

PowerWAVE 6000 (500 kVA)

Technical Specification



Continuous power availability is essential in today's dynamic IT and process-related environments. It is equally important that any installed power protection system is sufficiently resilient and adaptable to handle changes brought about by the introduction of new server technologies, migration and centralization. Such demands are well met by the PowerWAVE 6000 UPS system, which provides the foundation for continuous power availability of network-critical infrastructures both in enterprise data centres, where business continuity has paramount importance, and in process control environments where manufacturing continuity is essential.

The PowerWAVE 6000 incorporates the latest technological developments in power engineering and represents a completely new generation of high power, three phase UPS systems. Its advanced double conversion VFI (Voltage and Frequency Independent) topology responds fully to both the highest availability and environmentally friendly requirements compliant with IEC 62040-3 (VFI-SS-111) standards.

PowerWAVE 6000 features innovations that combine to deliver the industry's best key values such as: enhanced power performance, parallel capability and connectivity's interaction.

Uninterruptible Power Supplies Ltd. specialises in the installation and maintenance of Uninterruptible Power Systems; and this powerful UPS is just one example of our wide range of state-of-the-art power protection devices that will provide your critical equipment with a steady and reliable power supply for many years.

PowerWAVE 6000 configurations

The PowerWAVE 6000 UPS can be configured to operate as a single, stand-alone UPS or several (up to 10) UPS cabinets can be connected in parallel to operate as a multi-module UPS system. A multi-module configuration is generally chosen either to increase a system's total power capacity or to provide module redundancy in order to keep the load supplied in the event of a module failure.

Due to its Decentralised Parallel Architecture (DPA) design, each PowerWAVE 6000 UPS can take the leadership role when operating in a multi-module system, which avoids single points of failure in the parallel chain and ensures the highest level of power availability.

System expansion

Most data centres present a low initial power demand which increases as the data centre grows to its full capacity; and it is essential that the installed power protection system can be expanded to meet the growing demand without compromising the existing load. This situation is easily managed in a PowerWAVE 6000 multi-module installation by adding an additional UPS(s) to an existing system to increase the overall system capacity without having to temporarily transfer the load to the raw mains (by-pass) supply. This results in the highest level of power availability interruption free.

Key features


The highlights of this innovative UPS solution include its high reliability, upgrade ability, low operating costs and excellent electrical performance.

KEY FEATURES	
Compact size, small foot print	Space saving on expensive floor space
Flexible battery management	Advanced management of battery charging and preventive failure diagnostics avoids premature deterioration of battery life.
Best in class ac-ac efficiency, up to 96%	Energy-Operational cost savings (TCO)
Low input power factor (near unity)	Cost savings during installation and the entire life cycle (TCO)
Blade-server-friendly power; full power from 0.9 lead to 0.9 lag	No de-rating required with leading PF loads
Very low input current distortion THDi THDi = < 3.5% @ 100% load	Gen-set power and installation cost saving


GENERAL SPECIFICATIONS

This Technical Specification provides detailed technical information on the mechanical, electrical and environmental performance of the PowerWAVE 6000 500kVA model; and is intended to support and provide answers to tender and end-user requirements.

MECHANICAL CHARACTERISTICS SUMMARY	
Dimensions (WxHxD)	1650x1994x850 mm
Dimensions with elevation kit (WxHxD)	1650x2094x850 mm
Weight	950 kg
Colour	Graphite (RAL 7024)
Transportation pallet	Provided with UPS.
Positioning	Minimum 100mm from side and 400mm top clearance. No rear space required for service or operating access.
Input and output power cable entry	Bottom
Battery	Located in separate battery cabinet or rack mounted. Bespoke to installation.



MECHANICAL CHARACTERISTICS 500kVA + Top Cable Entry (TCE) cabinet	
Dimensions (WxHxD)	2150 x 1994 x 850 mm
Dimensions with elevation kit (WxHxD)	2150 x 2094 x 850 mm
Weight with TCE basic	950+115 kg
Weight with TCE + single input feed cables	950+245 kg
Weight with TCE + dual input feed cables	950+285 kg
Colour	Graphite Grey (RAL 7024)
Transportation pallet	Provided with UPS. TCE Cabinet shipped separately
Positioning	Minimum 100mm from side and 400mm top clearance. No rear space required for service or operating access.
Input and output power cable entry	Top of TCE cabinet
Power cables between TCE and UPS	Bottom
Battery	Located in separate battery cabinet or rack mounted. Bespoke to installation.



SYSTEM CHARACTERISTICS					
Topology		On-line, double conversion, Voltage and Frequency Independent (VFI)			
Technology		Second generation transformerless			
Parallel configuration expansion		For added redundancy and/or capacity a parallel system can be extended to up to 10 modules on request			
Max load power connection	kW	500			
Double conversion AC/AC efficiency with fully charged battery and linear load (PF = 1)	Load	25%	50%	75%	100%
	% eff.	95.5%	96.0%	95.5%	95.0%

INPUT CHARACTERISTICS					
Nominal input voltage	V	3x 380/220V+N, 3x 400/230V+N, 3x 415/240V+N			
Input voltage tolerance (ref to 3x400/230V) for Loads in %:	V	(-23% to +15%) 3x308/177 V to 3x460/264 V for <100 % load (-30% to +15%) 3x280/161 V to 3x460/264 V for < 80 % load (-40% to +15%) 3x240/138 V to 3x460/264 V for < 60 % load			
Input frequency	Hz	35-70			
Inrush current	A	Limited by soft start			
Max. Input Power with rated output power and charged battery (pf=1.0)	kW	532			
Max. Input Current with rated output power and charged battery (pf=1.0)	A	771			
Max. Input Power with rated output power and discharged battery (pf=1.0)	kW	585			
Max. Input Current with rated output power and discharged battery (pf=1.0)	A	848			
	Load	25%	50%	75%	100%
Input power factor (leading)		0.96	0.985	0.99	0.99
Input current distortion (THDi) (%)		9.0	6.0	4.5	3.5

BATTERY CHARACTERISTICS	
Battery type	Maintenance-free VRLA or NiCd
Variable number of 12V battery blocks	44 - 50 blocks (only even numbers allowed)
Maximum battery charger current (standard)	100 A
Temperature controlled battery charger	Yes (temperature sensor optional)
Battery charging curve	Ripple-free: IU (DIN 41773)
Battery test	Automatic and periodic (adjustable)

OUTPUT CHARACTERISTICS		
Output rated power (@min 44 battery blocks)	kW	500
Output current In (PF=1.0) (@min 44 battery blocks)	A	722
Output rated voltage	V	3x 380/220 or 3x 400/230 or 3x 415/250
Output voltage stability (Static)	%	< ± 1.0
Output voltage stability (Dynamic)	%	< ±4 (with load step 0-100%, 100-0%)
Output voltage distortion with linear load	%	< 2 with linear load
Output voltage distortion with non-linear load	%	< 4 (EN 62040-3:2001)
Output frequency	Hz	50 or 60
Output frequency tolerance	%	±0.1 free-running, quartz oscillator ±2 or ±4 with mains synchronised (selectable)
Frequency slew rate	Hz/s	1.0
Output waveform		Sinewave with 0deg. phase imbalance @100% unbalanced load
Permissible unbalanced load	%	100% (all 3 phases independently regulated)
Overload capability on inverter	%	At PF=1.0 110% load for 10 minutes At PF=1.0 135% load for 1 minute At PF=0.9 125% load for 10 minutes At PF=0.9 150% load for 1 minute
Output short circuit capability (rms)	A	On inverter: 2x inverter rated output for 40ms On bypass: 10x rated In for 10ms
Crest factor		3:1
Bypass operation		At ±15.0% of nominal input voltage

OUTPUT POWER VERSUS COS Ø													
	Inductive (lagging COS Ø)								Unity	Capacitive (leading COS Ø)			
	0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95		1.0	0.95	0.9	0.85
kVA	500	500	500	500	500	500	500	500	500	500	500	490	485
KW	300	325	350	375	400	425	450	475	500	475	450	417	338

V_{out}=230Vac (L-N), 50 Hz, with minimum of 44 battery blocks

BYPASS CHARACTERISTICS		
Bypass rating	kVA	500
Overload capacity	%	1000% for 10 msec.
Load transfer time from inverter to bypass	ms	0.0
Load transfer time from bypass to inverter	ms	< 1.0
Minimum mains voltage before inhibiting the bypass	V	190
Integrated maintenance bypass		Yes (Optional)

ENVIRONMENTAL CHARACTERISTICS			
Audible noise @ 100/50% load	dBA	N/A	
Ambient temperature for UPS	°C	0 to 40	
Ambient temperature for batteries (recommended)	°C	20	
Battery storage time at ambient temperature		Maximum 6 months	
Cooling		Fan-assisted	
Airflow (25 - 30°C) with 100% non-linear load	m³/h	6550 (EN 62040-1-1:2003)	
Heat dissipation with 100% non-linear load	W	30000	
Heat dissipation with 100% non-linear load	BTU/h	102389	
Heat dissipation without load	W	4000	
Relative air-humidity		Maximum 95% (non-condensing)	
Max altitude above sea level without derating		1000m (3300ft) without derating	
De-rating factor for use at altitudes above 1000m sea level according (IEC 62040-3)		Height above sea level (m/ft)	Derating factor for power
		1500 / 4850	0.95
		2000 / 6600	0.91
		2500 / 8250	0.86
		3000 / 9900	0.82

STANDARDS	
Safety	EN62040-1-1:2003 EN60950-1:2001/A11;2004
Electromagnetic compatibility	IEC/EN 62040-2:2005, IEC/EN61000-3-2:2000, IEC/EN61000-6-2:2001,
Performance	EN 62040-3:2001
Product certification	CE
Degree of protections	IP20

COMMUNICATION OPTION DETAILS

COMMUNICATION OPTIONS	
Touch-screen control panel	TFT displays mimic diagram showing UPS operational status
Customer Interfaces: (Dry Ports)	<ul style="list-style-type: none"> • X1 – Castell interlock interface • X2 – Status and alarm outputs for remote indication and interfacing with BMS systems. • X3 – Customer inputs interface. Emergency stop, On Generator, etc
RS232 on Sub-D9 port RS232 on USB port	For monitoring and integration in network management
RS485 on RJ45 port	Remote monitoring system with graphical display (option)
RS485 on RJ45 port	For multidrop purposes (option)
Slot for SNMP Card	Ethernet card for monitoring and integration in network management (option)
Slot for SNMP Card	Modem card for GSM remote monitoring (option)

UPS Control panel

The TFT control panel has a microprocessor-based touchscreen display which offers simple operation. When the UPS is energised the display runs through an initialisation process for several seconds and then automatically turns on, displaying the default mimic diagram screen. The screen's backlight turns off after three minutes of inactivity and turns back on when the screen is next touched.

From the UPS control panel the operator can:

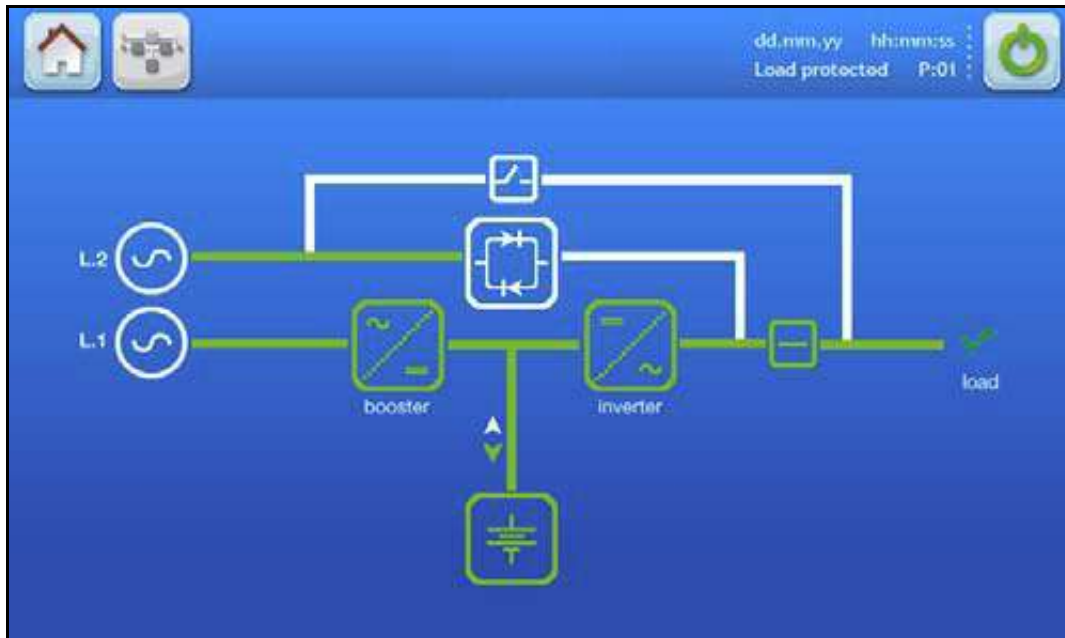
- Stop and start the UPS module
- Transfer the UPS output (load) between the inverter and bypass supply
- Monitor the UPS input/output voltage, current and frequency
- Monitor the battery charge and discharge current, and battery status
- Interact with monitored alarm and warning messages
- Configure the UPS operating parameters
- Interrogate the UPS events and alarm history
- Carry out diagnostic actions

Default mimic display

A UPS mimic diagram is displayed on the default screen and shows the power flow through the UPS module and indicates its operating status – in either single cabinet or multi-cabinet configuration. This screen can be accessed from any other screen by pressing the MIMIC icon in the display header bar.

The functional status of each block is identified by its line colour, as shown below.


- Green – In operation
- White – Inactive
- Yellow – Warning condition
- Red – Fault condition



Three meters are included on the mimic display screen to indicate the rectifier, inverter, bypass and load operating parameters. The meter source is selected by touching the associated power block on the mimic display. The battery meter display includes the battery temperature and remaining autonomy time.

Display header bar

A navigation and status bar is displayed in the header area of every screen.



A Home	Accesses the HOME screen.
B Mimic diagram	Accesses the MIMIC diagram screen.
C Warning	The warning symbol is only visible in the presence of an alarm or monitored events. Touching this icon will silence the audible alarm and open the EVENTS screen.
D Date	Current date indication. Set in the user menu and used to date-stamp the alarms/events log.
E Time	Current time indication. Set in the user menu and used to timestamp the alarms/events log.
F ON/OFF	Turns the UPS module ON/OFF. Requires a confirmation message to be accepted.
G UPS number	Each UPS module is given a sequential number in a parallel system. The number shown here is used to identify a particular module –e.g. P01 indicates the UPS number 01. In a single module installation this would indicate S.
H Load Status	Load status: displays whether or not the load is protected, when the user is in the module navigation level.

Home screen

The home screen is accessed by pressing the HOME icon on the display header bar on any screen and contains six icons that provide access to subordinate control and set-up function screens.



K Events	Displays a list of recently occurred events with date, time, event name, description and sequential ID number. As a default the most recent appears on top.
L Measures	This item displays a full set of measurements for each functional block of the UPS.
M Command	In this menu, the user can change the operating mode of the UPS. Once the command is executed, the user is immediately directed to the mimic diagram where the new status of the UPS is indicated.
N UPS Data	Gives information regarding the manufacturing of the UPS.
O User	Enables the adjustment of data such as date and time, automatic battery test, etc .
P Service	This password protect area enables the service technician to adjust several UPS parameter..

Customer interfaces: (Dry ports)

Customer I/O interface facilities are made available at three terminal blocks annotated X1, X2 and X3. The connections are made to Phoenix spring terminals (cable 0.2mm² to 1.5mm²).

All voltage-free contacts are rated at 250Vac/8A, 30Vdc/8A, 110Vdc/0.3A, 220Vdc/0.12A

	Terminal	Contact	Signal	Display	Function
X3	X3/14	Gnd	Gnd		Battery Temperature Sensing (If connected this input is battery temperature dependent)
	X3/13	In	+3.3V		
	X3/12	Gnd	Gnd	GENERATOR OPER ON	Customer Specific Input (1) (Default NC = Generator on line)
	X3/11	In	+12V		
	X3/10	Gnd	Gnd	EXTERNAL O/P BREAKER	When used, both the external output breaker and internal IA2 have to be either open or closed in order to isolate or connect the UPS. Display: PARALLEL_SW_OPEN or PARALLEL_SW_CLOSED
	X3/9	In	+12V		
	X3/8	Gnd	Gnd	EXT MAN BYP	External Manual Bypass (Default NC = External bypass closed)
	X3/7	In	+12V		
	X3/6	Out	+12V		+12Vdc Power source (max 200mA)
	X3/5	Gnd	Gnd		
	X3/4	Gnd	Gnd	REMOTE SHUTDOWN	RSD Remote Shut Down Leave jumper JP5 in place if no Remote Shut Down input is connected
	X3/3	In	+12V		
	X3/2	-		REMOTE SHUTDOWN	RSD Remote Shut Down (For external switch) Max 250Vac/8A, 30Vdc/8A, 110Vdc/0.3A, 220Vdc/0.12A
X3/1	-				
X2	X2/18	Com			Common
	X2/17	NC			Auxiliary NO
	X2/16	NO			Auxiliary NC
	X2/15	Com	Alarm	COMMON ALARM	Common
	X2/14	NC			No Alarm Condition
	X2/13	NO			Common (System) Alarm active
	X2/12	Com	Status	LOAD ON MAINS	Common
	X2/11	NC			Load NOT On Bypass
	X2/10	NO			Load on Bypass (Mains) active
	X2/9	Com	Alarm	BATT LOW	Common
	X2/8	NC			Battery OK
	X2/7	NO			Battery Low active
	X2/6	Com	Status	LOAD ON INV	Common
	X2/5	NC			Load not On Inverter
	X2/4	NO			Load on Inverter active
	X2/3	Com	Alarm	MAINS OK	Common
	X2/2	NC			Mains Failure
X2/1	NO		Mains Present		
X1	X1/2	230Vac	-	EXT MAN BYP	Castell Interlock Function External Manual Bypass closed (230Vac 2AT)
	X1/1	N	-		

RS232 Computer serial interface

A serial RS 232 interface is available through a standard 9-pin, female D-Type socket (JD1 Smart Port) and a standard USB port.

The Smart Port provides an intelligent RS 232 serial port which allows the UPS to be connected to a computer. When used in conjunction with the optional WAVEMON software, it enables the computer to continuously monitor the input mains voltage and UPS status, and display a message in the event of any UPS system changes.

RS485 Interface for multidrop

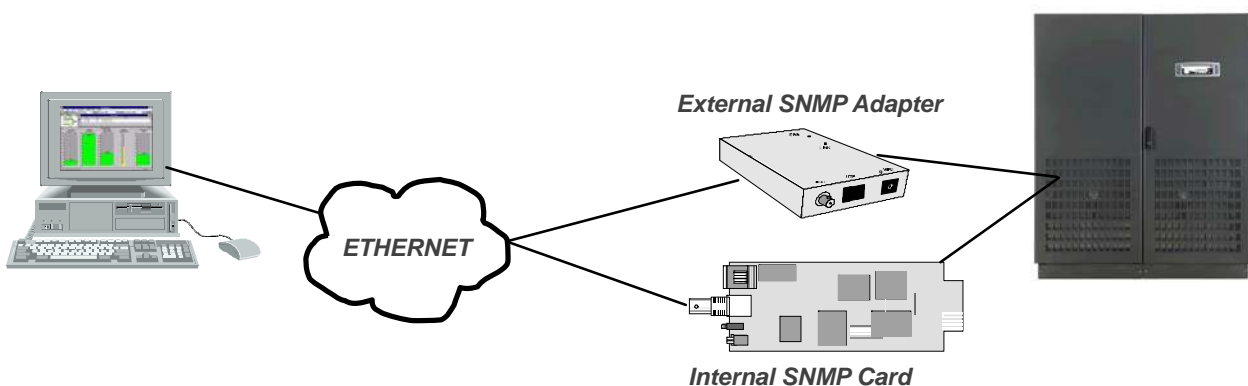
The computer interface (JR1) is an intelligent RS485 serial port that allows a computer to access system information from all the modules that are connected in a parallel system, using the Multidrop connection kit. The retrieved data can be used to display the system operating parameters and status. JR1 is a standard RJ45 socket.

SNMP Card slots

Simple Network Management Protocol (SNMP) is a world-wide, standardised communication protocol that can be used to monitor any network-connected device via a simple control language. The monitored results are displayed in an application running within a standard web browser.

The PowerWAVE 6000 contains two SNMP slots; one is designed to house a Modem/Ethernet SNMP adapter card and the other a Modem/GSM adapter. Alternatively, SNMP connectivity can also be implemented using an external SNMP adapter connected to the UPS RS232 output.

An SNMP/Ethernet adapter contains an RJ-45 connector which allows it to be connected to the network using a standard network cable. Once connected, the UPS-Management software agent, which is already installed in the SNMP adapter, then monitors the UPS operating parameters and outputs its data in SNMP format to the connected network. In a multi-module UPS system the SNMP interface can communicate 'system-wide' data or data for an individual UPS module.



UPS MONITORING AND AUTOMATED CONTROL SOFTWARE

Three (optional) monitoring systems are available for use with the PowerWAVE 6000 UPS system:

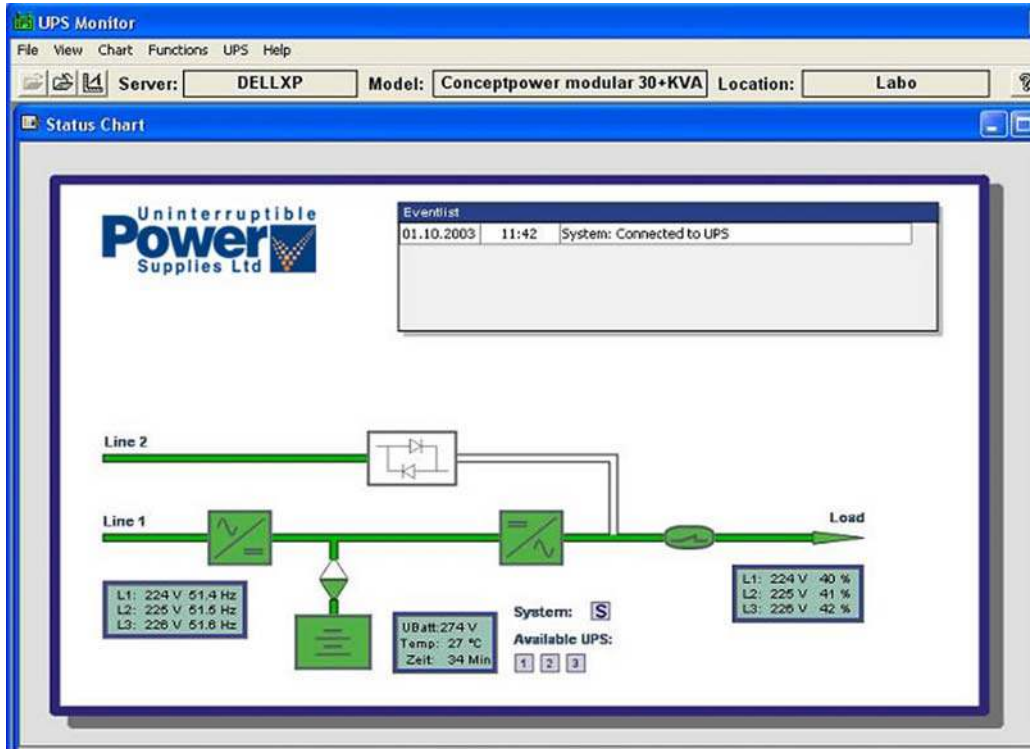
- SNMP – can be used for monitoring and controlled UPS shutdown
- WAVEMON – can be used for monitoring and controlled UPS shutdown
- PowerREPORTER – can be used to automatically email Uninterruptible Power Supplies Ltd. details of monitored parameters and alarm events for appropriate service support response

SNMP monitoring software

The SNMP adapter described above requires a PC with terminal connections and, for normal operation, at least one Ethernet network connection. It also requires that the network operating system in use is SNMP-compatible.

WAVEMON UPS monitoring and control software

WAVEMON is designed to operate in conjunction with many of the systems supplied by Uninterruptible Power Supplies Ltd. and features both UPS monitoring and automatic UPS/server shutdown facilities.



WAVEMON comprises a bespoke software package which is installed on a local PC and communicates with the UPS via USB or a standard RS232 serial cable of up to 15m in length. It is only required when an SNMP card or adapter box is not purchased.

The main features of WAVEMON are:

- On-screen autonomy time/battery time countdown
- On-screen server log-off and shutdown procedure
- Time and date stamp event log
- Extensive logging of all UPS activity and power quality data
- Permits alarm warnings to be monitored remotely via email
- Scheduled UPS service mode and other systems status
- Graphical user interface for Windows-compatible platforms
- Automatic unattended local shutdown
- Special modules for MS-Office software to close and save open documents
- Compatible with all optional modules like UPSDIALER, SNMP adaptors, temperature sensors, etc.

Functional description

WAVEMON is a client/server software application for networks and local workstations. In general, it consists of two parts: the server module of the UPS management software is *UPSMAN*, which communicates with the UPS via an RS232/USB interface. Running as a background application, *UPSMAN* collects and interprets the messages received from the UPS and places them at the disposal of the client module *UPSMON*, as well as any connected SNMP-based instrumentation and control system.

If *UPSMAN* detects voltage variations or a power failure, it can execute various 'system event' routines, by means of which, for example, the server is switched off or a warning/alarm is sent to the connected users. These 'system event' routines are a part of the management software and can be configured to suit local application requirements.

The software of your PowerWAVE 6000 UPS unit can be integrated into a network in two ways:

1. By the server which is supplied by the UPS itself and has been integrated into the network. In most cases this server is used as a sub-agent and you only need the WAVEMON software (without an SNMP adapter). You will also need to establish an RS232/USB connection between the UPS and computer/server.
2. In many cases the use of what is referred to as an 'SNMP adapter' is to be preferred in order to integrate the UPS into the network. In this case up to 50 computers can be shut down in one RCCMD environment. RCCMD (Remote Console Command) is an additional software module that is used in order to execute a command (typically a shutdown command) in a remote system.

Licensing

A licence is issued with every software serial number for use of what is known as the 'UPS service' on a single server in connection with one UPS and an unlimited number of connected WINDOWS workstations. For operation with two or more servers, a further licence is required for each additional server. In this case it is of no importance whether the UPS service on these servers is active or whether the server was stopped by a remote UPS service. The same applies to the use of RCCMD with the 'remote send/receive' modules for 'multi-server shutdown' under NT, UNIX and other operating systems.

The service programs are generally supplied as single licences. In order to use a single CD-ROM for several 'multi-server shut-down' units you must acquire additional licence codes.

RCCMD Server shutdown

In order that remote shutdown of servers can take place, initiated by the SNMP card or WAVEMON software, further licenses must be purchased. The license is for the RCCMD client (or listening) software that resides in each target server.

PowerREPORTER™ management software

PowerREPORTER is a remote monitoring and management service which provides peace-of-mind protection by offering a continuous (24/7/365) watch over mission-critical facilities. Continuous monitoring is an affordable insurance policy to detect issues and provide an early warning before they develop into a crisis.

The main features and benefits offered by PowerREPORTER are:

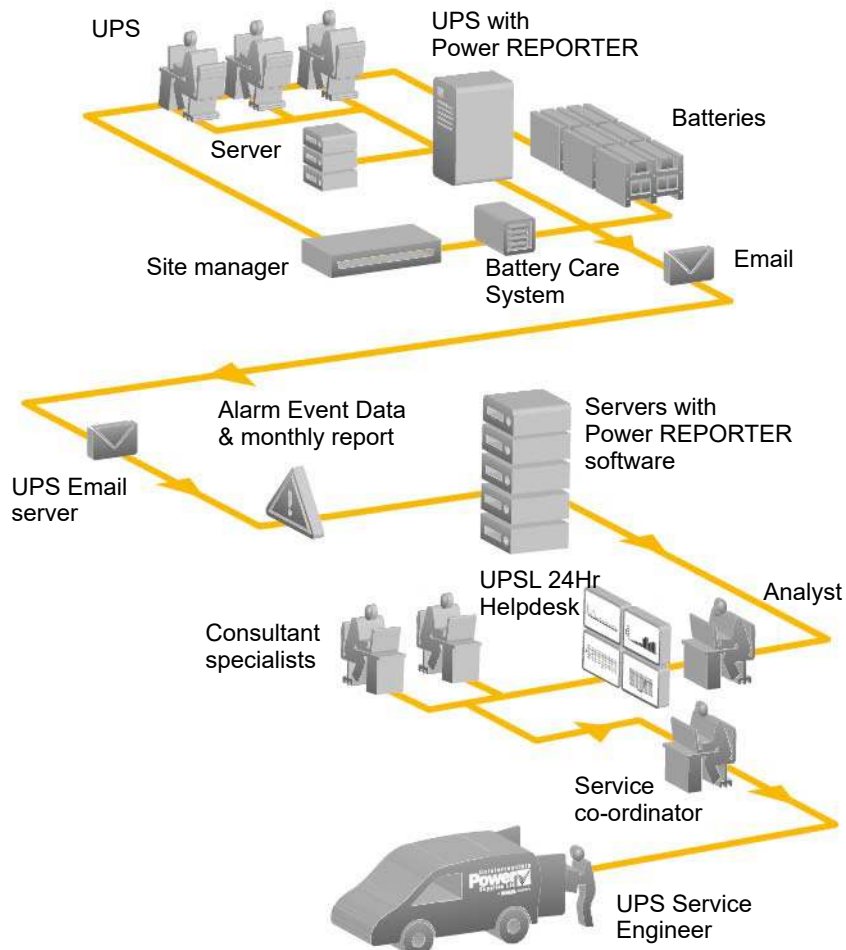
- Real time email notification sent directly to UPSL Service Centre in response to alarm/critical events
- Acquisition of key performance data and productivity information. Empowers you with the details needed to better understand machine performance and quickly troubleshoot downtime events
- Combined with a service contract, PowerREPORTER improves service levels. The engineer can determine if site attendance is necessary and bring relevant spare parts
- Monthly Status Report detailing trends and alarms
- Optional battery analysis and care service; PowerNSURE - measures battery voltage, temperature, impedance and prolongs battery service life through the application of battery charge equalization

Functional description

PowerREPORTER communicates constantly with your UPS system in order to automatically detect any error or alarm messages. In the event of an incident being detected, PowerREPORTER automatically connects with UPS Limited Service Centre via an email, transmitting a status message.

The email, which provides details relating to the fault, a snapshot of the UPS performance parameters and a device identification string, is automatically processed and UPS Limited Service Centre personnel are alerted.

UPS Limited Service Centre personnel are then able to liaise with the company's field service team and will remotely diagnose the UPS incident before reaching the facility with appropriate spare parts within the contracted service agreement time-frame.



INSTALLATION PLANNING

The following *guidelines* should be taken into account when planning a suitable UPS location and environment.

Location considerations summary

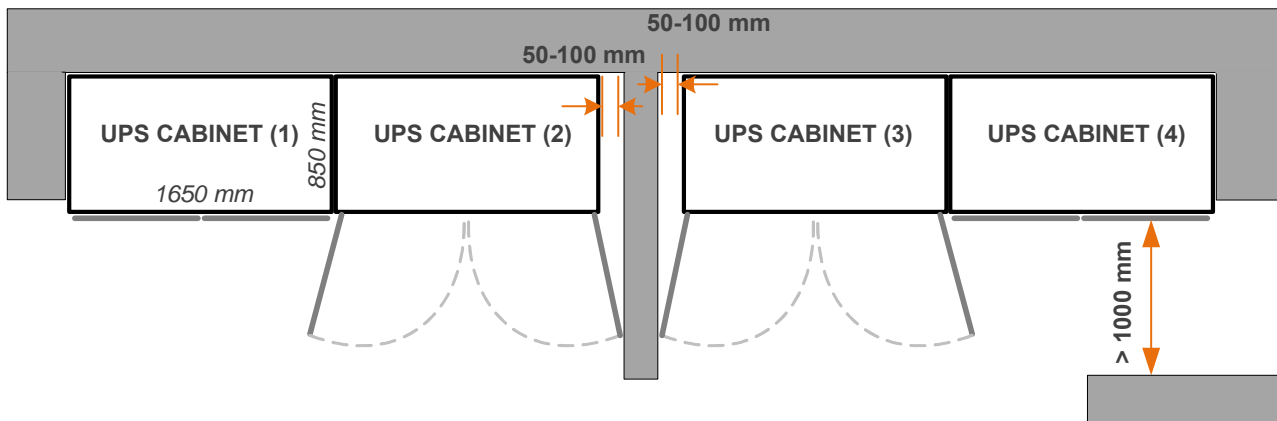
- The equipment must be installed and transported in a upright position
- The floor at the installed location and en-route from the off-loading point must be able to safely take the weight of the UPS and battery equipment
- The floor material where the UPS is to be located should be non-flammable
- Local fire protection standards must be respected
- Ensure that appropriate power supplies are available and that UPS cabling can be performed easily
- The location must be vibration free
- If the UPS is to be installed in bayed enclosures, partition walls must be installed.

Environmental considerations summary

- Avoid high ambient temperature, moisture and humidity.
Humidity (< 90% non-condensing) and temperature (+15°C / +25°C) are within prescribed limits
- An ambient temperature of 20°C is recommended to achieve a long battery life.
- Any prescribed air cooling flow must be available. Ensure the air conditioning system can provide a sufficient amount of air cooling to keep the room at, or below, the maximum desired temperature.
- Ensure no dust or corrosive/explosive gases are present

MAXIMUM HEAT DISSIPATION (with non-linear load)	
Heat dissipation with 100% non-linear load (EN 62040-1-1)	30000 W
Heat dissipation with 100% non-linear load (EN 62040-1-1)	102389 BTU/h
Airflow (25° - 30°C) with 100% non-linear load (EN 62040-1-1)	6550 m³/h
Heat Dissipation without load	4000 W

Clearances

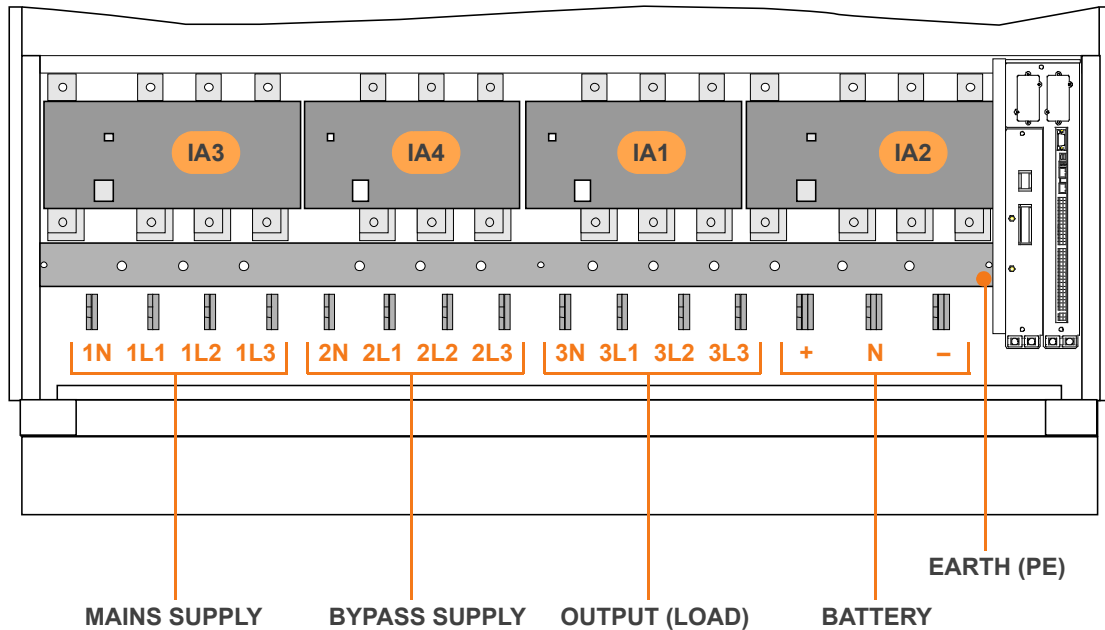


The above diagram illustrates the recommended clearances to be provided around the UPS.

Notes

1. No rear or side cabinet access is required for installation or servicing. All cables enter the UPS via the bottom of the cabinet, or via top if a Top Cable Entry (TCE) cabinet option is installed.
2. A minimum of 1000mm clearance is required at the front of the cabinets for service access, and where possible this should be increased to allow safe passage in front of the UPS with the doors open.
3. In order to gain full access to some internal components it is necessary to open the doors by slightly more than 90°. If the cabinet is located adjacent to a partition or wall that extends beyond the front of the cabinet a clearance of 50-100mm should be provided between the cabinet and the partition to allow the doors to open adequately, as illustrated in the diagram above. Note that there is no space required between cabinets.
4. The 500kVA cabinet is force-cooled by roof-mounted extraction fans and requires a minimum free space of 400mm above the cabinet to allow adequate exhaust air flow. The air flow at 25°-30° with 100% load is 6550 m³/h.

UPS POWER CABLING



Mains Supply (3+N+PE)	Bypass Supply (3+N)	Output Load (3+N+PE)	Battery (+ / N / - / PE)	Max admissible cable section (mm ²)	Tightening Torque (Nm)
3x (5 x M12)	3x (4 x M12)	3x (5 x M12)	3x (4 x M12)	240	Max 84

All input, output and battery power cables are connected to busbars located near the bottom of the UPS cabinet, as shown above.

If an optional Top Cable Entry (TCE) cabinet is installed, it is attached to the left hand side of the UPS cabinet and the power cables pass through the base of the cabinets. If a Top Cable Entry cabinet is not installed, a 'cable support kit' can be used to provide additional support for cables entering the bottom of the UPS cabinet directly. The cable support kit is shipped separately and fitted as part of the UPS cable installation procedure.

Single/dual feed input

The UPS can be configured for either a 'single feed' or 'dual feed' input supply. In the case of a single feed input (standard) the mains supply terminals and bypass supply terminals are linked by additional busbars fitted behind the input circuit breakers and the mains supply cables therefore feed both inputs. Where a 'dual feed' configuration is used, the mains/bypass busbar links are removed and the bypass supply terminals are connected to a separate power source.

Note: Rear cabinet access is required to reposition the single/dual feed busbar links. If the cabinet is to be placed against a wall, any necessary configuration change must be carried out before the cabinet is finally positioned.

Input/Output supply protection

The UPS mains/bypass input power cables must be connected via an LV-Distribution board fitted with suitable fuses or circuit breakers to provide both overload protection and a means of isolating the UPS from the mains supply when required. Similarly, the UPS output cables should be connected to the load equipment via a suitably protected load distribution panel.

Note: It is the customer's responsibility to provide all external fuses, isolators and cables used to connect the UPS input and output power supplies.

Top Cable Entry (TCE) cabinet (option)

A Top Cable Entry (TCE) cabinet is available as an optional equipment item that can be used in conjunction with the 500kVA UPS to facilitate top cable entry of the UPS input, output and battery power cables.

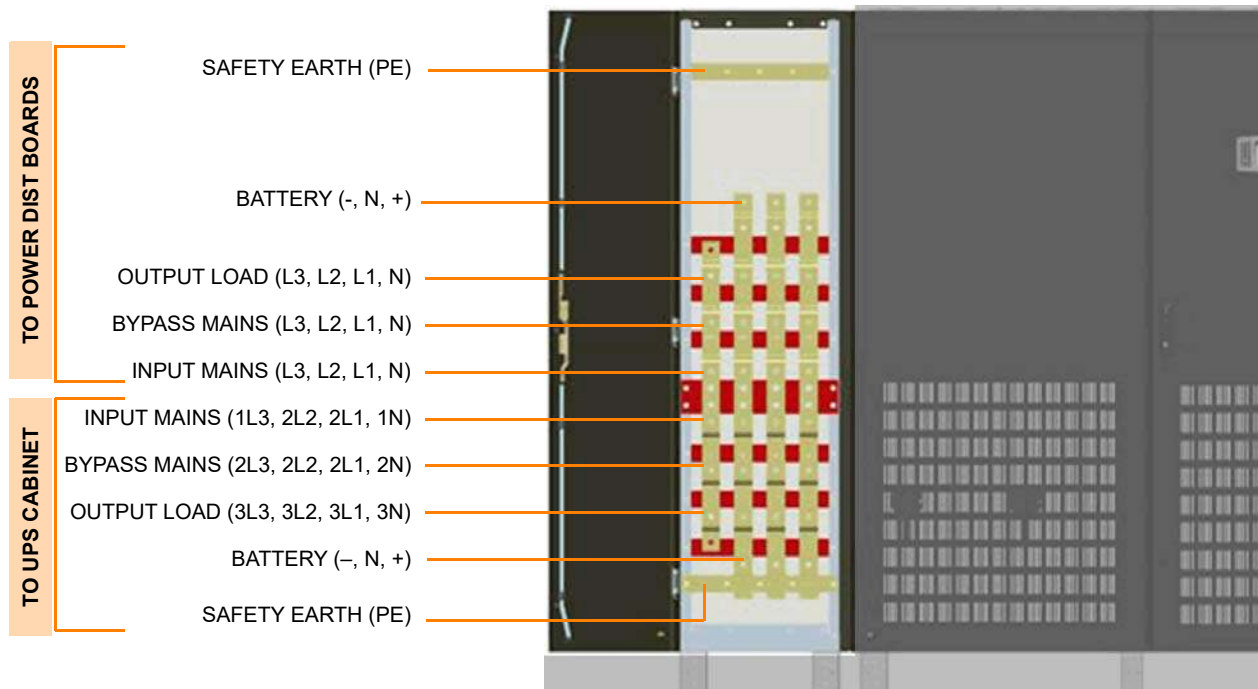
The TCE option equipment comprises:

- A purpose designed TCE enclosure containing all the necessary power connecting busbars.
- A hardware accessory pack that is used to attach the TCE enclosure to the UPS cabinet.
- A set of ready-made cables for connecting the TCE enclosure to the UPS power terminals.

The enclosure is delivered on a specifically designed pallet that can be moved easily using a forklift or a pallet jack. The accessories pack is delivered inside the enclosure and the cable set is delivered in a separate package.

When installing the TCE enclosure, all the installation planning recommendations mentioned above are still valid except that the TCE enclosure will add a further 500 mm to the width of the 500kVA unit shown, and an additional 115 kg weight (approximately).

Cable connection identification



All power cables are connected to busbars using M12 bolts and tightened to 84Nm

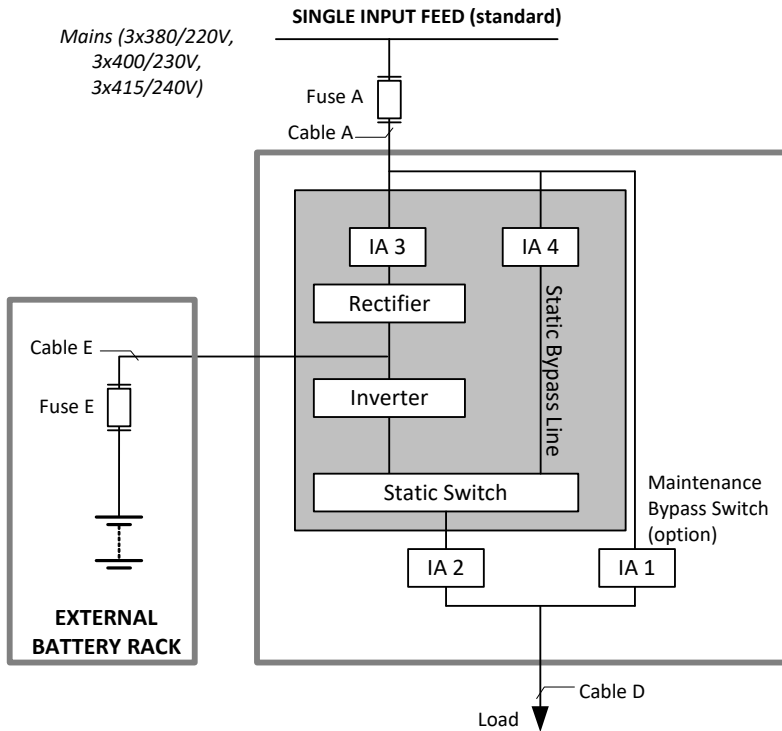
FUSE & CABLE SIZING

The diagrams on the following page identify the UPS input/output cabling requirements and provide information regarding the necessary fuse ratings and cable sizes.

Notes:

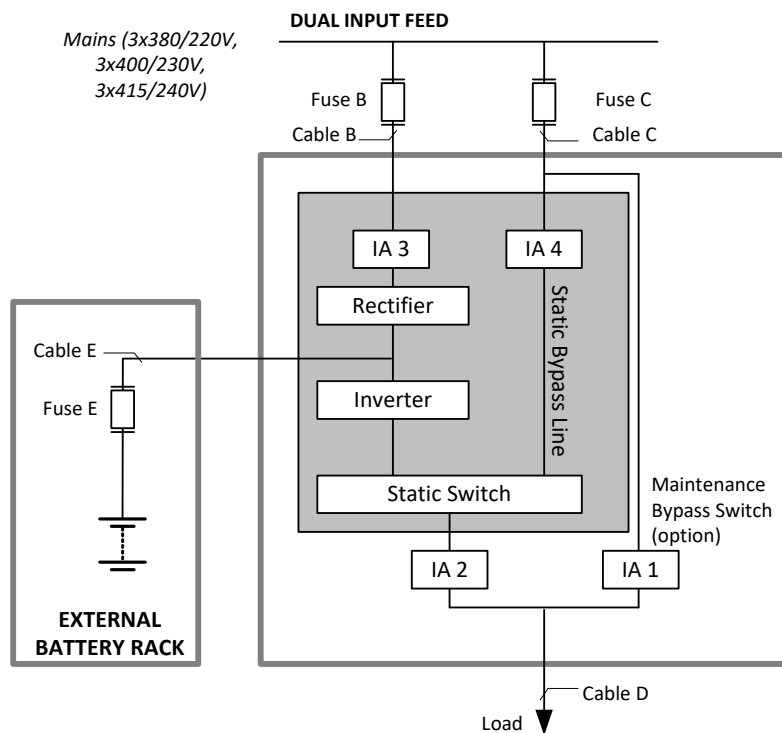
1. Fuse and Cable recommendations to IEC 60950-1:2001.
2. The fuse and cable rating details in the tables are provided as a recommendation only.
3. The UPS must be installed to prescribed IEC or local regulations (e.g. BS7671:2008).
4. External DC Cables and Battery fuses are bespoke to the installation.

Fuses & cables quick reference



Single input feed

Fuse A (AgI/CB)	3x 800A
Cable A (IEC 60950-1)	5x(3x 150mm)
Cable D (IEC 60950-1)	5x(3x 150mm)
Fuse E (+/N/-)	3x1250A
Cable E (+/N/-)	3x(3x 240mm) +PE



Dual input feed

Fuse B (AgI/CB)	3x 800A
Cable B (IEC 60950-1)	5x(3x 150mm)
Fuse C (AgI/CB)	3x 800A
Cable C (IEC 60950-1)	5x(3x 150mm)
Cable D (IEC 60950-1)	5x(3x 150mm)
Fuse E (+/N/-)	3x1250A
Cable E (+/N/-)	3x(3x 240mm) +PE

