

Technical Specification

PowerWAVE 6000

High end power protection 60 – 200 kVA

Three phase input and output



- Best in class efficiency
Cost savings during the entire life-cycle (TCO)
- Low input harmonic distortion
Cost saving during installation
- Input Power Factor near unity
Cost saving during installation and the entire lifecycle (TCO)
- Full rated output power from 0.73 lag to 0.9 lead
Suitable power for the last IT equipment generation without de-rating
- Compact Size
Floor space cost savings

POWERWAVE 9000DPA SYSTEM DESCRIPTION

In environments that demand zero downtime, continuous power protection availability is essential. In order to respond to today’s dynamic IT and process-related environments that experience daily change through new server technologies, migration and centralisation, resilient and easily adaptable power protection concepts are required.

POWERWAVE 6000 is the foundation for continuous power protection availability of network-critical infrastructures in enterprise data centres where business continuity has paramount importance and in process control environment where manufacturing continuity is essential.

POWERWAVE 6000 is an advanced double conversion UPS, VFI (Voltage and Frequency Independent) topology that responds fully to both 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 like enhanced power performance, parallel capability and connectivity’s interaction

Our Decentralized Parallel Architecture is based on stacking independent UPSs for power capacity increase or for redundancy purpose for power availability increase. When operating in parallel configuration, each POWERWAVE 6000 can take the leadership role avoiding single points of failure in the parallel chain ensuring the highest level of power availability.

The most demanding Data Centre starts with low power before achieving its full capacity. It is in this case essential to be able to recover the missing power requirement without risk for the applied load. POWERWAVE 6000 allows for system upgrades to meet the highest level of availability interruption free and without a temporary transfer the load to row mains (by-pass).

This Technical Specification provides detailed technical information on the mechanical, electrical and environmental performance of the PowerWAVE 6000 that can support to give answers to tender and enduser requirements. The POWERWAVE 6000 was designed to respond to the most stringent safety, EMC and other important UPS standards.

PowerWAVE 6000 is a stand-alone UPS which can be paralleled for power protection increase and/or for redundancy purpose. It offers 6 different power ranges: 60, 80, 100, 120, 160 & 200 kVA. Up to 10 UPS can be paralleled together to achieve the maximum power capacity of 2000kVA using common or separate battery configuration.

Key Features of PowerWAVE 6000:

- Best in class efficiency *Energy-Operational cost savings (TCO)*


- Compact size, small footprint *Saving expensive floor space*

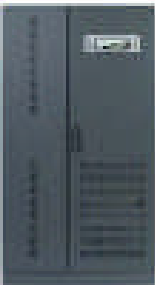
- Blade-server-friendly power;
 full power from 0.9 lead to 0.73 lag *No de-rating with leading PF loads*


- Very low input current harmonic distortion THDi;
 < 3.5% for loads of 100% *Gen-set power and installation cost saving*


- Input Power Factor near unity *Cost savings during installation and the entire life cycle (TCO)*

MECHANICAL CHARACTERISTICS

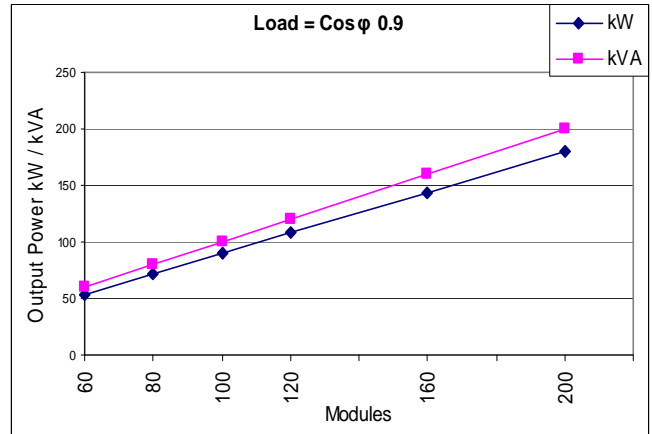
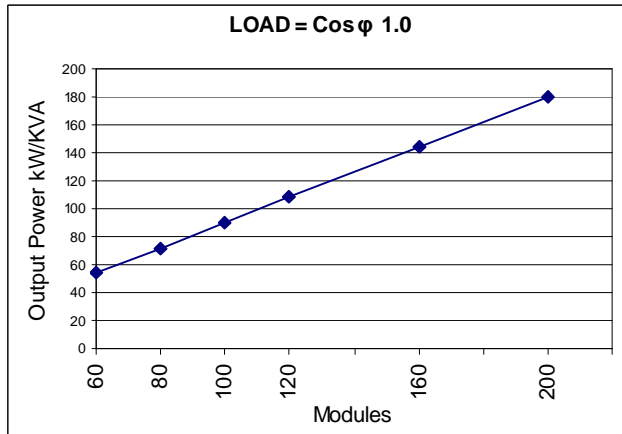
PW6000 NO BATTERY ENCLOSURE					
	Power Range	Max.	60	80	100
	Dimensions (wxdxh)	mm	550 x 750 x 1820		
	Weight	kg	230	240	245
	Colours		RAL 7024 - Graffito Grey		

PW6000 WITH BATTERY ENCLOSURE A					
	Power Range	Max.	60	80	100
	Dimensions (wxdxh)	mm	970 x 750 x 1820		
	Weight	kg	250	260	285
	Colours		RAL 7024 - Graffito Grey		

PW6000 WITH BATTERY ENCLOSURE B					
	Power Range	Max.	60	80	100
	Dimensions (wxdxh)	mm	1180 x 750 x 1820		
	Weight	kg	260	270	295
	Colours		RAL 7024 - Graffito Grey		

PW6000					
	Power Range	Max.	120	160	200
	Dimensions (wxdxh)	mm	850 x 750 x 1820		
	Weight	kg	280	290	310
	Colours		RAL 7024 - Graffito Grey		

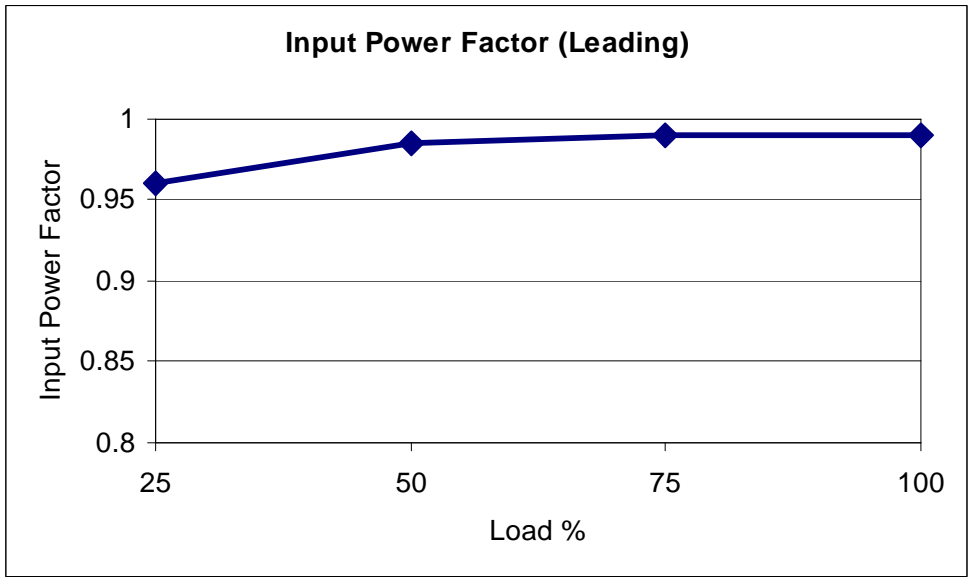
POWER SELECTION TABLE



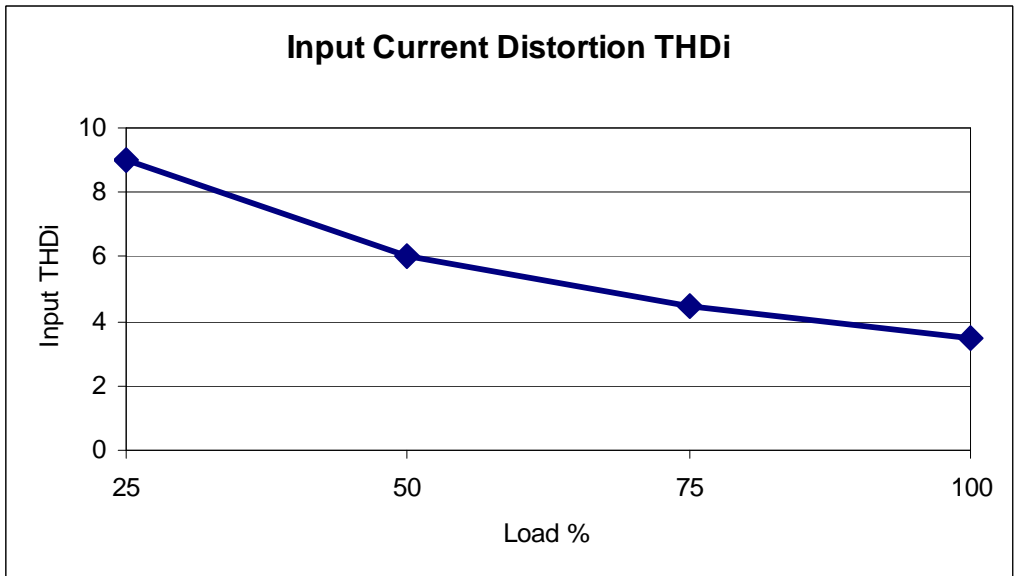
INPUT CHARACTERISTICS

Output rated power	kVA	60	80	100	120	160	200
Nominal Input Voltage	V	3 x 380/220V+N, 3 x 400V/230V+N, 3 x 415/240V+N					
Input Voltage Tolerance (ref to 3 x 400/230V) for loads in %:	V	(-23%/+15%) 3 x 308/177 V to 3 x 460/264 V for <100 % load (-30%/+15%) 3 x 280/161 V to 3 x 460/264 V for < 80 % load (-40%/+15%) 3 x 240/138 V to 3 x 460/264 V for < 60 % load					
Input Frequency	Hz	35 – 70					
Input Power Factor		PF=0.99 @ 100 % load					
Inrush Current	A	Limited by soft start / Max. In					
Input Current Distortion THDi		Sine-wave THDi = 3.5 % @ 100% load					
Max. input power / current with rated output power and charged battery (output cosφ = 1.0)	kW	57.5	76.6	95.7	114.9	153	191.5
	A	83.3	111	138.7	166.5	222	277
Max. input power / current with rated output power and discharged battery (output cosφ = 1.0)	kW	63.3	84.3	105.3	126.4	168.5	210.7
	A	91.7	122.2	152.6	183.2	244.2	305.4

INPUT PF VERSUS % LOAD



INPUT DISTORTION THDi VERSUS % LOAD



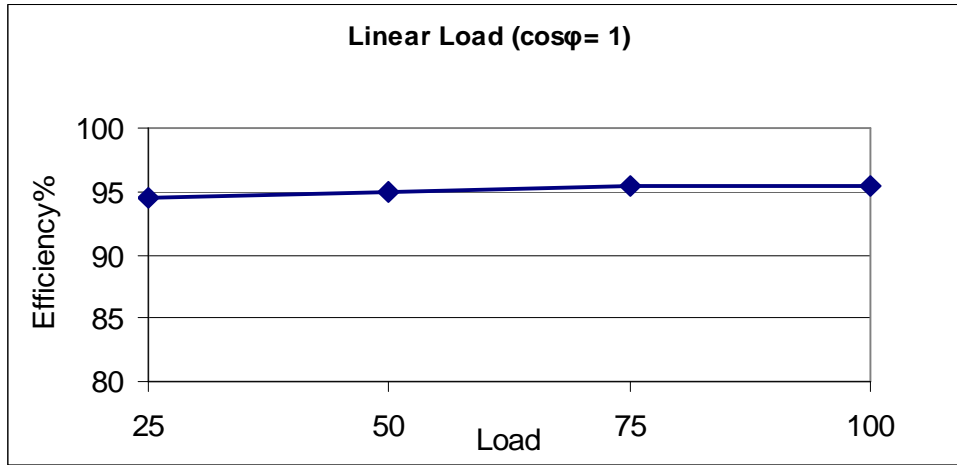
BATTERY CHARACTERISTICS

UPS Range		60	80	100	120	160	200
Fixed Number of 12V Battery Blocks	No	40-50			40 - 50		50
Maximum Battery Charger Current	A	25A			50A		
Battery Charging Curve	Ripple free; IU (DIN 41773)						
Temperature compensation	Standard (temperature sensor optional)						
Battery Test	Automatic and periodically (adjustable)						
Battery Type	Maintenance free VRLA or NiCd						

OUTPUT CHARACTERISTICS

	kVA	60	80	100	120	160	200	
Output Rated Power	kVA	60	80	100	120	160	200	
Output Rated Power	kW	54	72	90	108	144	180	
Output Current In @ cosφ 1.0 (400 V)	A	78.3	104.3	130.4	156.5	208.7	260.9	
Output Rated Voltage	V	3 x 380/220V or 3 x 400/230V or 3 x 415/240V						
Output Voltage Stability	%	Static: Dynamic (Step load 0%-100% or 100%-0%)					< +/- 1 < +/- 4	
Output Voltage Distortion	%	With Linear Load With Non-linear Load (EN62040-3:2001)					< +/- 2 < +/- 4	
Output Frequency	Hz	50 Hz or 60 Hz						
Output Frequency Tolerance	%	Synchronized with mains (selectable for bypass operation) Free running					or < +/- 2 < +/- 4 +/- 0.1	
Bypass operation		At nominal input voltage of 3 x 400 V or 190 V to 264 V ph-N					+/- 15%	
Permissible Unbalanced Load (All 3 phases regulated independently)	%	100%						
Phase Angle Tolerance (With 100 % Unbalanced load)	Deg.	+/- 0 deg.						
Overload capability on inverter	%	125 % load 150 % load					10 min. 60 sec.	
Output short capability (RMS)	A	Inverter : Bypass :					2 x In for 250 ms 10 x In for 10 ms	
Crest - Factor		3 : 1						

AC – AC EFFICIENCY with linear load @ cos 1



Output Power in KW and KVA VERSUS cosphi (using 50 battery blocks)

Load Power Factor De-Rating Table

Load cosφ	60		80		100		120		160		200		
	kW	kVA	kW	kVA	kW	kVA	kW	kVA	kW	kVA	kW	kVA	
Cap	0.85	50	59	66.4	78	83	98	99.6	117	133	156	166	195
	0.90	54	60	72	80	90	100	108	120	144	160	180	200
	0.95	58	61	77	81	96	101	115.2	121	153.6	163	192	202
	1.00	65	65	86.4	86.4	108	108	129.6	129.6	173	173	216	216
Ind	0.95	65.4	69	87.2	92	109	115	131	138	174.4	183.5	218	229
	0.90	63.6	70.6	84.8	94.2	106	118	127	141	169.6	188.4	212	235.5
	0.85	60.6	71.3	80.8	95	101	119	121	142	161.6	190	202	238
	0.80	58.2	73	77.6	97	97	121	116.4	145.5	155.1	194	194	242.5
	0.75	55.2	73.6	73.6	98	92	123	110.4	147	147	196	184	245
	0.70	51.6	74	68.8	98	86	123	103	147	137.6	196.6	172	246
	0.60	45	75	60	100	75	125	90	150	120	200	150	250

ENVIRONMENTAL CHARACTERISTICS

		60	80	100	120	160	200
Audible Noise with 100% / 50% Load	dBA	<65			<69		
Operation temperature	°C	0 to 40					
Ambient Temperature for Batteries (recommended)	°C	20 to 25					
Storage Temperature	°C	-25 to +70					
Battery Storage Time at Ambient Temperature		Maximum 6 months					
Max. altitude (above sea level)	m	1000m (3300ft) without de-rating					
De-rating factor for use at altitudes above 1000m sea level according (IEC 62040-3)		Meter above sea level (m / ft)			De-Rating Factor for Power		
		1500 / 4850			0.95		
		2000 / 6600			0.91		
		2500 / 8250			0.86		
		3000 / 9900			0.82		
Relative Air-humidity		Maximum 95% (non-condensing)					
Accessibility		Totally front accessibility for service and maintenance (no need for side, top or rear access)					
Positioning		Minimum 200mm rear space (required for cooling)					
Input and Output Power Cabling		To the bottom, at the front					
Efficiency AC-AC (at cosφ 1 ind) (depending on UPS power)	%	Load	:	100%	75%	50%	25%
			:	95.5	95.5	95.0	94.5
Eco-Mode efficiency at 100% load	%	99 %					

STANDARDS

Safety	EN 62040-1-1:2003, EN 60950-1:2001/A11:2004
Electromagnetic Compatibility	EN 62040-2:2005, EN61000-3-2:2000, EN61000-6-2:2001,
EMC Classes C2 domestic or industrial In <16A C3 industrial In >16A	C3
Performance	IEC/EN62040-3:2001
Product Certification	CE
Degree of Protection	IP 20

COMMUNICATION

Power Management Display (PMD)	LCD display
RS232 on Sub-D9 port RS232 on USB port	For monitoring and integration in network management
Customer Interfaces : Inputs DRY PORT	1 Remote shut down [EMERGENCY OFF (normally closed)] 1 GEN-ON (normally open) 1 Programmable customer's Inputs (normally open) 1 Temperature sensor for battery control
Customer Interfaces : Outputs DRY PORT	5 voltage free contacts For remote signalling and automatic computer shutdown
RS485 on RJ45 port	Remote monitoring system with graphical display (optional)
RS485 on RJ45 port	For multidrop purpose (optional)
Slot for SNMP	SNMP card (optional) For monitoring and integration in network management
Slot for WaveWATCH	WaveWATCH card (optional) for premium power protection

POWER MANAGEMENT DISPLAY (PMD)

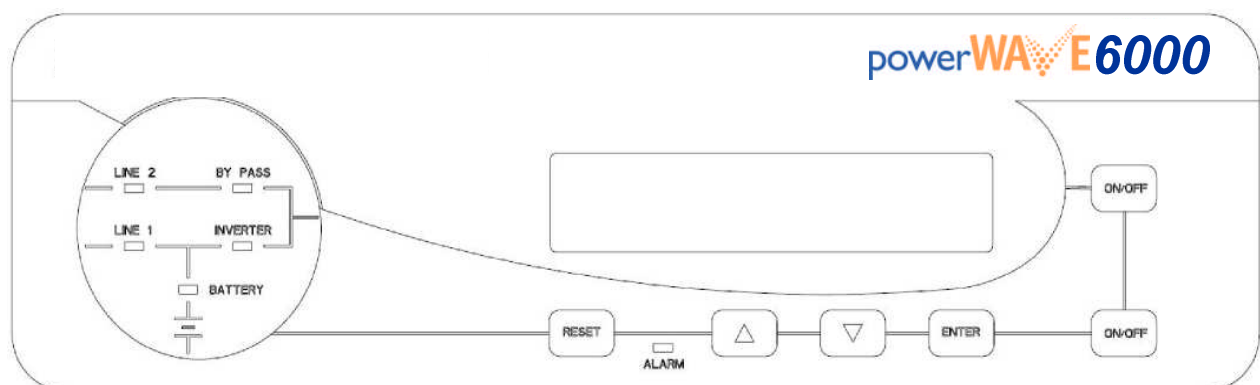
The user-friendly PMD consists of three sections; the MIMIC DIAGRAM, CONTROL KEYS and LCD that provides all the necessary monitoring information regarding the UPS.

MIMIC DIAGRAM

The mimic diagram serves to give the general status of the UPS. The LED-indicators show the power flow status and in the event of mains failure or load transfer from inverter to bypass and vice-versa the corresponding LED-indicators will change colour from green (normal) to red (warning). The LED's LINE 1 (rectifier) and LINE 2 (bypass) indicate the availability of the mains power supply. The LED's INVERTER and BYPASS if green indicate which of the two are supplying power to the critical load. When the LED-indicator BATTERY is lit it means that the battery due to mains failure is supplying the load. The LED-indicator ALARM is a visual indication of any internal or external alarm condition. At the same time the audible alarm will be activated.

DISPLAY

The 2 x 20 character LCD simplifies the communication with the UPS. The menu driven LCD enables the access to the EVENT REGISTER, or to monitor the input and output U, I, f, P, Autonomy Time and other Measurement's, to perform commands like start-up and shut-down of INVERTER or load transfer from INVERTER to BYPASS and vice-versa. It also serves for the DIAGNOSIS (SERVICE MODE) for adjustments and testing by trained personnel.



CUSTOMER INTERFACES (Terminals X1.X2)

CUSTOMER INPUTS DRY PORTS: Terminal block X1

Connection of remote shut down facilities, generator operation, customers specials

CUSTOMER OUTPUTS DRY PORTS: Terminal blocks X2

Provision of signals for the automatic and orderly shutdown of servers, AS400 or automatic building systems.

All voltage free contacts are rated 60 VAC maximum and 500 mA maximum

All the interfaces are connected to Phoenix Spring terminals with wires: 0.5 mm²

Block	Terminal	Contact	Signal	On Display	Function
X1	X1/1		+ 12 Vdc		Customer IN 1 (default as Generator Operation) (NC=Generator ON)
	X1/2		GND		
	X1/3		+ 12 Vdc		Customer IN 1 (Function on request, to be defined)
	X1/4		GND		
	X1/5		+3.3 Vdc		Battery Temperature (If connected, the battery charger current is batt. temperature dependent)
	X1/6		GND		
	X1/7		+ 12 Vdc		Remote Shut down (Do not remove factory mounted bridge until an external remote shut down is connected)
	X1/8		GND		
	X1/9		+ 12 Vdc		12 V dc source (Max 200mA load)
	X1/10		GND		
X2	X2/1			MAINS_OK	Mains Present
	X2/2		ALARM		Mains Failure
	X2/3			Common	
	X2/4			LOAD_ON_INV	Load on Inverter
	X2/5		Message		(Load on Mains bypass)
	X2/6			Common	
	X2/7			BATT_LOW	Battery Low
	X2/8		ALARM		Battery OK
	X2/9			Common	
	X2/10			LOAD_ON_MAINS	Load on bypass (Mains)
	X2/11		Message		(Load on Inverter)
	X2/12			Common	
	X2/13			COMMON_ALARM	Common Alarm (System)
	X2/14		ALARM		NO Alarm Condition
	X2/15			Common	

OPTIONS

- Modem/Ethernet card or Modem/GSM card for WaveWATCH management software
- SNMP card and WAVEMON management software, Modbus protocol
- External battery cabinets
- Parallel kit, Synchronisation kit
- In/output transformer for special voltages
- Back-feed protection
- Temperature sensor for battery temperature control

MODEM/ETHERNET CARD / WaveWATCH MANAGEMENT SOFTWARE

WaveWATCH is a redundant remote monitoring and management service which is a part of the Premium Power Protection Concept. It offers peace-of-mind protection for mission critical applications by providing a continuous 24/7 monitoring service by our control centre. There are two different solution cards, Modem/Ethernet or Modem/GSM, to connect the UPS to the outside world.

Continuous monitoring is an affordable insurance policy to detect and warn of problems before they become a crisis.

Acquire key performance parameters in real-time to empower our engineer with the necessary details to better understand machine performance and troubleshoot downtime events faster.

Early warning system, so problems can be addressed before they become a real threat to the load. **Professional experts**, your virtual remote service technician.

Total transparency of information and actions performed like notification of all critical status changes, coordination of equipment service, reporting of all alarms with priorities.

What are the features?

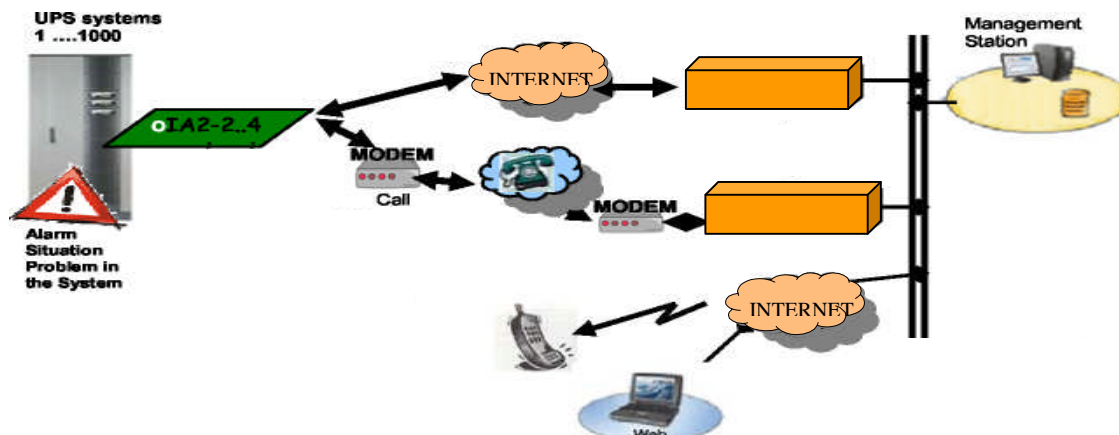
- Redundant and secure communication
- Alarm acknowledgment
- Priority driven management (with escalation)

Comprehensive Management System

- Reception and management of alarm calls from UPS
- Storage of UPS Data in a database e x portable in a CVS-format for easy handling in Excel
- Unlimited number of UPS that can be managed
- User administration with passwords and permission-level
- Administration of log file
- Data logging with statistical analysis and diagnostics, report

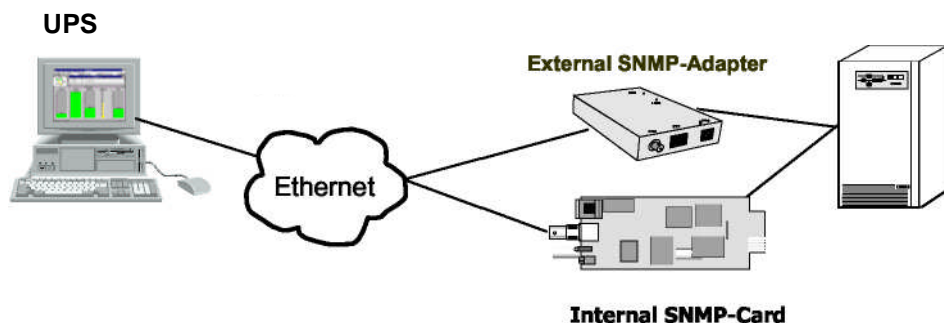
Visualization of the UPS data:

- Current status ('single' and 'parallel' operation)
- Measured values for single or three phase
- Recording function including graphs with zooming capabilities for selected measured values
- Display of event log file
- Display of UPS Parameters
- Web Server functionality, for data access from any web browser





SNMP Card / WAVEMON Management Software

The Simple Network Management Protocol (SNMP) is a worldwide-standardized communication-protocol. It is used to monitor any device in the network via simple control language. The UPS-Management Software WAVEMON also provides its data in this SNMP format with its internal software agent. The operating system you are using must support the SNMP protocol. We offer our WAVEMON software with SNMP functionality for Novell, OS/2, and all Windows running on INTEL and ALPHA, DEC VMS, Apple. Two types of SNMP interfaces with identical functionality are available: an external SNMP-Adapter (Box) and an internal SNMP-Card. Both can manage a parallel system (N modules) and return either global values - which are consistent for the whole parallel system - or specific values from the single modules.

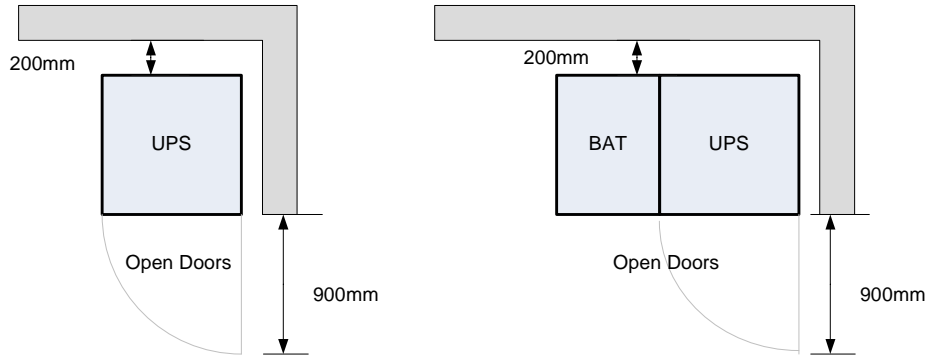


BATTERY CABINETS

The integrated battery enclosures are part of the UPS, therefore cannot be defined as a separate battery cabinet		UPS & BAT ENCLOSURE A Only for 60, 80 and 100kVA	UPS & BAT ENCLOSURE B Only for 60, 80 and 100kVA
BAT- ENCLOSURE A & B			
Configuration accommodates:	Max.	80 Battery Blocks for 28Ah mounted on 16 shelves (5 blocks/per shelf)	120 Battery Blocks for 28Ah mounted on 24 shelves (5 blocks/per shelf)
Strings : Terminals		2 3 x M8	3 3 x M8
Fuse Type (Very Fast acting)	A	2 x 3 x 100A	3 x 3 x 100A
Dimensions of UPS and Battery	mm	970 x 750 x 1820	1180 x 750 x 1820
Weight without trays and batteries	kg	20	30
Battery Configuration	Max.	(2x40) x 28Ah	(3x40) x 28Ah

INSTALLATION AND PLANNING

Minimum Clearances



UPS Cabinet type	60 - 100	60 – 100 with battery enclosure	120 - 200
Dimensions (w x d x h) mm	550 x 750 x 1820	970 x 750 x 1820 1180 x 750 x 1820	850 x 750 x 1820
Accessibility	Totally front access for service and maintenance (no need for side, top or rear access)		
Positioning	Min. 200mm rear space (required for cooling)		
Input and Output Power Cabling	From the bottom, at the front		

MAXIMUM HEAT DISSIPATION PER UPS WITH NON LINEAR LOAD

UPS Type		60	80	100	120	160	200
Heat Dissipation with 100% Non-linear Load per UPS (EN 62040-1 -1:2003)	W	2970	3690	4950	5940	7920	9900
Heat Dissipation with 100% Non-linear Load per UPS (EN 62040-1 -1:2003)	BTU	10141	13521	16901	20281	27642	33802
Airflow (25° - 30°C) with Non-linear Load per UPS (EN 62040-1-1:2003)	m ³ /h	1300	1500	1700	2500		
Heat Dissipation without load	W	800			1000		

WIRING AND BLOCK DIAGRAMS FOR ALL CABINETS

Uninterruptible Power Supplies Limited can offer a full ‘turnkey’ electrical installation service for the PowerWAVE 6000. All work is undertaken in accordance with BS 7671 17th Edition standard and by NICEIC/ECA approved electrical contractors.

Alternatively a comprehensive installation manual is included with the UPS, which provides detailed electrical information to enable the customer’s electrician or nominated electrical subcontractors to cable and connect the UPS.

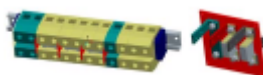
The following is general information regarding the recommended cable and fuse sizes for the PowerWAVE 6000.

NOTE: The installation and connection of the batteries and the supply of the DC cabling (excluding the provision and laying of cable trays) is undertaken by our own trained service personnel.

TERMINAL CONNECTIONS OVERVIEW

Rating kVA Terminals (T) Connection Bar (B)	Battery (+ / N / -) +PE	Input Bypass 3+N	Input Rectifier 3+N+PE	Output load 3+N+PE	Max. cable section admissible (mm ²)	Tightening Torque (Nm)
60	4 x M8	4 x 35 mm ²	4 x 35 mm ² +PE M8		35	3.5
80		4 x 50 mm ²	4 x 50 mm ² +PE M8		50	5
100		4 x 70 mm ²	4 x 70mm ² +PE M8		95	8
120	4 x M10		5 x M10		185	Max 50
160				185		
180				240		

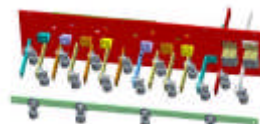
60 80 100 kVA



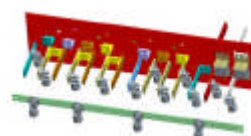
120 160 200 kVA



Dual Feed Input

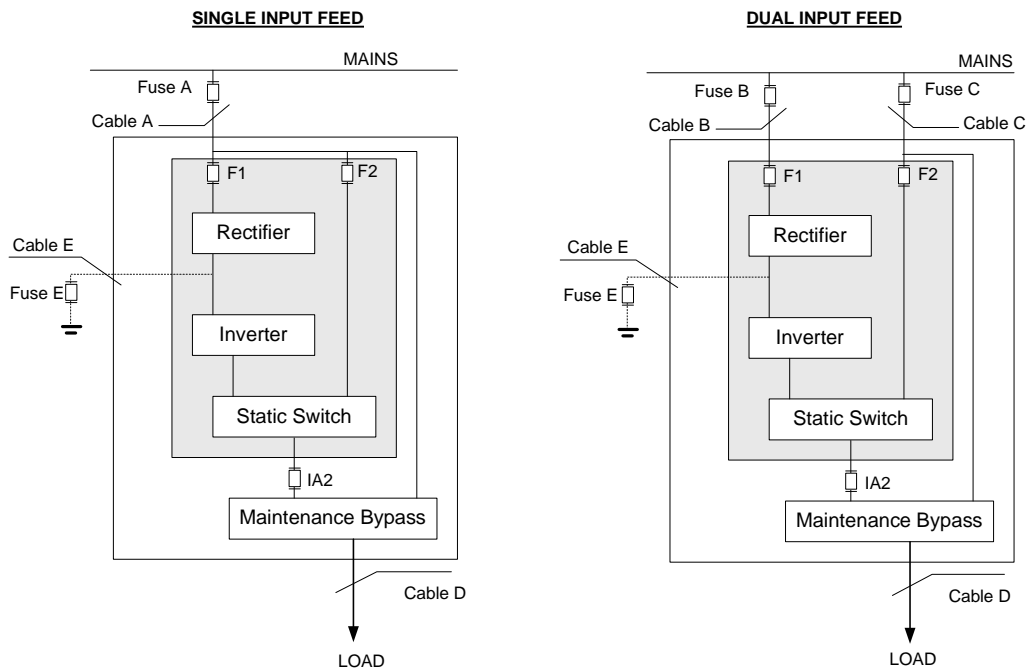


Single Feed input



INPUT FEED RATINGS

Recommended Cable Sections and Fuse Ratings



SINGLE INPUT		
Cabinet type	Fuse A	Cable A & D (mm ²) (IEC 60950- 1:2001)
60	3 x 100	5 x 35
80	3 x 125	5 x 50
100	3 x 160	5 x 50
120	3 x 200	5 x 70
160	3 x 250	5 x 120 or 5 x (2 x 50)
200	3 x 315	5 x 185 or 5 x (2 x 70)

DUAL INPUT					
Cabinet type	Fuse B	Cable B (mm ²) (IEC 60950- 1:2001)	Fuse C	Cable C (mm ²) (IEC 60950- 1:2001)	Cable D (mm ²) (IEC 60950- 1:2001)
60	3 x 100	5 x 35	3 x 100	5 x 35	5 x 35
80	3 x 125	5 x 50	3 x 125	5 x 50	5 x 50
100	3 x 160	5 x 50	3 x 160	5 x 50	5 x 50
120	3 x 200	5 x 70	3 x 200	5 x 70	5 x 70
160	3 x 250	5 x 120 or 5 x (2 x 50)	3 x 250	5 x 120 or 5 x (2 x 50)	5 x 120
200	3 x 315	5 x 185 or 5 x (2 x 70)	3 x 315	5 x 185 or 5 x (2 x 70)	5 x 185