

MGE Power Management Solutions for High Availability IT Needs

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1 A Complete Range of Advanced, Flexible Solutions to Address all your Power Management Needs

- ▶ Feature-rich, yet simple-to-use, point-to-point or network-based power protection and management solutions
- ▶ Free capability, via near-by proxy PC, to remotely manage UPS through industry-standard Ethernet protocols and user-friendly web-based graphical interfaces
- ▶ Optional Network Management cards allow MGE UPS's to become autonomous and intelligent network devices with advanced features, accessible over the network
- ▶ Access to the above via either:
 - > user-friendly web-based graphical interfaces,
 - > or simple integration with all the leading SNMP-based network management platforms
- ▶ A wide range of operating systems supported
- ▶ A coherent, transverse offering from low-cost line-interactive 500VA up to 800KVA UPSs and other power quality systems

2 Why Power Management?

MGE UPSs are designed and built to provide you with the best in electrical protection against all power issues, ensuring that your key applications and systems (servers, storage systems, networking equipments...) will continue their mission-critical tasks. In order to deliver the highest up-time, while simplifying the deployment, proactive management and supervision of these systems, hardware and/or software-based management solutions has become an integral part of a true power protection offer.

UPSs are mostly used to provide battery backup in case of a power failure to prevent servers and other IT systems to crash. This protection remains only partial as long as users don't get advanced notification of the remaining battery runtime to adjust their ability to operate on backup power accordingly. Another essential need is the ability to initiate a graceful, orderly shutdown should the server be left unattended.

These needs and many more are being addressed through power management: connecting the UPS to the IT infrastructure will enable remote monitoring and control of power, power event logging and initialization of automatic actions based on these events. Through these secondary, yet essential tasks, power management does enhance reliability and data integrity a lot.

3 MGE's Power Management Solutions for Enterprise IT

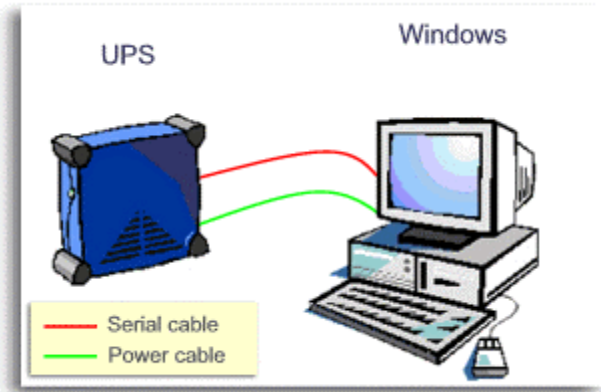
MGE has developed a full line of hardware and software solutions, to meet any kind of needs, from the basic ones of individual users to the very sophisticated ones of enterprise network administrators.

3.1 MGE's Point-to-point Power Management

If you need to protect a single server or workstation and its peripherals, a simple direct communication (RS 232 or USB) between the UPS and the protected IT system will do the job. This can be achieved in two ways.

3.1.1 Power Management Integrated in the Operating System

Some operating systems like Windows include a UPS service. These drivers will only perform basic tasks (like signaling a power failure and initiating an orderly shutdown after a preset battery time) but this can be sufficient for most users. Most MGE UPSs are compatible with these drivers. Installation is typically straightforward: you just need to connect the UPS to the system using a USB cable. The operating system will automatically detect the MGE UPS and install the driver accordingly. The necessary USB or RS232 cable is always included with your MGE UPS.



3.1.2 Dedicated MGE Power Management Software: Personal Solution Pac

Should you be looking for more controls or settings than the integrated driver, MGE Personal Solution-Pac (PSP) is your power management software of choice. In addition to adjusting shutdown parameters to your exact needs, PSP provides extensive capabilities for control of individual receptacles, scheduling facilities, support for hibernate mode in Windows, and many more...

Personal Solution-Pac is available free of charge on the Solution-Pac CD included with any MGE UPS. Also, regular updates and features improvements are available free of charge on MGE's web site. This solution is available for a large variety of operating systems including Windows XP, Server 2003, 2000, NT, 95, 98, etc., Mac OS 9 and OS X, Linux, Netware, Unix, etc. (refer to the table at the end of this document for details)

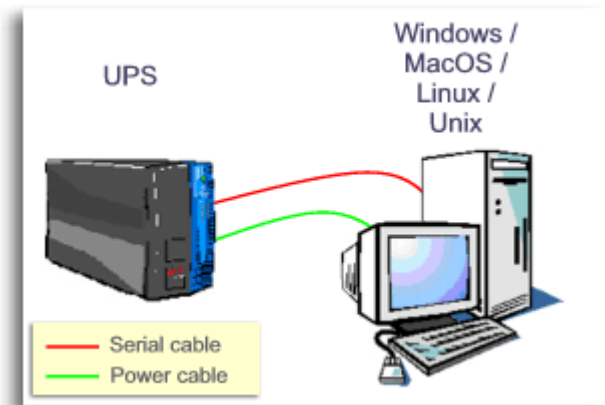


Table 1: How to pick the type of power management solution you need

Your need	Recommended choice	Why?	Limitations
Basic power failure notification and orderly shutdown at the end of battery backup	OS Integrated Power Management	<ul style="list-style-type: none"> > No software installation. > Just connect the USB UPS to a Windows computer 	<ul style="list-style-type: none"> > Limited or no control over shutdown parameters > No UPS shutoff > Windows only
Same as above plus remote notification of power events and extended control of all On/Off sequences	MGE Personal Solution-Pac	<ul style="list-style-type: none"> > Simple to install and operate. > Full set of features > Various OS's 	No communication over the network or possibility to shutdown multiple systems
Same as above plus network communication	Network-based communication	The widest range of possibilities over the network	Knowledge of IP network administration recommended

3.2 Network-based Power Management

In order to manage the power protection of multiple servers, connected to one or more UPS, or, to remotely manage UPS and systems, it is necessary to:

- Integrate/connect the UPS on the IP Network
- Enable proper automatic system shutdown (end of battery runtime...) through installing a "shutdown" module on the protected servers
- Provide a remote management/supervision "console" with a user-friendly interface

Let us review these different steps/components and how they are implemented in MGE's network-based power management solutions.

3.2.1 UPS Integration to the Network

Depending on your environment, MGE proposes two distinct ways to integrate the UPS within an IP network: (1) add a network and management card to the UPS to interface it directly (physically) to the network as an autonomous node, or, (2) use a nearby network-connected PC or server as a "proxy".

3.2.1.1 Add a network management card to the UPS

This solution is recommended for central UPSs protecting a complete network or for UPSs backing up critical nodes. The UPS is fitted with a network management card providing various network protocols (TCP/IP, SNMP, HTTP, XML, Telnet) for various needs. When such a card has been installed, the UPS has a network interface, it bears its own IP address, and it also includes the local computing capabilities to (a) serve web pages to any remote web browser console with reporting, settings and alarms information, (b) integrate with management/supervision systems and send alerts through various standard protocols and (c) communicate with the shutdown modules installed on the power-protected systems.



MGE proposes two such cards:

- MGE SNMP/Web card, available in "minislot" and "transverse" form factors for all UPS's from small line-interactive UPS (Evolution) to large 3-phase systems (Galaxy PW)
- MGE XML/Web card, available only in "transverse" form factor for large on-line single- and 3-phase systems (Pulsar and Comet Extreme, Comet EX RT, Galaxy 3000 and PW).

MGE SNMP/Web cards fit most needs for small single-phase UPS systems, while MGE XML/Web cards provide advanced features for larger UPS's. (Please refer to the selection table to pick the most appropriate network management card for you)



3.2.1.2 Integrate the UPS to the network using a near-by "proxy" PC or server

For small, inexpensive UPSs, the relative cost of a power management card may be too high. These systems can still be managed over the network by means of a proxy software agent installed on one of the protected IT devices (that is physically connected to the PC via a serial connection). The proxy system provides the physical network connection, and the proxy software handles the various protocols needed to interact with the remote console, or shutdown module. This solution is attractive as it gives access to network management capabilities without any additional cost on the UPS side. However, UPS communication is dependent on the availability of the network connection on the protected IT device. Any loss of communication due to the user turning off the PC or the system being frozen will void any communication to and from the UPS.

Like for management cards, two proxy agents are available from MGE:

- MGE UM-Agent, is better suited if your management need is to integrate UPS's within a larger scale NMS (Network Management System) that usually rely on the SNMP standard, such as HP Openview, IBM Tivoli Netview, or Computer Associates Unicenter
- MGE XML-Agent, if your objective is to remotely manage the UPS, through a standard web browser, or if you want to be able to shut down a very large number of protected servers (250 machines or more)

Table 2: Step 1 - How to pick the right connection method to the network

Your need	Recommended choice	Why?	Limitations
Managing UPS protecting critical systems	Network management card within the UPS -> Go to Step 2a	Total control over the UPS	Might be too expensive compared with the cost of small UPSs
Managing small UPSs over the network	Install a proxy agent software in a near-by system -> Go to Step 2b	No additional cost	UPS communication will be lost should the protected IT device be turned off or locked up

Table 3: Step 2a - How to pick the right MGE network management card for your needs

Your need	Recommended choice	Why?	Limitations
<ul style="list-style-type: none"> > Support of all UPSs from small to large > Web-based supervision and integration within NMS (Openview, etc.) 	MGE SNMP/Web card	<ul style="list-style-type: none"> > Exists in two formats to fit in all UPS (starting with Evolution) > Support of HTTP and SNMP standards 	<ul style="list-style-type: none"> > Protection of up to 32 servers > Web-based monitoring not as rich for 3-phase systems
<ul style="list-style-type: none"> > Feature-rich 3-phase supervision > Protection of more than 32 servers > Advanced security 	MGE XML/Web card	<ul style="list-style-type: none"> > Advanced monitoring for 3-phase systems > Supports up to 50 shutdown "client" modules HTTPS, SSL 	<ul style="list-style-type: none"> > No SNMP support > Card format not compatible with small (<5KVA) single-phase UPS's

Table 4: Step 2b - How to pick the right MGE proxy agent software for your needs

Your need	Recommended choice	Why?	Limitations
<ul style="list-style-type: none"> > Integrate within a management solution using SNMP 	MGE UM-Agent	SNMP-based	Supports serial communication only
<ul style="list-style-type: none"> > Use a standard browser for monitoring/management > Protection of up to 250 servers 	MGE XML-Agent	<ul style="list-style-type: none"> > Full-feature web-based monitoring > Supports up to 250 shutdown "client" modules > USB and serial communication supported > HTTPS/SSL > Central configuration 	Requires a dedicated Windows 2000 server with IIS installed

3.2.2 Servers Protection/Shutdown

Ensuring data integrity of the protected server(s) is the essential benefit of power management. As computer systems require proper application and operating system shutdown sequences to ensure system and data integrity, MGE power management solutions allow, among multiple automatic possibilities, to:

- > let the system execute a script to close any application running on the server (like a database);
- > select whether the operating system will initiate its shutdown sequence after a preset time (to conserve battery time for any subsequential power failure) or just prior to battery exhaustion for service continuity;
- > select whether they want the operating system to reboot automatically or manually on power restoration.
- > customize alert notification on UPS events

Once one of the above network connection mechanisms has been established, a shutdown software module (or shutdown client) is installed on each of the computers that are power-protected by the UPS. This shutdown client is in close interaction with the UPS system, via the Ethernet link provided by the management card or proxy agent. The UPS continuously monitors its power state and battery status. It is able to trigger actions, as predefined according to the administrator's preferences. One of the most important actions would be for example, to initiate a clean system shutdown during an extended power outage, before the battery runs out of capacity. Upon these conditions, an order would be sent to each shutdown software modules, so that they can in turn, call the operating system for applications, then proper OS shutdown. Many advanced features are available to customize events handling upon crisis situations; please refer to the detailed feature list.

MGE's shutdown software modules are called either UM-Client or XML-client, and are designed to work respectively with the matching communication mechanisms (cards or proxy agents):

- UPS network integration through **SNMP/Web card** or **UM-Agent**: install **UM-Clients** on each of the protected servers
- UPS network integration through **XML/Web card** or **XML-Agent**: install **XML-Clients** on each of the protected servers; XML-client is a "light" software that can also be very conveniently deployed using "silent" installation and centralized configuration

MGE's UM-Client and XML-Client are available for a very wide range of operating systems, and MGE power management solutions allow for simple protection of heterogeneous OS-based servers connected to a single UPS.

3.2.3 Remote Management and Supervision

Multiple user categories may want to check the status of their UPSs remotely. Be it at a departmental, building or enterprise level, MGE power management solutions can be integrated seamlessly with the most convenient administration tools.

3.2.3.1 From any web browser

Thanks to the embedded capabilities of MGE's network management cards and XML-Agent, it is possible to access each UPS detailed status, measures and settings from anywhere on the network, using a standard web browser. Just store the IP address of your UPS(s) in your favorite web browser and check their status at any time through a few simple interactive panels. You can also "subscribe" to UPS alarms notifications: in that case, you will receive these alarms even if your web browser is not pointing to UPS web pages. There is no software installation required and compatibility with your operating system is no longer an issue. This solution is available right out of the box for any MGE UPS.



3.2.4.2 On/Off control

How to reboot some locked up IT equipment in a remote, secured site when nobody on site has access privileges or the knowledge to perform this simple yet essential task? Using the UPS as a smart switch is an easy way to overcome this issue: Once notified of a loss of service with the IT system, the network administrator can simply send a command to the UPS to switch Off and On sequentially. This will reboot the faulty IT device automatically. No expensive service cost, no extended downtime to be afraid of.

3.2.4.3 Individual outlet control

More and more modern UPSs can expand On/Off control capabilities further: you can not only control the output of the UPS, but also control each output receptacle individually. This feature opens a vast range of possibilities, including:

- > the ability to shed non-critical systems in case of power failure to extend battery runtime to more critical devices;
- > the assignment of preset startup sequences to prevent potentially damaging inrush currents, or to first start servers then workstations;
- > the possibility to manage individually multiple IT systems connected to one central UPS as if they were all connected to their own UPS.

3.2.4.4 Summary: Control features (Table 5)

Your need	Benefits	Solution	How? / When ?
Turn IT devices Off at a preset time, then reboot at another time	<ul style="list-style-type: none"> > Energy conservation > Access control 	Scheduling	<ul style="list-style-type: none"> > Automatic > On Utility power/Always
Turn IT devices Off, then On again	<ul style="list-style-type: none"> > Reboot locked up devices 	On/Off control	<ul style="list-style-type: none"> > Manual > Always
Turn non-critical IT devices Off in case of a power failure	<ul style="list-style-type: none"> > Longer operation time for critical systems 	Load shedding	<ul style="list-style-type: none"> > Automatic > On battery power
Start up sequentially IT devices	<ul style="list-style-type: none"> > Prevent initialization issues related to inrush currents on start-up 	Sequential start-up	<ul style="list-style-type: none"> > Automatic > Always

3.2.5 Additional Options using Multislot and the New Environment Sensor

3.2.5.1 Multislot



Using MGE's Multislot gateway, you can either:

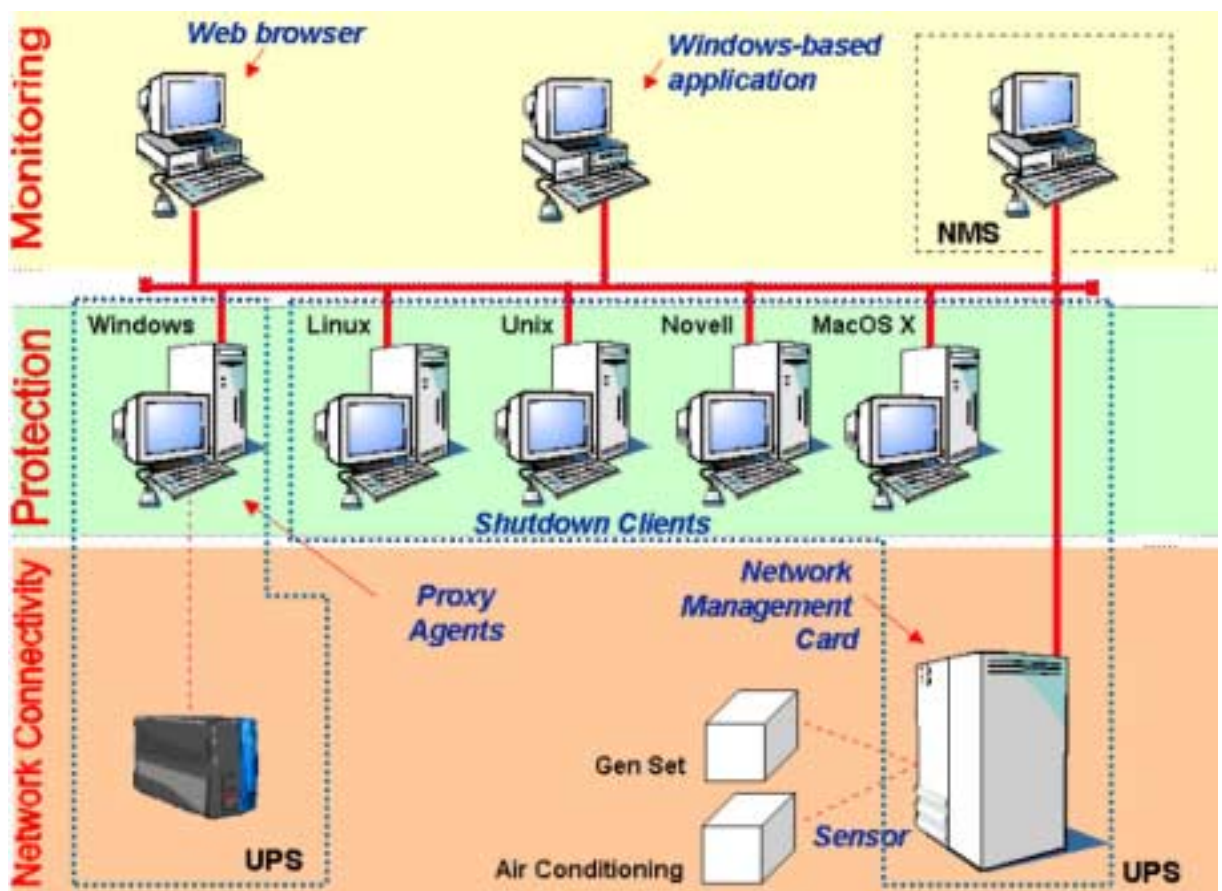
- Connect any large MGE UPS to the network (even those who cannot accept directly a network management card); Multislot will be connected to your UPS via serial link and it will be fitted with the network management card of your choice
- Connect a single UPS to several distinct networks (note that some UPS's can accommodate three network cards without requiring the Multislot)

3.2.5.2 Environment Sensor for SNMP/Web cards

UPS are frequently used in sensitive environments such as computer racks. Environmental conditions (temperature, humidity, door opening) can also impact the information system availability and uptime. For this reason, MGE UPS provide with its management offering, a complete communication and management framework. It is highly recommended to integrate these additional features to the UPS's availability, monitoring and alert capabilities.

This product provides : a temperature sensor, a humidity sensor, and two contact inputs (for rack door opening, etc). It can be conveniently located anywhere using velcro straps, and connected to the SNMP/Web cards (Transverse or Minislot). Alerts are generated when value is over user-defined thresholds or on change of the contact status. Through the web interface of the SNMP/Web card, one can easily check temperature and humidity (current, min, max, etc.), set new thresholds, configure events handling, etc.

Diagram 1: Network-based Power Management Summary



Features and Selection Guide

3.3 Personal Solution-Pac Features and Supported OS's

PSP features	Windows	Mac OS	Linux (Intel)	IBM/Sun/HP	Novell Netware
Versions	Server 2003 /XP/2000/ NT/9X	OS 9/OS X		AIX 4.3, 5.1, 5.2 / Solaris WS 7,8, 9, PC 2.6, 7, 8 / HP-UX 10.x, 11	4.1x, 5.x, 6
Installation/setup					
Connection	USB or Serial	USB	Serial (USB with NUT Open-Source drivers)	Serial	Serial
Plug-and-Play Compatible	Yes				
Easy setup (default configuration fits most)	Yes	Yes	Yes	Yes	Yes
Basics					
Automatic system shutdown on timer or low battery	Yes (Shutdown and Hibernate)	Shutdown	Shutdown	Shutdown	Shutdown
Automatic system reboot	Yes	Yes	Yes	Yes	Yes
Warning messages to admin and/or users	Yes	Yes	Yes	Yes	Yes
Log file	Yes	Yes	Yes	Yes	Yes
Alert messages to Email/pager/SMS	Q2, 2004 (Email/pager/SMS)		Yes (Email)	Yes (Email)	
Graphical User Interface					
UPS monitoring GUI	Advanced	Basic	Semi graphical	Semi graphical	From Windows station
Log file graphical view	Yes				
Contextual help	Yes				
Integration to OS shortcuts	Systray, program files, Integrated to Power Management Options	System preferences			
Advanced features					
Launch specific programs after power failure or before shutdown	Yes	Yes (before shutdown)	Yes	Yes	Yes
Configure Events & actions	Yes		Yes	Yes	Yes
UPS ON/OFF Schedule	Yes				
Output receptacle management (for UPS with Powershare)	Yes				Yes
Multi-server shutdown	Use network-based power mgt solution	SSH shutdown script	Use network-based power mgt solution	Use network-based power mgt solution	Use network-based power mgt solution
Life cycle monitoring					
Automatic battery test	Yes	Yes	Yes	Yes	Yes

3.4 Network-based Power Management Features Summary

	SNMP/Web card or UM-Agent (network connection) + UM-Client (protected system shutdown)	XML/Web card or XML-Agent (network connection) + XML-Client (protected system shutdown)
Network Connection...		
...via Network Management Card:		
	SNMP/Web card	XML/Web card
Form factor/UPS compatibility	- Minislot for Pulsar Evolution and EXtreme C - Transverse for EXtreme, EX, Galaxy 3000, Galaxy PW and MultiSlot	- Transverse for EXtreme, EX, Galaxy 3000, Galaxy PW and MultiSlot
Network interface	10Base-T and 100Base-Tx connection (auto sensing)	10Base-T and 100Base-Tx connection (auto sensing)
Network Protocols	TCP/IP, UDP,HTTP1.1, SNMPV1, Telnet, TFTP, SNTP, BOOTP, DHCP	TCP/IP, UDP,HTTP1.1, BOOTP, DHCP
Indicators (LED)	10Base-T and 100Base-Tx connection Link and activity indicator	10Base-T and 100Base-Tx connection Link and activity indicator
SNMP traps with acknowledgment	Yes	No
MIB	IETF MIB, standard MIB II, MGE MIB	No
Multiples server shutdown with various OS	32 (UM-clients)	50 (XMLClient)
Export of logs	Yes	Yes
Real-time clock embedded	Yes	Yes
Remote UPS control	Yes	No
Powershare™ management	Yes	No
Three-phase supervision	Limited	Rich
Security	Password protection	SSL encryption
Settings / Maintenance	Local(RS232) or remote (HTTP or Telnet)	Local(RS232) or remote (HTTP)
Shutdown simulation	Yes (from Dx release)	Yes
Email notification	Yes	No
Environmental monitoring (Temp, humidity, contacts)	Yes with optional remote sensor	No
...via proxy PC:		
	UM-Agent	XML-Agent
UPS Connection	Serial	USB and serial
OS supported (proxy)	Windows 95, 98, Me, NT, 2000, XP, Server 2003 ; NetWare ; HP/UX 10.x, 11 ; IBM AIX 4.2, 4.3, 5.1 ; SCO Unix and more	Windows NT, 2000
IETF and MGE MIB	Yes	No
SNMP traps with acknowledgment	Yes	No
Max. number of shutdown clients	24 (UM-Clients)	Unlimited - tested with up to 250 clients
Powershare™ management	Yes	No
SSL encryption	No	Yes
Shutdown simulation	No	No
Actions upon UPS events	No	Yes

	SNMP/Web card or UM-Agent (network connection) + UM-Client (protected system shutdown)	XML/Web card or XML-Agent (network connection) + XML-Client (protected system shutdown)
Protection/Shutdown and Event Management		
Shutdown module:	UM-Client	XML-Client
Installation/setup		
OS supported (protected server)	Windows Server 2003, XP, 2000, Me, 9x, NT (Intel & Alpha), Linux, Netware, IBM AIX, HP-UX, SUN Solaris, Compaq Tru64, SCO OpenServer & Unixware, Interactive Unix, OS/2,	Windows (Server 2003 Under test), XP, 2000, NT (Intel), Linux, Mac OS X, Netware, IBM AIX, HP-UX, SUN Solaris, Any OS Compatible with Java 2
Ease of deployment: silent installation, central configuration, build customized package	No	Yes (except for Mac OS/X that only supports Central Configuration)
Easy setup (default configuration fits most)	Yes	Yes
Basics		
Automatic system shutdown on timer or low battery	Yes (Shutdown)	Yes (Shutdown + Hibernate for Windows)
Automatic system reboot	Yes	Yes
Warning messages to admin and/or users	Yes	Yes
Log file	Yes	Yes
Alert messages to Email/pager/SMS	(under Windows)	Email/pager/SMS for Windows and e-mail for others
Advanced features		
Launch specific programs after power failure or before shutdown	Yes	Yes
Configure Events & actions	Yes (limited & through UM-Console +)	Yes (full features)
System shutdown on individual outlet ON/OFF (UPS with Powershare feature)	Yes	No
Remote Management and Supervision		
UM-Console+ related features	For UM-Agent only:	
UPS ON/OFF Schedule	Yes	
Powershare outlet management (individual ON/OFF)	Yes	
Web interface related features	Web based with SNMP/Web card only:	
UPS status monitoring and event log	Yes (with SNMP/Web card only)	Yes
Export of logs	Yes (with SNMP/Web card only)	Yes
UPS ON/OFF	Yes with SNMP/Web card (use UM-Console+ with UM-Agent)	No
Powershare outlet individual ON/OFF	Yes with SNMP/Web card (use UM-Console+ with UM-Agent)	No
Alarm notification via browser	Yes (with SNMP/Web card only)	Yes
NMS integration related features		
SNMP compliance (RFC 1628)	Yes	
Snap-in application for UPS monitoring	Available for HP Open-View Windows/UX, IBM Tivoli Netview, CA Unicenter, HP Insight Manager	

3.5 Ordering and Part Numbers

	SNMP/Web card or UM-Agent (network connection) + UM-Client (protected system shutdown)	XML/Web card or XML-Agent (network connection) + XML-Client (protected system shutdown)
Network Connection...		
...via Network Management Card:	SNMP/Web card	XML/Web card
	- 66244 for Pulsar Evolution and EXtreme C - 66074 for EXtreme, EX, Galaxy 3000, Galaxy PW and MultiSlot	- 66073 for EXtreme, EX, Galaxy 3000, Galaxy PW and MultiSlot
...via proxy PC:	UM-Agent	XML-Agent
	On CD included with most UPS's or free of charge on MGE web site	Available free of charge on MGE web site
Protection/Shutdown & Event Management		
Shutdown module:	UM-Client	XML-Client
	On CD included with most UPS's or free of charge on MGE web site	Available free of charge on MGE web site
Remote Management & Supervision		
MGE Tool:	UM-Console+	
	On CD included with most UPS's or free of charge on MGE web site	
Integration with Network Management Systems	Management-Pac 2	
	66923 (available March '04)	
Multislot DIN/USE	66055	
Multislot IEC	66057	
Environment Sensor for SNMP/Web card	66846	