UPS DIRECT powerprotection

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APC
www.apcc.com

# APC Smart-UPS Uninterruptible Power Supply 230 VAC User's Manual

990-7020C, Revision 7, 3/00

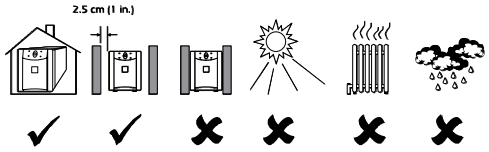
## Initial Start-Up

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

### 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.

### Placement




Install the UPS in a protected area that is free of excessive dust and has adequate air flow. Do not operate the UPS where the temperature and humidity is outside the specified limits.

**Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the warranty.**

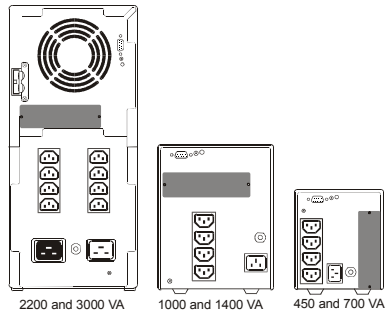
### Installation

**To install this UPS, please follow the installation instructions in the *Smart-UPS Quick Reference Guide*.**
**This UPS is equipped with a SmartSlot for accessories. See the APC Website (www.apcc.com) for available accessories.**

### Charge the battery

The UPS charges its battery whenever it is connected to utility power. The battery will charge fully during the first 4 hours of normal operation. Do not expect full runtime during this initial charge period.

### Rear Views




### Connect Computer Interface Port (Optional)

Power management software and interface kits can be used with this UPS. Use only kits supplied or approved by the manufacturer. If used, connect the interface cable to the 9-pin computer interface port on the back panel of the UPS. Secure the connector's screws to complete the connection.

### 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. To make a connection to the TVSS connector, loosen the screw and connect the surge suppression device's ground lead. Tighten the screw to secure the lead.

### Battery Pack Connector (3000 VA only)

Use the battery pack connector to connect the optional external battery pack.

### 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 a third time to reset **normal** sensitivity.

normal
reduced
low

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.

### 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.

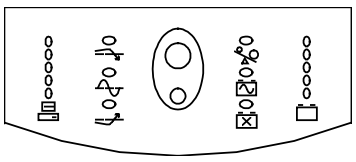
To change the warning interval, press the rear panel configuration button while pressing and holding the front-panel on/test button.

2 min.
5 min.
7 min.

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 a third time to reset the interval to two minutes.

## Operating Instructions

### Switch On — Switch Off



With the UPS plugged in, press and release the large upper on/test button to supply power to the loads. The loads are immediately powered while the UPS performs a self-test.

Press and release the small, lower off button to turn off power to the loads. It may be convenient to use the UPS as a master on/off switch for the protected equipment.

**Note: Whenever the UPS is plugged in and utility voltage is present, the charger maintains battery charge.**

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

### Self-test

The UPS performs a self-test automatically when turned on, and every two weeks thereafter (by default). Automatic self-test eases maintenance requirements by eliminating the need for periodic manual self-tests.
During the self-test, the UPS briefly operates the loads on-battery. If the UPS passes the self-test, it returns to on-line operation.

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 by a failed test. Recharge the battery overnight and perform the self-test again. If the replace battery LED is still on, replace the battery using the ***Replacing the Battery*** procedure.

### SmartTrim

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

### SmartBoost

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

### On Battery

During on-battery operation, the on-battery LED illuminates 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.

### Low Battery

When the UPS is operating on-battery and the energy reserve of the battery runs low, the UPS beeps continuously until the UPS shuts down from battery exhaustion or returns to on-line operation.

100%
80%
60%
40%
20%

### 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. The top LED goes out whenever the battery is not 100% charged. When the LEDs are flashing, the battery can supply less than the "low battery warning interval" time for the load.

### Shutdown Mode

If there is no utility power present, a host system connected to the computer interface port can command the UPS to shut down. This is normally done to preserve battery capacity after a controlled shutdown of the protected system. In shutdown mode the UPS stops supplying power to the load, waiting for the return of utility power.

The UPS scrolls the front panel indicators sequentially in shutdown mode. If the UPS has shutdown due to a low battery, the UPS lights the Battery Charge Bar Graph only. When line power is restored, the UPS returns to on-line operation.

### Replace Battery

If the battery fails a self-test, the UPS emits short beeps for one minute and the replace battery LED illuminates. The UPS repeats the alarm every five hours. Perform the self-test procedure to confirm replace battery conditions. The alarm stops when the battery passes the self-test.

85%
67%
50%
33%
17%

### 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.

### Overload

When loads exceed the UPS's capacity, the overload LED illuminates, the UPS emits a sustained tone, and the input circuit breaker may trip (the resettable center plunger of the circuit breaker pops out). The alarm remains on until the overload is removed. Disconnect nonessential load equipment from the UPS to eliminate the overload. If there is AC power and the circuit breaker does not trip during overload, the loads are still powered. If the circuit breaker trips and the UPS attempts to go on-battery, the output AC will shut down.

### Cold Start

When the UPS is off and there is no utility power, it is possible to cold start the UPS to power the loads from the UPS's battery.

**Note: Cold start is not a normal condition.**

- Press and hold the on/test button until the UPS begins beeping.
- Release the on/test button during the beeping to start the UPS.

### 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 approximately four seconds the 5-LED display on the right of the front panel shows the utility input voltage. Refer to the figure below for the voltage reading.

264
247
230
213
196

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 starts a self-test as part of this procedure. The self-test does not affect the voltage display.**

## Storage

### 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 4 hours. Disconnect any cables connected to the computer interface port to avoid unnecessarily draining the battery.

### Extended storage

- At -15 to +30 °C (+5 to +86 °F), charge the UPS's battery every 6 months.
- At +30 to +45 °C (+86 to +113 °F), charge the UPS's battery every 3 months.

For further information contact UPS Direct Ltd:
Tel: 08456 445 002 - Fax: 08456 445 003 - Email: info@upsdirect.com - Website: www.upsdirect.com

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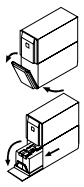
## Replacing the Battery

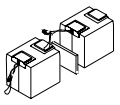
This UPS has an easy to replace hot-swappable battery. Battery replacement is a safe procedure, isolated from electrical hazards. You may leave the UPS and loads on for the following procedure. See your dealer or call the number in this manual for information on replacement battery kits.

**Note: Please read the cautions in the *APC Safety Guide*.**
**Once the battery is disconnected, the loads are not protected from power outages.**

### Battery Replacement Procedure - 2200 - 3000 VA Models



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.
5. Pull the white cord on the front battery connector to remove the batteries.
6. Set aside the foam spacer located between the batteries.
7. Reach into the battery compartment and grasp the white cord on the other battery connector. Pull firmly to disconnect the connector and remove the second set of batteries.

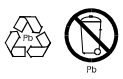


**Note: Be careful removing the batteries - they are heavy.**

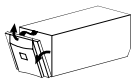
8. Slide the first set of new batteries into the unit. Hold the connector down below the top of the batteries and toward the door, otherwise the assembly will not fit. Guide the connector over the top of the batteries and **press firmly** to connect it to the rear connector of the battery compartment.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

**Note: Small sparks at the battery connectors are normal during connection.**

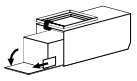
10. Slide the second set of batteries in, then guide the connector over the batteries and **press** firmly to connect it to the front connector of the battery compartment.
11. Now close the battery door, replace the screws, and replace the lower front cover.
12. Dispose of the old battery properly at an appropriate recycling facility or return it to the supplier in the packing material for the new battery. See the new battery instructions for more information.



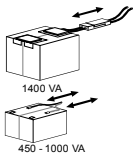

### Battery Replacement Procedure - 450 - 1400 VA Models



1. Grasp the top of the front cover and **tilt** it out and down.



2. **Unhook** the bottom of the cover from the chassis and lift it upward to expose the battery door. Be careful not to strain the ribbon cable. Do not touch the exposed printed circuit board.
3. **Fold** the front cover on top of the UPS as shown.
4. Use a flat-blade screwdriver or a coin to **remove** the two battery door screws and open the door.
   Grasp the tab and gently **pull** the battery out of the UPS.
5. Disconnect the battery leads.
   - For the 450 through 1000 VA models, loosen the connectors by gently wiggling them while pulling straight back from the battery connector.
   - For the 1400 VA model, pull the two gray couplers apart to disconnect the battery.




6. **Connect** the battery leads to the new battery.

**Note: Small sparks at the battery connectors are normal during connection.**

   - For the 450 through 1000 VA models, connect the red wire to the positive (+) terminal and the black wire to the negative (–) terminal.
   - For the 1400 VA model, connect the gray battery coupler to the UPS's coupler.
7. Now **slide** the battery into the UPS, **close** the battery door, **replace** the battery compartment **screws**, and replace the front cover.
8. Dispose of the old battery properly at an appropriate recycling facility or return it to the supplier in the packing material for the new battery. See the new battery instructions for more information.

## Declaration of Conformity

| | |
|---|---|
| **Application of Council Directives:** | 89/336/EEC,73/23/EEC,92/31/EEC, 93/68/EEC,91/157/EEC |
| **Standards to Which Conformity Declared:** | EN55022, EN50082-1, EN50091, EN60950 |
| **Manufacturer's Name and Address:** | American Power Conversion<br>132 Fairgrounds Road<br>West Kingston, Rhode Island, 02892, USA<br>-or-<br>American Power Conversion (A. P. C.) b. v.<br>Ballybritt Business Park<br>Galway, Ireland<br>-or-<br>American Power Conversion Phillipines<br>Second Street<br>Caivte EPZA<br>Roserio, Cavite Phillipines |
| **Importer's Name and Address:** | American Power Conversion (A. P. C.) b. v.<br>Ballybritt Business Park<br>Galway, Ireland |
| **Type of Equipment:** | Uninterruptible Power Supply |
| **Model Numbers:** | Smart-UPS 450, 700, 1000, 1400, 2200, 3000 |
| **Serial Numbers:** | X9601 000 0000 — X9699 999 9999*<br>X9701 000 0000 — X9799 999 9999* |
| **Years of Manufacture:** | 1995, 1996, 1997, 1998, 1999, 2000 |
| **Note:** | Where X = B, O, W, or D |

We, the undersigned, hereby declare that the equipment specified above conforms to the above directives.

| | | |
|---|---|---|
| Billerica, MA | 1/1/97 | |
| Place | Date | Stephen A. Lee, Regulatory Compliance Engineer |
| Galway, Ireland | 1/1/97 | |
| Place | Date | Gerard Rutten, Managing Director, Europe |

## Service

### If the UPS requires service do not return it to the dealer!

Follow these steps:

1. Use the ***Troubleshooting*** section of the ***Quick Reference Guide*** to eliminate common problems.
2. Verify that no circuit breakers are tripped. A tripped circuit breaker is the most common UPS problem!
3. If the problem persists, call customer service or visit the APC Internet Website (www.apcc.com).

- Note the model number of the UPS, the serial number, and the date purchased. A technician will ask you to describe the problem and try to solve it over the phone, if possible. If this is not possible the technician will issue a Return Merchandise Authorization Number (RMA#).
- If the UPS is under warranty, repairs are free. If not, there is a repair charge.

4. Pack the UPS in its original packaging. If the original packing is not available, ask customer service about obtaining a new set.

- 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).

5. Mark the RMA# on the outside of the package
6. Return the UPS by insured, prepaid carrier to the address given to you by Customer Service.

## 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 | Manufacture Date | Date of Battery Replacement | Reset this date on battery replacement. |
| Minimum Capacity Before Return from Shutdown | 0 percent | 15, 50, 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, 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, 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. |
| Output Voltage | 230 Vac | 220, 225, 240 VAC | Sets the output voltage for on-battery operation. |
| High Transfer Point | 253 Vac | 264, 271, 280 VAC | To avoid unnecessary battery usage, set the High Transfer Point higher if the utility voltage is chronically high and the load is known to work well under this condition. |
| Low Transfer Point | 196 Vac | 188, 204, 208 VAC | Set the Low Transfer Point lower if the utility voltage is chronically low and the load can tolerate this condition. |

## Regulatory Agency Approvals

## Specifications

| | 450 VA | 700 VA | 1000 VA | 1400 VA | 2200 VA | 3000 VA |
|---|---|---|---|---|---|---|
| Acceptable input voltage | 0 - 325 VAC | | | | | |
| Output voltage | 196-253 VAC (by default) | | | | | |
| Input Protection | Resettable circuit breaker | | | | | |
| Frequency limits (on-line operation) | 50 or 60 Hz, ±5% | | | | | |
| Transfer time | 2 ms typical, 4 ms maximum | | | | | |
| Maximum load | 450 VA 280 W | 700 VA 450 W | 1000 VA 670 W | 1400 VA 950 W | 2200 VA 1600 W | 3000 VA 2250 W |
| On-battery output voltage | 220, 225, 230, or 240 VAC | | | | | |
| On-battery frequency | 50 or 60 Hz, ±0.1 Hz; unless synchronized to utility during brownout. | | | | | |
| On-battery waveshape | Low-distortion sine wave | | | | | |
| Protection | Overcurrent and short-circuit protected, latching shutdown on overload. | | | | | |
| Noise Filter | Normal and common mode EMI/RFI suppression, 100 kHz to 10 MHz | | | | | |
| 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 ºC (+32 to +104 ºF) | | | | | |
| Storage temperature | -15 to +45 ºC (+5 to +113 ºF) | | | | | |
| 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 61000-2, 61000-3, 61000-4 | | | | | |
| Audible noise in dBA at 1 m (3 ft) | <41 | <42 | <45 | | <53 | |
| Size (H x W x D) | 15.8 x 13.7 x 35.8 cm (6.2 x 5.4 x 14.1 in.) | | 21.6 x 17 x 43.9 cm (8.5 x 6.7 x 17.3 in.) | | 43.2 x 19.6 x 54.6 cm (17.0 x 7.7 x 21.5 in.) | |
| Weight - net (shipping) | 10.5 (11.8) kg 23.2 (26) lb. | 13.1 (14.5) kg 29 (32) lb. | 18.8 (20.8) kg 41.5 (46) lb. | 24.1 (26.1) kg 53 (58) lb. | 51 (60.8) kg 112 (134) lb. | 55.8 (64.4) kg 123 (142) lb. |
| Safety approvals | GS licensed by VDE to EN 50091 and 60950 | | | | | |
| EMC verification | CISPR 22 Class A | | | | | |

For further information contact UPS Direct Ltd:
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