

PowerVar

**Uninterruptible
Power System**

1000 VA through 3000 VA

05145420 A Sept-97

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Class A Statement for FCC and ICES

(for ACE2000a, ACE2400a, ACE3000a, ACE2000i, ACE2400i, and ACE3000i)

For Users in the United States Only

Note: This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this 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/her own expense.

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

For Users in Canada

This Class A Interference Causing Equipment meets all requirements of the Canadian Interference Causing Equipment Regulations ICES-003.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Self-Certified Class B Statement for FCC and ICES

(ACE1000a, ACE1500a, ACE1000i, and ACE1500i)

For Users in the United States Only

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE THAT MAY CAUSE UNDESIRE OPERATION.

Note: This equipment has been tested and found to comply with the limits for a Class B device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a residential 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.
- Ensure that mounting screws, connector attachment screws, and all ground wires are secured and tight.

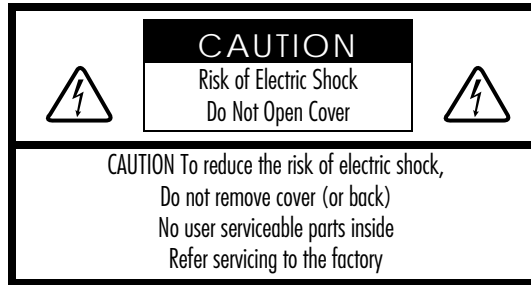
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

For Users in Canada

This Class A Interference Causing Equipment meets all requirements of the Canadian Interference Causing Equipment Regulations ICES-003.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

**The following are examples of symbols
used to alert you to important information:**



This symbol is intended to alert you to the presence of uninsulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock.



This symbol is intended to alert you to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.



This symbol indicates that you should not discard the UPS or the UPS batteries in the trash. The UPS may contain sealed, lead-acid batteries. Batteries must be recycled.

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Declaration of Conformity

Units that are labeled with a CE mark comply with the following European Union directives:

73/23/EEC Council Directive on the harmonization of the laws of member states relating to electrical equipment designed for use within certain voltage limits.

89/336/EEC Council Directive on the approximation of the laws of member states relating to electromagnetic compatibility.

93/68/EEC Amending Directives.

The EC Declaration of Conformity is available upon request for products with a CE mark. For copies of the EC Declaration of Conformity, contact:

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P R E F A C E

ACE SERIES

— ONE OF THE BEST!

Congratulations on selecting the ACE Series uninterruptible power system (UPS) to protect your sensitive electronic equipment from power disturbances and dirty power.

Because a power outage can occur when you least expect it — threatening the loss of critical data — it's important to protect your network with a full-featured UPS such as the ACE Series. Network administrators often spend countless hours trying to troubleshoot problems that, in many cases, would never have occurred had a UPS protected their network.

Properly installed, a UPS can be the single most cost-effective measure you can take to ensure system security. Providing outstanding performance and reliability, the ACE Series's unique benefits include the following:

- **Advanced Battery Management (ABM™)** doubles battery service life, optimizes recharge time, and provides a warning up to 60 days before the end of useful battery life.
- **Hot-swappable batteries** simplify maintenance by allowing you to safely replace batteries without powering down your critical load.
- **Network and modem protection** (may not be available on your model) guards your modem, fax machine, and other network communications equipment from surges.
- **Buck and Double Boost** regulation ensures consistent voltage to your load by correcting voltage fluctuations without using battery power.
- **Start-on-battery compatibility** allows you to power up your UPS even if utility power is not available.
- **Our power management software** is fully compatible with the ACE Series and provides sequential orderly shutdown of all network devices including multiple servers and workstations.
- **Optional power communication cards** provide enhanced communication capabilities for increased power protection and longer battery backup times.

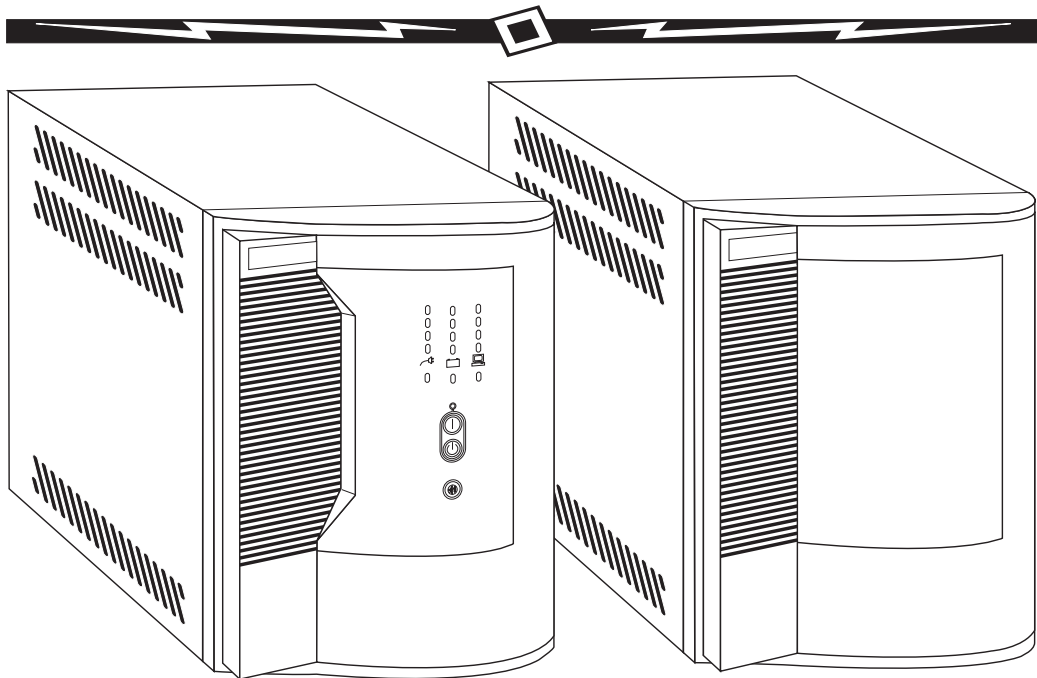


Figure 1. ACE Series and External Battery Box

How to Contact Us

POWERVAR is committed to excellence in dependability and customer satisfaction. If you have any questions about our products, please contact us at: 847-816-8585.



S E C T I O N 1

INSTALLATION

This section explains:

- Inspecting equipment
- Safety precautions
- Installing your UPS

Inspecting Your Equipment

If any equipment has been damaged during shipment, keep the shipping cartons and packing materials for the carrier or place of purchase and file a claim for shipping damage. If you discover damage after acceptance, file a claim for concealed damage.

To file a claim for shipping damage or concealed damage: 1) File with the carrier within 15 days of receipt of the equipment; 2) Send a copy of the damage claim within 15 days to your service representative.

Safety Precautions

Read the following before you install your UPS.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS. This manual contains important instructions that you should follow during installation and maintenance of the UPS and batteries. Please read all instructions before operating the equipment and save this manual for future reference.



WARNING



- Electrical Energy Hazard. The battery pack contains HIGH ENERGY. To reduce the risk of electric shock, use caution when you handle and interconnect the units.
 - If operating the UPS while it is unplugged from the source of electrical power, DO NOT make contact with the line cord input pins. Electrical shock hazard exists.
 - To reduce the risk of fire or electric shock, install in a temperature- and humidity-controlled indoor area free of conductive contaminants.
 - (VDE requirement) The sum of earth leakage current from all loads connected to the UPS must not exceed 1.5 mA.
-

Installing the UPS

Follow these steps to install your UPS. Figure 2 shows a typical installation; installing your specific model may vary. Appendix C shows the rear panel of each model.

NOTE

Some units may not recognize 50 Hz outlets. If you connect your UPS to a 50 Hz outlet, and it will not start, press the ON button for 3 seconds to start the UPS on battery. Then configure the UPS input voltage for either 100 V or 110 V (see Section 3, Configuration). The UPS recognizes the input line and goes off battery.

CAUTION



A small amount of arcing may occur when connecting an external battery to the UPS. Insert the battery cable into the UPS battery connector quickly and firmly.

CAUTION



DO NOT plug laser printers into a UPS. The high surge currents they produce can disrupt any manufacturer's UPS.



NOTE

- If your UPS output receptacles are divided into Load Segments, and you plan to take advantage of this feature (available only with specific power management software), read the appropriate sections of your power management software manual before you install the UPS.
 - Changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.
-

1. If your UPS has an external battery, connect it to the UPS as shown in Figure 2.
2. If you plan to use our power management software, connect the supplied communication cable between your computer and your UPS RS-232 port.
3. Plug your UPS power cord into a wall outlet or other power source.

If your UPS uses a customer-supplied power cord, it must be correctly rated (see Appendix B, Specifications). You can also use the power cord from your largest load if it is correctly rated.

Once the UPS is connected, it conducts a self-test then goes to Standby mode. If a red Site Wiring or Battery Service LED stays on, consult Section 2, Operation, or Section 5, Troubleshooting.

4. Plug your loads (computer, monitor, etc.) into the UPS output receptacles. Use the provided interconnecting line cords where applicable.
5. Start the UPS by pressing the ON button as shown in Figure 2. Power is now available to the rear receptacles, and the ON LED is lit.

You have now completed installation. To learn how to operate the UPS, see Section 2, Operation. To change the factory-set defaults, see Section 3, Configuration.

NOTE

The UPS will charge to 90% in approximately 4 hours. However, it is recommended that you charge for 24 hours after installation or long storage.

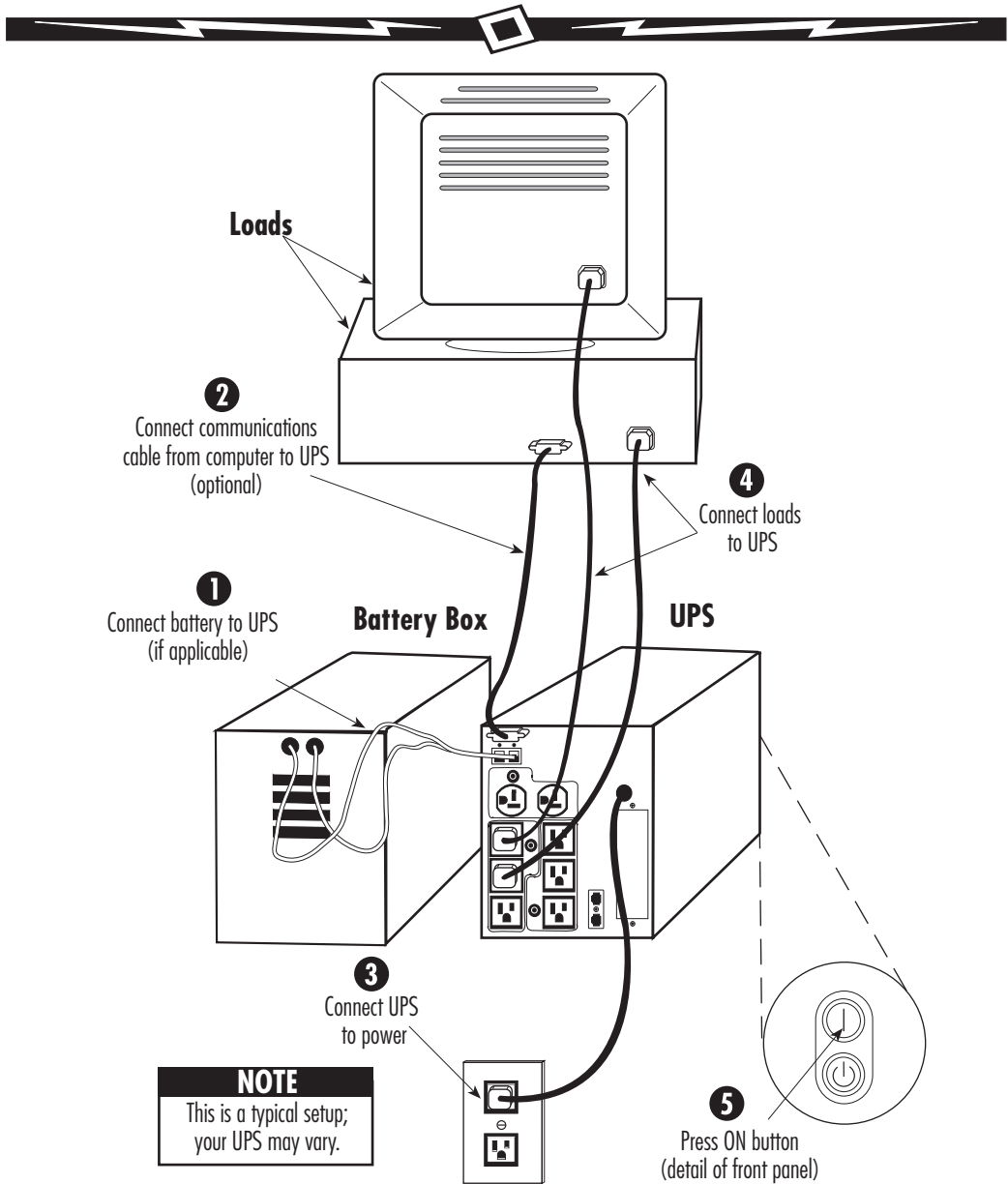


Figure 2. Typical UPS Installation



S E C T I O N 2

OPERATION

This section explains how to:

- Turn the UPS on and off
- Interpret the LED display
- Put the UPS in Standby mode
- Initiate the self-test
- Silence an audible alarm

Turning the UPS On

Once the UPS is connected to a power source, it conducts a self-test and enters Standby mode. To turn the UPS on, press the ON button on the front panel (shown in Figure 3). Power is now available at the rear receptacles.

To turn the UPS on without using AC input, press the ON button for 3 seconds. When the UPS starts on battery, it conserves battery power by not conducting a self-test.

Turning the UPS Off

To turn the UPS off, press the OFF/Standby button on the front panel and unplug the UPS from the AC power source. If you do not unplug the UPS, it remains in Standby mode.

Silencing an Audible Alarm

Press the Test/Alarm Reset button to silence an audible alarm.

Although you have silenced the alarm, you may still need to resolve the problem which triggered the alarm. For more information, see Section 5, Troubleshooting

Interpreting the LED Display

The front panel LEDs indicate how the UPS is functioning and also warn about possible problems. Figure 3 and Table 1 explain how to interpret the LEDs when the UPS is in Operation mode. When the UPS is in Configuration mode, the front panel LEDs provide different information. For more information about how to interpret LEDs when the UPS is in Configuration mode, see Section 3, Configuration.

NOTE

The front panel may be rotated clockwise 90 degrees on some models.

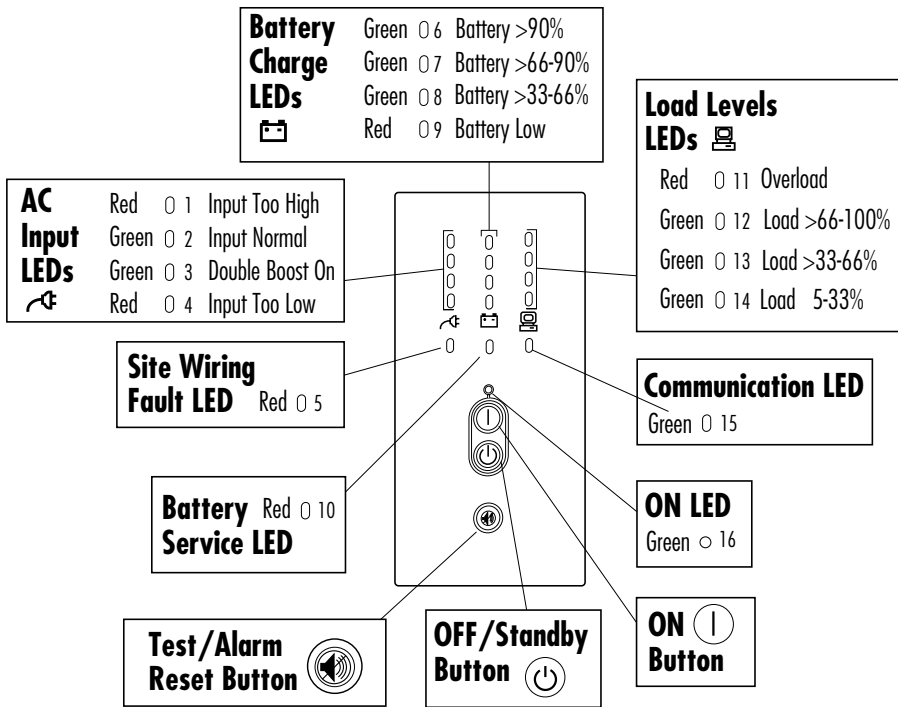


Figure 3. Interpreting LEDs in Operation Mode

Table 1. Interpreting LEDs in Operation Mode

| Name | Number | Color | Explanation (if lit) |
|-------------------|------------|------------|---|
| ON | 16 | Green | Output voltage available at the rear outlets. |
| AC Input | 1 | Red | Line voltage is too high; UPS battery provides all power. |
| | 2 | Green | Line voltage is normal; AC input provides all power. |
| | 3 | Green | Line voltage is lower than normal; AC input provides all power. |
| | 4 | Red | Line voltage is too low; UPS battery provides all power. |
| Site Wiring Fault | 5 | Red | Ground wire connection doesn't exist, or the line and neutral wires are reversed in the socket. |
| Battery Charge | 6 | Green | Batteries are fully charged. |
| | 7 | Green | Battery charge is approximately 2/3 of full charge. |
| | 8 | Green | Battery charge is approximately 1/3 of full charge. |
| | 9 | Red | Low battery charge; there are approximately 3-5 minutes of battery backup remaining. If the battery shuts down before AC input is restored, the load also shuts down. |
| Battery Service | 10 | Red | Potential battery failure. |
| Load Level | 11 | Red | Load current exceeds full load. |
| | 12, 13, 14 | Green | The amount of load current or watts. Each LED represents 1/3 of a full load rating. When all three LEDs are green, the load is approximately full. |
| Communication | 15 | Green | The UPS has received a command from a computer to establish communication. |
| | | (Flashing) | Data is being transferred via the Communication Port. |

Putting the UPS in Standby Mode

To put the UPS in Standby mode, press the OFF/Standby button. In Standby mode, the battery recharges when necessary, but power is no longer available at the rear receptacles.

Initiating the Self-Test

Press the Test/Alarm Reset Button for three seconds to initiate the self-test. During the test, individual LEDs turn on as various parts of the UPS are checked. If the UPS finds a problem, an LED turns on to indicate where the problem is. For more information, see Section 5, Troubleshooting.

NOTE

Batteries must be at least 90% charged (LEDs 6, 7, and 8 must be on) and the unit must be off battery, to perform the self-test.



S E C T I O N 3

CONFIGURATION

This section explains:

- Why you may want to change factory defaults
- How to reconfigure functions

Why Change Factory Defaults?

Input Nominal Voltage (LEDs 1, 2, 3, and 10)

If your AC input consistently fluctuates higher OR lower than the factory-set nominal input voltage (higher than +20% OR lower than -30% of 120 V or 230 V nominal), your UPS maintains the selected nominal input voltage by repeatedly switching to battery power. If this creates a nuisance, you can configure the UPS nominal input voltage to more closely match the nominal voltage of your AC input source.

Extended Nominal Voltage Range (LED 4)

If your AC input consistently fluctuates higher AND lower than the factory-set nominal input voltage (higher than +20% AND lower than -30% of 120 V or 230 V nominal), your UPS maintains the selected nominal input voltage by repeatedly switching to battery power. If this creates a nuisance, you can configure the UPS nominal input voltage to more closely match the wider range of your AC input source.

Other Settings

Reconfigure LEDs 5, 6, or 8 to change the alarms. Reconfigure LED 7 to change the delay before unconditional shutdown. Reconfigure LED 9 so the UPS does not shut off power to the load when the UPS is on battery power and the load is not drawing current. LEDs 11 through 14 are inactive and cannot be selected.



Reconfiguring Functions

You can change the functions after switching the UPS from Operation mode to Configuration mode. In Configuration mode the front-panel LEDs represent changeable functions, and the control buttons turn them on or off. Figure 4 shows the LED numbers, and Table 2 explains the functions.



CAUTION

DO NOT press the UPS OFF button, while the UPS is in Configuration mode. The UPS will switch to Standby and cut off all power to the attached loads.

1. Press the ON and Test/Alarm Reset buttons at the same time for one beep. The unit goes to Configuration mode.
2. Press the ON button to scroll to the function you want to change. The UPS beeps as you scroll through each function. The selected function (LED) blinks. Figure 4 shows how the LEDs are numbered. Table 2 describes the functions.
3. If you press the ON button and nothing happens, you are still in Operation mode. Repeat step 1 for one beep ONLY to go to Configuration mode, and then perform step 2.
4. Press the Test/Alarm Reset button ONCE to turn the selected function on or off. LED 16 turns on when the function is on and off when the function is off. Set the remaining functions as desired.
5. Press the ON and Test/Alarm Reset buttons any time to return to Operation mode. Scrolling through LED 15 also returns the unit to Operation mode. Changes take effect immediately after returning to Operation mode.

NOTE

The front panel may be rotated clockwise 90 degrees on some models.

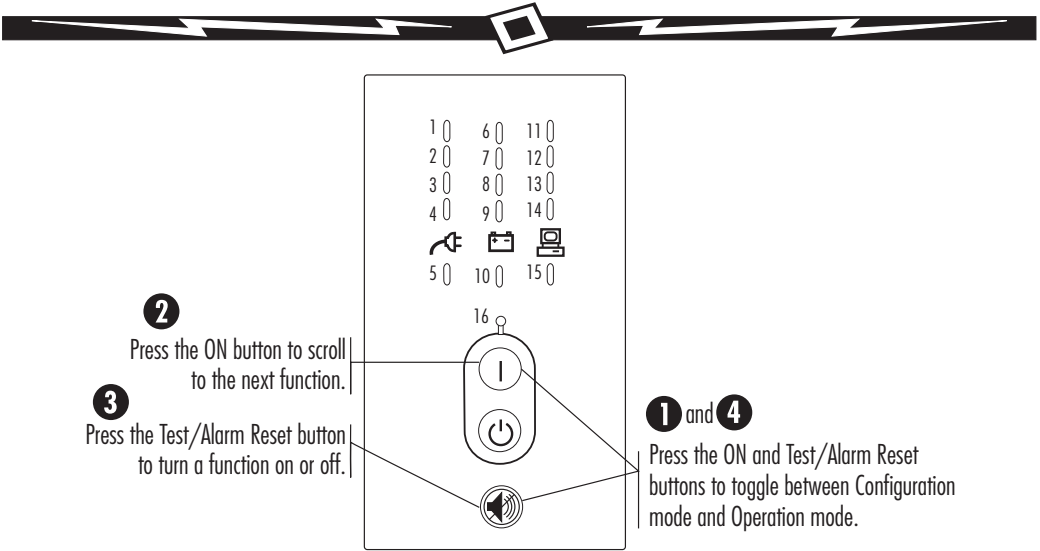


Figure 4. LED Function in Configuration Mode

Table 2. How to Interpret LEDs in Configuration Mode

| LED | Function | LED 16 | Explanation |
|-------|--------------------|---------------|--|
| 1 | 120/230 Nom. | ON (default) | Nominal voltage on low voltage models is 120 V and on high voltage models is 230 V; all other nominal input voltages are disabled. |
| | | OFF | Nominal voltage on low voltage models is NOT 120 V and on high voltage models is NOT 230 V; some other nominal input voltage is selected. |
| 2 | 110/220 Nom. | ON | Nominal voltage on low voltage models is 110 V and on high voltage models is 220 V; all other nominal input voltages are disabled. |
| | | OFF (default) | Nominal voltage on low voltage models is NOT 110 V and on high voltage models is NOT 220 V; some other nominal input voltage is selected. |
| 3 | 127/240 Nom. | ON | Nominal voltage on low voltage models is 127 V and on high voltage models is 240 V; all other nominal input voltages are disabled. |
| | | OFF (default) | Nominal voltage on low voltage models is NOT 127 V and on high voltage models is NOT 240 V; some other nominal input voltage is selected. |
| 4 | Extended Voltage | ON | The UPS accepts an input voltage within -35% to +20% of the selected nominal input voltage before switching to battery. |
| | | OFF (default) | The UPS accepts an input voltage within -30% to +20% of the selected nominal input voltage before switching to battery. |
| 5 | Wiring Fault Alarm | ON (default) | Alarm sounds when the polarity of the input source is reversed or ground is missing; have a qualified electrician repair input source. |
| | | OFF | Alarm DOES NOT sound when the polarity of the input source is reversed or ground is missing. |
| 6 | Low Battery Alarm | ON (default) | Alarm sounds 3 minutes before battery shutdown. |
| | | OFF | Alarm sounds 5 minutes before battery shutdown. |
| 7 | Shutdown Delay | ON (default) | 5-second delay before unconditional shutdown after UPS receives signal from a computer via Communication Port. |
| | | OFF | 180-second delay before unconditional shutdown after UPS receives signal from a computer via Communication Port. When this LED is not enabled, the user can also create a new delay time by reconfiguring the Communication Port. See Appendix A, Additional UPS Features, for more information. |
| 8 | AC Input Failure | ON (default) | Alarm sounds when there is an AC input failure. |
| | | OFF | Alarm DOES NOT sound when there is an AC input failure. |
| 9 | Sleep Mode | ON (default) | UPS shuts off power to load when the UPS is on battery power and load is not drawing current. This feature saves battery power. |
| | | OFF | UPS DOES NOT shut off power to load when the UPS is on battery power and load is not drawing current. |
| 10 | 100/208 Nom. | ON | If your unit is configurable for 100 V operation, when LEDs 10 and 16 are both on, the nominal voltage on 100 V models is 100 V and on 208 V models is 208 V; all other nominal input voltages are disabled. |
| | | OFF (default) | Nominal voltage on 100 V models is NOT 100 V and on 208 V models is NOT 208 V; some other nominal input voltage is selected. |
| 11-14 | | N/A | Reserved for future use. |
| 15 | Reset Defaults | ON (default) | All factory-set defaults are active. |
| | | OFF | One or more factory-set defaults have been changed. |



S E C T I O N 4

UPS CARE AND BATTERY REPLACEMENT

This section explains how to:

- Replace your batteries
- Return your used batteries
- Care for your UPS and batteries
- Store your UPS

Replacing Batteries

Our hot-swappable battery feature allows you to replace your UPS batteries easily without turning the UPS off or disconnecting the load. The following section explains how.

When to Replace Batteries

When the Battery Service LED (LED 10) turns red, your batteries may need replacing. Conduct a self-test by pressing the Test/Alarm Reset button. If the LED stays on, contact your service representative to order new batteries.



WARNING

- **ELECTRIC ENERGY HAZARD.** Do not attempt to alter wiring in either the battery connector or the battery tray. Attempting to alter wiring can cause injury or death.
 - A battery can present a risk of high short circuit current which can cause burns. The following precautions should be observed when working on batteries: 1) Remove watches, rings, or other metal objects; 2) Use tools with insulated handles; 3) Do not lay tools or metal parts on top of batteries.
 - The battery has no support when you pull it out of the UPS. Pull the battery out onto a flat, stable surface.
-

CAUTION



- When the UPS is on line, all three green Battery Charge LEDs (6, 7, 8) should be lit before replacing (hot-swapping) the batteries. DO NOT DISCONNECT the batteries while the UPS is on battery power or while the UPS is charging the batteries.
- If you choose to unplug the UPS to change the battery: 1) Press the OFF button and remove input power; 2) Wait 60 seconds while the internal microprocessor shuts down before you disconnect the battery.

CAUTION



The UPS and its batteries are heavy. If your unit is installed in a rack, you must support the front of the unit while replacing the batteries.

How to Replace Batteries

Figure 5 and Figure 6 show how to replace your UPS batteries. Consider all warnings, cautions, and notes before replacing batteries.

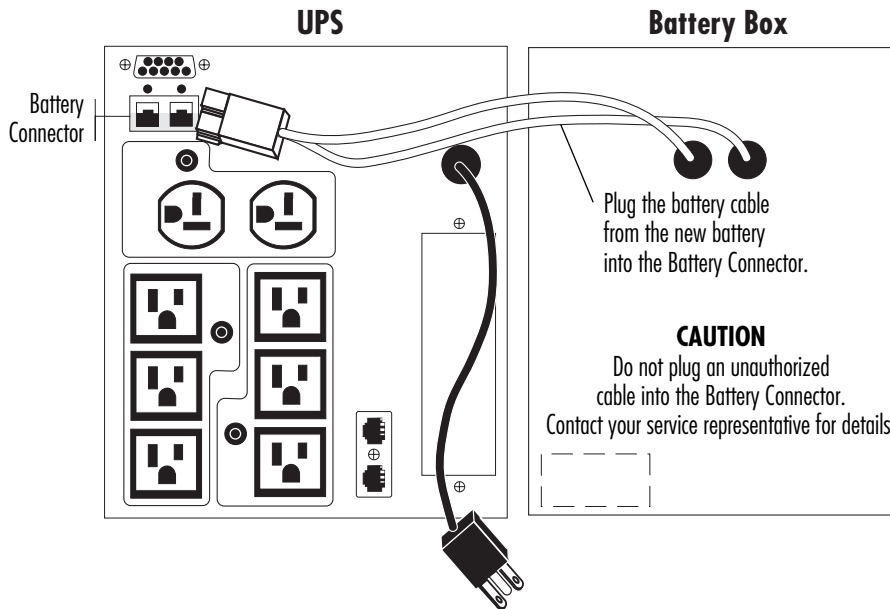


Figure 5. Replacing External Batteries

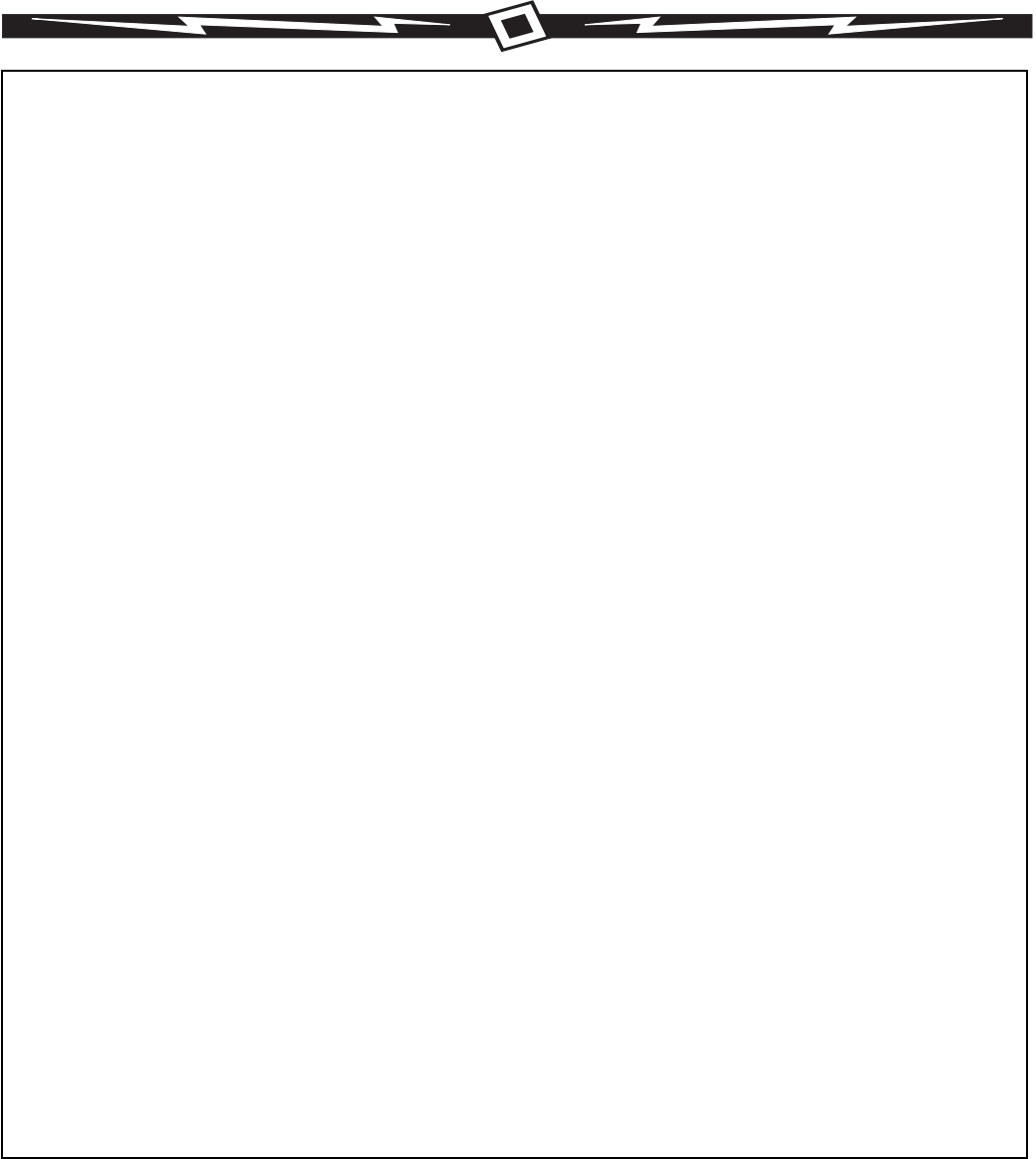


Figure 6. Replacing Internal Batteries



Testing New Batteries

Press the Test/Alarm Reset button to start a self-test. The red Battery Service LED (LED 10) should turn off and the Battery Charge LEDs (LEDs 6, 7, and 8) should show a charge. If the red Battery Service LED stays on, check the battery connections. If it remains on, see Section 5, Troubleshooting, or call your service representative.

Returning the Used Battery

Use the packaging from your new battery to return your old battery. Call your service representative to get information about returning your used battery.



WARNING

- Do not dispose of battery or batteries in a fire. Batteries may explode. Dead batteries are considered a hazardous waste. Return batteries to the factory for proper disposal. It is illegal to dump or improperly dispose of batteries.
- Do not open or mutilate the battery or batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.



CAUTION

This product contains sealed, lead-acid batteries which must be recycled. For more information, contact your local recycling center or your service representative.

UPS/Battery Care and Storage

For the best preventive maintenance, keep the area around the UPS clean and dust-free. If the atmosphere is very dusty, clean the outside of the system with a vacuum cleaner.

For full battery life, keep the UPS at an ambient temperature of 25°C (77°F).

Storing the UPS

If you store the UPS for a long period, recharge the battery every six months by plugging the UPS into a power outlet. The UPS will charge in Standby mode. Charging takes 6 to 24 hours.



UPS Repairs

Repairs on your UPS must be performed by the factory or by factory-authorized service locations. If you have any questions or problems, please contact your service representative.



SECTION 5

TROUBLESHOOTING

This section explains:

- How to recognize the symptoms of UPS problems
- The possible causes of UPS problems
- How to correct UPS problems.

Table 3. Troubleshooting Guide

| Symptom | Possible Cause | What To Do |
|---|---|--|
| LED 16 is not on; the UPS will not start. | A circuit breaker or an input fuse on the rear panel is open. | Push the circuit breaker button or replace the fuse (see Appendix C, UPS Rear Panels). |
| | The line cord is not connected. | Connect the line cord. |
| | The wall outlet is dead. | Have a qualified electrician test and repair the outlet. |
| | The UPS may be unable to recognize a 100 V, 50 Hz wall outlet. | See Appendix B, Specifications, to verify that your UPS accepts 100 V nominal input. Unplug the UPS. Start the UPS on battery and reconfigure the nominal input voltage for 100 V (see Section 3, Configuration). Turn the UPS off for 3 seconds. Plug the UPS into an outlet. |
| The UPS switches frequently between battery and AC input. | A battery fuse or circuit breaker is open. | Contact your service representative. |
| | Input voltage in your area differs from the UPS nominal. | Change the UPS nominal input to match your local nominal; see Section 3, Configuration. |
| The Low Battery Alarm does not give enough warning. | The batteries need charging or service. | Plug the UPS into a wall outlet for 24 hours, to charge the battery; press the Test/Alarm Reset button for three seconds; then check LED 10 (Battery Service). |
| | The Low Battery Alarm is not set appropriately. | Change the alarm setting. See Section 3, Configuration. |
| LED 1 (AC Input, High) or LED 4 (AC Input, Low) are on. | The line voltage is too high or too low; the UPS is running on battery power. | Correct the input voltage, if possible, or prepare for a power failure less than 5 minutes after LED 9 turns on (depending on configuration, with normal load and ample charge). If LED 1 or LED 4 are on continuously, the input voltage in your area may differ from the UPS nominal. Change your UPS to match your local conditions. See Section 3, Configuration, for more information. |

continued



Table 3. Troubleshooting Guide (continued)

| Symptom | Possible Cause | What To Do |
|--|---|--|
| LED 5 (Site Wiring Fault) is on. | There is no ground wire or ground connection in the wall outlet. | Have a qualified electrician establish a grounding connection. |
| | The line and neutral wires are reversed in the wall outlet. | Have a qualified electrician correct the wiring. |
| | | To disable this fault condition, see Section 3, Configuration. |
| LED 9 (Battery Charge, Low) is on. | The battery is running low. | Less than 5 minutes of power remains (depending on configuration, with normal load and ample charge); prepare for a power failure. Save your work and turn off your equipment. |
| LED 10 (Battery Service) is on, or on only during startup. | The battery may be fully discharged because of a long storage period or failing because of age. | Plug the UPS into a wall outlet for 24 hours to charge the battery. Push the Test/Alarm Reset button, then check LED 10. If LED 10 is still on, see Section 4, UPS Care and Battery Replacement, to replace the battery. |
| | The battery is not connected correctly. | Check connections or call your service representative. |
| LED 10 (Battery Service) is flashing. | The DC voltage is high; the alarm won't clear | Contact your service representative. |
| LED 11 (Load Level, Overload) is on. | The load is drawing too much power from the UPS. | Determine if the load is defective or if some of the load needs to be disconnected. |

ADDITIONAL UPS FEATURES

This appendix explains:

- How to use the UPS Communications capabilities
- Where to find more information about Option Cards
- How to use the Network Transient Protector (not available on all units)
- Where to find more information about Load Segments (not available on all units)
- How to install the Remote Emergency Power Off (not available on all units)

Communication Port Configurations

To establish communication between the UPS and a computer, plug the UPS/Computer Interface Cable into the Comm Port. Use only the factory-supplied cable and software. The UPS operates normally if you do not use this port.



CAUTION

To prevent damage to your equipment, connect only a factory-supplied cable or a cable built to factory specifications (see Table 4) to your RS-232 port. A standard serial cable may damage your computer.

As shown in Table 4, the communication port Pins 1 and 2 operate in two modes. The first is Basic Alarms mode, which has AC fail alarm and output shutdown. The second is Serial Data mode, which is UPS Code II compliant.

The system always starts in Basic Alarms mode. When serial data is received at Pin 1, the function of Pin 1 and Pin 2 changes to Serial Data mode.

If serial data has not been received before going to battery power, serial communications is disabled until AC input returns.

If the computer is running power management software, the interface cable between the UPS and the computer's Comm Port enables a data exchange. Every 30 seconds, the software polls the UPS for detailed information on the status of the power environment. If a power emergency occurs, the software initiates the saving of all data and an orderly shutdown of the equipment.

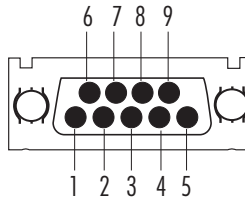


Figure 7. Communication Port

Table 4. Communication Port Configuration

| Pin # | Signal Type | Function |
|-------|--|---|
| 1 | Basic Alarms Mode — Input: RS-232 level low (+12 V) pulse 4 to 5 seconds | Remote UPS off: In absence of AC, output is turned off until normal AC returns |
| | Serial Data Mode — Input: RS-232 data | RS-232 serial communication input. 1200 baud, 8-bit, no parity, one stop bit, one start bit, Xon/Xoff |
| 2 | Basic Alarms Mode — Output: RS-232 level low (+12 V) | AC Input failure |
| | Serial Data Mode — Output: RS-232 data | RS-232 serial communication output. Same as input |
| 3 | Output: Open collector transistor ON, 50 mA, 40 VDC rating | AC Input failure |
| 4 | Signal Common | Signal Common |
| 5 | Output: Open collector transistor ON, 50 mA, 40 VDC rating | Impending low battery |
| 6 | Input: RS-232 RTS | Plug and Play software enable trigger (activates when pin changes from +12 V to -12 V) |
| 7 | Input: Relay contact or RS-232 level | Remote output OFF: UPS total output can be kept off with low signal or closing relay contact |
| 8 | Output: 8 to 25 VDC, 5 W constant power (0.63 A max. @ 8 V) | Auxiliary Control Power |
| 9 | Chassis | Connection to chassis |

Option Slot

The option slot accepts various installable option modules that help your UPS communicate in a variety of networking environments. See the manual that accompanies each module for more information, or contact your sales representative.

Network Transient Protector

The Network Transient Protector, shown in Figure 8, is located on the rear panel and has slots labeled IN and OUT. This feature accommodates a single RJ-45, 10BaseT, network connector.

Some models also have modem protection (RJ-11) that allows a connection to a standard public telephone line to protect modems, fax machines, or other telecommunications equipment. As with most popular modem equipment, it is not advisable to use this jack in digital PBX (Private Branch Exchange) environments. Connect the input jack of the equipment you are protecting to the slot labeled IN. Connect the output jack to the slot labeled OUT. The UPS operates normally whether or not you use this feature.

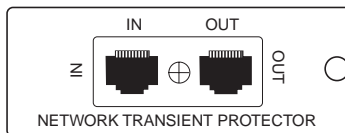


Figure 8. Network Transient Protector

Load Segments

Load Segments are sets of receptacles that can be turned on individually using our power management software. For example, during a power outage, you can keep key pieces of equipment running while you turn off other equipment. This feature allows you to save battery power. See your power management software manual for details.



A P P E N D I X B

SPECIFICATIONS

For all of the models listed in Table 5, . Model List, this appendix provides detailed specifications for the following:

- Electrical input and output
- Battery
- Weights and dimensions
- Environmental and safety

Table 5. Model List

| Feature | Specification | |
|-----------------|---------------------------|----------------------------|
| UPS Models: | <u>Low Voltage Models</u> | <u>High Voltage Models</u> |
| | ACE1000a | ACE1000i |
| | ACE1500a | ACE1500i |
| | ACE2000a | ACE2000i |
| | ACE2400a | ACE2400i |
| | ACE3000a | ACE3000i |
| Battery Models: | See Table 8 | |

Table 6. Electrical Input

| Feature | Specification | |
|--------------------|--|--|
| Nominal Voltage: | <u>Low Voltage Models</u> | <u>High Voltage Models</u> |
| | 120 V default; 100, 110, 120, 127 V selectable | 230 V default; 208, 220, 230, 240 V selectable |
| Voltage Range: | -30% to +20% at full load for nominal voltage; -35% to 20% user selectable, extended range | |
| Nominal Frequency: | <u>Low Voltage Models</u> | <u>High Voltage Models</u> |
| | 60 Hz; 50/60 if 100 V or 110 V selected | 50/60 Hz |
| Noise Filtering: | MOVs and line filter for normal and common mode noise | |
| Connections: | See Appendix C | |



Table 7. Electrical Output

| Feature | Specification | | | | | | | | | | | | |
|--|--|---------------------------|----------------------------|--|--|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Power Levels (rated at nominal inputs): | <table border="0"> <tr> <td><u>Low Voltage Models</u></td> <td><u>High Voltage Models</u></td> </tr> <tr> <td>ACE1000a: 1000 VA, 670 W</td> <td>ACE1000i: 1000 VA, 670 W</td> </tr> <tr> <td>ACE1500a: 1440 VA, 960 W</td> <td>ACE1500i: 1500 VA, 960 W</td> </tr> <tr> <td>ACE2000a: 1920 VA, 1400 W</td> <td>ACE2000i: 2000 VA, 1400 W</td> </tr> <tr> <td>ACE2400a: 2400 VA, 1600 W</td> <td>ACE2400i: 2300 VA, 1600 W</td> </tr> <tr> <td>ACE3000a: 2880 VA, 2250 W</td> <td>ACE3000i: 3000 VA, 2250 W</td> </tr> </table> | <u>Low Voltage Models</u> | <u>High Voltage Models</u> | ACE1000a: 1000 VA, 670 W | ACE1000i: 1000 VA, 670 W | ACE1500a: 1440 VA, 960 W | ACE1500i: 1500 VA, 960 W | ACE2000a: 1920 VA, 1400 W | ACE2000i: 2000 VA, 1400 W | ACE2400a: 2400 VA, 1600 W | ACE2400i: 2300 VA, 1600 W | ACE3000a: 2880 VA, 2250 W | ACE3000i: 3000 VA, 2250 W |
| <u>Low Voltage Models</u> | <u>High Voltage Models</u> | | | | | | | | | | | | |
| ACE1000a: 1000 VA, 670 W | ACE1000i: 1000 VA, 670 W | | | | | | | | | | | | |
| ACE1500a: 1440 VA, 960 W | ACE1500i: 1500 VA, 960 W | | | | | | | | | | | | |
| ACE2000a: 1920 VA, 1400 W | ACE2000i: 2000 VA, 1400 W | | | | | | | | | | | | |
| ACE2400a: 2400 VA, 1600 W | ACE2400i: 2300 VA, 1600 W | | | | | | | | | | | | |
| ACE3000a: 2880 VA, 2250 W | ACE3000i: 3000 VA, 2250 W | | | | | | | | | | | | |
| Regulation On-Line: | -10% to +6%; within Computer Business Equipment Manufacturers Association's guidelines; (-15% to +10% using extended range) | | | | | | | | | | | | |
| Regulation On-Battery (Nominal Voltage $\pm 5\%$): | <table border="0"> <tr> <td><u>Low Voltage Models</u></td> <td><u>High Voltage Models</u></td> </tr> <tr> <td>120 V for 110, 120, 127 V; 100 V for 100 V</td> <td>230 V for 220, 230, 240 V; 208 V for 208 V</td> </tr> </table> | <u>Low Voltage Models</u> | <u>High Voltage Models</u> | 120 V for 110, 120, 127 V; 100 V for 100 V | 230 V for 220, 230, 240 V; 208 V for 208 V | | | | | | | | |
| <u>Low Voltage Models</u> | <u>High Voltage Models</u> | | | | | | | | | | | | |
| 120 V for 110, 120, 127 V; 100 V for 100 V | 230 V for 220, 230, 240 V; 208 V for 208 V | | | | | | | | | | | | |
| Voltage Wave Shape: | Sine Wave; <3% distortion with linear load | | | | | | | | | | | | |
| Overcurrent Protection | On-Line: Resettable Circuit Breaker; On-Battery: Active current limit and short circuit protection | | | | | | | | | | | | |
| Connections: | See Appendix C | | | | | | | | | | | | |

Table 8. Battery

| Feature | Specification | | | | | | | | | | | | |
|---------------------------------|--|---------------------------|----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Configurations: | <table border="0"> <tr> <td><u>Low Voltage Models</u></td> <td><u>High Voltage Models</u></td> </tr> <tr> <td>ACE1000a: internal batteries</td> <td>ACE1000i: internal batteries</td> </tr> <tr> <td>ACE1500a: internal batteries</td> <td>ACE1500i: internal batteries</td> </tr> <tr> <td>ACE2000a: ACE1048-RP-1 external</td> <td>ACE2000i: ACE1048-RP-1 external</td> </tr> <tr> <td>ACE2400a: ACE1748-RP-1 external</td> <td>ACE2400i: ACE1748-RP-1 external</td> </tr> <tr> <td>ACE3000a: ACE1748-RP-1 external</td> <td>ACE3000i: ACE1748-RP-1 external</td> </tr> </table> | <u>Low Voltage Models</u> | <u>High Voltage Models</u> | ACE1000a: internal batteries | ACE1000i: internal batteries | ACE1500a: internal batteries | ACE1500i: internal batteries | ACE2000a: ACE1048-RP-1 external | ACE2000i: ACE1048-RP-1 external | ACE2400a: ACE1748-RP-1 external | ACE2400i: ACE1748-RP-1 external | ACE3000a: ACE1748-RP-1 external | ACE3000i: ACE1748-RP-1 external |
| <u>Low Voltage Models</u> | <u>High Voltage Models</u> | | | | | | | | | | | | |
| ACE1000a: internal batteries | ACE1000i: internal batteries | | | | | | | | | | | | |
| ACE1500a: internal batteries | ACE1500i: internal batteries | | | | | | | | | | | | |
| ACE2000a: ACE1048-RP-1 external | ACE2000i: ACE1048-RP-1 external | | | | | | | | | | | | |
| ACE2400a: ACE1748-RP-1 external | ACE2400i: ACE1748-RP-1 external | | | | | | | | | | | | |
| ACE3000a: ACE1748-RP-1 external | ACE3000i: ACE1748-RP-1 external | | | | | | | | | | | | |
| Voltage: | 24 VDC for internal; 48 VDC for external | | | | | | | | | | | | |
| Type: | Sealed, maintenance-free, valve-regulated, lead-acid | | | | | | | | | | | | |
| Charging: | Advanced charging for faster recovery; less than 3 hours to 90% usable capacity at nominal line and no supplementary power supply load | | | | | | | | | | | | |
| Monitoring: | Advanced monitoring for earlier failure detection and warning | | | | | | | | | | | | |
| Backup Time: | At least 5 minutes at full load with a new battery at approximately 25°C | | | | | | | | | | | | |



Table 9. Weights and Dimensions

| Feature | Specification | | | | | | | | | | | | |
|-----------------------------|--|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| UPS Dimensions (WxHxD): | 7 x 8.8 x 17.1 inches (17.8 x 22.3 x 43.4 cm) | | | | | | | | | | | | |
| UPS Weights: | <table border="0"> <tr> <td><u>Low Voltage Models</u></td> <td><u>High Voltage Models</u></td> </tr> <tr> <td>ACE1000a: 43 lbs. (20 kg)</td> <td>ACE1000i: 43 lbs. (20 kg)</td> </tr> <tr> <td>ACE1500a: 57 lbs. (26 kg)</td> <td>ACE1500i: 57 lbs. (26 kg)</td> </tr> <tr> <td>ACE2000a: 32 lbs. (15 kg)</td> <td>ACE2000i: 31 lbs. (14 kg)</td> </tr> <tr> <td>ACE2400a: 36 lbs. (16 kg)</td> <td>ACE2400i: 34 lbs. (15 kg)</td> </tr> <tr> <td>ACE3000a: 41 lbs. (19 kg)</td> <td>ACE3000i: 39 lbs. (18 kg)</td> </tr> </table> | <u>Low Voltage Models</u> | <u>High Voltage Models</u> | ACE1000a: 43 lbs. (20 kg) | ACE1000i: 43 lbs. (20 kg) | ACE1500a: 57 lbs. (26 kg) | ACE1500i: 57 lbs. (26 kg) | ACE2000a: 32 lbs. (15 kg) | ACE2000i: 31 lbs. (14 kg) | ACE2400a: 36 lbs. (16 kg) | ACE2400i: 34 lbs. (15 kg) | ACE3000a: 41 lbs. (19 kg) | ACE3000i: 39 lbs. (18 kg) |
| <u>Low Voltage Models</u> | <u>High Voltage Models</u> | | | | | | | | | | | | |
| ACE1000a: 43 lbs. (20 kg) | ACE1000i: 43 lbs. (20 kg) | | | | | | | | | | | | |
| ACE1500a: 57 lbs. (26 kg) | ACE1500i: 57 lbs. (26 kg) | | | | | | | | | | | | |
| ACE2000a: 32 lbs. (15 kg) | ACE2000i: 31 lbs. (14 kg) | | | | | | | | | | | | |
| ACE2400a: 36 lbs. (16 kg) | ACE2400i: 34 lbs. (15 kg) | | | | | | | | | | | | |
| ACE3000a: 41 lbs. (19 kg) | ACE3000i: 39 lbs. (18 kg) | | | | | | | | | | | | |
| Battery Dimensions (WxHxD): | 7 x 8.8 x 17.1 inches (17.8 x 22.3 x 43.4 cm) | | | | | | | | | | | | |
| Battery Weights: | ACE1048-RP-1: 47 lbs. (21 kg) ACE1748-RP-1: 63 lbs. (29 kg) | | | | | | | | | | | | |

Table 10. Environmental and Safety

| Feature | Specification | | | | |
|---------------------------------|--|---------------------------|----------------------------|---------------------------------|---|
| Operating Temp: | 0°C to 40°C (32°F to 104°F); UL tested 25°C (77°F) | | | | |
| Storage Temp: | -20°C to 60°C (-4°F to 140°F) | | | | |
| Relative Humidity: | 5–95% non-condensing | | | | |
| Operating Altitude: | Up to 3,000 meters above sea level | | | | |
| Audible Noise: | Less than 45 dBA typical | | | | |
| Surge Suppression: | ANSI C62.41 Category B (formerly IEEE 587) | | | | |
| Safety Conformance: | <table border="0"> <tr> <td><u>Low Voltage Models</u></td> <td><u>High Voltage Models</u></td> </tr> <tr> <td>UL 1778; CSA 22.2, No. 107.1</td> <td>EN 50091-1 and IEC 60950, UL 1778; CSA 22.2, No. 107.1</td> </tr> </table> | <u>Low Voltage Models</u> | <u>High Voltage Models</u> | UL 1778; CSA 22.2, No. 107.1 | EN 50091-1 and IEC 60950, UL 1778; CSA 22.2, No. 107.1 |
| <u>Low Voltage Models</u> | <u>High Voltage Models</u> | | | | |
| UL 1778; CSA 22.2, No. 107.1 | EN 50091-1 and IEC 60950, UL 1778; CSA 22.2, No. 107.1 | | | | |
| Safety Markings: | <table border="0"> <tr> <td><u>Low Voltage Models</u></td> <td><u>High Voltage Models</u></td> </tr> <tr> <td>UL, CSA</td> <td>CE, UL, and CSA</td> </tr> </table> | <u>Low Voltage Models</u> | <u>High Voltage Models</u> | UL, CSA | CE, UL, and CSA |
| <u>Low Voltage Models</u> | <u>High Voltage Models</u> | | | | |
| UL, CSA | CE, UL, and CSA | | | | |
| EMC: | <table border="0"> <tr> <td><u>Low Voltage Models</u></td> <td><u>High Voltage Models</u></td> </tr> <tr> <td>FCC, VCCI</td> <td>CISPR 22, EN 50091-2</td> </tr> </table> | <u>Low Voltage Models</u> | <u>High Voltage Models</u> | FCC, VCCI | CISPR 22, EN 50091-2 |
| <u>Low Voltage Models</u> | <u>High Voltage Models</u> | | | | |
| FCC, VCCI | CISPR 22, EN 50091-2 | | | | |



Table 11. Indicators and Controls

| Feature | Specification |
|-----------------------|--|
| Serial Communication: | Intelligent serial communication to provide alarms with history, measured parameters, self-test, and many other features; contact your authorized dealer for UPS/computer communication software options |
| Interface: | Ergonomic Indicators: Wiring Fault, Battery Service, Communication, Operation, System Normal Bar Graphs: Input Level, Battery Charge Level, % Load |
| Contact Closures: | Input Failure, Low Battery |



A P P E N D I X C

UPS REAR PANELS

This appendix shows the rear panels of all models discussed in this handbook, including (where applicable):

- Input and output receptacles, cords, and plugs
- Circuit breakers and fuses
- Comm ports

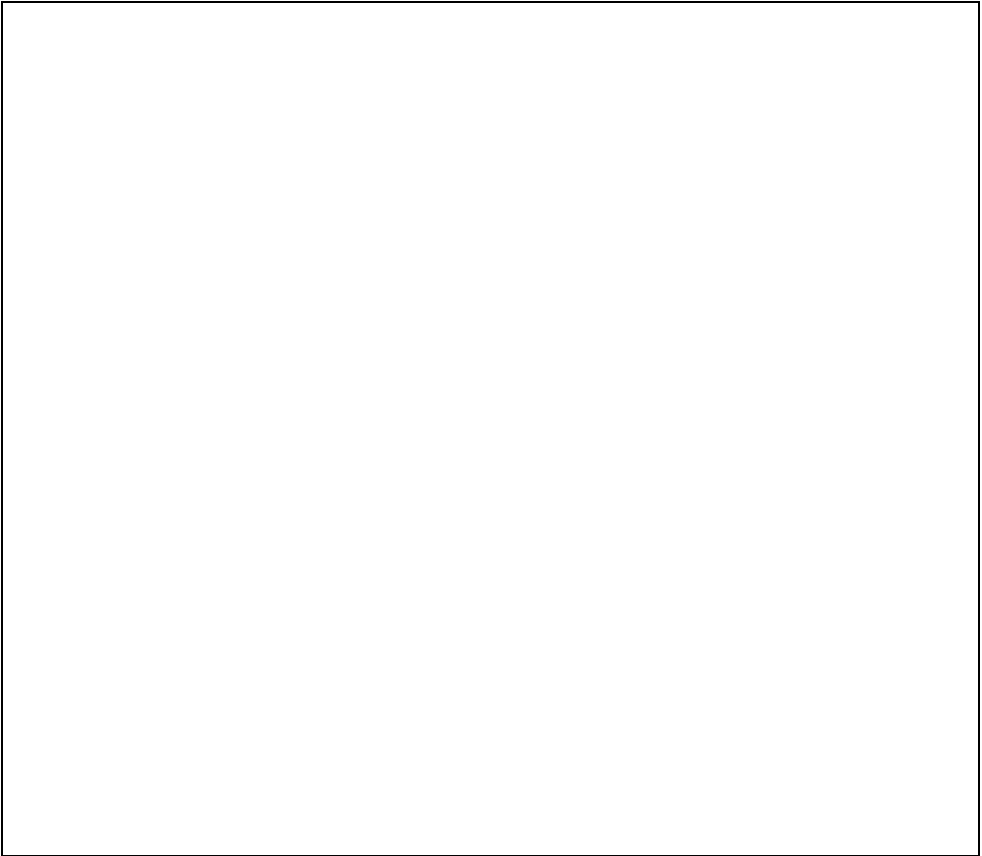


Figure 9. ACE1000a through ACE3000a Rear Panels

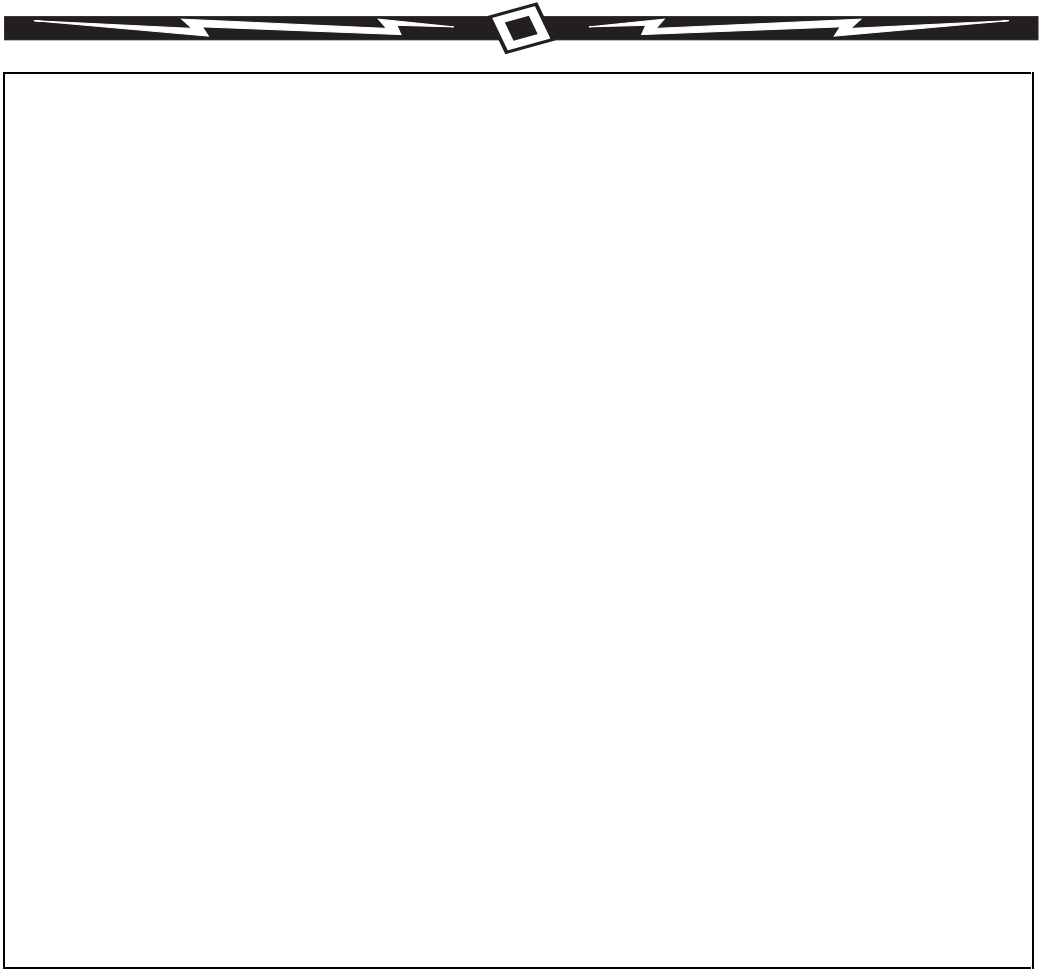


Figure 10. ACE1000i through ACE3000i Rear Panels

PowerVar Standard Warranty

POWERVAR warrants its uninterruptible power supplies or UPS (known hereafter as the “product”) to be free from defects in materials or workmanship for a period of two years from the date of shipment. The product will be repaired or (at POWERVAR’s option) replaced at no charge during this warranty period. Product must be returned prepaid to the factory.

POWERVAR makes no warranties, expressed or implied, of merchantability, fitness for a particular purpose, performance, condition, capacity or otherwise. POWERVAR is not liable for incidental or consequential damages, monetary loss, loss of sales, or loss of business resulting from the failure or malfunction of the product. Warranty is void on any product that is misused, misapplied, abused, altered or repaired by any unauthorized personnel or there evidence of tampering exists. The foregoing constitutes the sole and exclusive remedy of the purchaser and is in lieu of all other Warranties. No greater degree of liability is imposed on POWERVAR.

