Decision and Solution Guide
January 2006

Selecting 100V-240V Uninterruptible Power Supply (UPS) Options for IBM @server xSeries Servers

Protecting data and systems with reliable, high-availability IBM power management solutions

Server availability depends on reliable power management. No solution built from IBM® @server® xSeries® servers should be considered complete without a UPS solution. Today, UPS protection is more than a simple insurance policy; it is an integral component of any network.

IBM offers UPS products that have been tested and approved by IBM for compatibility with xSeries systems.

Contents

UPS products from IBM help protect your valuable investments in technology and data. The IBM lineup of tower and rack-ready UPS products are designed to provide:

- Battery backup to help provide continuous operation or graceful system shutdown in the event of a power failure or power supply interruption
- Surge protection to help prevent damage to sensitive equipment from voltage increases
- Power conditioning to help prevent glitches and errors caused by irregularities in the power supply.

Why Buy a UPS Solution from IBM

There are compelling reasons for purchasing a UPS solution from IBM with every tower or rack-ready xSeries solution:

- All IBM UPS products have been tested by IBM under the IBM ServerProven® program and approved for operation with xSeries servers and options.
- A preconfigured, all-IBM solution can help speed implementation with one-stop shopping and provide peace of mind that you have purchased the right degree of protection.
- UPS products sold by IBM carry a three-year limited warranty[1].
- UPS products sold by IBM are color matched (black) to xSeries servers and rack products.
- PowerChute Business Edition® for IBM software for advanced UPS power management and diagnostics provides easy integration with IBM Director server management software and with Tivoli® TME 10™ Network Management solutions for centralized control of UPS systems across monitored LANs.

The Need for Power Protection

Today, companies rely on computer systems to run almost every aspect of their business. In an ideal world, the electricity to power these systems would flow 24x7, without quality problems or interruption. However, no business is immune to power problems or occasional power outages.

Just how big a problem is power quality? Consider the following findings:

- Power problems are the largest cause (45%) of data loss and server downtime[2].
- Power disturbances account for about one third of all server failures[3].
- Electrical interruptions cost U.S. companies an estimated $80 billion in 2000[4].

[1] IBM-branded products include an IBM three-year limited warranty. APC-branded products include a three-year limited warranty from APC.
[2] Source: Contingency Planning Research (2001), a Division of Eagle Rock Alliance.
[3] Source: IDC (2004).

The Cost of Downtime

What is the true cost of power problems—in other words, the cost of downtime? For many companies, their data is their business. Business-critical data can take the form of financial transactions, online purchases, customer demographics, correspondence, spreadsheets or any number of business applications.

When companies do not have reliable solutions for the continuing operation of their equipment, they lose money. If a Web server goes down due to blackout, for example, customers are apt to click over to a competitor's Web site—and not come back. Should mission-critical computers involved in manufacturing be damaged by a surge, inventory runs behind and schedules are missed. Data errors may occur when electronic noise penetrates a file server. In fact, network file servers that are constantly writing to disk are particularly susceptible to power-related problems.

How much is downtime worth to your business in lost revenue? Depending on the industry, the cost of downtime can vary dramatically, and could cost up to $6.5 million per hour. Examples of downtime costs[5] include:

- Brokerage: $6.5M/hr
- Energy: $2.8M/hr
- Credit card operations: $2.6M/hr
- Telecommunications : $2M/hr
- Financial: $1.5M/hr
- Retail: $1M/hr
- Health care: $636K/hr

The Internet has further emphasized that availability equals viability. According to the Yankee Group[6] research firm, half of corporations surveyed rate their Internet downtime costs at more than $1,000 per hour, and nine percent rate Internet downtime costs at more than $50,000 per hour.

Understanding Power Problems

While many businesses expect their electric power to always be available, in reality, power is far from perfect. Many events can impact power reliability, including:

- Generating station problems, including fuel shortages, human error, plant shutdowns and earthquakes.
- Distribution network problems, including weather problems, trees, lightning, vehicular accidents, overloads and construction accidents.
- Local building power problems, including overloads, equipment failures, construction accidents and poor wiring connections.

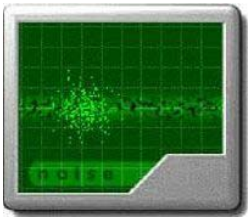
According to APC® (American Power Conversion Corporation), each year a typical site averages 15 power outages that are sufficient to cause IT system malfunctions. Ninety percent of the outages are less than five minutes in duration.

While power outages are the most apparent type of power problems, other irregularities in power supply can affect computer operations and data integrity.

Blackout

A blackout results in total loss of utility power.

- **Cause:** Blackouts are caused by excessive demand on the power grid, lightning storms, ice on power lines, car accidents, construction equipment, earthquakes and other catastrophes.
- **Effect:** Current work in RAM or cache is lost. The hard disk drive File Allocation Table (FAT) may also be lost, which results in total loss of data stored on drive.



Noise

More technically referred to as electromagnetic interference (EMI) and radio frequency interference (RFI), electrical noise disrupts the smooth sine wave one expects from utility power.

- **Cause:** Electrical noise is caused by many factors and phenomena, including lightning, load switching, generators, radio transmitters and industrial equipment. It may be intermittent or chronic.
- **Effect:** Noise introduces malfunctions and errors into executable programs and data files.

[4] Source: Worldwatch Institute
[5] Sources: Network Computing, March 5, 2001; Contingency Planning Research, a Division of Eagle Rock Alliance.
[6] November 2003.

Sags

Also known as brownouts, sags are short term decreases in voltage levels. This is the most common power problem, accounting for 87% of all power disturbances according to a study by Bell Labs.

- **Cause:** Sags are usually caused by the startup power demands of many electrical devices (including motors, compressors, elevators and shop tools). Electric companies use sags to cope with extraordinary power demands. In a procedure known as rolling brownouts, the utility will systematically lower voltage levels in certain areas for hours or days at a time. Hot summer days, when air conditioning requirements are at their peak, will often prompt rolling brownouts.
- **Effect:** A sag can starve a computer of the power it needs to function, and cause frozen keyboards and unexpected system crashes which both result in lost or corrupted data. Sags also reduce the efficiency and life span of electrical equipment.

Spike

Also referred to as an impulse, a spike is an instantaneous, dramatic increase in voltage. A spike can enter electronic equipment through AC, network, serial or phone lines and damage or destroy components.

- **Cause:** Spikes are typically caused by a nearby lightning strike. Spikes can also occur when utility power comes back online after having been knocked out in a storm or as the result of a car accident.
- **Effect:** Catastrophic damage to hardware occurs. Data will be lost.

Surge

A surge is a short term increase in voltage, typically lasting at least 1/120 of a second.

- **Cause:** Surges result from presence of high-powered electrical motors, such as air conditioners and household appliances in the vicinity. When this equipment is switched off, the extra voltage is dissipated through the power line.
- **Effect:** Computers and similar sensitive electronic devices are designed to receive power within a certain voltage range. Anything outside of expected peak and RMS (considered the average voltage) levels can stress delicate components and cause premature failure.

Selection Considerations

Points to consider:	**Factors influencing purchase decisions:**
How mission-critical is the data on the servers you want to protect?	Power protection almost always nets out as “cheap insurance” when you understand the short- and long-term costs associated with data loss and application outages.
How long a period of application downtime can your business tolerate?	Even though most power outages last only a few minutes, you should consider having enough battery power to sustain operations for longer term outages. For this reason, many customers often oversize their UPS requirements by a factor of two.
What is the value of your equipment purchase? How much are you willing to spend to protect that hardware investment?	You can provide maximum protection to your systems by investing in an adequately sized UPS. Typically, the cost will be a small fraction of the total cost of your servers and server options—and a good value in added piece of mind.
In addition to server(s) you plan to purchase, what other equipment needs protecting? Remember that UPS products provide surge protection and power conditioning as well as battery backup.	Look beyond the server to identify all equipment that merits power protection. This could range from switches and routers for a small office to multiple servers, network switches and storage devices for larger enterprises. It’s easy to forget items like monitors, printers and other critical options when conducting an outlet count and a VA/Watt analysis.
What is the sum total power requirement of all the equipment you want to protect?	Proper sizing requires that you consider the power requirements for all devices that will be supported by a single UPS. Refer to the IBM @server xSeries Rack Configurator at **ibm.com**/servers/eserver/xseries/library/configtools.html for this information.
How many outlets do you need to cover your current	In addition to total voltage/wattage, the UPS must be able to support the appropriate number of devices. It is easy to exceed

requirements?	the total allowable number of outlets or the VA/Watt rating of the original solution when taking into account all items.
Do you plan to add equipment to this UPS in the future? If so, what will the new outlet and load requirements be?	Consider both current and future requirements when selecting a UPS. Typically, it will be more cost-effective in the long run to purchase a unit that can accommodate growth rather than purchasing a smaller unit today and having to replace it at a later date.
In the event of a power failure, how much time do you need to save data, close applications and completely power down?	Be sure that the UPS you are considering will provide an adequate length of runtime for graceful shutdown of all equipment. At full load, most UPS products from IBM will provide five to seven minutes of battery-powered operation. This may not be adequate for some equipment. Even if you don't plan on adding more devices that will need power protection, buying a larger UPS can achieve longer battery operation and shutdown time in the event of a power failure.
What level of management do you require for your power protection?	All the IBM UPS offerings include PowerChute Business Edition for IBM, which make it easy to manage and monitor your power at any time. The IBM UPS3000X, IBM UPS7500XHV, and IBM UPS10000XHV take manageability one step further by offering a suite of network management opportunities via built-in 10/100 Network Management Devices and PowerChute Network Shutdown software.
Have you deployed IBM Director systems management software?	The IBM suite of products easily integrates into IBM Director so customers can get the most out of their investment. Power management and power monitoring are all made easier with the IBM Director plug-ins available for IBM-offered UPS products.

IBM-Branded UPS Overview

IBM UPS Products and Solutions

Available only from IBM, IBM-branded UPS products are designed by IBM and manufactured to our demanding specifications by a worldwide leader in power management and our longtime power management partner. This means you get IBM service, support, warranty protection and years of experience.

IBM UPS750T, UPS1000T and UPS1500T Overview: Tower Deployment

- Available in **750VA**, **1000VA**, and **1500VA** mode, each of these tower UPS models is offered in three varieties: 100V, 120V, and 230V.
- UPS1000T and UPS1500T include surge protection for LAN and telephone connections, offering a comprehensive power protection solution for the small office environment.
- Higher power factor than previous UPS tower products means power for more devices; also longer battery run times.

IBM UPS3000X Overview: Rack or Tower Deployment

- **2U** rack-optimized form factor; convertible for use as a tower (using included hardware).
- Hot-swappable electronics.
- User-friendly hot-swap modules allow for safe and easy module replacement while systems are up and running; reduces downtime in the unlikely event of a UPS electronics module failure.
- Automatic bypass to input line on fault or power module removal.
- Extended-run capabilities.
- Scalable run time with the option of adding up to *four* IBM UPS Extend Run Battery Option external battery packs.
- Built-in network management Interface.
- An embedded Network Management module provides full management of the IBM UPS3000X via multiple open standards such as Telnet, HTTP, FTP and SNMP.
- The network port can also be used in conjunction with shutdown software to provide a graceful shutdown of the OS over the network.
- Switchable outlets.

- Three outlet groups can be independently commanded, allowing the UPS to selectively switch off banks of outlets powering nonessential systems or non-intelligent devices, to increase run times for essential systems.
- Multiple options for management connectivity: serial, USB and network (LAN-based).
- Exceptional efficiency: **3000VA** and **2850W** mean this UPS has a power factor of **.95**, at a lower price point than our previous 3000VA rack UPS products.

IBM 2U UPS Extend Run External Battery Pack

- Designed for use with IBM UPS3000X.
- **2U** rack-mountable.
- Supports *four* hot-swappable battery units per Extend Run Battery Pack.
- *Each* additional Extended Run Battery Pack supports run times of up to **20** minutes at full load.
- Up to *four* Extended Run Battery Packs can be used per UPS.

IBM UPS7500XHV and UPS10000XHV Overview: Rack or Tower Deployment

Common features:

- Designed by IBM to meet customer requirements for high-density and cost-effective power management.
- Space-saving **6U** form factor for rack mounting or tower.
- Hot-swappable batteries help maximize uptime and availability.
- Power sourcing is designed to automatically switch to line current and back again—to keep systems up and running; this feature is commonly reserved for high-end, higher priced UPS products.
- Support for up to *four* IBM Run Online External Battery Packs; this can add more than **52** (UPS1000XHV) or **37** minutes (UPS7500XHV) of battery operation at full load.
- Available in a high-voltage version only; supports up to **four** devices and provides selectable nominal output at 200, 208, 220, 230 and 240V.
- Choice of serial, USB or LAN connectivity for management, using the built-in 10/100baseT Network Management Card.
- Support for **7500VA** and **6000W** (UPS7500XHV) or **10000VA** and **8000W** (UPS1000XHV) translates into up to a **.8** power factor.
- More features and better performance at a lower price per watt than previous UPS models offered by IBM.
- Full-time surge suppression, automatic voltage regulation and noise filtering.
- Includes a suite of easy-to-use software that allows management of the UPS either locally or remotely.

IBM 3U UPS Extend Run External Battery Pack

- Designed for interchangeable use with IBM UPS7500X and UPS10000X.
- **3U** rack-mountable.
- Supports *four* hot-swappable battery units per Run Online Battery Pack.
- With the addition of Extend Run External Battery Packs, run times of up to **52** minutes at full load can be supported.
- Up to *four* Extend Run External Battery Packs can be used per UPS.

Features Common to the Entire Line of IBM-Branded UPS Products

Availability features

- QuickSwap™ batteries.
- User-friendly, hot-swappable battery system.
- Allows for safe and easy battery replacement while your system is up and running.
- Automatic voltage regulation (AVR).
- SmartBoost™ automatically corrects brownout conditions.

- AVR Trim™ automatically corrects over voltage conditions.
- UPS will correct for voltage problems, within a certain range, without using the battery.
- An internal transformer is used to step up and step down the voltage.
- Intelligent battery management.
- CellGuard™ means longer battery life.
- Precision battery charging system and automatic true-load battery tests result in improved reliability.
- Overcharge protection contributes to longer battery life.
- Battery replacement warning.
- Automatic self-test alerts customers to degraded batteries before they wear out.
- Faster recharge times.
- Output is a pure sine-wave when on battery, providing compatibility with all supported loads.

Management features

PowerChute Business Edition for IBM and PowerChute Network Shutdown software provide advance UPS power management and diagnostics and an extensive set of user-configurable features, including:

- Unattended system shutdown.
- Testing/status checking.
- UPS settings, such as transfer points, sensitivity and audible alarms.
- Load, power and voltage meters.
- The load display LEDs let you know if you are nearing the UPS load capacity.
- The volt meter/battery charge LEDs report utility line voltage and battery capacity, allowing you to gauge how much time you have before batteries are low.
- Audible alarms.
- Audible alarms alert you to changes in operating environment and battery conditions.
- Some alarms are software-configurable, and most can also be suppressed or delayed.
- Serial and USB management on each unit (the UPS3000X, UPS7500XHV and UPS10000XHV add a network communication port).

Reliability features

- Line-interactive design.
- Uses the DC-to-AC power inverter “in reverse,” like a battery charger, during normal operation, providing greater performance and efficiency.
- Network-grade line conditioning.
- Full time EMI/RFI filters help prevent line noise from causing data errors.
- Lightning/surge protection.
- Auto self-test.
- Automatically initiates self-test at power-on, and every two weeks, alerting users to degraded batteries before they wear out.

APC-Branded UPS Overview

APC UPS Products

IBM also offers select APC UPS products that have been tested and approved by IBM for compatibility with xSeries systems. APC is a leading provider of global, end-to-end AC- and DC-based power products and services.

Key features

- APC Smart-UPS products have been tested by IBM under the IBM ServerProven® program and approved for operation with xSeries servers.
- Full-time multistage surge suppression, automatic voltage regulation and noise filtering.
- Provides Smart-UPS lightning and surge protection performance that is superior to most separate surge suppressers.
- AVR Boost™ automatically steps up low voltage to help customers work through brownouts without unnecessary battery drain.

- AVR Trim automatically steps down high voltage to safe output levels.
- Network-grade line conditioning prevents line noise from causing data errors; APC Smart-UPS meets Novell and Microsoft approval for network protection without the need for additional external conditioners.
- Graceful unattended shutdown: In the event of an extended power outage, APC Smart-UPS will interface with PowerChute Business Edition software via a serial or UPS port (depending on model) to perform automatic safe shutdown of the attached system(s). Safe shutdown options include:
- Single-server support via serial or UPS cable.
- Multiple-server support for up to 15 servers via serial cable and 2-port or 8-port expander card(s).
- Multiple-server support via network connection with Web/SNMP expander card.
- CellGuard intelligent battery management helps extend battery life.
- Precision microprocessor-controlled battery charging system.
- Prefailure diagnostics provide automatic self-testing and notification of battery wear.
- QuickSwap hot-swappable battery replacement system allows fast, safe and easy replacement of batteries while systems are up and running.
- Informative LED display with bar meters and status indicators provides at-a-glance information on load capacity, utility line voltage and battery status. Visible and audible alarms alert users to changes in operating environment and battery conditions.
- FAA-compliant battery disconnect feature meets or exceeds domestic and international safety requirements for shipment of battery-equipped devices by shipping all UPS products with the battery disconnected.

Features available with APC Smart-UPS products sold by IBM

- Emergency Power Off (EPO) cable.
- Longer communication cables (15 ft).
- Longer shutdown cables (10 ft).
- Three-year limited warranty from APC (compared with the standard two-year warranty on non-IBM APC products).
- Specialized support for IBM customers through a dedicated toll-free telephone number, plus next-day delivery of replacement units.
- IBM versions of APC products are color matched (black) to xSeries servers and NetBAY rack products.

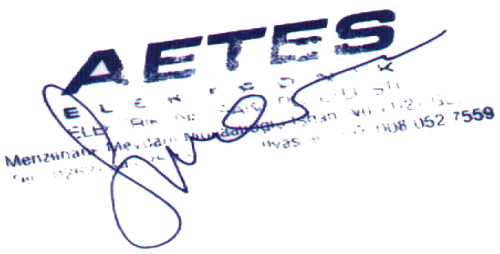
APC Smart-UPS 2U 1400RMB Overview: Rack Optimized

- **2U** form factor.
- Provides **1400VA** and **950W** of power.
- Operates on 110V input.
- Hot-swap batteries.

Product Family at a Glance

Technical Specifications

IBM P/N	Product	Description	Voltage
IBM-branded UPS products			
21301TX	IBM UPS750TLV	750VA, 500W	120V
21302TX	IBM UPS750THV	750VA ,500W	230V
21307TX	IBM UPS750TJV	750VA, 500W	100V
21303TX	IBM UPS1000TLV	1000VA, 700W	120V
21304TX	IBM UPS1000THV	1000VA, 700W	230V
21308TX	IBM UPS1000JTV	1000VA, 700W	100V
21305TX	IBM UPS1500TLV	1500VA, 1050W	120V
21306TX	IBM UPS1500THV	1500VA, 1050W	230V
21309TX	IBM UPS1500JTV	1500VA, 1050W	100V
2130R30 (32P1681)	IBM UPS3000XLV	2400V-3000VA, 2400W-2850W	100V-127V
2130R31 (32P1682)	IBM UPS3000XHV	3000VA, 2850W	200V-240V
21306RX (25R5583)	IBM UPS7500XHV	7500VA, 6000W	200V-240V
21308RX (25R5584)	IBM UPS10000XHV	10,000VA, 8000W	200V-240V
Options for IBM UPS3000X / UPS7500X / UPS10000X			
32P1692	2U UPS Extend Run Battery Pack	4 hot-swappable battery units	(For UPS3000)
25R5582	3U UPS Extend Run Battery Pack	4 hot-swappable battery units	(For UPS7500 and UPS10000)
APC-branded UPS products			
32P1020	APC Smart-UPS 1400RMB	1400VA, 950W	120V
32P1022	APC Smart-UPS 1400RMiB	1400VA, 950W	220V-240V



IBM UPS750TLV

Watts	500 (750VA)
Line input	NEMA 5-15P
Input voltage	120V
Line output	NEMA 5-15R
No. of line outputs	6
Interface ports	DB-9 RS-232, USB
No. of SmartSlot™ bays	1
Form factor	Tower
Dimensions	21.6 x 17.0 x 43.9cm
Net weight	19.1 kg (42 lbs)
Warranty	3 years
Color	Black
General features	Hot-swap batteries, intelligent battery management, overload indicator, replace-battery indicator, site wiring fault indicator, SmartSlot, automatic voltage regulation (AVR), user-replaceable batteries.
Includes	Smart-UPS signaling RS-232 cable, USB cable, CD with software, user manual.

Best use

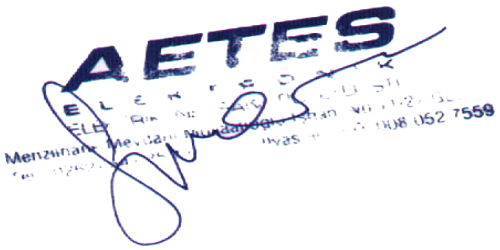
- Protection for a single tower server, such as the x206m, x226 or x236.
- Well-suited for high-volume installations, with a single UPS750TLV purchased for each tower server installed.

Points to consider	Reasons to "buy up"
The UPS750TLV provides **six** outlets and can protect up to **750VA** (**500 watts**). Is this sufficient for your present and near-future needs?	• A larger unit can support a higher total VA/wattage and protect more devices. • The IBM UPS1000TLV provides two more line outputs, can cover up to **1000VA** (**700 watts**). The next step up, the UPS1500TLV, provides protection for up to eight units; plus it can cover up to **1500VA** (**1050 watts**).
The UPS750TLV does not provide surge protection for LAN and telephone connections. Will this be a problem?	• LAN and telephone lines are a back door for surge damage to your system. The IBM UPS1000LTV and UPS1500TLV both offer protection against this type of surge.
In the event of a power failure, a loaded UPS750TLV will give you about **six** minutes to power everything down. Is that enough?	• The UPS0100TLV provides up to **140%** longer backup time at the same wattage. • The UPS1500TLV provides up to **300%** longer backup time at the same wattage.

Benefit comparison for different size models

A comparison of the UPS750TLV, the UPS1000TLV and the UPS1500TLV reveals:

	UPS750TLV	% Change, UPS750TLV to UPS1000TLV	UPS1000TLV	% Change, UPS750TLV to UPS1500T	UPS1500TLV
Backup minutes at 450W	**5**	2.4X	**12**	6.6X	**33**
Max. load (VA)	**750**	33%	**1000**	100%	**1500**
Telephone and LAN interface	**No**	—	**Yes**	—	**Yes**
Line outputs	**6**	33%	**8**	33%	**8**



IBM UPS1000TLV

Watts	700 (1000VA)
Line input	NEMA 5-15P
Input voltage	120V
Line output	NEMA 5-15R
No. of line outputs	8
Interface ports	DB-9 RS-232, USB
No. of SmartSlot bays	1
Form factor	Tower
Dimensions	21.6 x 17.0 x 43.9cm
Net weight	19.1 kg (42 lbs)
Warranty	3 years
Color	Black
General features	Advanced battery monitoring, audible alarms, auto diagnostic testing, automatic voltage regulation (AVR), AVR Boost, AVR Trim, brownout correction, hot-swap batteries, CellGuard intelligent battery management, lightning and surge protection, line-interactive design, load meter, network-grade line conditioning, overload indicator, pager notification, programmable power event response, QuickSwap, replace-battery indicator, sine-wave output, site wiring fault indicator, SmartSlot, status indicator LEDs, USB compatibility, user-replaceable batteries , surge protection for LAN and telephone connections.
Includes	Smart-UPS signaling RS-232 cable, USB cable, 2M telephone line cable, CD with software, user manual.

Best use

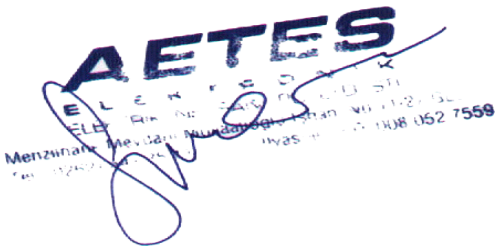
- Can provide protection for larger groups of tower servers like the x206m, x226 or x236.
- Can also be used with tower servers that consume more power, such as the x260.

Points to consider	Reasons to "buy up"
The UPS1000TLV can protect up to **1000VA** (**700 watts**). Is this sufficient for your present and near-future needs?	• A larger unit can support a higher total VA/wattage plus protect more devices. • The next step up, the UPS1500TLV, also provides protection for up to eight units and can cover up to **1500VA** (**1050 watts**).
In the event of a power failure, a loaded UPS1000TLV will give you about **one** minute to power everything down. Is that enough?	• The UPS1500TLV provides up to **83%** longer backup time. • The UPS3000XLV (rack or tower unit) provides up to **155%** longer backup time at the same wattage. It also allows even greater run time with the addition of IBM Extend Run Battery Packs.

Benefit comparison for different size models

A comparison of the UPS1000TLV, the UPS1500TLV and the UPS3000XLV reveals:

	UPS1000TLV	% Change, UPS1000TLV to UPS1500TLV	UPS1500TLV	% Change, UPS1000TLV to UPS3000XLV	UPS3000XLV
Backup minutes at 700W	**6**	83%	**11**	4.67X	**28**
Max. load (VA)	**1000**	1.5X	**1500**	3X	**3000**
Telephone and LAN interface	**Yes**	—	**Yes**	—	LAN
Line outputs	**8**	—	**8**	-25%	**6** (13 with a NetBAY PDU)



IBM UPS1500TLV

Watts	1050 (1500VA)
Line input	NEMA 5-15P
Input voltage	120V
Line output	NEMA 5-15R
No. of line outputs	8
Interface ports	DB-9 RS-232, USB
No. of SmartSlot bays	1
Form factor	Tower
Dimensions	21.6 x 17.0 x 43.9cm
Net weight	24.1 kg (53 lbs)
Warranty	3 years
Color	Black
General features	Advanced battery monitoring, audible alarms, auto diagnostic testing, automatic voltage regulation (AVR), AVR Boost, AVR Trim, brownout correction, hot-swap batteries, CellGuard intelligent battery management, lightning and surge protection, line-interactive design, load meter, network-grade line conditioning, overload indicator, pager notification, programmable power event response, QuickSwap, replace-battery indicator, sine-wave output, site wiring fault indicator, SmartSlot, status indicator LEDs, USB compatibility, user-replaceable batteries , surge protection for LAN and telephone connections.
Includes	Smart-UPS signaling RS-232 cable, USB cable, 2M telephone line cable, CD with software, user manual.

Best use

- A higher power tower unit perfect for small work groups of tower servers.
- Provides comfortable backup times for tower servers with high power consumption, such as the x260.
- When long run times are needed for IBM IntelliStation or critical application servers, this is the best choice for tower servers.

Points to consider	Reasons to "buy up"
The UPS1500TLV can protect up to **1500VA** (**1050 watts**). Is this sufficient for your present and near-future needs?	• A larger unit can support a higher total VA/wattage plus protect more devices. • The next step up, the UPS3000XLV, can protect substantially greater loads up to **3000VA** (**2850 watts**).
In the event of a power failure, a loaded UPS1500TLV will give you about **six** minutes to power everything down. Is that enough?	• The UP3S000XLV provides up to **200%** longer backup time at the same wattage.

IBM UPS3000XLV

Watts	2850 (3000VA)
Line input	NEMA L5-20P
Input voltage	100-127V
Line output	IEC 320-C13 (6) NEMA L5-20R (1)
No. of line outputs	6 (plus up to 7 more with NetBAY PDU)
Interface ports	DB-9 RS-232, USB, integrated Network Management Module (RJ45)
No. of SmartSlot bays	1
Form factor	2U rack-mount, convertible to tower with included hardware
Dimensions	8.89 x 43.0 x 68.5cm
Net weight	46.7 kg (103 lbs)
Warranty	3 years
Color	Black
General features	Emergency power off, hot-swap electronics, optional UPS Extend Run external battery packs (up to four), hot-swap batteries, controllable outlet groups, integrated network management, CellGuard intelligent battery management, overload indicator, rack mount, replace-battery indicator, resettable circuit breaker, automatic voltage regulation (AVR), status indicator LEDs, user-replaceable batteries.
Includes	Emergency power off cable, Smart-UPS signaling RS-232 cable, four IEC rack jumper cords, rack-mounting support rails, CD with software, user manual.

Best use

- Provides enough power to protect and back up medium-size work groups of x306m, x336 or x346 servers.
- Has the power capabilities to protect xSeries rackable servers that consume more power, such as the x260, x366 and x460.

Points to consider	Reasons to "buy up"
The UPS3000XLV provides **seven** outlets and the ability to protect up to **seven** additional outlets by using one NetBAY PDU, for a total of up to **13** outlets, and can protect up to **3000VA** (**2250 watts**). Is this sufficient for your present and near future needs?	• A larger unit can support a higher total VA/wattage plus protect more devices. • The next step up, the UPS7500XLV, provides protection for up to **13** units (using an optional NetBAY PDU) and can cover up to **7500VA** (**6000 watts**).
In the event of a power failure, a loaded UPS3000XLV will give you about **four** minutes to power everything down. Is that enough?	• The UPS7500XHV provides up to **475%** longer backup time at the same wattage. • Optionally, adding up to **four** Extend Run battery packs provides up to **1.7 hours** of backup time at the same wattage.

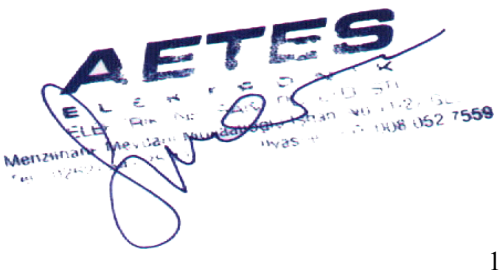
IBM UPS7500XHV

Watts	6000W (7500VA)
Line input	Must be hard wired directly into room power supply
Input voltage	200V-240V
Line output	IEC 320-C19
No. of line outputs	4
Interface ports	DB-9 RS-232, USB, integrated Network Management Card (RJ45)
No. of SmartSlot bays	1
Form factor	6U rack-mount
Dimensions (H x W x D)	267 x 430 x 685 mm (10.5 x 16.9 x 26.9 in)
Net weight	109 kg (240 lbs)
Warranty	3 years
Color	Black
General features	Emergency power off, optional UPS Extend Run external battery packs, hot-swap batteries, integrated network management, intelligent battery management, overload indicator, rack mount, replace-battery indicator, resettable circuit breaker, status indicator LEDs.
Includes	Rail set, accessory kit, UPS serial cable, UPS cable, EPO cable, four rack jumper cords, documentation and software CDs.

Best use

- For BladeCenter, Clusters
- Small racks of servers and storage devices

Points to consider	Reasons to "buy up"
The UPS7500XHV provides **4** outlets and can protect up to **7500VA** (**6000 watts**). Is this sufficient for your present and near future needs?	• The next step up, the UPS10000XHV can cover up to **10,000VA** (**8000 watts**).
In the event of a power failure, a fully loaded UPS7500XLV will give you about **seven** minutes (at **6,000 watts**) to power everything down. Is that enough?	• Optionally, adding up to **four** Extend Run External Battery Packs provides up to **52 minutes** of backup time at the same wattage.



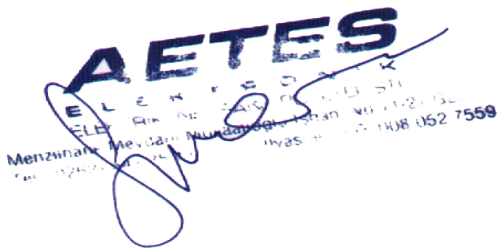
IBM UPS10000XHV

Watts	8000W (10,000VA)
Line input	Must be hard wired directly into room power supply
Input voltage	200V-240V
Line output	IEC 320-C19
No. of line outputs	4
Interface ports	DB-9 RS-232, USB, integrated Network Management Card (RJ45)
No. of SmartSlot bays	1
Form factor	6U rack-mount
Dimensions (H x W x D)	267 x 430 x 685 mm (10.5 x 16.9 x 26.9 in)
Net weight	109 kg (240 lbs)
Warranty	3 years
Color	Black
General features	Emergency power off, optional UPS Extend Run external battery packs, hot-swap batteries, integrated network management, intelligent battery management, overload indicator, rack mount, replace-battery indicator, resettable circuit breaker, status indicator LEDs.
Includes	Rail set, accessory kit, UPS serial cable, UPS cable, EPO cable, four rack jumper cords, documentation and software CDs.

Best use

- BladeCenter, Clusters
- Full rack of servers and storage devices

Points to consider	Reasons to "buy up"
• In the event of a power failure, a fully loaded UPS10000XHV will give you about **four** minutes (at **8,000 watts**) to power everything down. Is that enough?	• Adding up to four Extend Run External Battery Packs provides up to **37 minutes** of backup time at the same wattage.



Sizing Guide for IBM UPS Solutions

1. Identify the devices contained in the rack configuration.
2. Sum the total load (watts) of all devices in the configuration, using either Maximum Load for minimum runtime or Typical Load for typical runtime.
3. Find the Total Configuration Load In the table below.
4. Select the most appropriate UPS model to achieve the desired runtime. If the Total Configuration Load is greater than the entries in the table, split the load across two or more UPS units.

	IBM UPS 750TLV	IBM UPS 1000TLV	APC Smart-UPS 1400RMB	IBM UPS 1500TLV	IBM UPS 3000XLV	IBM UPS 7500XHV	IBM UPS 10000XHV
Total Load (W)	**Runtime[7]**						
100	28min	1hr	4hr 10min	1hr 16min	4hr 12min	6hr 0min	6hr 0min
200	18min	41min	2hr 16min	51min	2hr 18min	4hr 9min	4hr 9min
300	9.7min	23min	1hr 28min	28min	1hr 30min	3hr 9min	3hr 9min
400	7min	17min	1hr 3min	20min	57 min	2hr 30min	2hr 33min
500	5min	13.5min	47min	16.5min	40min	2hr 6min	2hr 6min
600	-	10min	36min	12min	34min	1hr 48min	1hr 48min
700	-	8min	28min	11min	25min	1hr 33min	1hr 33min
800	-	-	23min	9min	23min	1hr 22min	1hr 22min
900	-	-	18min	7.4min	18min	1hr 13min	1hr 13min
1000	-	-	15min	6.7min	15min	1hr 6min	1hr 9min
1200	-	-	11min	-	13min	55min	55min
1400	-	-	8min	-	9min	47min	47min
1600	-	-	-	-	7.8min	41min	41min
2000	-	-	-	-	5.6min	32min	32min
2200	-	-	-	-	4.9min	28min	28min
2500	-	-	-	-	4.4min	24min	24min
3000	-	-	-	-	-	19min	19min
5000	-	-	-	-	-	10min	10min
6000	-	-	-	-	-	7min	7min
7000	-	-	-	-	-	-	5min
8000	-	-	-	-	-	-	4min

[7] Battery run times are estimates based on IBM testing; actual times will vary depending on many factors including battery age, temperature, maintenance, etc.