

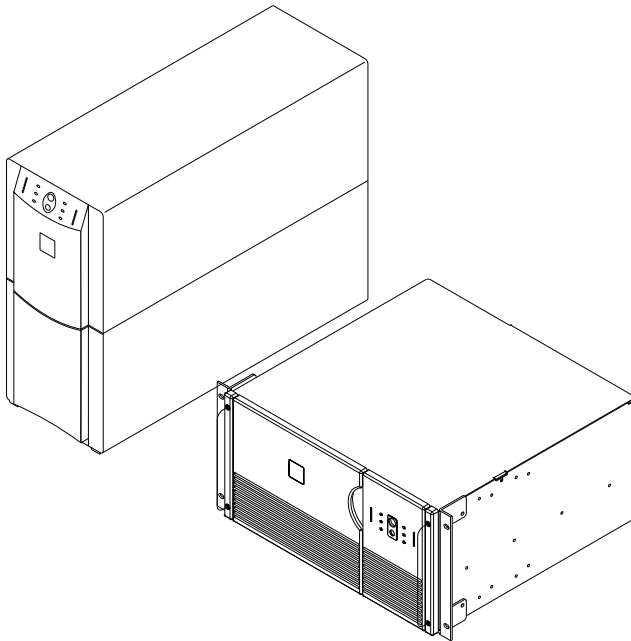


**AMERICAN POWER CONVERSION**

# Smart-UPS®

**Models**

**1400XLT, 2200XLT, 3000XLT**



**User's Manual**



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**Please note:** The troubleshooting section (section 8) offers solutions for most of the difficulties you may encounter with this UPS. Before calling customer service, please have available your UPS's serial number (see label on the rear of the UPS). A returned materials authorization (RMA) number is required for all return shipments to APC. Do not send return shipments to APC without an RMA number. See section 9.

Serial number: \_\_\_\_\_

Toll free technical support:

United States and Canada 1-800-800-4272

Others:

+1 401 789 5735 (USA)

Return shipment addresses:

American Power Conversion Corporation

132 Fairgrounds Road

P. O. Box 278

West Kingston, Rhode Island 02892

USA



# 1. Introduction

## 1.1 Thank you!

Thank you for selecting this uninterruptible power source (UPS). It is designed for many years of reliable, maintenance-free service.

### Important!

Please read this manual. It provides safety, installation, and operating instructions that will help you get the fullest performance and service life from your UPS. This manual describes the inner workings of the UPS and how they relate to providing superior protection from utility power problems such as blackouts, brownouts, sags, swells, EMI/RFI noise, and surges. The manual includes instructions for obtaining factory service if necessary.

If you have a problem with the UPS, please refer to this manual before calling customer service. The troubleshooting section (section 8) can help with most situations typically encountered when using the UPS.

### Please save the packaging materials!

The UPS's shipping materials are designed with great care to provide protection during shipping. These materials are invaluable if you ever have to return the UPS for service. Damage sustained during transit is not covered under the warranty.

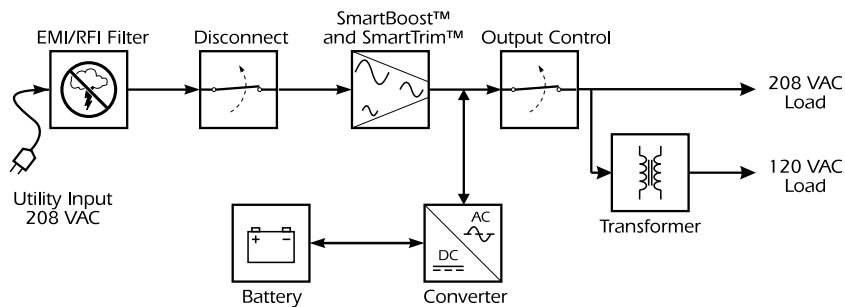
## 1.2 Radio Frequency Interference

**Warning:** Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules and the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Shielded signal cables must be used with this unit to ensure compliance with the Class A FCC limits.

## 1.3 Theory of Operation



This high-performance, line-interactive, uninterruptible power source (UPS) provides clean, reliable, AC power to computer systems and other electrical equipment — protecting them from power blackouts, brownouts, swells, sags, surges, and interference. It is designed to provide protection for equipment that operates on 208 volts AC, as well as peripheral equipment requiring 120 volts AC.

The UPS requires single phase 208 volts AC input for proper operation. Typically, this is supplied by connecting the UPS to two phases of a three phase 208V delta or 120V wye service.

The primary output is single phase 208 volt AC. An auxiliary 400VA, (3.3 amps), 120 volt AC output is provided to receptacles on the rear panel by an internal isolation transformer with the output neutral grounded.

When the front panel display or the optional software report the amount of load, the load on the 120 VAC output is not reported separately, but it is included in the total load. This means that the 120 VAC load is accounted for when calculations are made to determine the amount of run time remaining.

**Note:** Any load on the 120 volt output reduces the maximum load that can be powered by the 208 volt output.

**Note:** The 120 VAC output is provided by an isolation transformer which adds resistance in series with the equipment to be powered. As a result, the 120 VAC output variation due to load (expressed as a percentage of nominal output) will be greater than the 208V output it is powered from. This should not be a problem for most equipment that will be powered. See Section 12 for more information.

Normally, the UPS operates “on-line,” supplying power from the **utility input** to the **load** (workstation, server, or other device). The **converter** circuitry is used to maintain an optimal float charge level on the **battery**.

When the utility fails, the **converter** supplies AC power to the load and the **disconnect** switch opens. The loads operate normally until shut down or until the battery is exhausted. The UPS automatically transfers the load back to utility power when the line voltage returns to normal.

The UPS also provides surge protection and EMI/RFI filtering, as well as **Smart-Boost™** and **SmartTrim™**, which correct high and low input voltage without drawing power from the battery.

**Output control** uses the UPS’s remote interface to turn the load on or off, without disabling other UPS functions.

## 1.4 Features

### Intelligent Battery Management

The UPS provides visual and audible indications of the battery's present status including capacity, low battery condition, and replace battery condition.

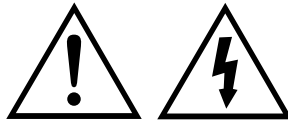
The UPS exercises the battery during its self-test, and detects a weak battery before it is put into service. The UPS normally performs a self-test at power up and every 14 days. Self-tests can also be conducted manually with the on/test button at any time.

The UPS features user-replaceable batteries. Batteries can be replaced without having to remove power from the loads or send the UPS in for service.

### Computer Interface and Accessory Slot

Advanced monitoring, power management, and customizing functions are available through the computer interface and accessory slot. See section 7 for more information.

## 2. Safety



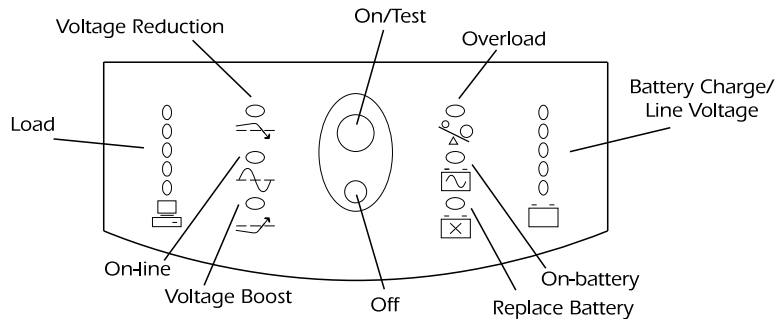
### CAUTION!

- To reduce the risk of electric shock in conditions where load equipment grounding cannot be verified, disconnect the UPS from the AC power outlet before installing a computer interface or accessory slot signal cable. Reconnect the power cord only after all signaling connections are made.
- Connect the UPS to a two-pole, three-wire grounding AC power outlet. The receptacle must be connected to appropriate branch protection (fuse or circuit breaker). Connection to any other type of receptacle may result in a shock hazard and violate local electrical codes.
- The UPS has an internal energy source (the battery). **The output may be energized when the unit is not connected to an AC power outlet.**
- To deenergize the outputs of the UPS, first press the Off button for more than one second to switch the UPS off. Next disconnect the UPS from the AC power outlet. To deenergize the UPS completely, disconnect the battery. See section 10.
- This UPS's protective Earth conductor carries the leakage current from the load devices (computer equipment). This UPS generates approximately 1.5 mA of leakage current. To ensure a safe limit of 3.5 mA, limit the total leakage current of the load devices to 2 mA.
- Use of this equipment in life support applications where failure of this equipment can reasonably be expected to cause the failure of the life support equipment or to significantly effect its safety or effectiveness is not recommended.



## 3. Presentation

### 3.1 Front panel



With the UPS plugged in, press the **on/test** button to turn on the UPS and power the loads. See Sec. 5.1. **On/test** also activates the UPS's self-test and utility line voltage displays. See sections 5.3 and 5.6.

The **overload** LED lights when the loads connected to the UPS exceed the UPS's capacity. See section 6.2.

The **battery charge/line voltage** display shows the present battery charge as a percentage of battery capacity. See section 5.5. It also displays the voltage of the utility line. See section 5.6.

The **on-battery** LED comes on when the UPS is supplying battery power to the loads.

The **replace battery** LED comes on when the UPS's battery is no longer useful and must be replaced. See section 10.

Press the **off** button to turn off the UPS and the load. See section 5.2.

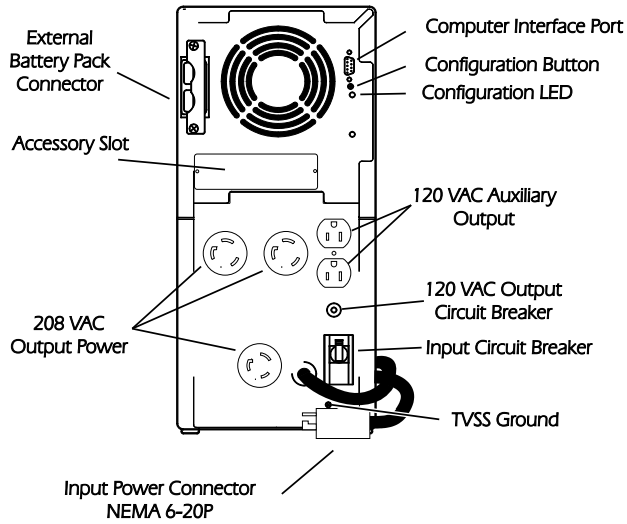
The **SmartBoost** LED comes on when the UPS is correcting a low utility voltage condition. The loads receive normal power.

The **on-line** LED comes on when the UPS is supplying utility power to the loads.

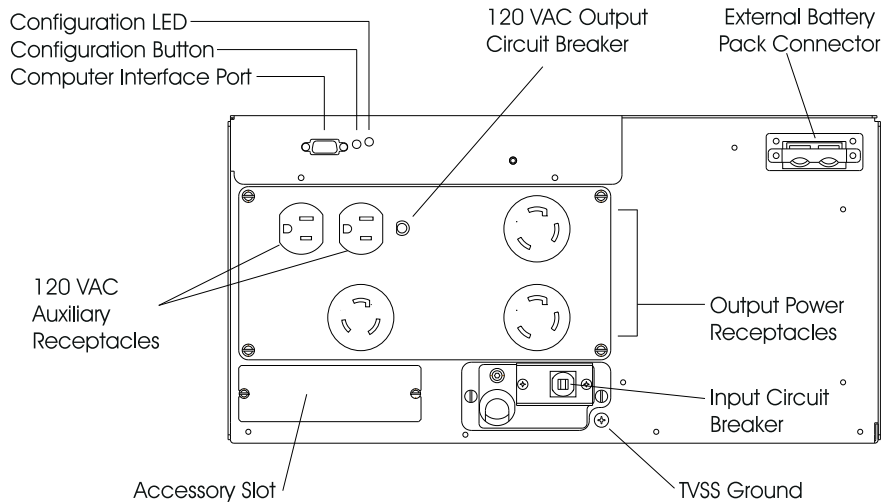
The **load** display shows the power being drawn by the load. See section 5.4.

The **SmartTrim** LED comes on when the UPS is correcting a high utility voltage condition. The loads receive normal power.

## 3.2 Rear Panel



Tower Models



Rack Mount Models

Use the **computer interface port** for UPS monitoring and control. See section 7.

The **configuration button** changes the UPS's sensitivity to utility voltage variations and the low battery warning interval. See sections 5.9 and 5.10.

The **configuration LED** indicates the voltage sensitivity setting and the low battery warning interval. See sections 5.9 and 5.10.

The **120 VAC output circuit breaker** trips when the connected load exceeds the rated capacity. The center plunger of the circuit breaker extends when tripped.

The **input circuit breaker** trips when the total load exceeds the UPS's capacity. The paddle handle on the input circuit breaker shows "off" when tripped.

Use the transient voltage surge suppression (**TVSS**) **ground** connector for the ground leads of telephone or network line protectors. See section 4.9.

The **input power connector** is a power cord with a NEMA L6-20P connector.

The **output power** receptacles are NEMA type L6-20R and L6-30R for 208V output, and type 5-15R for 120V output. An optional hard wiring kit is available. See your dealer or call the number at the front of this manual for more information.

Optional accessories can be installed in the **accessory slot**. See section 4.4 and section 7.

Use the **battery pack connector** to connect the optional external battery pack. See section 4.5.

## 4. Installation

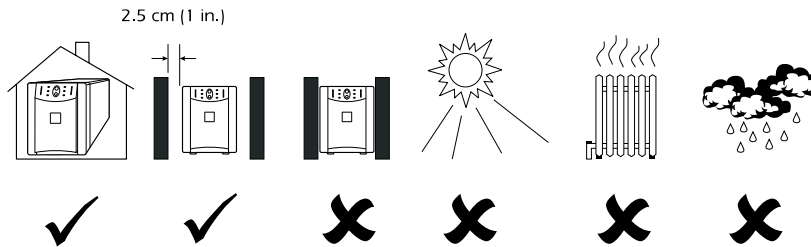
To obtain warranty coverage fill out and return the warranty registration card now.

### 4.1 Inspection

Inspect the UPS upon receipt. Notify the carrier and dealer if there is damage. The packaging is recyclable; save it for reuse or dispose of it properly.

### 4.2 Placement

#### Tower Models

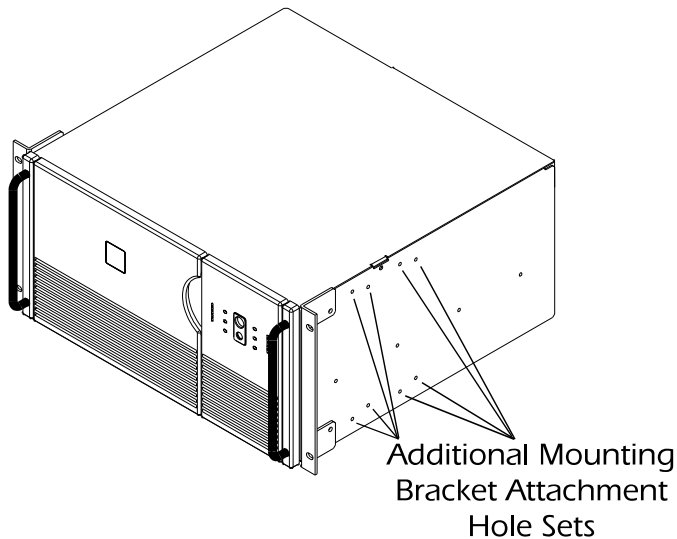


Install the UPS in a protected area with adequate air flow and free of excessive dust. Do not operate the UPS where the temperature and humidity is outside the specified limits. See section 12. Allow the UPS to come to room temperature before continuing.

#### Rack Mount Models

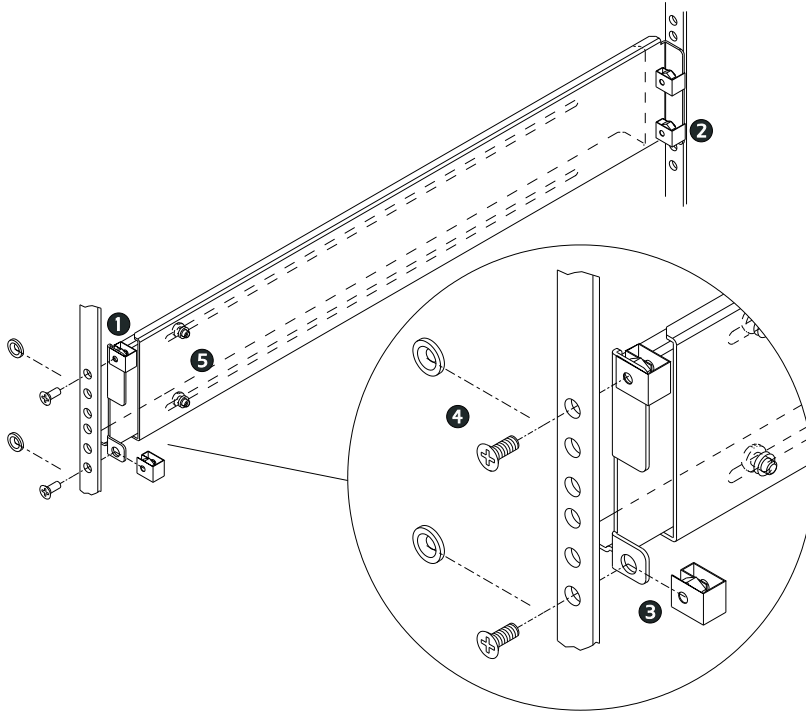
Please observe the following items when installing the UPS.

- The ‘T’ models are supplied with L-channel supports. These supports may be used to ease installation.
- **Caution:** These models require two or more people to install due to their weight.
- The UPS is not supplied with screws to attach the mounting brackets (ears) to the rack, as the size of screw varies according to the type of rack used.
- UPSs are heavy. Select a rack location sturdy enough to handle the weight. Try to mount the UPS near the bottom of the rack.
- Select a rack location with adequate air flow that is free from excessive dust. Ensure that the air vents on the sides of the UPS are not blocked. Do not operate the UPS where temperature or humidity are outside the limits in Section 12 of the *User’s Manual*.
- **Caution:** Remove the UPS before transporting the rack.
- Two additional sets of bracket holes are located on the sides of the UPS (see below). These holes allow mounting the brackets with a three inch or six inch setback. Move the mounting brackets back if desired to optimize the esthetic or physical requirements of the rack.  
**Caution:** Check the rack to make sure it won't tip after moving the mounting brackets.



### Installing the Support Brackets

1. Verify the contents of the kit. It contains: two adjustable-length L-channel supports, eight clip nuts, eight 10-32 x 1/2" flat-head screws, and eight washers. The washers are for use with square rack holes only.
2. If the rack uses threaded holes, drill out the appropriate front rail rack holes with a 7/32" drill bit. This step is not required when mounting in racks with square holes.
3. Install clip nuts on the uppermost and lowermost holes at each end of the L-channel supports. Orient the clip nut as shown in the drawing above ❸. The nuts should be to the inside of the cabinet when the supports are installed.
4. Secure the front of the support to the front cabinet rack using two 10-32 x 1/2" flat-head screws ❹. Note that the front ear of the L-channel support has a square cutout on the mounting ear ❶, and the rear ear has no cutout ❷. For cabinets with square rack holes, use a washer under the head of each screw.
5. Loosen the two 10-32 x 5/16" pan-head screws that lock together the two halves of the L-channel support ❺. Slide the outer half of the support to the rear until it contacts the rear rack of the cabinet. If the rack uses threaded holes, drill out the appropriate rear rail rack holes with a 7/32" drill bit (see Step 3). Secure the rear of the support to the rear cabinet rack using two 10-32 x 1/2" flat-head screws. For cabinets with square rack holes, use a washer under the head of each screw.
6. Securely tighten the two 10-32 x 5/16" pan-head screws that lock together the halves of the L-channel support ❻.
7. Repeat steps 3 through 6 to install the other L-channel support.
8. Slide the UPS onto the L-channel supports and use rack hardware to secure the UPS mounting ears to the rack rails.



### 4.3 Protection Strategies

This UPS provides high performance power line protection to the loads. There are, however, other potential entry points for damaging surges in information systems. These include serial ports (RS-232, RS-422, RS-485, etc.), parallel ports, telephone lines, and network connections. These other entry points must be considered in developing a comprehensive system protection strategy. Contact your dealer or call the number in the front of this manual for information on a complete set of related products designed to accomplish total system protection.

Sensitive information systems can be further safeguarded by following these guidelines:

- Verify that all electrical outlets are properly grounded.
- Connect information systems to a different electrical service branch than heavy motor loads like air conditioners, copiers, refrigerators, and heavy industrial machinery.
- Plug all power protection and information system equipment into the same branch where possible.

## 4.4 Install Accessory (Optional)

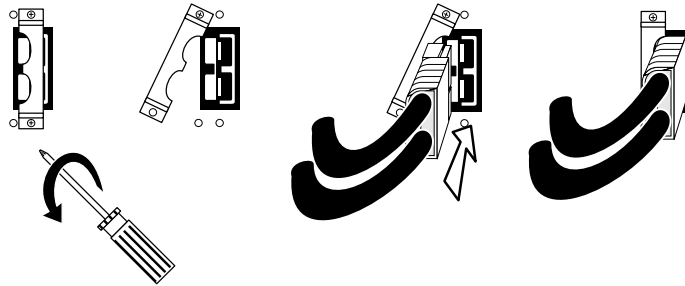
Some UPS accessories connect to the computer interface (DB-9) port, while others install in the accessory slot. See the literature accompanying the accessory to determine proper installation. The screws holding the slot cover are #2 Phillips head type.

To use the computer interface port, connect the accessory to the DB-9 connector and tighten down the connector's screws.

Connect the optional battery pack (3000 VA model only) according to the instructions with the battery pack.

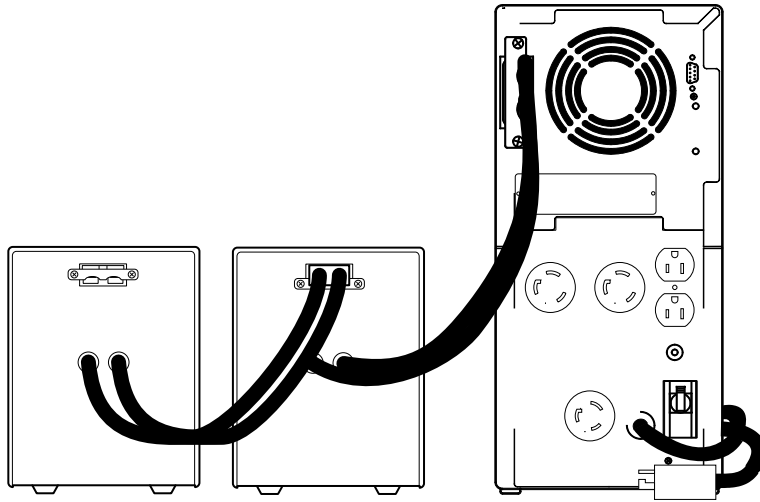
## 4.5 Connect Battery Packs (optional)

Install up to 10 additional external battery packs per XL model UPS following the instructions below. See your dealer or call the number at the front of this manual for information on purchasing the correct battery pack for your model. **Note:** The 3000 VA UPS accepts only one additional external battery pack.



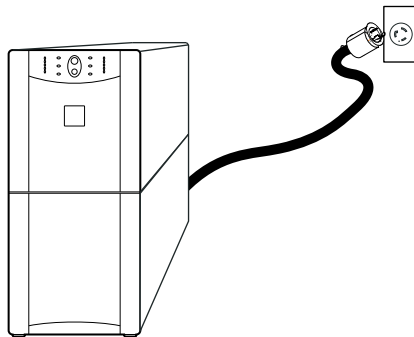
1. Prepare the UPS to connect the battery pack(s). Note the holes used to attach the battery pack connector clamp (near the center of the connector opening). Use a #2 Phillips head screwdriver to remove the battery pack connector clamp from the back of the UPS.
2. Turn the clamp over and loosely attach one end at the edge of the connector opening in the UPS.
3. Holding the clamp aside, insert the battery pack connector into the UPS.
4. Secure the connector clamp.

To install additional battery packs, repeat this procedure using the battery pack connectors on the battery packs. **Note:** Do not stack battery packs.



Completed XL installation with two battery packs.

## 4.6 Connect to Utility



Plug the UPS into an L6-20 receptacle connected to a 208VAC, 20 Amp service. The service may be either 50 or 60 Hz, but it must be equipped with a safety ground. If the service at your location uses a receptacle other than an L6-20, the UPS plug may be replaced with an appropriate plug by a qualified individual. The UPS is not rated for more than 20 Amps and should not be connected to a service that supplies a higher current. Avoid using extension cords and adapter plugs.



## 4.6 Charge the Battery

The UPS charges its battery whenever it is connected to utility power. For best results, charge the battery for 2.5 hours before use. It is acceptable to use the UPS without first charging the battery, but on-battery run time may be reduced until the battery charges.

## 4.7 Connect the Loads

Plug the loads into the output connectors on the rear of the UPS. To use the UPS as a master on/off switch, make sure that all of the loads are switched on.

Test the system with all loads operating to make sure that the UPS is not overloaded. See section 6.2.

## 4.8 Connect Ground Leads to TVSS Connector (Optional)

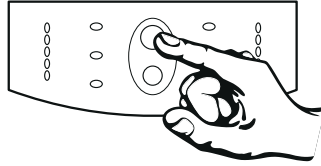
The UPS features a TVSS connector for connecting the ground lead on transient voltage surge-suppression (TVSS) devices such as telephone and network line protectors. The TVSS connector provides grounding through the UPS's power cord ground conductor.

**Note:** Do not use the TVSS connector without first verifying that the UPS is properly grounded.

To make a connection to the TVSS connector, loosen the screw and connect the surge suppression device's ground lead. See section 3.2 for the location of the connector. Tighten the screw to secure the lead.

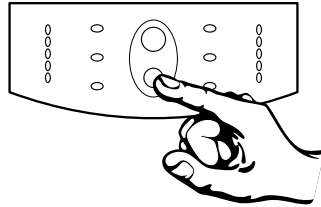
## 5. Operation

### 5.1 Switch On



With the UPS plugged in, press the on/test (upper) button to supply power to the loads. The loads are immediately powered while the UPS beeps and performs a self-test. See section 5.3.

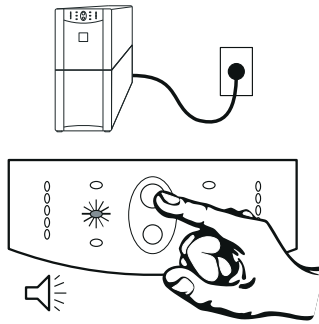
### 5.2 Switch Off



To switch off the UPS's output power, press the off (lower) button. It may be convenient to use the on and off buttons of the UPS as a master on/off switch for the protected equipment.

**Note:** The UPS is on (the internal processor is operating) whenever it is plugged in and utility voltage is present. Even when switched off the UPS maintains the battery charge and will respond to commands received through the computer interface port and the accessory slot.

## 5.3 Self-test



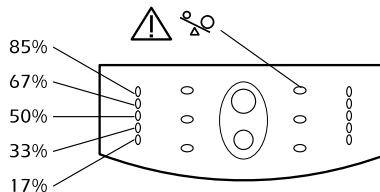
Use the self-test to verify both the operation of the UPS and the condition of the battery. With the UPS plugged in to normal utility power, activate the self-test by pressing the on/test button until the UPS beeps and the on-line LED flashes.

**Note:** By default the UPS performs a self-test at power up and once every two weeks.

During the self-test, the UPS briefly operates the loads on-battery (the on-battery LED comes on). If the UPS passes the self-test, it returns to on-line operation. The on-battery LED goes off and the on-line LED goes on steady.

If the UPS fails the self-test it immediately returns to on-line operation and lights the replace battery LED. The loads are not affected. Recharge the battery overnight and perform the self-test again. If the replace battery LED is still on, see section 10 for information on replacing the battery.

## 5.4 Load Bar Graph

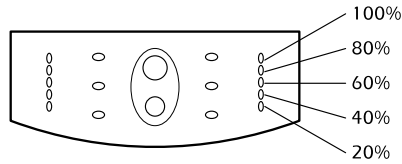


The 5-LED display on the left of the front panel shows the power drawn from the UPS by the load. The display indicates the percentage of the UPS's rated capacity. For example, if three LEDs are lit, the load is drawing between 50% and 67% of the UPS's capacity.

If all five LEDs light, thoroughly test your complete system to make sure that the UPS will not become overloaded.

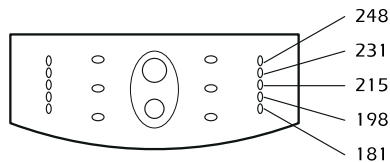
If the UPS is overloaded, the overload LED lights and an alarm sounds. See section 6.2.

## 5.5 Battery Charge Bar Graph



The 5-LED display on the right of the front panel shows the present charge of the UPS's battery as a percentage of the battery's capacity. When all five LEDs light, the battery is fully charged. When the lowest LED is flashing, the battery can supply less than two minutes of run time for the load.

## 5.6 Utility Voltage Bar Graph



This UPS has a diagnostic feature that displays the utility voltage. With the UPS plugged into the normal utility power, press and hold the on/test button to see the utility voltage bar graph display. After four seconds the 5-LED display on the right of the front panel shows the utility input voltage. Refer to the list for the voltage reading.

The display indicates that the voltage is between the displayed value from the list and the next higher value. For example, with three LEDs lit, the input voltage is between 230 and 247 VAC.

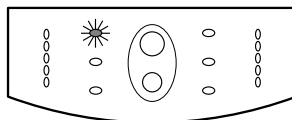
If no LEDs come on and the UPS is plugged into a working AC power outlet, the line voltage is extremely low.

If all five LEDs come on, the line voltage is extremely high and should be checked by an electrician.

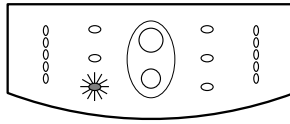
**Note:** The UPS will start a self-test as part of this procedure. The self-test does not affect the voltage display.

## 5.7 SmartBoost and SmartTrim

The UPS automatically corrects high and low utility voltages so that the loads receive voltage within the normal range.



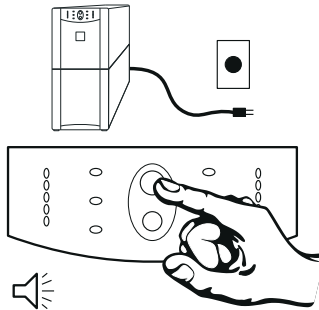
The UPS's **SmartTrim** LED comes on to indicate that the UPS is compensating for a high voltage level.



The **SmartBoost** LED comes on to indicate that the UPS is compensating for a low voltage condition.

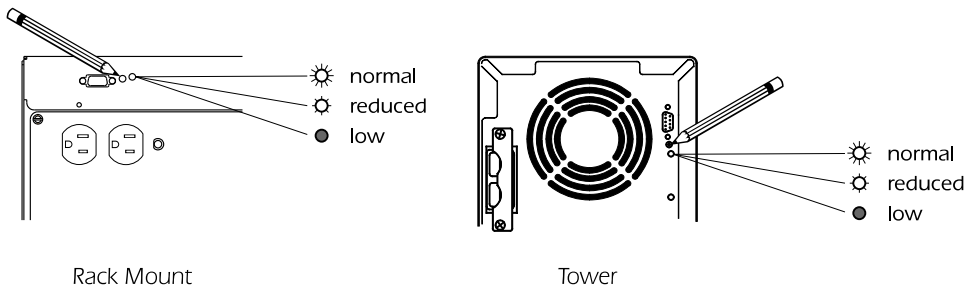
SmartTrim and SmartBoost indications are advisory. No user action is required. To check the utility voltage use the utility voltage display. See section 5.6.

## 5.8 Cold Start



When the UPS is off and there is no utility power, use the cold start feature to apply power to the loads from the UPS's battery. Press the on/test button until the UPS beeps. Release the button *during the beep* and the loads are powered within 4 seconds. Cold start is not a normal operating condition.

## 5.9 Voltage Sensitivity



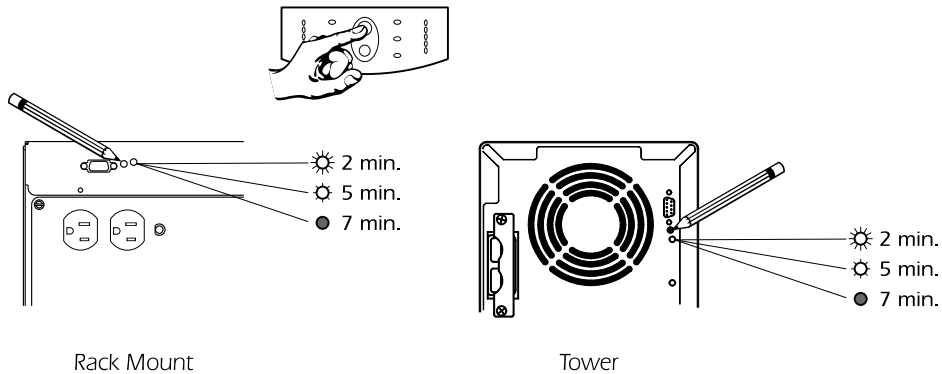
The UPS detects line voltage distortions such as spikes, notches, dips, and swells, as well as distortions caused by operation with inexpensive fuel powered generators. By default, the UPS reacts to distortions by transferring to on-battery operation to protect the loads. Where power quality is poor, the UPS may frequently transfer to on-battery operation. If the loads can operate normally

under such conditions, battery capacity and service life may be conserved by reducing the sensitivity of the UPS.

To reduce UPS sensitivity, press the configuration button on the rear panel. Use a pointed object such as a pen to press the button. Press it once to set the UPS's sensitivity to **reduced**. Press it again to set the sensitivity to **low**. Press the button again to reset **normal** sensitivity.

When the UPS is set to normal sensitivity, the configuration LED is brightly lit. When it is set to reduced sensitivity, the LED is dimly lit. When it is set to low sensitivity, the LED is off.

## 5.10 Low Battery Warning Interval



By default, the low battery warning occurs when there are approximately two minutes of on-battery run time remaining. This may not be enough time to gracefully shut down some protected computer systems. To change the warning interval, press the rear panel configuration button while pressing and holding the front-panel on/test button. Use a pointed object such as a pen to press the configuration button.

Press the configuration button once to set the low battery warning interval to approximately five minutes. Press it again to set the interval to approximately seven minutes. Press the button again to reset the interval to two minutes.

When the UPS is set for a two minute warning interval the configuration LED is brightly lit. When the UPS is set for a five minute warning interval the configuration LED is dimly lit. When the UPS is set for a seven minute warning interval the configuration LED is off.

## 5.11 Shutdown Mode

In shutdown mode the UPS stops supplying power to the load, waiting for the return of utility power. If there is no utility power present, external devices (e. g., servers) connected to the computer interface or the accessory slot can command the UPS to shut down. This is normally done to preserve battery capacity after the graceful shutdown of protected servers. The UPS will scroll the front panel indicators sequentially in shutdown mode.

## 6. Alarms

### 6.1 On Battery

In on-battery operation, the on-battery LED comes on and the UPS sounds an audible alarm consisting of four beeps every 30 seconds. The alarm stops when the UPS returns to on-line operation.

Press the on/test button during on-battery alarms to stop the beeping. This works for the current alarm only — the next on-battery alarm will have the audible indication. Shutting off the audible alarm in this way does not affect alarm reporting through the computer interface or accessory slot.

### 6.2 Overload

When the UPS is overloaded (when the connected loads exceed maximum listed in section 12) the overload LED comes on and the UPS emits a sustained tone. The alarm remains on until the overload is removed. Disconnect nonessential load equipment from the UPS to eliminate the overload. If the UPS is operating on-battery when an overload occurs, the unit will shut down after 4 seconds in an overloaded state.

### 6.3 Replace Battery

The UPS emits short beeps for one minute and the replace battery LED comes on if the battery fails the self-test. The UPS repeats the alarm every five hours. Perform the self-test procedure in section 5.3 to confirm the replace battery condition. The alarm stops when the battery passes the self-test.

### 6.4 Low Battery

When the UPS's battery is low the UPS beeps continuously until the UPS returns to on-line operation or shuts down from battery exhaustion. The low battery warning interval is a configuration item. See section 5.10.

# 7. Options

## 7.1 Overview

This UPS has several options that support advanced operation. Advanced operations include graceful shutdown of a protected computer, and several communication and command functions. Computer systems require time to perform an orderly shutdown, without corrupting or losing data. In an extended power failure, a computer system protected by a UPS eventually will lose power when the battery is exhausted. Using UPS monitoring, the UPS and the computer system communicate so that the computer system is warned of impending UPS shutdown and has time to shut itself down gracefully.

## 7.2 Software

Use available power management software for unattended operation of servers and workstations, power quality related data logging, shutdown notification and control, auto-restart, diagnostics, and battery conservation features. Software is available for most operating systems and is supplied with a signalling cable that connects to the UPS. See your dealer or call the number at the front of this manual for more information.

## 7.3 Interface Kits

For computer systems that have built-in UPS monitoring features, a series of interface kits are available to connect the UPS to your system. Each kit includes the appropriate interface cable to convert the UPS's status signals into signals your system recognizes (use only factory supplied or authorized UPS monitoring cables). See your dealer or call the number at the front of this manual for more information.

## 7.4 Accessory Slot

The capabilities of the accessories that plug into the UPS accessory slot include; SNMP UPS monitoring and control, multiple server support for one UPS, out-of-band management, special signalling, power control, and environment monitoring. See your dealer or call the number at the front of this manual for more information.



## 8. Troubleshooting

Problem	Possible Cause	Solution
UPS will not turn on.	On/test button not pushed.	Press the on/test button to power the UPS and the load
	UPS input circuit breaker tripped.	Reduce the load on the UPS by unplugging equipment and reset the circuit breaker by pressing the plunger back in.
	Very low or no utility voltage.	Check the AC power supply to the UPS.
UPS will not turn on or off.	Computer interface or accessory problem.	Disconnect the computer interface or accessory. If the UPS now works normally, check the interface cable, the attached computer, and the accessory.
UPS operates on-battery even though normal line voltage is thought to exist.	UPS's input circuit breaker tripped.	Reduce the load on the UPS by unplugging equipment and reset the circuit breaker.
	Very high, low, or distorted line voltage.	Test the input voltage with the utility voltage display. See section 5.6. Inexpensive fuel powered generators can distort the voltage. If acceptable to the load, reduce the UPS's sensitivity. See section 5.9.
UPS beeps occasionally.	Normal UPS operation.	None. The UPS is protecting the load.
UPS does not provide expected back up time.	The UPS's battery is weak due to recent outage or is near the end of its service life.	Charge the battery. The UPS's batteries require recharging after an extended outage. Batteries wear faster when put into service often and when operated at elevated temperatures. If the battery is near the end of its service life, consider replacing the battery even if the replace battery indicator is not yet lit.
	The UPS is overloaded.	Check the UPS's load display. See section 5.4. Unplug less needed equipment, such as printers.
Front panel indicators flash sequentially.	The UPS has been shut down by remote control.	None. The UPS will restart automatically when utility power returns.
All indicators are lit and the UPS emits a constant tone.	Internal UPS fault.	Do not attempt to use the UPS. Turn the UPS off and have it serviced immediately.

Problem	Possible Cause	Solution
Low battery light is on and the on-line light is off.	The UPS is shut down and the battery is discharged from an extended power outage.	None. The UPS will return to normal operation when the power is restored and the battery has a sufficient charge.
The replace battery light is lit.	Weak batteries.	Allow the batteries to recharge for at least four hours. If the problem persists after recharging, replace the batteries. See section 10.
	Replacement batteries not connected properly.	Confirm the battery connections. See section 10.

## 9. Service

If the UPS requires service:

1. Use the troubleshooting section (section 8) to eliminate obvious causes.
2. Verify that no circuit breakers are tripped. A tripped circuit breaker is the most common UPS problem! See section 6.2.
3. Go to section 5.3 and perform a self-test to check the battery.
4. See the front of this manual for the correct telephone number. Call customer service for a return material authorization number (RMA#). If customer service is not available in your area, call the dealer that sold the UPS.
  - Note the model number of the UPS, the serial number, and the date purchased. A technician will ask you to describe the problem and help solve it over the phone, if possible, or will give you an RMA#.
  - If the UPS is under warranty, repairs are free. If not, there will be a charge for repair.
5. Pack the UPS in its original packaging. If the original packing is not available, ask customer service about obtaining a new set.
  - It is important to pack the UPS properly to avoid damage in transit. Never use styrofoam beads for packaging. Damage sustained in transit is not covered under warranty.
  - Include a letter with your name, RMA#, address, copy of the sales receipt, description of the trouble, your daytime phone number, and a check (if necessary).
6. Mark the RMA# on the outside of the package. The factory cannot accept any package without this marking.
7. Return the UPS by insured, prepaid carrier to the address at the front of this manual.

## 10. Replacing the Battery

This UPS has a replaceable battery. Please read section 10.1 before performing the procedure in sections 10.3 or 10.4.

### 10.1 Warning

- This Uninterruptible Power Source (UPS) contains potentially hazardous voltages. Do not attempt to disassemble the unit beyond the battery replacement procedures below. Except for the battery, the unit contains no user serviceable parts. Repairs should be performed only by factory trained service personnel.



- The batteries in this UPS are recyclable. Dispose of the batteries properly. The batteries contain lead and pose a hazard to the environment and human health if not disposed of properly. Refer to local codes for proper disposal requirements or return the battery to a factory authorized service center. See the instructions with the new battery for more information.



**CAUTION**—Do not dispose of batteries in a fire. The batteries may explode.

**CAUTION**—Do not open or mutilate batteries. They contain an electrolyte which is toxic and harmful to the skin and eyes.



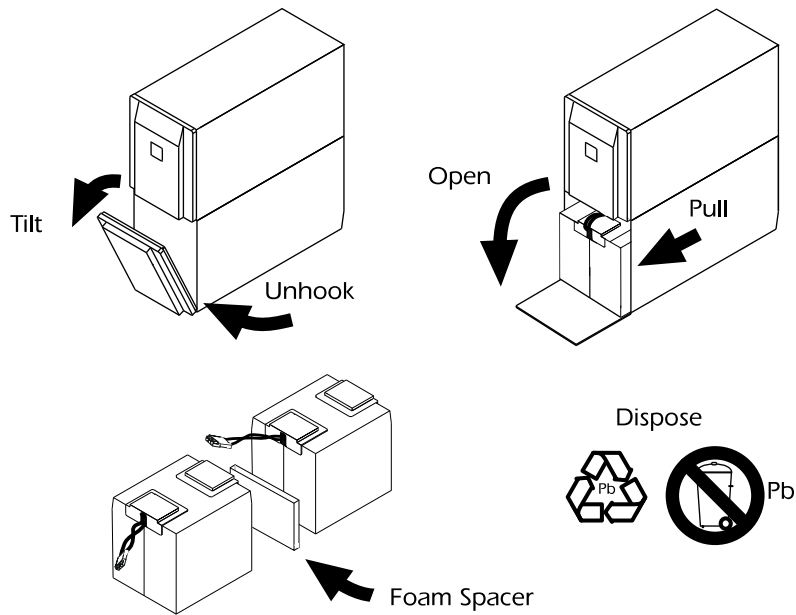
**CAUTION**—To avoid personal injury due to energy hazard, remove wrist watches and jewelry such as rings when replacing the batteries. Use tools with insulated handles.

**CAUTION**—Replace batteries with the same number and type of batteries as originally installed in the UPS.

### 10.2 Replacement Batteries

See your dealer or call the number at the front of this manual for information on replacement battery kits and battery recycling.

## 10.3 Battery Replacement Procedure (Tower models)



**Note:** Please read the cautions in section 10.1.

Battery replacement is a safe procedure, isolated from electrical hazards. You may leave the UPS and loads on for the following procedure.

1. Grasp the top edge of the bottom front cover and **tilt** it out.
2. **Unhook** the bottom section of the front cover from the chassis and set it aside.
3. Use a flat-blade screwdriver or a coin to remove the two battery door screws and **open** the door.
4. Grip the wires for the front set of batteries and **pull** firmly to disconnect the connector from the battery compartment. Remove the batteries. Set aside the foam spacer located between the batteries. Now reach into the battery compartment and grasp either the white cord (if it is present), or the wires for the other set of batteries. Again, **pull** firmly to disconnect the connector. Remove the second set of batteries.

**Note:** Be careful removing the batteries — they are heavy.

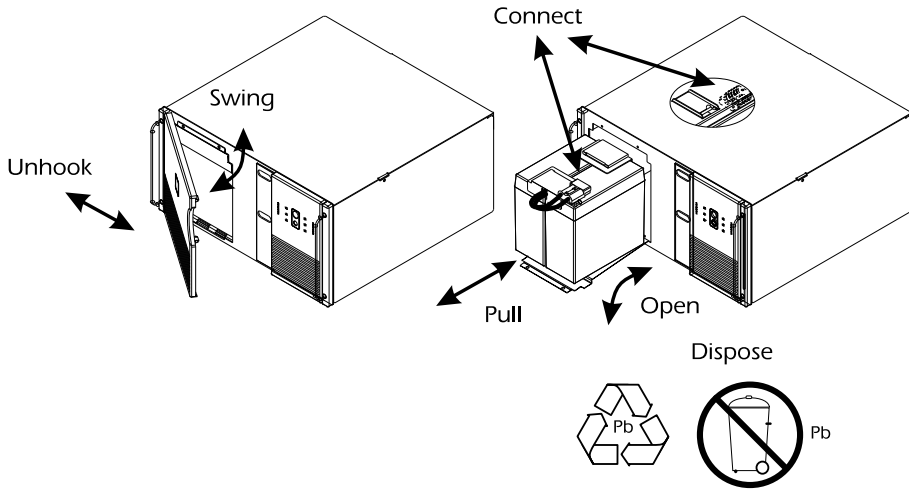
5. Slide the first set of new batteries into the unit. Hold the connector down below the top of the batteries and toward the door; otherwise the assembly will not fit. Guide the connector over the top of the batteries and connect it to the rear connector of the battery compartment. Set the foam spacer against the rear batteries to prevent the wires from being pinched. Slide the

second set of batteries in, then guide the connector over the batteries and connect it to the front connector of the battery compartment. **Note:** Small sparks at the battery connectors are normal during battery connection. Close the battery compartment door, making sure that no wires are pinched. Replace the battery compartment screws and replace the front cover.



6. Dispose of the battery properly at an appropriate recycling facility or return it to the supplier in the packing material for the new battery. See the instructions supplied with the new battery for more information.

## 10.4 Battery Replacement Procedure (Rack mount models)



1. Reach into the finger pull and open the front cover. **Swing** the cover open as shown.
2. **Unhook** the side of the cover from the chassis and lift it away to expose the battery door.
3. Use a flat-blade or phillips screwdriver or a coin to remove the three battery door screws and **open** the door.
4. Grip the wires for the front set of batteries and **pull** firmly to disconnect the connector from the battery compartment. Remove the batteries. Set aside the foam spacer located between the batteries. Now reach into the battery compartment and grasp either the white cord (if it is present), or the wires for the other set of batteries. Again, **pull** firmly to disconnect the connector. Remove the second set of batteries. **Note:** Be careful removing the batteries — they are heavy.

5. Slide the first set of new batteries into the unit. Hold the connector down below the top of the batteries and toward the door; otherwise the assembly will not fit. Guide the connector over the top of the batteries and connect it to the rear connector of the battery compartment. Set the foam spacer against the rear batteries to prevent the wires from being pinched. Slide the second set of batteries in, then guide the connector over the batteries and connect it to the front connector of the battery compartment. **Note:** Small sparks at the battery connectors are normal during battery connection. Close the battery compartment door, making sure that no wires are pinched. Replace the battery compartment screws and replace the front cover.



6. Dispose of the battery properly at an appropriate recycling facility or return it to the supplier in the packing material for the new battery. See the instructions supplied with the new battery for more information.

## 11. Storage

### 11.1 Storage conditions

Store the UPS covered and upright in a cool, dry location, with its battery fully charged. Before storing, charge the UPS for at least 2 hours. Remove any accessories in the accessory slot and disconnect any cables connected to the computer interface port to avoid unnecessarily draining the battery.

### 11.2 Extended storage

During extended storage in environments where the ambient temperature is  $-15$  to  $+30$  °C ( $+5$  to  $+86$  °F), charge the UPS's battery every 6 months

During extended storage in environments where the ambient temperature is  $+30$  to  $+45$  °C ( $+86$  to  $+113$  °F), charge the UPS's battery every 3 months.

## 12. Specifications

	1400 VA	2200 VA	3000 VA
Acceptable input voltage	0 - 325 VAC		
Input voltage (on-line operation)*	160-253 VAC		
208 volt output range*	176-229 VAC		
120 volt output range* with 400 VA load with no load	95-130 VAC 100-135 VAC		
Nominal input frequency	50 or 60 Hz, autosensing		
Input Protection	Resettable circuit breaker		
Frequency limits (on-line operation)	50 or 60 Hz, $\pm 5\%$		
Transfer time	2 ms typical, 4.5 ms maximum		
Maximum load, Total	1400 VA/950 W	2200 VA/1600 W	3000 VA/2250 W
Maximum load, 120V auxilliary	400 VA/400 W		
On-battery output voltage	208 VAC		
On-battery frequency	50 or 60 Hz, $\pm 0.1$ Hz; unless synchronized to utility during brownout.		
On-battery waveshape	Low-distortion sine wave		
Overload protection (on-battery)	Overcurrent and short-circuit protected, latching shutdown on overload.		
Overload protection (on-line)	2 pole, 20 Amp UL certified input circuit breaker		
Overload protection (120VAC auxiliary)	Transformer and output protected by resettable thermal circuit breaker (on-line and on-battery)		
Surge energy rating (one time, 10/1000 $\mu$ s waveform)	1120 J		
Surge current capability (one time, 8/20 $\mu$ s waveform)	6500 A maximum		
Surge response time	0 ns (instantaneous) normal mode; <5 ns common mode		
Surge voltage let-through (percentage of applied ANSI C62.41 Cat. A $\pm 6$ kV test waveform)	0.30%		
Noise Filter	Normal and common mode EMI/RFI suppression, 100 kHz to 10 MHz		

\* settings may be changed via optional software

	1400 VA	2200 VA	3000 VA
Battery type	Spill proof, maintenance free, sealed lead-acid		
Typical battery life	3 to 6 years, depending on number of discharge cycles and ambient temperature		
Typical recharge time	2 to 5 hours from total discharge		
Operating temperature	0 to +40 °C (+32 to +104 °F)		
Storage temperature	-15 to +45 °C (+5 to +113 °F)		
Operating and storage relative humidity	0 to 95%, non-condensing		
Operating elevation	0 to +3,000 m (0 to +10,000 ft)		
Storage elevation	0 to +15,000 m (0 to +50,000 ft)		
Electromagnetic immunity	IEC 801-2 level IV, 801-3 level III, 801-4 level IV		
Audible noise in dBA at 1 m (3 ft)	<55		
Size (H x W x D)	43.2 x 19.6 x 54.6 cm (17.0 x 7.7 x 21.5 in.)		
Weight - net (shipping)	120 (143) lb 54.3 (64.8) kg	137 (160) lb 62.0 (72.5) kg	137 (160) lb 62.0 (72.5) kg
Safety approvals	Listed to UL 1778, certified to CSA 107.1		
EMC verification	FCC/DOC Class A verified		



# 13. How to Determine On-battery Run Time

This table will aid in estimating the length of run time that you may expect for a given load.

1. To calculate the on-battery run time first determine the total load protected by the UPS in Volt-Amps. Obtain load figures from either the labelling on the protected equipment or the accompanying literature. For loads specified in watts, multiply the specified figure by 1.4. For loads specified in Amps, multiply the specified figure by 208 for the main load, or 120 for the auxilliary load.
2. Add the individual loads to determine the total load.
3. Compare the total load of your system to the run time table below

## 1400VA and 2200VA Models

Typical On-Battery Run Time Versus Load, in Minutes											
Load	Internal Battery	1 battery pack	2 battery packs	3 battery packs	4 battery packs	5 battery packs	6 battery packs	7 battery packs	8 battery packs	9 battery packs	10 battery packs
100	270	585	925	1,265	1,605	1,945	2,285	2,625	2,965	3,305	3,645
200	165	375	585	810	1,035	1,265	1,490	1,715	1,940	2,170	2,395
300	110	270	425	580	750	920	1,085	1,255	1,425	1,595	1,765
400	80	205	325	450	575	710	845	980	1,115	1,245	1,380
500	63	160	265	365	470	570	680	795	905	1,015	1,125
600	51	130	220	305	390	480	565	660	755	850	945
700	41	105	180	255	330	405	480	555	640	720	800
800	35	90	155	225	290	355	425	490	555	630	700
900	29	76	135	195	255	315	375	435	495	550	615
1000	26	67	120	170	225	280	335	385	440	495	550
1200	20	53	91	135	180	225	270	315	360	405	450
1400	16	42	73	110	150	185	225	265	300	340	375
1600	13	34	60	88	120	155	185	220	250	285	315
1800	11	29	52	75	105	130	160	190	220	250	280
2000	9	25	44	65	87	115	140	165	190	220	245
2200	8	21	38	56	75	100	120	145	170	190	215

## 3000 VA Models

Typical On-Battery Run Time Versus Load, in Minutes		
Load	Internal Battery	1 Battery Pack
100 VA	228	491
150 VA	183	394
200 VA	152	328
300 VA	110	245
400 VA	84	193
500 VA	67	157
600 VA	54	131
800 VA	36	96
1000 VA	26	73
1200 VA	20	58
1400 VA	16	46
1600 VA	13	37
2000 VA	10	26
2200 VA	8	22
2500 VA	7	18
3000 VA	5	13

## 14. User Configuration Items

Note: Setting these items requires optional software or hardware.			
Function	Factory Default	User Selectable Choices	Description
Automatic Self-Test	Every 14 days (336 hours)	Every 7 days (168 hours), On Startup Only, No Self-Test	Sets the interval at which the UPS will execute a self-test.
UPS ID	UPS_IDEN	Up to eight characters to define the UPS.	Use this field to uniquely identify the UPS for network management purposes.
Date of Last Battery Replacement	Manufactur Date	Date of Battery Replacement	Reset this date on battery replacement.
Minimum Capacity Before Return from Shutdown	0 percent	15, 50, or 90 percent	The UPS will charge its batteries to the specified percentage before return from a shutdown.
Sensitivity	Normal	Reduced, Low	Set lower than normal sensitivity to avoid lowered battery capacity and service life in situations where the load can tolerate minor power disturbances.
Duration of Low Battery Warning	2 minutes	5, 7, or 10 minutes	Sets the time before shutdown at which the UPS issues a low battery warning. Set higher than the default only if the OS needs the time for graceful shutdown.
Alarm Delay After Line Fail	5 second delay	30 second delay, At Low Battery Condition, No Alarm	To avoid alarms for minor power glitches, set the alarm delay.
Shutdown Delay	20 seconds	180, 300, or 600 seconds	Sets the interval between when the UPS receives a shutdown command and when shutdown occurs.
Synchronized Turn-on Delay	0 seconds	60, 180, 300 seconds	To avoid branch circuit overload, the UPS will wait the specified time after the return of utility power before turn-on.
High Transfer Point	253 Vac	264, 271, 280 Vac	
Low Transfer Point	196 Vac	188, 204, 208 Vac	

Notes:

Notes:

## Limited Warranty

American Power Conversion (APC) warrants its products to be free from defects in materials and workmanship for a period of two years from the date of purchase. Its obligation under this warranty is limited to repairing or replacing, at its own sole option, any such defective products. To obtain service under warranty you must obtain a Returned Material Authorization (RMA) number from APC or an APC service center. Products must be returned to APC or an APC service center with transportation charges prepaid and must be accompanied by a brief description of the problem encountered and proof of date and place of purchase. This warranty does not apply to equipment which has been damaged by accident, negligence, or misapplication or has been altered or modified in any way. This warranty applies only to the original purchaser who must have properly registered the product within 10 days of purchase.

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