

RT5kVA and RT6kVA 3U Rack or Tower Uninterruptible Power Supplies

Product Guide

The RT5kVA and RT6kVA 3U Rack or Tower Uninterruptible Power Supply (UPS) offerings provide extended power protection with increased efficiency and simplified power management to safeguard high-availability of Lenovo server environments. With efficiency ratings of up to 98%, these compact 3U rack or tower designs can help reduce energy usage without compromising performance or reliability. The 3U Rack or Tower UPS units can be installed in a data center rack cabinet or can be used as tower UPS units in office and distributed IT environments where extended power protection is required.

The 3U Rack UPS unit (RT5kVA or RT6kVA) is shown in Figure 1.



Figure 1. RT5kVA or RT6kVA 3U Rack UPS unit

Did you know?

3U Rack or Tower UPS units feature Advanced Battery Management (ABM) technology that uses a unique three-stage charging technique that significantly extends battery service life and optimizes recharge time, compared to traditional charging methods.

3U Rack or Tower UPS units can enhance system availability with individual receptacle groups or load segments that can be programmed and controlled, which allows mission-critical devices to be prioritized during shutdown to preserve battery run time if there is a prolonged power outage.

3U Rack or Tower UPS units come standard with UPS Manager software that integrates seamlessly with the major virtualization platforms, which enables you to view and manage your entire power system from your current dashboard. It also triggers live migration during power outages and avoids data loss by gracefully shutting down virtual machines and hosts in a cluster if there is an extended power outage.

Ordering information

Table 1 shows the part numbers and feature codes for the 3U Rack or Tower UPS models and options.

Table 1. Ordering part numbers and feature codes

Description	Part number	Feature code
UPS units		
RT5kVA 3U Rack or Tower UPS (200-240VAC)	55945KX	A540 (5594-RU6)
RT6kVA 3U Rack or Tower UPS (200-240VAC)	55946KX	A541 (5594-RU6)
Extended Battery Modules		
5kVA/6kVA 3U Rack or Tower Extended Battery Module	55946BX	A542
Options		
Environmental Monitoring Probe	46M4113	6146

The UPS models are shipped standard with the Network Management Card (NMC) included in the box, and they include the following items:

- An accessory kit that contains the following items:
 - Rack-mount kit
 - Rack installation instructions
 - Tower kit
 - Serial cable: 1.2 m (4 ft)
 - USB cable
 - Remote On/Off (ROO) and Remote Power Off (RPO) connector
- Documentation package

The Extended Battery Modules (EBMs) are shipped with the following items:

- An accessory kit that contains the following items:
 - Rack-mount kit
 - Tower kit
 - EBM power cable
 - EBM detection cable
- Documentation package

The RT5kVA and RT6kVA 3U Rack or Tower UPS models do not ship with line cords. Table 2 lists the compatible line cords that are suitable for the RT5kVA 3U Rack or Tower UPS unit. The RT6kVA 3U Rack or Tower UPS unit has a hardwired terminal block connector for AC input power.

Table 2. Line cords for the RT5kVA 3U Rack or Tower UPS unit

Description	Part number	Feature code
DPI 30A Cord (NEMA L6-30P)	40K9614	6500
DPI 32A Cord (IEC 309 P+N+G)	40K9612	6502
DPI PDU+ Australian/NZ 3112 Cord (32A)	40K9617	6505
DPI PDU+ Korean 8305 Line Cord (30A)	40K9618	6506

All 3U Rack or Tower UPS models come standard with an NMC included with the models (not installed). The NMC provides convenient, over-the-network UPS remote monitoring and management through a standard web browser or UPS Power Manager software. Figure 2 shows the UPS NMC.



Figure 2. UPS Network Management Card

The NMC has the following features:

- Versatile connectivity through HTTP, SNMP, SMTP, Telnet, SSL, and SSH
- Simultaneous shutdown of protected servers
- Configuration of automatic email messages in response to UPS alarms and to transmit periodic reports
- Customizable actions, including automatic shutdown if there is an extended power failure with standard UPS Power Protector software
- Control of UPS on/off switching with a web browser
- Adjustment and control of load segments through the HTML interface, including sequential starting of the installation and optimization of backup time by shutting down non-priority systems
- Automatic date and time adjustment through an NTP server
- Dual stack IP v4/IP v6
- Recording of events and measurements in the card log
- Data and event logging in the nonvolatile memory
- Card firmware update through the network
- 10/100 Mb Ethernet (RJ-45 connector) with auto-negotiation
- Measurement of humidity and temperature with the optional Environmental Monitoring Probe (EMP)

An optional Environmental Monitoring Probe (EMP) (part number 46M4113) is used to report local temperature and humidity values and make that information available to management tools. The EMP connects to the UPS via the NMC. The EMP is shown in Figure 3.



Figure 3. Environmental Monitoring Probe

The EMP has the following features:

- Monitors temperature, humidity, and status of two user-provided contact devices or sensors
- Connects to an NMC through an RJ-45 CAT5 Ethernet cable (1 m cable included with the EMP)
- Can be located up to 20 m (65.6 ft) from the UPS
- Measures ambient temperatures between 0 - 80 °C (32 - 176 °F) with an accuracy of ± 1 °C
- Measures relative humidity between 10 - 90% with an accuracy of $\pm 5\%$
- Temperature, humidity, and contact closure status can be displayed through a web browser
- Supports user-defined alarm thresholds for temperature, humidity, and contact closure status
- Events are stored in the NMC's event log
- Sends SNMP alarms to network management systems
- Sends e-mail notifications through SMTP

Features

A UPS is a device that acts as a defensive barrier between electronic equipment and incoming power problems. It conditions, regulates, and filters out power disturbances to ensure a clean power source for IT equipment. A UPS also provides battery backup if there is a power failure.

In today's high availability server environments, unplanned power outages or line quality irregularities can have a considerable financial impact on all sized businesses. The typical utility power is 99.9% available, but that means that there can be almost 9 hours of downtime a year, not to mention brownouts and other power quality problems. Selecting the right UPS can help protect against these potentially costly issues.

The RT5kVA and RT6kVA 3U Rack or Tower UPS units protect against power failures, power sags, power surges, under-voltage, electrical line noise, over-voltage, frequency variation, switching transients, and harmonic distortion.

The RT5kVA and RT6kVA 3U Rack or Tower UPS models offer the following features:

- High-efficiency protection delivers more real power (Watts) in a compact tower or 3U rack design, lowering power and cooling consumption
- A graphical Liquid Crystal Display (LCD) that provides intuitive configuration, management and monitoring capabilities in the following languages to reduce management complexity:
 - English
 - French
 - German
 - Spanish
 - Russian
 - Portuguese
 - Italian
- Hot-swappable batteries for maximum uptime, availability, and ease of maintenance
- Standard UPS Power Manager software that provides effective local or remote power monitoring and management for servers and virtual machines, and allows for graceful remote system shutdown
- ABM technology that significantly extends battery service life and optimizes recharge time
- Load segments for individual control of receptacle groups to manage sequential shut downs and start ups and reserve battery run time for the most critical equipment
- Optional EBMs that provide extra run time to critical systems during a prolonged power outage
- Standard Network Management Card (NMC) for enhanced UPS monitoring and control over-the-network through a standard web browser
- An optional EMP for thermal management requirements (temperature and humidity)

- Dual channel communication through the USB or RS-232 port at the same time to maximize communications flexibility
- Remote flash upgradeable firmware for both the UPS and NMC, which makes it an ideal solution for remote locations
- An ROO and RPO port to control power of the UPS unit through a wired remote switch

Technical specifications

Table 3 lists the technical specifications for the 5kVA and 6kVA 3U Rack or Tower UPS models.

Table 3. Technical specifications

Specification	RT5kVA 3U Rack or Tower UPS (200-240VAC)	RT6kVA 3U Rack or Tower UPS (200-240VAC)
General		
Part number	55945KX	55946KX
Form factor	3U Rack or Tower	3U Rack or Tower
Topology	Online, double conversion, sinewave output	
VA/Watts rating	5000 VA/4500 W	6000 VA/5400 W
Efficiency (on utility power)	<ul style="list-style-type: none"> • Online mode: Up to 94% • High efficiency mode: Up to 98% 	<ul style="list-style-type: none"> • Online mode: Up to 94% • High efficiency mode: Up to 98%
Transfer time	<ul style="list-style-type: none"> • Online mode: 0 ms (no break) • High efficiency mode: 10 ms maximum (due to loss of utility power) 	
Energy Star compliant	Yes	Yes
Electrical input		
Input voltage	200 - 240 V AC	200 - 240 V AC
Input frequency	50/60 Hz	50/60 Hz
Max input amperage	25 A	30 A
Input connector	Proprietary	Hardwired terminal block
Input line cord	Optional (See Table 2)	Onsite wiring required
Electrical output		
Output voltage settings	200/208/220/230/240 V AC	200/208/220/230/240 V AC
Output frequency	50/60 Hz	50/60 Hz
Output power capacity	200-240 V AC: 5000 VA/4500 W	200-240 V AC: 6000 VA/5400 W
Output connectors	<ul style="list-style-type: none"> • 2x IEC 320-C19 (16 A) • 8x IEC 320-C13 (10 A) 	<ul style="list-style-type: none"> • 2x IEC 320-C19 (16 A) • 8x IEC 320-C13 (10 A)
Output load segments	<ul style="list-style-type: none"> • Master: 2x C19 • Group 1: 4x C13 • Group 2: 4x C13 	<ul style="list-style-type: none"> • Master: 2x C19 • Group 1: 4x C13 • Group 2: 4x C13
Batteries		
Battery type	Valve Regulated Lead Acid (VRLA): Maintenance-free, sealed, leak-proof	

Specification	RT5kVA 3U Rack or Tower UPS (200-240VAC)	RT6kVA 3U Rack or Tower UPS (200-240VAC)
Battery management	ABM technology or temperature-compensated charging method (user selectable), automatic battery test and deep discharge protection, automatic recognition of external battery units.	
Battery replacement	Hot-swap internal battery and extended battery modules	
External battery support	Up to 4 (PN 55946BX)	Up to 4 (PN 55946BX)
Typical backup times	See Table 4	
Communications and management		
USB port (Type B)	Yes	Yes
RS-232 serial port (RJ-45)	Yes	Yes
10/100 Mbps Ethernet port (RJ-45)	Yes (on the NMC)	
Environmental monitoring	Optional with EMP, 46M4113 (requires NMC, 46M4110)	
Management software	UPS Power Manager (UPM) and UPS Power Protector (UPP)	
Control panel	Intelligent 5-button graphical LCD	
LED indicators	Online, On Battery, Bypass, and Fault	
Remote On/Off and Power Off	Remote On/Off (ROO) and Remote Power Off (RPO) terminal block connectors	

Table 4 lists the expected period that the 3U Rack or Tower UPS models operate only on batteries, depending on the load.

Note: Battery backup times are approximate and can vary with equipment, configuration, battery age, and temperature.

Table 4. 3U Rack or Tower UPS runtime chart

Load		Run time, Minutes				
Percentage	Watts	No EBM	1x EBM	2x EBMs	3x EBMs	4x EBMs
RT5kVA 3U Rack or Tower UPS (200-240VAC)						
25%	1125 W	27	103	175	262	377
50%	2250 W	11	48	88	123	167
75%	3375 W	5.3	27	53	83	109
100%	4500 W	3.4	20	38	54	80
RT6kVA 3U Rack or Tower UPS (200-240VAC)						
25%	1350 W	22	85	147	214	287
50%	2700 W	8.5	38	71	104	133
75%	4050 W	4.5	24	45	62	90
100%	5400 W	3	16	27	47	58

Leak current: Important specifications on UPS leak current and circuit breaker recommendations can be found in Support Tip HT511959, <https://datacentersupport.lenovo.com/solutions/HT511959>.

Connectors and controls

The front of the RT5kVA and RT6kVA 3U Rack or Tower UPS units feature a 5-button graphical LCD. The display provides useful information about the UPS, load status, events, measurements, and settings.

The following figure shows the control panel on the front of the 3U Rack or Tower UPS.

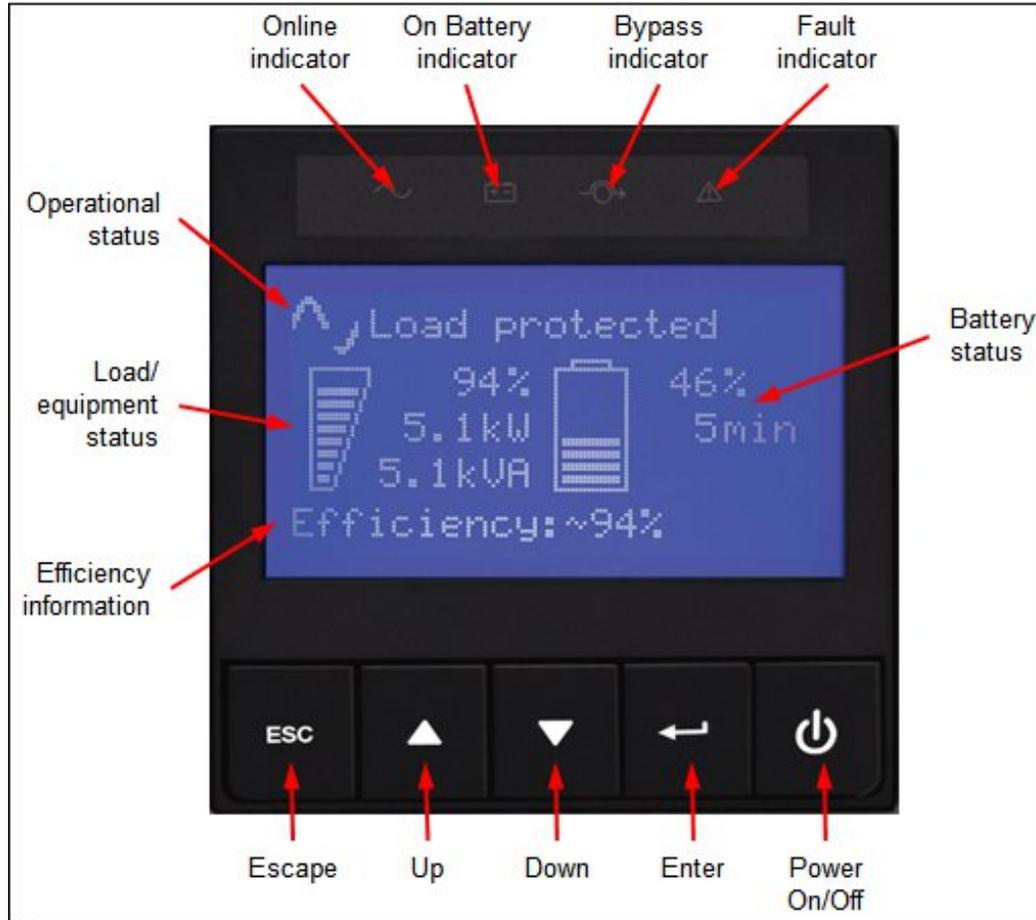


Figure 4. Control panel on the front of the RT5kVA or RT6kVA 3U Rack or Tower UPS

The following functions are available on the control panel:

- Status information: Displays the battery status, load percentage, output power, operational mode, and load group information.
- Measurements: Displays the output Watts, VA, amperage, power factor, voltage, frequency, input voltage, input frequency, battery voltage, efficiency, and power usage.
- Control: Displays the battery test, reset error state, configure load segments, clear power usage measurements, and restore settings.
- Settings: Allows you to change product general parameters and set input and output parameters, on/off conditions, and battery configuration.
- Event log: Displays the stored events, selects faults, alarms and events to display, and clears events.
- Fault log: Displays the event log and alarm history.
- Identification: Displays the machine type, model, and serial number of the unit, and the firmware level of the UPS, including the NMC's firmware level and IP address.

The following figure shows the rear view of the RT5kVA 3U Rack or Tower UPS (200-240VAC) (55945KX).

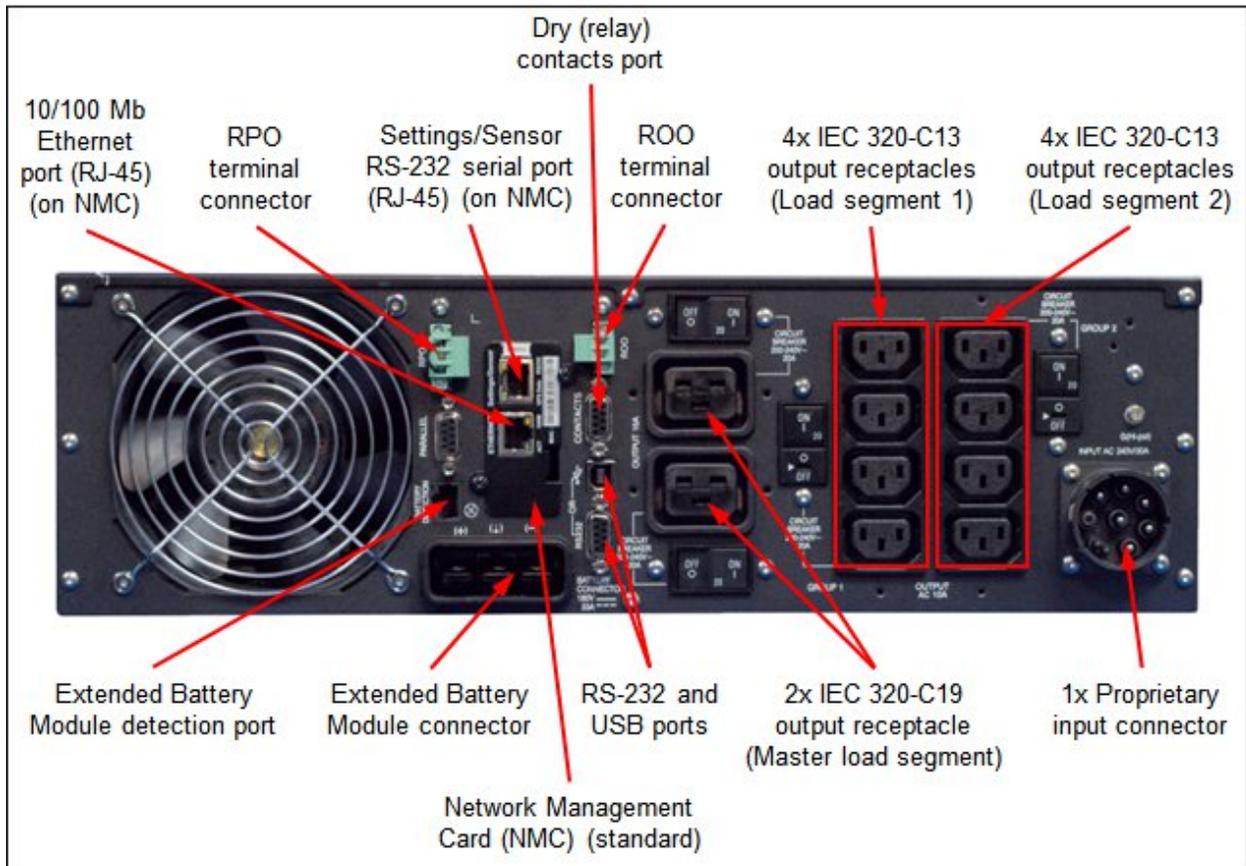


Figure 5. Rear view of the RT5kVA 3U Rack or Tower UPS (200-240VAC) (55945KX)

The following figure shows the rear view of the RT6kVA 3U Rack or Tower UPS (200-240VAC) (55946KX).

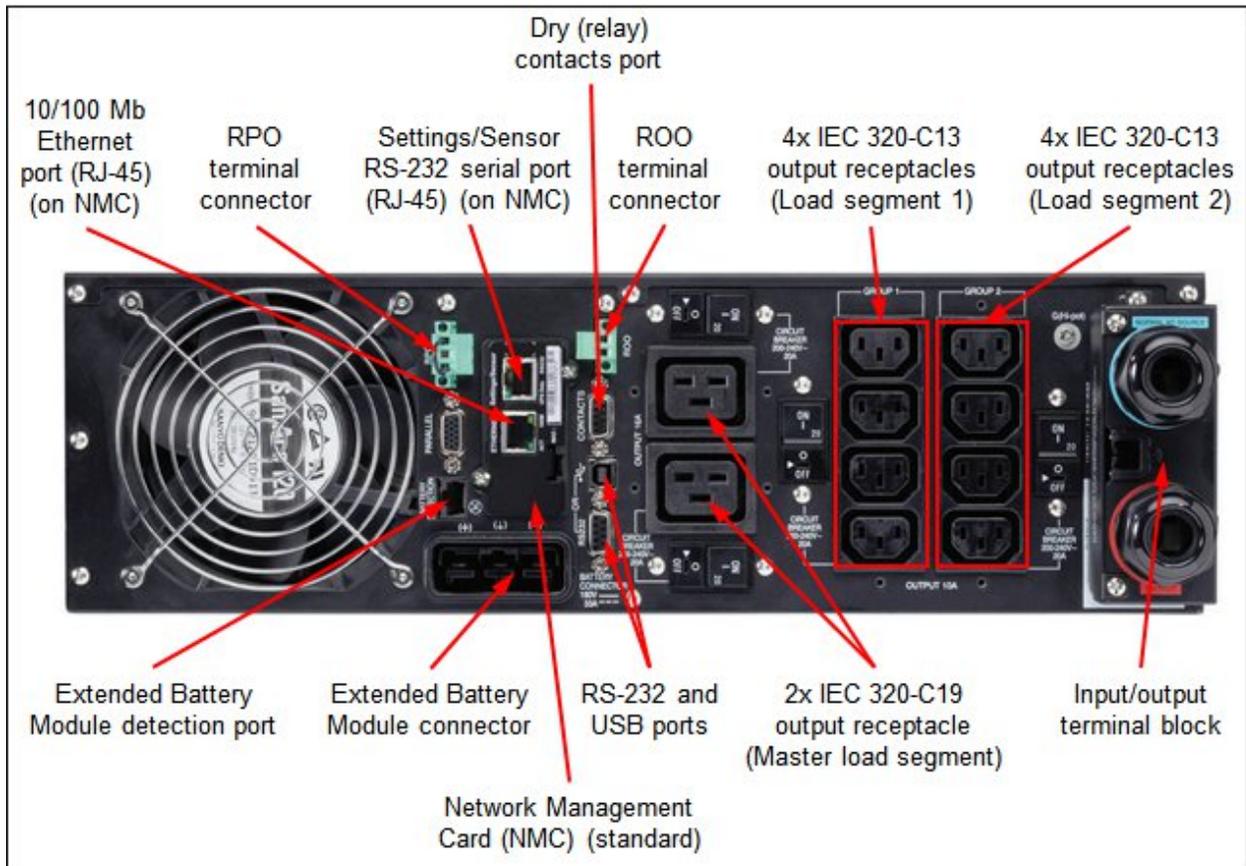


Figure 6. Rear view of the RT6kVA 3U Rack or Tower UPS (200-240VAC) (55946KX)

The following figure shows the rear view of the 5kVA/6kVA 3U Rack or Tower Extended Battery Module (55946BX).

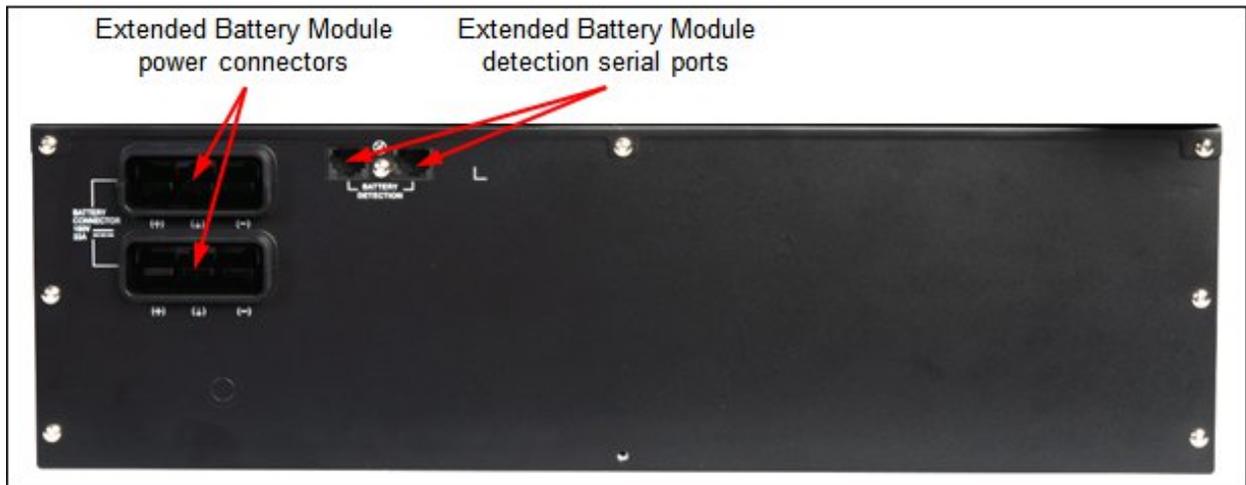


Figure 7. Rear view of the 5kVA/6kVA 3U Rack or Tower Extended Battery Module (55946BX)

Physical specifications

The 5kVA and 6kVA 3U Rack or Tower UPS units have the following physical specifications (approximate):

- Height: 130 mm (5.1 in.)
- Width: 441 mm (17.4 in.)
- Depth: 685 mm (27.0 in.)
- Weight: 48 kg (106 lb)

The 5kVA/6kVA 3U Rack or Tower Extended Battery Module has the following physical specifications (approximate):

- Height: 130 mm (5.1 in.)
- Width: 441 mm (17.4 in.)
- Depth: 645 mm (25.4 in.)
- Weight: 68 kg (150 lb)

Operating environment

The RT5kVA and RT6kVA 3U Rack or Tower UPS units are supported in the following environment:

- Temperature (operation): 0 - 40 °C (32 - 104 °F), with linear derating for altitude
- Relative humidity: 0 - 95%
- Maximum altitude (operation): 3,000 m (9,843 ft)

Note: These UPS units are not supported in a maritime environment.

Agency approvals

The RT5kVA and RT6kVA 3U Rack or Tower UPS units conform to the following regulations:

- FCC
- UL
- CSA or cUL
- CE Mark
- NOM
- GOST
- BSMI Taiwan
- CB Report
- VCCI
- C-Tick (Australia)
- IRAM (Argentina)

Warranty

The RT5kVA and RT6kVA 3U Rack or Tower UPS models and the Extended Battery Module (EBM) have a 3-year limited warranty. Optional features have a 1-year warranty.

Management software

Optional software can be downloaded to be used the UPS units. This software is the UPS Power Manager (UPM) and UPS Power Protector (UPP) software. The UPM software can manage multiple devices. The UPP software is used to manage a single device. Note that a device refers to a UPS or a PDU.

UPS Power Manager

The UPS Power Manager (UPM) software is free to use for up to 10 devices (PDUs or UPS units). It is available either as a Windows application or a virtual appliance (OVF file). Download the software from: <https://datacentersupport.lenovo.com/us/en/solutions/Invo-ups-mgmt>

For up to 100 devices, a Silver license can be purchased. For up to 600 devices, a Gold license can be purchased. The following table shows the part number ordering information for each version of the UPM software.

Table 5. Comparison of UPM features

Features of UPM	Basic License (free)	Silver License	Gold License
Number of devices (UPS or PDU)	Up to 10	Up to 100	Up to 500
Identify and monitor third-party power devices	Yes	Yes	Yes
Shut down server and host without crashing	Yes	Yes	Yes
Configuration Policy	Yes	Yes	Yes
Control rack PDUs (on, off and reboot sections or outlets) (1)	Yes	Yes	Yes
Plug-in for VMware vCenter	Yes	Yes	Yes
Enter and exit maintenance mode	Yes	Yes	Yes
Shutdown Virtual Hosts (e.g. VMware ESXi)	Yes	Yes	Yes
Shutdown Storage	Yes	Yes	Yes
Advanced Event Action with Standard Events	No	Yes	Yes
Miscellaneous Advanced Actions, Generic SSH action	No	Yes	Yes
Shut down specific, targeted virtual machines	No	Yes	Yes
Migrate virtual machines to targeted hosts	No	Yes	Yes
Virtual machines load shedding	No	Yes	Yes
Trigger targeted, automatic advanced actions	No	Yes	Yes
Safely shut down and restore high availability environments	No	Yes	Yes
Fully virtualized cluster shutdown	No	Yes	Yes
Integrated with Microsoft Hyper-V virtualization platform to facilitate guest virtual machine shutdown or suspend, and graceful shutdown of the Hyper-V hypervisor	No	Yes	Yes
Integrated with VMware vSAN hyperconverged infrastructure software to enable graceful shutdown of logical data layer used by vSAN and full vSAN clusters	No	Yes	Yes
Integrated with Nutanix Acropolis Hypervisor to gracefully shut down of user VMs, controller VMs then AHV on Lenovo HX appliances running AHV	No	Yes (2)	Yes
Manage third-party power devices	No	No	Yes
OpenStack monitoring and control	No	No	Yes

(1) Support for SNMPv1 required at target device

(2) Requires UPM v1.65.221 or higher

UPM brings managing various power and environmental devices under control through a single, web-based interface. The UPM software solution ensures system uptime and data integrity by allowing you to monitor, manage, and control the devices on your network remotely.

The UPM user interface is shown in the following figure.

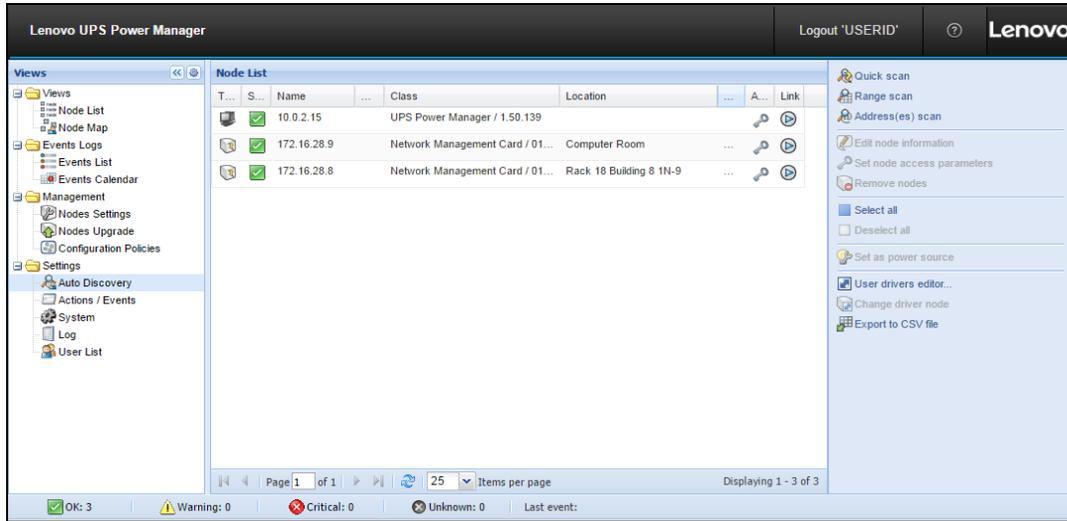


Figure 8. UPM User Interface

The UPM software offers the following features:

- Monitors and manages multiple power and environmental devices from a web browser or your virtual machine management dashboard
- Seamlessly integrates into popular virtualization infrastructures, including VMware ESXi, Microsoft Hyper-V, Citrix XenServer, and Linux KVM
- Triggers live migration for virtual machines during power outages
- By using a user-definable tree structure, enables grouping, access, and management of multiple devices across multiple locations
- Monitors power consumption, which helps track ways to improve energy efficiency
- Uses auto discovery to provide fast installation by automatically detecting devices on the network
- Mass-upgrades firmware, which reduces network management card setup and maintenance time

UPS Power Protector

The UPP software is free to download and use. Download it from the following links (v1.52.007):

- Windows: <https://datacentersupport.lenovo.com/us/en/downloads/DS119231>
- Linux: <https://datacentersupport.lenovo.com/us/en/downloads/DS119230>

UPP software facilitates automatic, graceful shutdown of computers, servers, and network devices that are powered by a UPS, which saves all work-in-progress and ensures data integrity. UPP's user interface provides detailed information about connected servers and UPS units through USB and serial or network communication.

The UPP user interface is shown in the following figure.

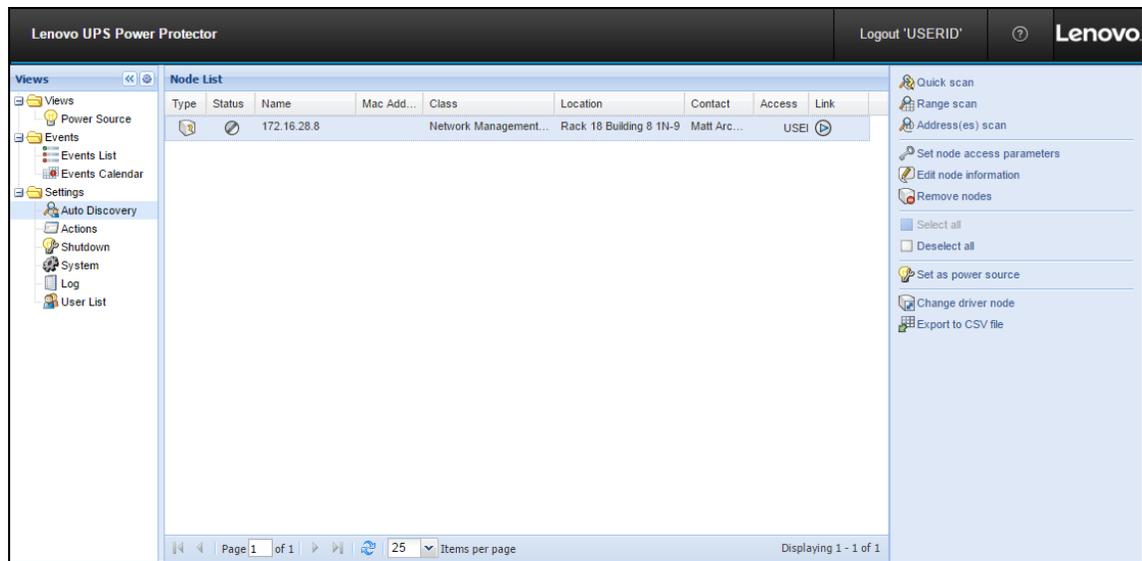


Figure 9. UPP User Interface

The UPP software offers the following features:

- Helps avoid data loss by gracefully shutting down computers and virtual machines or servers that are powered by a UPS during an extended power outage
- Keeps servers running smoothly by automatically identifying hang-ups and rebooting the machine by using a watchdog capability
- Provides redundancy capability for dual-cord servers
- An easy-to-use web browser interface
- Communicates with the protected device directly (via USB or serial) or through the network (via NMC)

Supported servers

The RT5kVA and RT6kVA 3U Rack or Tower UPS offerings are compatible with all ThinkSystem, System x and ThinkServer systems and other devices that require AC power.

To determine the best fit UPS for a particular configuration, the following needs to be considered:

- Total power load of the hardware that will be connected to the UPS
- Number and type of outlets required
- UPS outlet and group limitations for connecting the hardware to the UPS

To determine chassis, node and server overall power capacities, use the Power Configurator tool. The tool can be downloaded from <http://support.lenovo.com/documents/LNVO-PWRCONF>

To determine the power draw of other devices such as storage and switching that will be attached to the UPS, refer to the products user manual for the maximum power draw.

For additional technical information on the UPS line cords, outlets and grouping refer to the UPS Technical Reference, <https://support.lenovo.com/docs/UM104477>

Supported rack cabinets

The RT5kVA and RT6kVA 3U Rack or Tower UPS units can be installed in the compatible rack cabinets that are listed in Table 5.

Table 6. Rack cabinets

Part number	Description
201886X	11U Office Enablement Kit
93072RX	25U Standard Rack
93072PX	25U Static S2 Standard Rack
93634PX	42U 1100mm Dynamic Rack
93634EX	42U 1100mm Dynamic Expansion Rack
93604PX	42U 1200mm Deep Dynamic Rack
93604EX	42U 1200mm Deep Dynamic Expansion Rack
93614PX	42U 1200mm Deep Static Rack
93614EX	42U 1200mm Deep Static Expansion Rack
93084PX	42U Enterprise Rack
93084EX	42U Enterprise Expansion Rack
93074RX	42U Standard Rack
93074XX	42U Standard Rack Extension
93624PX	47U 1200mm Deep Static Rack
93624EX	47U 1200mm Deep Static Expansion Rack
93634AX	PureFlex® System 42U Rack
93634BX	PureFlex System 42U Expansion Rack
93634CX	PureFlex System 42U Rack
93634DX	PureFlex System 42U Expansion Rack

Related publications and links

For more information about this topic, refer to these documents:

- Rack UPS product page
<https://www3.lenovo.com/us/en/data-center/servers/server-options/system-x-options/rack-and-power-infrastructure/upss/c/ups>
- Power and Cooling Technical References:
<http://support.lenovo.com/us/en/documents/lnvo-powinf>
- Power Configurator Tool
<http://support.lenovo.com/au/en/documents/LNVO-PWRCONF>
- *Installation and User's Guide - 3U Rack or Tower UPS*
http://systemx.lenovofiles.com/help/topic/com.lenovo.sysx.racks.doc/rk_3u_ups_iug.pdf
- *Network Management Card User Guide*
<http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-5085199>
- US Announcement Letter
<http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS114-100>

Related product families

Product families related to this document are the following:

- [Uninterruptible Power Supplies](#)

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