# TreStar™

## Three Phase ■ On-Line ■ 100 to 250 kVA Uninterruptible Power Supply

The TreStar Series UPS is designed to meet the power protection needs of today's sensitive electronic equipment and computer loads. The energy efficient TreStar delivers true on-line power with high quality, low distortion, and true sine wave output, allowing the UPS to power almost any combination of linear and nonlinear loads. Unlike other UPS systems, the TreStar will provide continuous power to any load within its power rating.

UPS reliability begins with its design. The TreStar is designed with circuitry to prevent failure. A user friendly diagnostic display panel allows complete access to 15 critical measurements and 33 alarms, including stored measurements made just before and after an inverter stoppage. Special circuitry has been incorporated into the TreStar to protect and lengthen the service life of the batteries, which are the most sensitive and expensive component of a UPS system. For added reliability, it is equipped with an electrostatic shielded output isolation transformer for additional transient surge suppression and electrical noise attenuation.

The TreStar Series UPS totally isolates the connected load from the AC primary supply, protecting it from voltage sags, spikes, transients, RFI, and frequency variations. In the event of an AC primary failure, an alarm sounds and the UPS will continue without interruption, providing clean, safe, continuous power from its batteries. When the AC primary supply returns to normal, the TreStar automatically recharges its batteries to prepare for the next power disturbance. The TreStar comes equipped with two bypass switches. A static bypass switch, which transfers the load to a bypass source upon an inverter overload, and an internal maintenance bypass switch, which provides complete UPS isolation during maintenance service.

A wide range of planned maintenance and service programs is offered to maximize the service life and reliability of your UPS through an extensive network of factory trained professionals.

## Advantages:

- *Double Conversion, True On-Line*
- *Pulse Width Modulated Inverter*
- *Microprocessor Diagnostics and Control*
- *Deep Discharge Battery Protection*
- *Advanced Battery Diagnostics*
- *K-30 Rated Output Isolation Transformer*
- *Compatible With Any Load Power Factor*
- *Remote Diagnostic Interface*
- *AS/400, DEC, DG, HP Interface*
- *Low Audible Noise*
- *Low Cost of Ownership*

STACO ENERGY PRODUCTS CO.
A Components Corporation of America Company

The TreStar Series of UPS products' modular design makes these units easy to install, and greatly reduces maintenance requirements. The advanced battery management system has been designed to extend battery life. Coupled with its high operating efficiency, the TreStar provides a very low cost of ownership compared to similar UPS.

The batteries in any UPS are the very heart of the system. It supplies energy to the inverter when the AC source fails. Your UPS is dependent on a reliable, functioning, and properly charged battery. Not only is the battery expensive, but it is also highly susceptible to both high and low temperatures, improper charging, and will not survive if allowed to discharge beyond certain limits. That's why the TreStar has four special battery diagnostic circuits built-in to provide greater battery life and reliability than any other UPS.

## *Overheating*

Overheating is one of the primary causes of premature battery failure. The TreStar Series UPS measures the battery temperature at all times and automatically adjusts the charging current to maintain optimum battery temperature. This assures maximum energy storage in the shortest possible recharge time while preserving battery life.

## *Deep Discharge Protection*

Most UPS systems have a low voltage cutoff mechanism to prevent the battery from being discharged to a point that it destroys the battery. The TreStar design recognizes that the low voltage point for a battery differs dramatically between rapidly discharging batteries and slowly discharging batteries.

Under full load it is safe to drop the battery to 1.65 volts per cell. That is where other UPS systems set the voltage cutoff. Many users reduce the load on the UPS after a power failure to extend the backup time. Unfortunately, the voltage at which a battery will fail under slow discharge is a much higher 1.8 volts per cell. The TreStar measures the discharge rate in hours and resets the low voltage cutoff to match.

## *Battery Diagnostics*

When the AC input power fails, that is not the time to discover that the battery system is not fully available. To eliminate this possibility, the TreStar is designed to run a diagnostic test of the batteries every week. It places them under load by reducing the charger voltage. Then, it measures and compares the battery discharge curve to stored data to confirm the integrity of the battery. If any fault is detected, an alarm will flash on the diagnostic display panel.

Throughout this procedure, the rectifier remains on and connected to ensure the uninterruptibility of the AC power to the critical load.

## *Low AC Current*

Another parameter affecting the life of the battery system is the AC (ripple) current that appears with the DC (charging) current. Most manufacturers ensure that the ripple current is set at just under the battery manufacturers recommendation. The TreStar Series UPS reduces the ripple to 1/20th of the maximum allowable level, thus adding years of reliable service to the battery system.

## *Built-In Diagnostics*

### *The measurements are:*

**Inverter:** Voltage, Frequency, Current

**Bypass:** Voltage, Frequency, Current

**Load:** Voltage, Frequency, Current, % of Capacity, Crest Factor

**Rectifier:** Voltage, Current

**Battery:** Current, Time Remaining

### *The alarms are:*

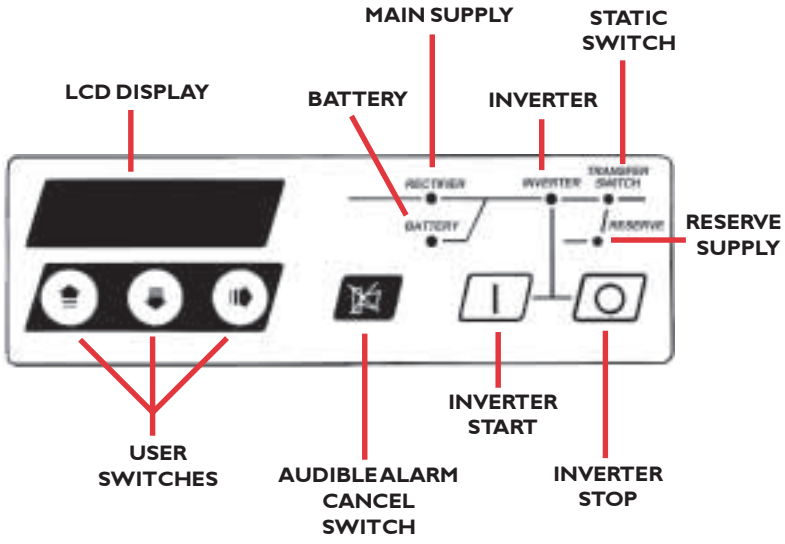
- Primary Supply Failure
- Phase Sequence Error
- Battery Fault
- Battery Contactor Open
- Shutdown Imminent
- Battery Discharging
- DC Voltage High/Low
- Output Breaker Open
- Bypass Switch Closed
- Over-temperature
- Reserve Breaker Open
- Static Switch Fault
- Bypass Frequency Fault
- Bypass Volts High/Low
- Battery Charge Inhibited
- Inverter Volts High/Low
- Backfeed Protection Active
- Out of Synchronization
- Inverter Fault
- Harmonic Filter Open
- Input Breaker Open
- Inverter Not Running
- Inverter Inhibited
- Inverter Stop
- Load Not Supplied
- Load On Bypass
- Current Limit
- Stop Due to Overload
- Overload
- Bypass Fault

## *On-Board Diagnostics and Control Panel*

The TreStar control panel is easy to use. With only three buttons, the user can select menus and scroll up or down within a menu to obtain readouts of 15 measurements and 33 alarms.

A microprocessor reads all alarms and measurements 10 times each second and stores 11 of these readings in memory. If an inverter stop takes place, the 10 seconds prior to the stop and one second after the stop may be accessed through the control panel as an aid to diagnosing the fault.

An RS232 port on the back of the unit allows remote communication of all control panel measurements and alarms using optional software.




## *General Specifications*

### AC Input Characteristics

| | |
|---|---|
| Input Voltage: | 480 VAC, 3 Phase, 4-wire (plus ground), ± 20% from nominal voltage |
| Frequency: | 60 Hz., ± 3 Hz. |
| Power Factor: | Greater than 0.82, full load, nominal conditions |
| Inrush Current: | Walk-in from 25% load to full load in 10 seconds. |

### AC Output Characteristics

| | |
|---|---|
| Output Voltage: | 208Y/120 or 480/277 VAC, 3 Phase, 4-wire (plus ground). Adjustable ± 5% |
| Steady-state Regulation: | ± 1%, 0 to full balanced load. Phase angle 120° ± 1°, ± 3°, (0, 0, 100) Unbalanced load. Phase angle 120° ± 3% |
| Dynamic Regulation: | ± 5% maximum deviation (to 100% step load on or off) with recovery to 2% of steady state in <20 msec. |
| Frequency: | Normally synchronized to mains over frequency range of ± 0.75%, ± 1.5%, ± 3%, or ± 6% (selectable). Free running is ± 0.05%, slew rate is less than 1Hz./sec. |
| Overload Rating: | 150% for 1 minute, 125% for 10 minutes. |
| Harmonic Distortion: | 3% THD for linear loads, 5% THD for 100% nonlinear loads with a 3 to 1 crest factor. |
| Efficiency: | AC-AC 92.5% at 100 kVA to 93% at 250 kVA |
| Maintenance Bypass Switching: | Bypass switching allows the load to be fed from the main, isolating the UPS and static transfer switch for safety during maintenance. |

### Static Switch

| | |
|---|---|
| Transfer Time: | Zero Break |
| Transfer Initiation: | • Inverter Fail • Inverter Overload • Overcurrent • Manual • Overtemp |
| Retransfer: | Automatic |
| Overload Capacity: | 125% Ten Minutes<br>150% One Minute<br>1000% 30 Cycles<br>1500% 5 Cycles |

### Environmental

| | |
|---|---|
| Ambient Temperature: | 0° to 40° C |
| Relative Humidity: | 95% (non-condensing) |
| Operating Altitude: | 3300 ft. derating 1% for each 300 feet higher |
| Audible Noise: | Less than 65 dBA at 3 feet |
| Grounding: | AC power neutral isolated from chassis ground. OK to bond neutral to ground. |

### Safety Designed To Meet:

- National Electrical Code
- IEEE 587, ANSI C 62-41-1980
- FCC, Part 15, Class B
- ETL Listed to U.L. 1778
- NEMA PE-1
- ASA-C.39.1-1984

## How To Order

| Voltage Rating | | *TreStar Model Number* | | | | | |
|---|---|---|---|---|---|---|---|
| Input | Output | 100 kVA | 125 kVA | 150 kVA | 200 kVA | 225 kVA | 250 kVA |
| 480 | 208Y/120 | SE5100-42 | SE5125-42 | SE5150-42 | SE5200-42 | SE5225-42 | SE5250-42 |
| 480 | 480Y/277 | SE5100-44 | SE5125-44 | SE5150-44 | SE5200-44 | SE5225-44 | SE5250-44 |

## Battery Selection Guide

| | | | | | | |
|---|---|---|---|---|---|---|
| UPS weight without battery | 1650 lbs. | 2205 lbs. | 2310 lbs. | 2650 lbs | 2765 lbs. | 2880 lbs. |
| 80 AH Battery | 5 mins.<br>BAT-14<br>2878 lbs. | | | | | |
| 100 AH Battery | 12 mins.<br>BAT-16<br>3434 lbs. | 8 mins.<br>BAT-16<br>3434 lbs. | 5 mins.<br>BAT-16<br>3434 lbs. | | | |
| 150 AH Battery | 21 mins.<br>BAT-18<br>4562 lbs. | 15 mins.<br>BAT-18<br>4562 lbs. | 11 mins.<br>BAT-18<br>4562 lbs. | 6 mins.<br>BAT-18<br>4562 lbs. | 5 mins.<br>BAT-18<br>4562 lbs. | |
| 100 AH Battery | 32 mins.<br>BAT-20<br>6868 lbs. | 24 mins.<br>BAT-20<br>6868 lbs. | 19 mins.<br>BAT-20<br>6868 lbs. | 12 mins.<br>BAT-20<br>6868 lbs. | 9 mins.<br>BAT-20<br>6868 lbs. | 8 mins.<br>BAT-20<br>6868 lbs. |
| 150 AH Battery | 52 mins.<br>BAT-22<br>9124 lbs. | 38 mins.<br>BAT-22<br>9124 lbs. | 31 mins.<br>BAT-22<br>9124 lbs. | 21 mins.<br>BAT-22<br>9124 lbs. | 17 mins.<br>BAT-22<br>9124 lbs. | 15 mins.<br>BAT-22<br>9124 lbs. |
| 150 AH Battery | 85 mins.<br>BAT-24<br>13686 lbs. | 65 mins.<br>BAT-24<br>13686 lbs. | 52 mins.<br>BAT-24<br>13686 lbs. | 37 mins.<br>BAT-24<br>13686 lbs. | 31 mins.<br>BAT-24<br>13686 lbs. | 28 mins.<br>BAT-24<br>13686 lbs. |

*Note: Weight of BAT units includes batteries and cabinet only. For total weight add the weight of the UPS to the weight of the BAT.*

## UPS Cabinet Dimensions (approx.) - By Power Rating

| Power | H | W | D | Power | H | W | D | Power | H | W | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 100 kVA | 70” | 32” | 33” | 150 kVA | 70” | 40” | 33” | 225 kVA | 70” | 56” | 33” |
| 125 kVA | 70” | 40” | 33” | 200 kVA | 70” | 56” | 33” | 250 kVA | 70” | 56” | 33” |

## Battery Cabinet Dimensions (approx.)

| Cabinet | H | W | D | Cabinet | H | W | D | Cabinet | H | W | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BAT-14 | 77” | 40” | 33” | BAT-18 | 77” | 40” | 33” | BAT-22* | 77” | 40” | 33” |
| BAT-16 | 77” | 40” | 33” | BAT-20* | 77” | 40” | 33” | BAT-24** | 77” | 40” | 33” |

*Note: For flame retardant batteries, add FR to cabinet number.*
** two cabinets required ** three cabinets required*

## Options

- Remote Windows® Diagnostics with Event Driven Diagnostic Interface
- 10% Input Harmonic Filter
- Remote Alarm Unit
- External MBS

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