 48". Refer to NEC Table 110.26(A)(1) for specific details. Side and rear access is not required for service.

### 3.6 POWER AND CONTROL CABLES

Multiple battery strings must be wired in parallel. A bus landing cabinet furnished as part of the battery cabinet system is typically used for this purpose.

Low voltage control wiring should be kept separate from the power wiring to prevent noise from being introduced into the control signals.

Refer to the battery system drawings for details concerning the installation and routing of the cabinet-to-cabinet control cables.



## 3.7 GROUNDING

The battery cabinets contain ground studs for use in bonding the cabinets together. Use the GE provided equipment-grounding jumpers to connect the battery system cabinets together. The customer provided cable run from the battery system to the UPS module must include a dedicated ground conductor sized per NFPA70 requirements.

## 3.8 BATTERY WIRING

A battery system consisting of multiple battery strings includes the power and control cables required to connect the multiple battery cabinets together. If a bus cabinet is included in the battery system, it must be physically located within the battery system as shown on the battery system drawings provided with the system in order for the GE supplied power interconnect cables to fit.

### **WARNING!**

Battery connections on each tier of the GE battery cabinet are disconnected for safety during shipment. If a local electrical contractor completes these connections as part of start-up, a GE Field Service Engineer will verify the connections. Otherwise, the GE Field Service Engineer will complete and verify the connections. Polarity must be correct when wiring the battery cabinet to the connected equipment (positive to positive; negative to negative). An improperly installation can result in personal injury or damage to equipment.

### **NOTE**

*A GE Specialist can perform a detailed inspection of the entire battery system to ensure it meets current IEEE standards. This inspection service is available at additional cost and is recommended because batteries are a very critical part of the UPS system.*

### **NOTE**

*DC power and control cables are provided with GE battery cabinets for use between multiple cabinets. Power and control cables from the battery system to the UPS electronics cabinet must be provided and installed in the field by the customer.*

### 3.9 BATTERY VOLTAGE AND WIRING CHECK

**WARNING!**

Do not attempt to close any of the battery circuit breakers until all voltage checks are completed and all battery strings are verified to be properly connected, of proper voltage and in good condition.

The power cable connections between the battery system and the UPS electronics module must be visually inspected for both proper installation and polarity. All positive cables should be marked (typically with red tape) to allow easy visual inspection.

Each battery cabinet contains one battery string comprised of forty 12V battery 'jars' connected in series. This series connected battery string is split in half when the internally mounted circuit breaker is in the open position. Figure 1 shows how the circuit breaker is wired to the batteries.

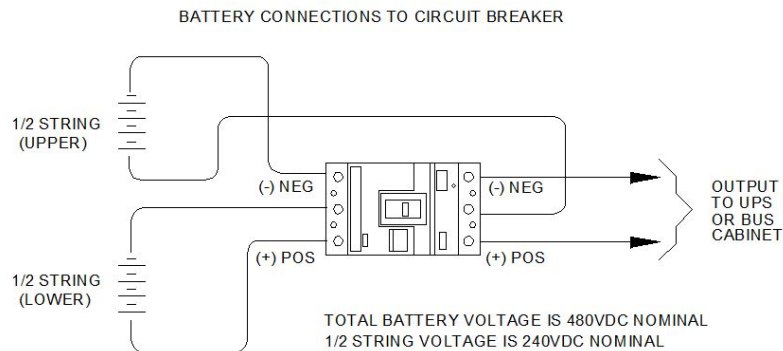


Figure 1

The voltage checks shown in Figure 2 and Figure 3 must be completed for each individual battery cabinet in the battery system. In order to complete these checks, it may be necessary to remove the safety shield located in front of the circuit breaker. Proper PPE (Personal Protective Equipment) must be worn at all times.

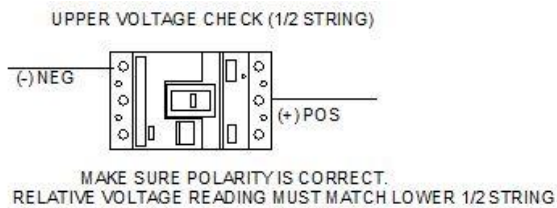


Figure 2

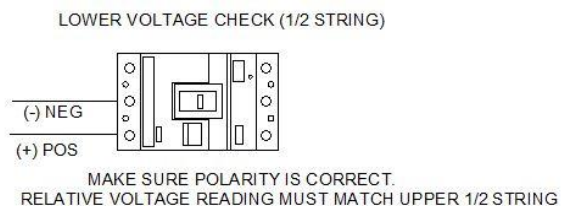


Figure 3

## 4 OPERATION & MAINTENANCE

### ! WARNINGS

Lead-acid batteries contain hazardous materials. Batteries must be handled, transported and recycled in accordance with federal, state and local regulations. Because lead is a toxic substance, lead-acid batteries must be recycled rather than discarded.

**Disconnect and isolate the battery from all charging sources before beginning any maintenance activities.**

Servicing of batteries should be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries. Use the same manufacturer, type and quantity when replacing batteries.

Do not open or mutilate the batteries.

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

A battery can present a risk of electrical shock and high short circuit current. The following precautions should be observed when working on batteries:

- Remove watches, rings and other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of batteries.
- Disconnect charging source prior to connecting or disconnecting battery terminals.
- Determine if battery is inadvertently grounded. If inadvertently grounded, remove source of ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock will be reduced if such grounds are removed during installation and maintenance.

Lead-acid batteries can present a risk of fire because they generate hydrogen gas. In addition, the electrical connections must be protected against accidental short circuits, which can cause sparks. The following procedures should be followed:

- DO NOT SMOKE when near batteries.
- DO NOT cause flame or spark in battery area.
- Discharge static electricity from body before touching batteries by first touching a grounded metal surface.
- After replacing battery jars in a battery cabinet, replace the retaining brackets or straps that hold the jars in place on the shelves. This will limit accidental movement of the jars and connectors should the cabinet ever need to be repositioned or relocated.

Regular maintenance of the battery module is an absolute necessity. Periodic inspections of battery and terminal voltages, specific gravity and connection resistance should be made. Strictly follow the procedures outlined in the battery manufacturer's manual, available on the manufacturer's Web site.

Valve-regulated lead-acid (VRLA) batteries do require periodic maintenance. Although maintenance of electrolyte levels is not required, quarterly visual inspections and checks of battery voltage and connection resistance should be made.

### NOTE

*Do not use cleaners on the batteries. Solvents can make the battery cases brittle. Use only a dry cloth or a cloth moistened in water.*

Since individual battery characteristics are not identical and may change over time, the UPS module is equipped with circuitry to equalize battery cell voltages. This circuit increases charging voltage to maintain flooded type battery cells at full capacity.

## NOTE

Do not use equalize charge on valve-regulated lead-acid (VRLA) batteries. Consult the battery manufacturer's manual for specific information about equalize-charging.

Basic environmental requirements for operation:

- Ambient Temperature Range: 0-40°C (32-104°F)
- Recommended Operating Range: 20-25°C (68-77°F)
- Maximum Relative Humidity: 95%, non-condensing

## 4.1 BATTERY CABINETS

The Battery Cabinets should be given a periodic inspection and electrical check. Checks should be performed at least annually to ensure years of trouble-free service.

## 4.2 VOLTAGE RECORDS

-With the Battery Cabinet DC circuit breaker closed and the connected UPS operating, measure and record battery float voltage.

-With the DC circuit breaker open, measure and record the nominal (open circuit) voltage.

(Both these measurements should be made across the final positive and negative terminal lugs.)

-Compare these values with those shown below. The recorded nominal voltage should be no less than the value shown; while the recorded float voltage should be within the range shown. If a discrepancy is found, contact GE Service Representative at 1-800-637-1738 option 3.

Number of Cells	Battery Voltage (VDC)	
	Nominal	Float
240	480	540-547

## 4.3 BATTERY CELL TERMINALS

Check for discoloration, corrosion and connection integrity. Clean and tighten if necessary. Note that when installing a new battery, the initial torque value is 5 inch lbs. more than the re-torque value. Consult the battery manufacturer's documentation or refer to their website for torque values.

## 4.4 BATTERY OPERATION

The separate battery manufacturer's manual (available on the battery manufacturer's Web site), provides information for the installation, operation, charging and maintenance of the battery. Use the battery manufacturer's manual in conjunction with this manual.

For models with nominal 240-cell battery, the DC bus nominal float voltage range is 540-547 VDC. For maximum equalize voltage see battery manufacturer data sheet. Battery voltage at end of discharge is 400.8 VDC at the battery.

Every 10°C (18°F) increase in temperature reduces the battery life by 50%. Once the battery is damaged by heat its capacity cannot be improved.

Every 10°C (18°F) decrease in temperature reduces the battery run time by 50%.

## **4.5 OVERCURRENT PROTECTION**

Each battery cabinet system is supplied with an internally mounted circuit breaker. These circuit breakers are used for manual connection to the UPS module, and both manual and automatic disconnection of the battery from the UPS module. Refer to the circuit breaker manufacturer's documentation for the required connection torque value, usually located on a sticker attached to the front of the circuit breaker.

## **4.6 WARRANTY**

For warranty on batteries and other components of the UPS Battery Cabinets refer to GE UPS Limited Warranty Rider document.