

**EAT•N**

**Powerware**

**Powerware® BladeUPS™ Uninterruptible Power System**

Product Focus

12–60 kW

**EAT•N** | Powerware



**BladeUPS**

## High-density computing environments demand more power

Today, the management of a data center or network operations center places you under the intense pressure to reduce costs while dealing with inescapable operational realities:

**Expanding power demands.** The blade servers that are satisfying business demands can also raise the demands for power consumption in the same footprint. Rack power requirements that were once at 60 watts per U may now have to be delivered at levels up to 600 watts per U with redundant power supplies.

**Increasing power costs.** Utility rates have a common recurrence. They always go up. IDC research reports that energy costs represent a dominant influence on IT spending (IDC U.S. Market Watch Survey, Q2 2006, September 7, 2006). Most organizations are researching and developing plans for the selection of new data center sites based on the proximity of affordable power facilities. The need for more cost-effective power solutions is confirmed in a recent Gartner research report. Power will be 50% of data center operational costs (Gartner RAS Core Research, August 18, 2006).

**Excessive heat.** Blade servers generate a lot of heat—translating into a high demand for additional energy. A fully loaded rack of blade servers can use close to 30kW of power. This equals over 100,000 BTU/hr in heat generation that requires cooling—wasted heat that is not utilized in any way. Since cooling adds huge costs to data center operations, IT organizations are forced to increase their power efficiency to counteract the inefficient heat and cooling problems.

If you manage, engineer, or plan the present and future of a data center or network operations center, you are already aware of these critical issues and their impact on operations. Your challenge is to make decisions that provide efficient power protection and distribution for growing loads, while managing the heat. Eaton is ready to help you with these challenges.

## Introducing the Powerware BladeUPS uninterruptible power system

Designed specifically for high-density computing environments, the Powerware BladeUPS delivers 12 kW of efficient, reliable power in only 6U of standard rack space, including batteries. Expand capacity by combining 12 kW modules in a building block fashion to deliver 60 kW of redundant backup power from a single rack enclosure. This powerful configuration delivers higher power density than competitive, modular solutions, while dissipating one-third of the heat.

The standard internal batteries provide needed ride-through power until an auxiliary power source takes over or systems are gracefully shut down. Extend runtime up to 34 minutes at full load (or 76 minutes at half load) with Extended Battery Modules (EBMs).

### Power protection for:

*Blade servers*

*Small, medium, and large data centers*

*Network closets*

*PBX and VoIP equipment*

*Networking applications: IPTV, security*

*Storage devices: RAID, SAN*

*Database clusters*



Powerware BladeUPS - 12 kW

## Features

- Protects mission-critical applications with innovative backup power technology designed specifically for high-density computing environments
- Supports the constant moves, adds, and changes (MAC) of today's dynamic data center with a modular, scalable, and flexible backup power architecture
- Conserves valuable rack space with 12 kW of power in only 6U of rack height, including batteries
- Accommodates growth by enabling building-block upgrades from 12 kW to 60 kW in a single rack enclosure
- Reduces energy costs and cooling needs through best-in-class efficiency performance
- Delivers highest levels of reliability at the rack with patented Powerware Hot Sync® paralleling technology and intelligent bypass design, field proven in thousands of large data centers globally
- Simplifies installation and service with true plug-and-power connections and hot-swappable batteries and electronics modules
- Increases battery life through ABM® technology, resulting in more uptime and fewer battery replacements



Powerware BladeUPS in a rack  
(60 kW, N+1 Redundant)

## Reduce energy costs with high-efficiency

As utility rates continue to climb, you need the highest efficiency delivered in the industry. Eaton, knowing this was critically important, confirmed the need through extensive customer research. The concern for energy efficiency tops the list.

The Powerware BladeUPS delivers an outstanding, industry-leading 97 percent efficiency in normal operation. Even at <50% load, where efficiency is typically much lower, this UPS performs more efficiently than competitors' modular products at full load.

Even small increases in efficiency can quickly translate into thousands of dollars. The example compares annual and five-year energy costs for the Powerware BladeUPS and a competitor's solution. It's easy to see that the Powerware BladeUPS pays for itself through energy and cooling savings alone.

In addition to dramatic cost savings, high system efficiency extends battery runtimes and produces cooler operating conditions within the UPS, extending the life of components and increasing overall reliability and performance.

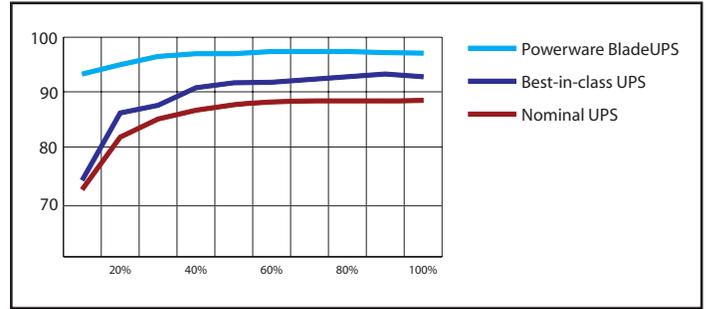
### Example

	Powerware BladeUPS	Nominal UPS
UPS Efficiency Rating	>97%	91.5%
Rack Power Consumption	60 kW	60 kW
Cost per Kilowatt Hour	\$0.10	\$0.10
Cost to Operate per Hour	\$6.18	\$6.56
Monthly Power Savings	\$273 Saved Each Month with Powerware BladeUPS	
Heat Dissipation (BTUs per hour)	6,300	19,000
*Monthly Cooling Savings	\$246 Saved Each Month with Powerware BladeUPS	
Annual Savings with Powerware BladeUPS	\$6,238 Saved Each Year	
<b>Five-Year Savings with Powerware BladeUPS</b>	<b>\$31,190 Saved In Five Years</b>	

\* Cooling savings based on industry calculation of cooling costs per kW of power costs.

## Reduce cooling costs with lower heat dissipation

The high-efficiency Powerware BladeUPS reduces the power requirements for the data center. In the example shown, the Powerware BladeUPS reduces energy costs by an average of \$273 per month. In addition, the high efficiency of a Powerware BladeUPS reduces overall air conditioning needs by more than one third, multiply that with a reduction in cooling costs by one-third and utility bills are further decreased by an additional \$246 per month. The savings compound with the data center size and the number of UPS products. The low heat dissipation means this UPS can be located close to equipment racks without a concern for creating hot spots in the data center.



Even at very small loads, where you would expect efficiency to be lower, the Powerware BladeUPS is still more efficient than other UPS products at full load.



The Powerware BladeUPS remains cool even in a data center full of servers.

## Meet current and changing requirements with modular architecture

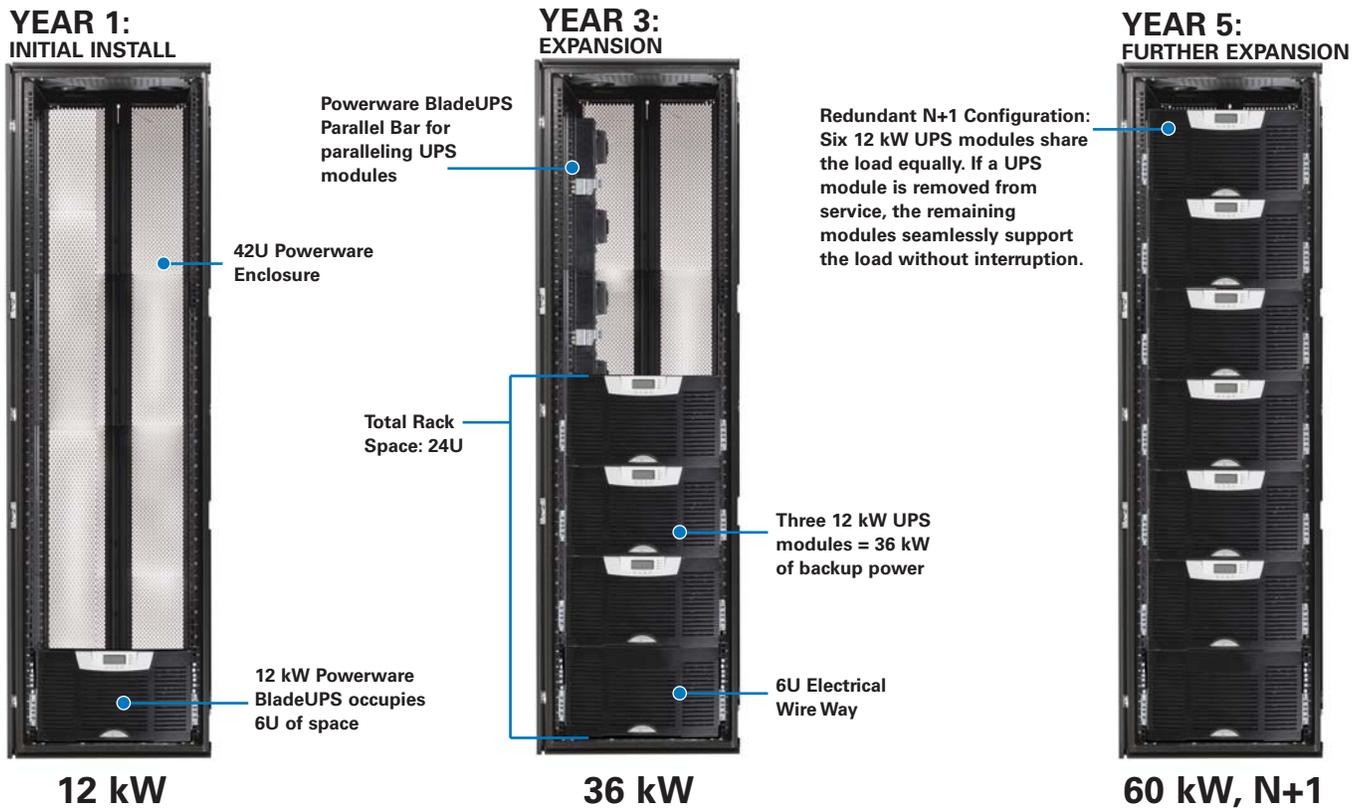
The building block of the Powerware BladeUPS system is a 6U rackmount module that provides 12 kW of backup power protection. The system expands easily to provide maximum results. As your data center grows, the system's modularity plays a key role in optimizing your capital planning and deployment. Using the patented and field-proven Powerware Hot Sync® paralleling technology, up to six Powerware BladeUPS modules can be paralleled for extra capacity or redundancy, providing 60 kW of redundant backup power protection in one 19" rack.

Patented load-sharing control intelligently distributes the workload among modules without requiring direct synchronization links among them. Any module can provide backup support for any other, with no interruption or downtime. For instance, in a redundant system you could perform full maintenance on any module without any interruption of conditioned power to the protected IT equipment.

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*The Powerware BladeUPS is the most scalable backup power protection solution of its kind, scaling easily from 12 kW to 60 kW, N+1 redundant, in a standard 19" rack enclosure.*

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*The Powerware BladeUPS is designed to be extraordinarily flexible—configured as a single module or multi-module system (up to six modules) in a standard 19" rack enclosure. The modular design enables you to deploy just the right amount of backup protection at the right price for your current needs, and expand later whenever needed.*

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## Easily set up with simple parallel configuration changes

The Powerware BladeUPS is easy to install, configure, and deploy—and easy to expand later, without help from Eaton. To link multiple Powerware BladeUPS modules into a parallel configuration, all you need is a Powerware BladeUPS Parallel Bar—a simple kit installed in the bottom of the rack and on the back rail. IT personnel can then simply plug additional modules into the parallel bus bar. The system is intelligent, so it automatically detects paralleled modules and fully configures itself for parallel operations.



Adding modules is a simple plug-and-power procedure for IT personnel with safety approved connectors.

Administrators can monitor and manage the Powerware BladeUPS using the unit's LCD panel or remote monitoring software. The UPS provides data for the entire multi-module system, as well as the individual module. In addition, a module working in a parallel configuration can be separated at any time and re-deployed as a stand-alone module to meet a data center's changing requirements.



Powerware BladeUPS Parallel Bar

The Powerware BladeUPS Parallel Bar easily connects up to six modules in parallel.

The brightly backlit 2.6" LCD shows parameters of the system or a module.



Access parallel system information



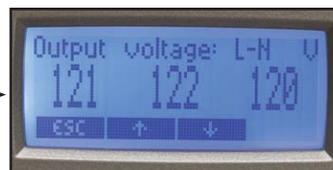
Display output from multiple modules on one screen



Display full system output from any UPS



Review any UPS from any display



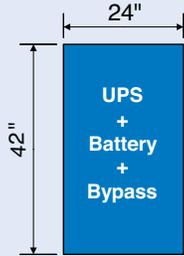
Display individual module output voltage



Display individual module output current

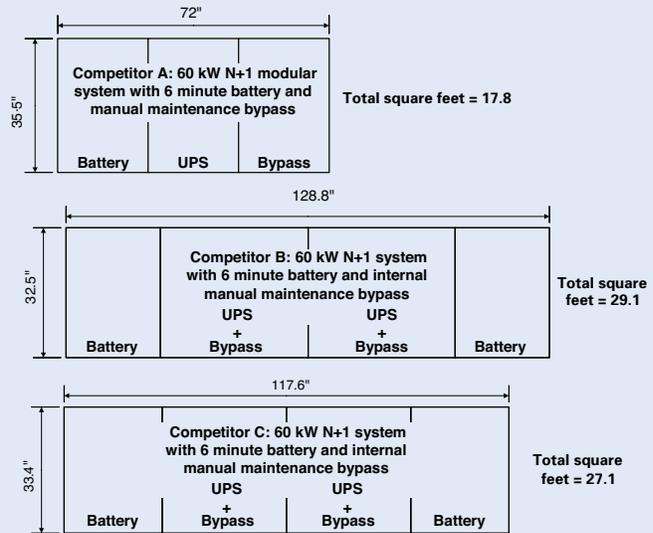
## Save space with high power density UPS

The Powerware BladeUPS offers the smallest footprint of any UPS in its class—double the power density of any other UPS system on the market. This compact design leaves more space for IT equipment in the rack and data center.



**Powerware BladeUPS**  
60 kW N+1 modular system with 6 minute battery and automatic maintenance bypass

**Total square feet = 7.0**



Powerware BladeUPS system footprint compared to competitors' footprints for 60 kW N+1 redundant application

## Expedite deployment with flexible installation options

The Powerware BladeUPS can be deployed in a variety of system architectures to support the specific requirement of your computer room or data center, and to support the desired level of redundancy (Tier I through Tier IV, as defined by the Uptime Institute).

**Centralized power protection for small computer rooms.** Start with one 12 kW module and expand to 60 kW with N+1 redundancy in single 19" rack enclosure.

**Zone power protection for mid-sized computer rooms.** Deploy 60 kW (N+1) in a 19" rack to protect a row of IT equipment racks.

**Distributed power protection.** Distribute 12 kW modules to protect one to three racks—thereby achieving zero footprint power protection.

**Hybrid power protection.** Stronger redundancy of power protection for equipment racks containing critical IT equipment.

- For dual-corded loads with one source on a central UPS and the other on utility power, you can back up selected loads with a local Powerware BladeUPS, deployed in a distributed or zone fashion.
- For dual- or single-corded loads on a central UPS, you can back up selected loads with a local Powerware BladeUPS (distributed or zone) in series with the central UPS. This configuration provides maximum reliability close to critical loads, with minimal heat dissipation and maximum efficiency.

With the flexibility to deploy and re-deploy a Powerware BladeUPS either in single or parallel systems—data center managers can tailor power protection to adapt to changing needs, often without the need for an electrician or service technician.

Eaton also offers an assortment of plug-and-play power distribution accessories with various input and output connections to distribute power from the Powerware BladeUPS to rack power strips or directly to high-power servers. You can choose from distribution designs with or without monitoring capability, for redundant or non-redundant applications spanning from zero U to full rack height.

## System Architecture with the Powerware BladeUPS

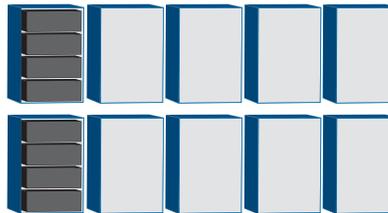
### Centralized Power Protection



### Centralized Power Protection—Dual Power Feeds



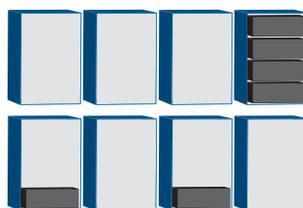
### Zone Power Protection



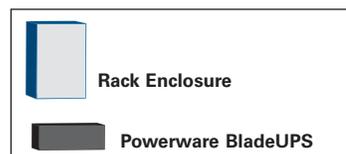
### Distributed Power Protection



### Hybrid Power Protection



### Central Large UPS



## Count on reliable system performance and uptime

Recognizing the mission-critical nature of data center operations, the Powerware BladeUPS has been designed for premium reliability and continuous operation. The rackmount Powerware BladeUPS incorporates leading technologies that Eaton developed for its largest UPS systems, such as:

**Robust paralleling.** With Eaton's patented Powerware Hot Sync technology, UPS modules work in peer-to-peer fashion when configured in a parallel system. Most other paralleling systems on the market use a single central main controller with a backup controller. If the main controller fails, the system must recognize this and transfer control to the backup control, or the entire system fails. With Eaton's patented approach, each UPS module operates independently, yet is completely synchronized with the others. There is no change in control, therefore no single point of failure.

**Intelligent maintenance bypass switch.** The internal switch inside the UPS chassis automatically activates bypass mode whenever a power module is removed. This feature ensures that power to protected loads is not accidentally interrupted by human error. (If the UPS is in a parallel environment with N+1 redundancy, removing an electronics module only causes that particular UPS module to go offline while the protected equipment is supported by other modules in the configuration.)

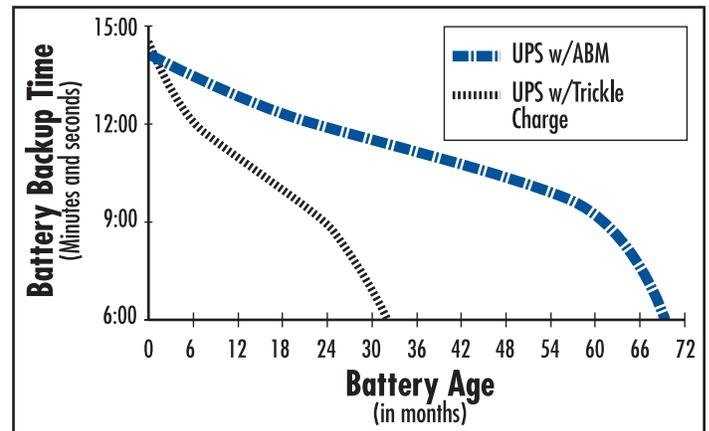
**Static bypass switch.** All Powerware BladeUPS modules have their own static switch for normal operations and for internal bypass in case of a high overload condition, output load fault or internal failure.

**Eaton's advanced battery management.** ABM technology significantly extends battery service life with a unique three-stage charging technique. The UPS automatically tests battery health and provides advance notification when preventive maintenance is needed, allowing ample time to hot-swap batteries without ever having to shut down connected equipment.

**Hot-swappable electronics and battery modules.** Replacing batteries or electronics modules can be done in minutes without interrupting power to IT equipment. This hot-swap capability helps reduce Mean Time to Repair (MTTR) and dramatically improves the availability of the protected IT equipment.



IT staff can easily replace battery modules.



Eaton's ABM technology significantly increases battery service life.

## Simplify UPS installation and maintenance

The Powerware BladeUPS is easy to install, configure, and deploy. All Powerware BladeUPS modules (UPS and battery) come with rackmount kits for easy installation in standard equipment racks. In-house IT staff can install and service this UPS themselves. Adding parallel units for future expansion is a simple, plug-and-play procedure.

The Powerware BladeUPS battery trays are user-replaceable so that one person, working alone, can replace the battery without disrupting data center operations or power to protected equipment.

Most IT teams are confident managing the Powerware BladeUPS without outside help because of its simplicity. However, Eaton's global service organization is readily available when needed with PowerTrust and eNotify Service Plans.



IT staff can easily install electronics modules.

## Flexible Runtime Options

Each Powerware BladeUPS can be configured with its own external battery backup. The Powerware Blade Ups design eliminates this single point of failure. Competitive, modular systems use a centralized battery bank with a shared connection point that presents a potential single point of failure.



Powerware BladeUPS Extended Battery Module

### POWERWARE BLADEUPS TYPICAL BATTERY RUNTIME CHART (IN MINUTES)

Single Module		Internal Battery	+ 1 EBMs	+ 2 EBMs	+ 3 EBMs	+ 4 EBMs
Load kW	Load %					
1.6	13%	55	118	183	253	329
2.4	20%	37	78.3	119	163	211
4	33%	23	46	69	94	120
6	50%	13	30	44	59	76
8	67%	9	21	32	43	54
9.6	80%	6.9	17	26	34	44
12	100%	4.8	12	20	27	34

### POWERWARE BLADEUPS TYPICAL BATTERY RUNTIME CHART (PARALLEL UPS, IN MINUTES)

Number of UPS Modules	Total Load kW	Configuration	Internal Battery	+ 1 EBMs	+ 2 EBMs	+ 3 EBMs	+ 4 EBMs
6	60	N+1	6	15	22	29	37
5	48	N+1	6.9	17	26	34	44
4	36	N+1	18	28	37	47	47
3	24	N+1	9	21	32	43	54
2	12	N+1	13	30	44	59	76

## Monitor the power infrastructure from anywhere

You can monitor the Powerware BladeUPS over your LAN or the Internet to stay informed of conditions in the power protection infrastructure.

With Powerware LanSafe® software that comes with the UPS, administrators can monitor UPS status and gracefully shutdown or restart the systems connected to that UPS.

Using PowerVision® software, you can also monitor the status of multiple UPSs and ancillary devices to accurately diagnose past events and predict future conditions.

FORESEER® software analyzes thousands of data points to proactively manage key equipment throughout an enterprise-wide infrastructure. This system interfaces with an extensive collection of devices from most major manufacturers of power and environmental equipment, as well as subsystems for fire detection and suppression, security, fuel handling, and building controls.

Software and connectivity options provide a unified window into the state of IT and facilities systems. With this level of visibility, you can transform the power system into a powerful strategic asset.

## Gain a new level of confidence

The innovative Powerware BladeUPS delivers reliable, energy-efficient backup power protection for your organization's critical IT systems today, and the flexibility to support your changing needs tomorrow.

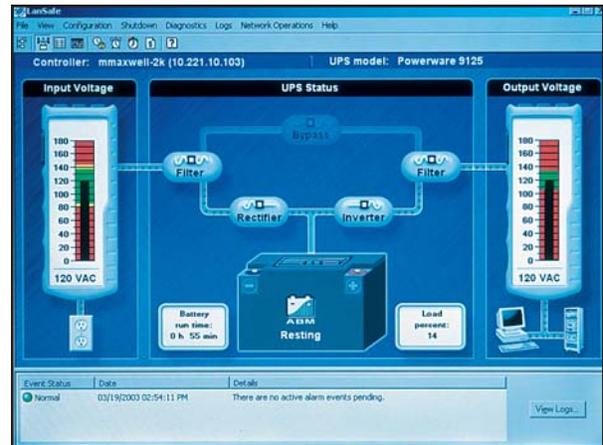
Eaton offers a full line of technology solutions designed to address the power crunch in IT infrastructures. In fact, Eaton offers solutions for the entire power system, from the point where utility power enters your facility all the way to the individual server. Eaton's solutions for the computer room, include:

- Rackmount and freestanding power protection systems deliver computer-grade power with battery backup throughout a data center.
- Versatile power distribution products and cable management accessories make it easy to deliver power exactly where needed, even as data centers adapt and evolve.
- Attractive and functional enclosures and structured wiring closets turn any location into a virtual, secure data center.

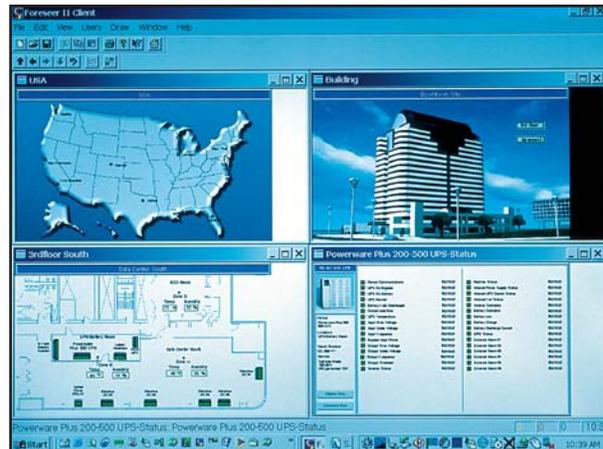
**Learn more about complete, integrated solutions for protecting and organizing your IT equipment.**

**1-800-356-5794**

**[www.powerware.com/bladeups](http://www.powerware.com/bladeups)**



**Powerware LanSafe software is included at no charge with the Powerware BladeUPS.**



**A configurable user interface displays critical data center information with FORESEER software.**

# Technical Specifications<sup>1</sup>

## General Characteristics

Power Rating	12 kW per UPS Module
Efficiency	Up to 97%
Heat Dissipation	371W/1266 BTU/hr at 100% rated load
Cooling	Fan cooled, temperature microprocessor monitored; front air entry, rear exhaust
Audible Noise, Normal Operation	<60 dBA at 1 meter
Altitude Before Derating	1000 meters (3300 ft ASL)

## Input Characteristics

Input Voltage	208 Vac and 400 Vac models
Voltage Range	208V model: 180 to 265 Vac 400V model: 311 to 519 Vac
Frequency Range	50 or 60 Hz, $\pm 5$ Hz
Input Current Distortion	<5% with IT loads (PFC power supplies)
Input Power Factor	>0.99 with IT loads (PFC power supplies)
Inrush Current	Load dependent
Input Requirements	3-phase, 4-wire + ground
Bypass Source	Same as input (single feed)
Generator Compatibility	Fast sync slew rate for generator synchronization

## Output Characteristics

Rated Output Voltage	208V model: 180 to 225 Vac, Ph to Ph 400V model: 180 to 240 Vac, Ph to N
Output Configuration	3-phase, 4-wire + ground
Output Frequency (nominal)	50 or 60 Hz auto-detection on startup
Frequency Regulation	0.1 Hz free running
Load Power Factor Range	Lagging: 0.7 Leading: 0.9
Total Output Voltage Distortion	<3% with IT loads (PFC power supplies) <5% non-linear or non-PFC power supplies

## Battery Characteristics

Battery Type	VRLA - AGM
Battery Runtime (Internal)	13 minutes at 50% load 4.8 minutes at 100% load
Battery String Voltage	240 Vdc
Battery Test	Automatic battery test standard (remote scheduling capable) Manual battery test from front display
Battery Recharge Profile	Advanced Battery Management 3-stage charging technology
Battery Cut-off Voltage	Variable from 1.67 VPC at <5 min. runtime to 1.75 VPC at >90 min. runtime
Battery Low Condition	Announced with alarm
Extended Battery Capability	Yes, add up to 4 additional 3U battery enclosures (~34 min at 100% load, >1 hour at 50% load)

## Physical Characteristics

Dimensions (HxWxD)	
UPS	10.3 (6U) x 17.4 x 26.0 inches 267 x 442 x 660 mm
EBM	5.2 (3U) x 17.2 x 26 inches 132 x 437 x 660 mm
Note:	
Total Chassis Weight without batteries or electronics	100 lb. (46 kg)
Total Chassis Weight with batteries or electronics	307 lb. (140 kg)
Total UPS Weight without Batteries	135 lb (61 kg)
Total UPS Weight with Batteries	307 lb (140 kg)
EBM Weight	170 lb (77 kg)

## Communications and User Interface

Software Compatibility	UPS ships with Software Suite CD containing Powerware LanSafe power management software and a trial version of PowerVision
X-Slot® Bays	Two available for the cards listed below
Optional X-Slot Communication Cards	
Application	Powerware Card
Web – TCP/IP	ConnectUPS™-X Web/SNMP Card
Modbus® RTU	Modbus Card
IBM eServer™ (i5™, iSeries™, or AS/400™)	Relay Interface Card
N/O, N/C (dry contacts)	Industrial Relay Card
Parallel Remote Monitoring	Powerware Hot Sync CAN Bridge Card Modem Card
Control Panel LCD	2 lines by 20 characters 4 menu-driven interface buttons 4 status at a glance LEDs
Multi-language	English standard; 20 languages available
Configuration Changes	User capable, firmware auto configures
Dry Contact Inputs	Two, user-configurable
Dry Contact Outputs	One, user-configurable

## Service

Installation	User capable, located in the IT racks
Preventative Maintenance	User capable, optional factory service available
Corrective Maintenance	User capable, optional factory service available
Serviceability Features	Hot-swappable batteries Hot-swappable electronics module Automated internal maintenance bypass Auto-configure firmware Flash firmware upgradeable

## Certifications

Safety	208V model: UL1778, cUL 400V model: CE
EMI	208V model: FCC Part 15 Class A 400V model: EN 62040-2 Class A
Surge Protection	ANSI C62.41, Cat B-3
Hazardous Materials (RoHS)	EU Directive 2002/95/EC Category 3 (4 of 5)

## Warranty

Standard	12 months
Warranty Repair	Factory depot repair or replace

## Service Support Agreements<sup>2</sup>

Depot	PowerTrust™ Express
On-site 5x8	PowerTrust Value
On-site 7x24	PowerTrust 8-, 6- or 2-hour response

## Options and Accessories

Detachable input cord	
Detachable input/output cord assembly	
Detachable paralleling cord assembly	
Extended Battery Modules (EBMs)	
3U output sub-distribution module	
0U to 3U rack power strips	
60 kW Powerware BladeUPS Parallel Bar	
4-post rail kit	
Environmental Monitoring Probe (EMP) for temperature and humidity monitoring	
X-Slot Communication Cards (see Communications and User Interface section)	

1. Due to continuing product improvement programs, specifications are subject to change without notice.  
2. eNotify remote monitoring and 7x24 technical support included.

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Finland: 358.94.52.661  
France: 33.1.6012.7400  
Germany: 49.7841.666.0  
Italy: 39.02.66.04.05.40  
Norway: 47.23.03.65.50  
Sweden: 46.8.598.940.00  
United Kingdom: 44.1753.608.700



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