



PowerWave 33 USER MANUAL

PowerWave 33 highlights at a glance

- 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 savings during installation and the entire life-cycle(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

High end power protection
Power range: 60-200KVA

Specifications are subject to change without notice

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0.1 FOREWORD

The UPS System operates with mains, battery or bypass power. It contains components that carry high currents and voltages. The properly installed UPS System is grounded to earth and IP 20 rated against electrical shock and foreign objects. Installation and service have to be done by the manufacturer's qualified technicians or their authorized service partners.

**OPERATIONS INSIDE THE UPS MUST BE PERFORMED
BY A SERVICE ENGINEER FROM THE MANUFACTURER
OR FROM AN AGENT AUTHORIZED BY THE
MANUFACTURER.**

This user manual contains guidelines to check delivery, installing and commissioning of the UPS and is intended for people who plan the installation, install, commission and use or service the UPS. The reader is expected to know the fundamentals of electricity, wiring, electrical components and electrical schematic symbols

**CAREFULLY READ THE USER MANUAL BEFORE
OPERATING OR WORKING ON THE UPS.**

0.2 POWERWAVE 33 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 centralization, resilient and easily adaptable power protection concepts are required.

POWERWAVE 33 is the foundation for continuous power protection availability of network-critical infrastructures in enterprise data centers where business continuity has paramount importance and in process control environment where manufacturing continuity is essential.

POWERWAVE 33 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.

The POWERWAVE 33 UPS features innovations that combine to deliver the industry's best key values like: enhanced power performance, parallel capability and connectivity's interaction

Newave's 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 33 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 Centres 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 33 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 33 that can support to give answers to tender and end-user requirements. The POWERWAVE 33 was designed to respond to the most stringent safety, EMC and other important UPS standards.

POWERWAVE 33 is a stand-alone UPS which can be paralleled for power protection increase and/or for redundancy purpose. It offers 6 different power ranges: 60-80-100-120-160-200kVA .

Up to 10 UPS can be paralleled together to achieving the maximum power capacity of 2000kVA using common or separate battery configuration.

Key Features of POWERWAVE 33:

- | | |
|---|--|
| • Best in class efficiency | <i>Energy-Operational cost savings (TCO)</i> |
| • Compact size,
Small Footprint | <i>Space-saving of expensive floor space</i> |
| • Blade-server-friendly power
Full power from 0.9 lead to 0.73 lag | <i>No de-rating with leading PF loads</i> |
| • Very low input current distortion THDi
THDi = < 3.5% @ 100% load | <i>Gen-set power and installation cost saving</i> |
| • Input Power Factor near unity | <i>Cost savings during installation and the entire lifecycle (TCO)</i> |

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1.1 SAFETY INSTRUCTIONS

1.1.1 DESCRIPITON OF SYMBOLS USED IN THIS MANUAL



WARNING!

THERE IS DANGER OF AN ELECTRICAL IMPACT



NOTE!

READ THE INFORMATION, IN ORDER TO AVOID EQUIPMENT DAMAGES

1.1.2 SYMBOLS, CONTROLS, AND INDICATORS



PROTECTIVE GROUNDING TERMINAL

A terminal which must be connected to earth ground prior to making any other connection to the equipment.



A terminal to which or from which a direct current or voltage may be applied or supplied.



A terminal to which or from which a line part or voltage may be applied or supplied



Three-phase alternating current



This symbol indicates the word "phase".



ON The principal power switch is in the "ON" position



OFF The principal power switch is in the "OFF" position.



C CAUTION: REFER TO MANUAL
St Refer to the Operator's Manual for more information



DANGER: RISK OF ELECTRIC SHOCK
There is a risk of electric shock present, and you should observe associated warnings. The UPS contains high voltages.

1.1.3 OPERATOR PRECAUTIONS

The only user operations permitted are:

- Use of the LCD control panel (LCD Display) and of the Maintenance Bypass
- Start up and shut down of the UPS of the user field (excluding the commissioning start up)
- Operation of additional connectivity modules:
- SNMP adapters and their software
- Modem/GSM or Modem/Ethernet adapters and their software
- Multidrop Kit for paralleling connectivity information between multi-UPS configurations

The user must follow the precautions and only perform the described operations. Also in these measures the operator of the USP System must adhere to the instructions in this manual. Any deviations from the instructions could be dangerous to the user or cause accidental load loss.

NEWAVE SA DOES NOT TAKE ANY RESPONSIBILITY FOR DAMAGES CAUSED THROUGH WRONG MANIPULATIONS OF THE UPS SYSTEM.

	WARNING!	IT IS PROHIBITED TO REMOVE ANY SCREWS FROM THE UPS SYSTEM OR FROM THE BATTERY CABINET. THERE IS A DANGER OF ELECTRICAL SHOCK.
	WARNING!	HIGH FAULT CURRENTS (LEAKAGE CURRENTS): BEFORE CONNECTING THE MAINS YOU MUST ENSURE THAT THERE IS A PROPER EARTH CONNECTION!
	WARNING!	THE USER MUST DISPLAY A WARNING SHIELD ON ALL PRIMARY UPS CIRCUIT BREAKERS. THE SERVICE PERSONNEL HAS TO BE INFORMED ABOUT DANGEROUS VOLTAGES. THE WARNING PANELS MUST CONTAIN THE FOLLOWING TEXT: " BEFORE STARTING WITH THE MAINTENANCE WORK ON THE CIRCUIT BREAKERS MAKE SURE THE UPS IS ISOLATED

1.1.4 ENVIRONMENTAL CONSIDERATIONS

The UPS must be installed according to the recommendations in this manual. To operate the UPS at peak efficiency, your installation site should meet the environmental parameters outlined in this manual. Excessive amount of dust in the operating environment of UPS may cause damage or lead to malfunction. The UPS should be always protected from the outside weather and sunshine. If you intend to operate the system at an altitude higher than 1000 meters, contact your local sales or service office for important information about high altitude operation. The operating environment must meet the weight, airflow, size and clearance requirements specified in the technical datasheet.

Under no circumstances the UPS should be installed in an airtight room, in the presence of flammable gases, or in an environment exceeding the specification.

The basic environmental requirements of the UPS system are:

- Ambient Temperature Range: 0 to +40°C (32 – 104°F)
- Recommended Operating Range: +20 to +25°C (68 – 77°F)
- Maximum Relative Humidity: 95% (non-condensing)

The UPS cabinet uses forced air cooling to regulate internal component temperature. Air inlets are in the bottom sides and front of the cabinet, and outlets in the rear of the cabinet. You must allow clearance in back of the cabinet for proper air circulation. Refer to [Section 4, 4.2.2 POSITIONING](#) for clearance requirements.

1.1.5 DECLARATION OF SAFETY CONFORMITY AND CE MARKING

The product has the CE marking in compliance with the following European directives:

- Low Voltage Directive: 2006/95/EC
- EMC Directive: 2004/108/EC



Declaration of conformity with UPS harmonized standards and directives EN 62040-1-1 (Safety) and EN 62040-2 (EMC) is enclosed in Annexe (1)

Safety Standard:	IEC/EN 62040-1-1, IEC/EN 60950-1
Electromagnetic Compatibility Standard (EMC)	IEC/EN 61000-6-4 (product standard IEC/EN 62040-2 limit A (C2 UPS)) IEC/EN 61000-6-2 (product standard IEC/EN 62040-2 Criterion A (C2 UPS)) IEC/EN 61000-4-2, IEC/EN 61000-4-3, IEC/EN 61000-4-4, IEC/EN 61000-4-5, IEC/EN 61000-4-6
Performance Standard:	IEC/EN 62040-3

1.1.6 INQUIRIES

Address inquiries about the UPS and battery cabinet to the local office or agent authorized by the manufacturer. Please note the type code and the serial number of the equipment and contact your nearest agent authorized by the manufacturer (www.newaveups.com under Resellers).

The Code and the serial no. are shown on the nameplate see [Section 3, 3.1.2 Nameplate](#)

1.2 SYSTEM DESCRIPTION

The product described in this manual is a transformerless Uninterruptible Power System (UPS). It is a true online, continuous duty, double conversion, solid state, three-phase system, providing conditioned and uninterruptible AC power to protect the customer's load from all nine power failures.

1.2.1 MECHANICAL CHARACTERISTICS POWERWAVE 33 60-120KVA

POWERWAVE 33 without battery side



Power range	kVA	60	80	100
Dimensions (WxHxD)	mm	550x1820x750	550x1820x750	550x1820x750
Weight	kg	230	240	245
Colours		Graphite grey (RAL 7024)		

POWERWAVE 33 with battery enclosure A



Max. Power connection	kVA	60	80	100
Dimensions (WxHxD) with 80 battery blocks	mm	970x1820x750	970x1820x750	-
Weight without battery	kg	250	260	285
Weight with battery with 80 block of 28Ah	kg	1140	1150	1175
Colours		Graphite grey (RAL 7024)		

**POWERWAVE 33
with battery enclosure
B**


Max. Power connection	kVA	60	80	100
Dimensions (WxHxD) with 120 battery blocks	mm	1180x1820x750	1180x1820x750	1180x1820x750
Weight without battery	kg	250	260	285
Weight with battery with 120 block of 28Ah		1580	1590	1615
Colours		Graphite grey (RAL 7024)		

1.2.2 MECHANICAL CHARACTERISTICS POWERWAVE 33 120-200KVA
POWERWAVE 33


Max. Power connection	kVA	120	160	200
Dimensions (WxHxD)	mm	850x1820x750	850x1820x750	850x1820x750
Weight	kg	280	290	310
Colours		Graphite grey (RAL 7024)		

1.2.3 GENERAL SYSTEM DESCRIPTION

The UPS's are used to protect sensitive equipment and prevent loss of valuable electronic information, minimise equipment downtime, and minimise the adverse effect on production equipment due to unexpected power problems.

The UPS system continually monitors incoming electrical power and removes the surges, spikes, sags, and other irregularities that are inherent in commercial utility power. Working with a building's electrical system, the UPS system supplies clean, consistent power that sensitive electronic equipment requires for reliable operation. During brownouts, blackouts, and other power interruptions, batteries provide emergency power to safeguard operation.

The UPS system is housed in single freestanding cabinets. The cabinets line up and match in style and colour, and have safety shields behind the doors for hazardous voltage protection.

1.2.3.1 Feature : Advanced-Booster Technology

Traditional input THD filters are no longer needed with this UPS product. The build-in advanced booster technology of UPS modules provides perfect sinusoidal input power quality at 0.99 input power factor with harmonic content less than 3.5% THD(i). This leads to more reliable total system operation and savings in generator and transformer sizing as losses in the windings are minimised.

Due to the active front booster, regulating each individual phase, the UPS is comparable to a clean resistor load (unity) from the mains perspective. Thus, the high input power factor provides minimised cabling and fusing costs due to no reactive power consumption. The low harmonic currents are due to high input power factor and provide the benefits:

- No additional losses in wires and cables
- No extra heating of transformers and generators with shortened service life
- No over sizing of generators
- No false circuit breaker tripping and malfunction
- No erratic operation of computers, telecommunication, monitors, electronic test equipment etc.
- No Resonance with power factor correction capacitors

1.2.3.2 Feature : Flexible Battery Management (FBM)

The Flexible Battery Management (FBM) has been designed in all NEWAVE UPS products with the goal to avoid the deterioration of battery age. The FBM – Key Features protect the battery from environmental negative impacts (high temperature and false manipulations) and avoid deterioration of battery life by advanced management of battery charging and preventive failure diagnostics. The implemented features result in benefits not only for the end user, but also to the environment. The battery user will be required to replace his batteries less often. This translates into financial and environmental benefits. Last but not least a well protected and managed battery is a healthy battery and hence it enhance the overall availability of the UPS system.

The major benefits are:

- AC-Ripple free battery charging due to DC-DC charger separated from the rectifier and inverter
- Wide range of number of battery blocks (40-50 blocks of 12V) (60-160kVA range)
- UPS'S wide input voltage window tolerance extends the battery life due to less discharge cycles
- Battery discharge protection caused by load jumps
- Proactive battery protection from false manipulations and inadequate charging voltages
- Proactive battery failure detection thanks to Advanced Battery Diagnosis (ABD) - Algorithm
- User selectable battery tests
- Optional temperature compensated charging to enhance battery life

Hence, the function of FBM system is to prolong the battery life considerably compared to traditional systems. In a traditional online UPS the inverter also causes ripple-current to be fed to batteries causing corrosion.

1.2.3.3 Feature : DPA Technology - Decentralized Parallel Architecture

The UPS product features DPA paralleling technology that provides N+X redundancy without introducing a single-point-of-failure. The products utilizing the DPA technology are completely autonomous by means of individual Power Units, Bypasses, CPU's, Control Panels and separate battery configuration for each single module.

The DPA technology makes it more reliable than traditional paralleling techniques. A parallel UPS system means the linking together of two or more UPS units in parallel so that in the unlikely event one fails the other can automatically take up the load. Traditionally a parallel redundancy configuration is achieved by having a random or fixed master-slave relationship among the UPS units. This master logic gives out individual commands to all the slaves units. Unfortunately this can lead to a single-point-of-failure for the whole system because if the master logic or communication to slaves fails, and causes the whole UPS system to be in trouble.

The DPA technology was developed as a Multi-Master logic concept with separated independent regulation and logic buses to allow parallel capacity system and to maintain the highest system availability. An industry leading paralleling technology in its own right, the DPA technology enables you to set up a parallel redundant system giving you 100% conditioned power at all times. Its unique decentralized design eliminates the system level single point of failure inherent in traditional parallel UPS, and exponentially increases the reliability of the overall system.

DPA technology allows up to ten UPS modules to cover the same load in parallel and redundant configuration. No vulnerable master logic is needed in this design. It provides automatic load sharing and module level redundancy with nothing other than the power connecting to the PowerWave 33 version of UPS.

1.2.4 QUALITY STANDARDS AND UPS CLASSIFICATION CODE

The PowerWave 33 will provide your critical equipment with a steady and reliable power supply for many years.

The unique PowerWave 33 belongs to the newest generation of midrange 3phase UPS-Systems. High reliability, low operating cost and excellent electrical performance are only some of the highlights of this innovative UPS solution.

The criteria and methods implemented at NEWAVE SA for the design and manufacture correspond to the most stringent quality standards.

NEWAVE is certified successfully in every areas according to the model of the International Standard ISO 9001/EN 29001 and ISO 14001. The Certification of UPS with the operating performance according to the Norm

IEC 62 040-3 and VDE 0558 Part 530 is accomplished.

With it the NEWAVE UPS has the **Classification Code VFI-SS-111**.

1.2.5 SINGLE/PARALLEL CONFIGURATIONS

Single UPS Configuration:



Parallel UPS Configurations:



It is possible to parallel a PowerWave 33 UPS (up to 10 units) in order to increase power capacity or for power redundancy purpose.

1.2.6 WARRANTY

The UPS supplied is warranted against defects in design, materials for a period of twelve (12) months from its original date of commissioning or fifteen (15) months from the date of original delivery, whatever comes first, unless agreed differently between Newave and the partner or customer. Refer to 1.2.7 Extended warranty.

Transportation cost of warranted material is not included in the warranty and has to be paid by the end-user.

Do not return anything without written authorization from NEWAVE or your closest service centre. NEWAVE or the closest service centre will give you further instructions how to proceed.

Any product must be returned to NEWAVE headquarter in Quartino with transportation charges prepaid and must be accompanied by a description of the failure. Products without description will not be handled.

The warranty is invalidated, if the UPS has not been installed and/or commissioned by duly trained personnel of authorised subsidiaries or distributors.

The warranty does not apply in any case of damage or loss caused by misuse, negligence, unauthorized repair or modification, incorrect installation and commissioning, inappropriate environmental conditions, accident, act of God or inappropriate application.

If the UPS fails to conform to the above within the warranty period then NEWAVE SA or an authorized service centre will, at its sole option, repair or replace the UPS or parts of it. All repaired or replaced parts will remain the property of NEWAVE or of the authorized service centre.

NEWAVE is not liable for any costs resulting from a failure, if the installation, commissioning, repair, alternation, or ambient conditions of the equipment do not fulfil the requirements specified in the documentation delivered with the unit and other relevant documentation, such as loss of profits or revenue, loss of equipment, loss of data or software, cost of substitutes, claims by third parties or otherwise.

Under no circumstances shall NEWAVE, its suppliers or subcontractors be liable for special, indirect, incidental or consequential damages, losses or penalties. The technical data, information and specifications are valid at the time of printing. The UPS manufacturer reserves the right to modifications without prior notice.

As general policy, NEWAVE does not recommend the use of any of its products in life support applications where failure or malfunction of the NEWAVE product can be reasonably expected to cause failure of the life support device or to significantly affect us safety or effectiveness. NEWAVE does not recommend the use of any of its products in direct patient care. NEWAVE will not knowingly sell its products for use in such applications unless it receives in writing assurances satisfactory to NEWAVE that the risks of injury or damage have been minimized, the customer assumes all such risks and the liability of NEWAVE is adequately protected under the circumstances.



The UPS may contain batteries that must be re-charged for a minimum of 24 hours every 6 months to prevent deep discharging. Batteries that have been, for whatever reason, deep discharged are not covered by the warranty.

1.2.7 EXTENDED WARRANTY

The local office or distributor may grant a Extended Warranty period different to the above twelve (12) months and refer to local terms of liability as defined in the supply agreement or maintenance contract.

For more details please contact the nearest local office or agent authorized by the manufacturer. (www.newaveups.com Resellers).

1.3 DELIVERY – TRANSPORT - STORAGE

1.3.1 INTRODUCTION

This chapter contains all the necessary information for the correct unpacking, positioning, cabling and installation of the UPS

The UPS and accessories are delivered on a specifically designed pallet that is easy to move with a forklift or a pallet jack. Keep the UPS always in upright position and do not drop the equipment. Do not either stack the pallets because of high-energy batteries involved and the heavy weight



NOTE!

IF THE UPS IS NOT IMMEDIATELY INSTALLED THE FOLLOWING GUIDELINES MUST BE FOLLOWED:

TRANSPORT:

UPS CABINETS AND/OR BATTERY CABINET CAN FALL OVER. USE THE SHIPPING BRACKETS ON THE REAR AND FRONT TO SECURE THE CABINETS. DO NOT TILT THEM MORE THAN 10° FROM VERTICAL, OTHERWISE CABINETS MAY TIP OVER.

POTENTIAL DANGERS:

- TILTING THE CABINET MIGHT DAMAGE THE SYSTEM AND THEREFORE SHOULD NO LONGER BE CONNECTED TO THE MAINS.
- WEIGHT OF THE UPS SYSTEM COULD CAUSE SERIOUS INJURIES TO PERSONS OR ANYTHING IN THE SURROUNDING AREA.

STORAGE:

- THE UPS SHOULD BE STORED IN THE ORIGINAL PACKING AND SHIPPING CARTON
- THE RECOMMENDED STORING TEMPERATURE FOR THE UPS SYSTEM AND BATTERIES IS BETWEEN +5 °C AND +40°C.
- THE UPS SYSTEM AND THE BATTERIE SETS MUST BE PROTECTED FROM HUMIDITY < 90% RF (NON-CONDENSING)

1.3.2 RECEIPT OF THE UPS AND VISUAL INSPECTION

Upon receiving the UPS, carefully examine the packing container and the UPS for any sign of physical damage. The outside 'Tip&Tel' ("FRAGILE" and "ARROW") indicator should be intact if the equipment has been transported in the upright position. In case of rupture or suspect inform immediately:

- The carrier and
- NEWAVE SA.

Ensure that the received UPS corresponds to the material indicated in the delivery note.

The packing container of the **UPS** protects it from mechanical and environmental damage. To increase its protection the UPS is wrapped with a plastic sheet.



NOTE!

VISIBLE TRANSPORT DAMAGES MUST BE CLAIMED TO THE CARRIER IMMEDIATELY AFTER RECEIPT !!

OTHER CLAIM FOR SHIPPING DAMAGE MUST BE FILED IMMEDIATELY TOO AND THE CARRIER MUST BE INFORMED WITHIN 7 DAYS OF RECEIPT OF THE EQUIPMENT. THE PACKING MATERIALS SHOULD BE STORED FOR FURTHER INVESTIGATION.

1.3.3 UNPACKING

Unpack the equipment by removing the packing and shipping materials. Make a visual inspection and check that 'Tip&Tel' indicator ("FRAGILE" and "ARROW") on the packing container is intact.

Perform the following steps to unpack the UPS equipment from the pallet and make sure that the floor surface is solid and suitable for the wheeling and heavy weight:

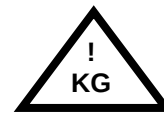
- 1) Cut wrappers and remove packing container by pulling it upwards;
- 2) Remove the plastic cover from the UPS;
- 3) Remove pallet from the UPS;
- 4) Retain the packaging materials for future shipment of the UPS;
- 5) Examine the UPS for any sign of damage. Notify your carrier or supplier immediately if damage is apparent.



1)



2)



HEAVY !



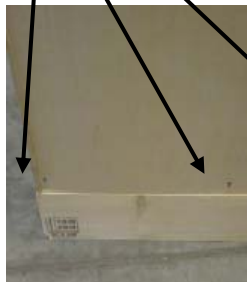
3)

By unpacking the equipment from the wooden case remove all screws.



Bottom screws

Sides screws



1.3.4 NAMEPLATE

The technical specifications of the Equipment are provided on the nameplate, which is situated at the front (internal door) of the UPS. Check if it corresponds to the purchased material mentioned in the delivery note.

Newave UPS System		CE													
Powerwave 33 TM		Made in Switzerland													
Power:	kVA	Power factor:	0,9 leading												
Input voltage:	V+N	Output voltage:	V+N												
Input current:	A	Output frequency:	Hz												
UPS Serial No. <table border="1"><tr><td>P</td><td>W</td><td></td><td></td><td></td><td></td></tr></table>		P	W					Production Date <table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>							
P	W														

1.3.5 BATTERIES AND STORAGE

The standard batteries of the UPS are sealed, maintenance-free batteries, mounted usually in an external battery cabinet and will typically be connected when the UPS is commissioned.

The battery life depends very much on the ambient temperature. A temperature range between +18° and +23°C will achieve the optimum battery life.

If the UPS is delivered without batteries, NEWAVE is not responsible for any damage or malfunctioning caused to the UPS by incorrect wiring.



1.3.5.1 Storage of battery

The battery life depends very much on the ambient temperature. It is therefore important not to store the battery longer than 6 months at 20°C, 3 months at 30°C and 2 months at 35°C storage temperature without a battery recharge. For long-term storage make sure that the battery is fully recharged every 6 months. Before and after storing, charge the battery.

Always store the batteries in a dry, clean, cool environment in their original packaging. If the packing container is removed protect the batteries from dust and humidity.



WARNING!

SEALED BATTERIES MUST NEVER BE STORED IN A DISCHARGED OR PARTIALLY DISCHARGED STATE.

EXTREME TEMPERATURE, UNDER- AND OVERCHARGE AND OVERDISCHARGE WILL DESTROY BATTERIES!

1.3.5.2 Storage of UPS

If you plan to store the UPS prior to use, keep the UPS unpacked in a dry, clean and cool storage room with an ambient temperature between (+5 °C to +40°C) and humidity of less than 90%.

If the packing container is removed protect the UPS from dust.



NOTE!

THE UPS SYSTEM, THE BATTERY CABINET AND THE BATTERIES ARE HEAVY AND MAY TIP DURING TRANSPORTATION CAUSING SERIOUS INJURY IF UNPACKING INSTRUCTIONS ARE NOT CLOSELY FOLLOWED.

1.4 SITE PLANNING AND POSITIONING

1.4.1 PLANNING BEFORE THE INSTALLATION

The equipment must be installed and transported in a upright position. The equipment requires space to bottom/front and back to enable cooling airflow. It is required to arrange ventilation of the UPS room.

All parts of the UPS for service and user access are accessible from the front and rear, making it a service-friendly and maintenance-friendly UPS. Reserve enough space from the front (min. 900 mm)

The UPS should be located where:

- Humidity (< 90 % non-condensing) and temperature (+15° and +25°C) are within prescribed limits
- Fire protection standards are respected
- Cabling can be performed easily
- Available front accessibility for service or periodic maintenance
- Requested air cooling flow should be granted
- The air conditioning system should have sufficient amount of air cooling needed to keep the max. room temperature rise at desired level:
- Dust or corrosive/explosive gases must be absent
- The place is vibration free
- Only front access is necessary for service and maintenance.
- If the UPS will be installed in bayed enclosures, partition walls have to be installed as well.

An ambient temperature of 15 to 25 Celsius degrees is recommended to achieve a long life of the UPS and batteries. The cooling *air entering the UPS must not exceed +40 °C*. Avoid high ambient temperature, moisture and humidity. The floor material should be non-flammable and strong enough to support the heavy load.

1.4.2 POSITIONING OF UPS AND BATTERY CABINET

1.4.2.1 Final Transport

Check before transporting the surface loading and use a adequate forklift to move the equipment to the final position.



1.4.2.2 Positioning

UPS : A minimum 20 cm rear space from the UPS to an obstruction is recommended for proper cooling as the air enters at bottom/front and exits at unit rear (see Fig. 6.2.1 and 6.2.2)

External Battery : It's recommended to install external battery cabinet(s) next to the UPS unit. The external battery is recommended to be placed on left hand side of the UPS unit.

Check before the installation that the battery voltage values in the type plate of the UPS and external battery cabinets are the same.



WARNING!

THE UPS CONTAINS HIGH DC VOLTAGES. A QUALIFIED PERSON MUST DO THE CONNECTIONS BETWEEN THE UPS AND THE EXTERNAL BATTERY CABINET(S). THE BATTERY CABINET IS CONNECTED ELECTRICALLY IN PARALLEL WITH THE INTERNAL BATTERIES OF THE UPS.



WARNING!

IF AVAILABLE, THE INTERNAL BATTERY HAS TO BE DISCONNECTED FIRST BECAUSE THE EXTERNAL BATTERY TERMINALS ARE HAZARDOUS DUE TO THE PARALLEL BATTERY STRING.

Battery Racks : External battery racks shall be sized to take the voltage drop in the cable into account. To obtain support and help contact the local office or agent authorized by the manufacturer.

Clearances	X	Y
Minimum	200 mm	900 mm

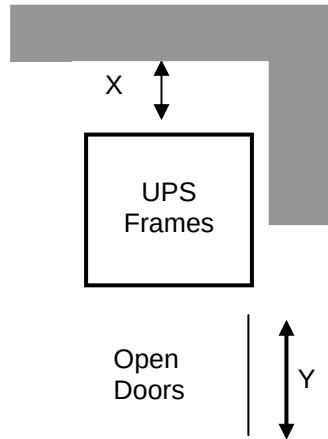


Figure 1: UPS space recommendation

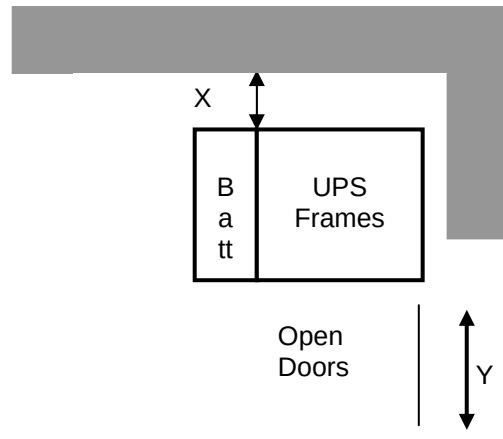


Figure 2 : UPS + Battery space recommendation

UPS Frame type	60-100 kVA	60-80-100 kVA (with battery enclosure A & B)	120-200 kVA
Dimensions (WxHxD) mm	550x1820x750	970x1820x750 1180x1820x750	850x1820x750
Accessibility	Totally front accessibility for service and maintenance (no need for side, top or rear access)		
Positioning	Min. 200 mm rear space (required for fan)		
Input and Output Power Cabling	From the bottom on the front		

1.5 ELECTRICAL INSTALLATION

The customer has to supply the wiring to connect the UPS to the local power source see Section 2, chapter 1.1. The electrical installation procedure is described in the following text. The installation inspection and initial start up of the UPS and extra battery cabinet must be carried out by a qualified service personnel such as a licensed service engineer from the manufacturer or from an agent authorised by the manufacturer.



WARNING!

THE INSTRUCTION IN THIS USER MANUAL HAVE ALWAYS TO BE FOLLOWED IN ORDER TO AVOID INJURIES FROM ELECTRICAL IMPACTS.



WARNING!

ALL THE OPERATIONS IN THIS MANUAL MUST BE PERFORMED BY AUTHORISED ELECTRICIANS OR BY QUALIFIED INTERNAL PERSONNEL.

DO NOT OPERATE IN CASE OF PRESENCE OF WATER OR MOISTURE.

BY OPENING OR REMOVING THE UPS-COVERS YOU RUN RISK OF EXPOSURE TO DANGEROUS VOLTAGES

PHYSICAL INJURY OR DEATH MAY FOLLOW, OR DAMAGE MAY OCCUR TO THE UPS, OR THE LOAD EQUIPMENT IF THESE INSTRUCTIONS ARE IGNORED.

To ensure correct operation of the UPS and its ancillary equipment it is necessary to provide the mains cables with appropriate fuse protection. See [Section 2, chapter 2.1.3](#)

The UPS unit has the following power connections:

Rectifier (In) : **Three-phase** (1L1, 1L2, 1L3), Neutral (1N) and protective earth (PE)
connection for the *rectifier input*

Bypass (In) : **Three-phase** (2L1, 2L2, 2L3), Neutral (2N) and protective earth (PE)
connection for the *bypass if used as Dual Feed input*

Load (Out) : **Three-phase** (3L1, 3L2, 3L3), Neutral (3N) and protective earth (PE)
connection for the *load output*

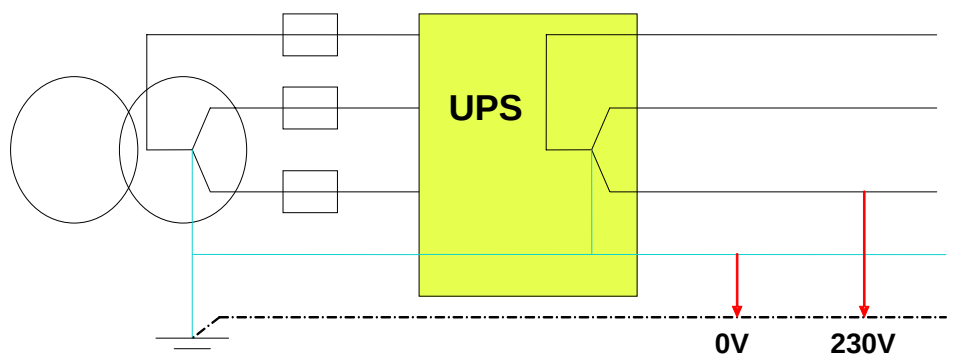
External Battery : **Plus (+), Common (N), Minus (-)** and protective earth (PE)
connection for the *external batteries*



NOTE!

INPUT NEUTRAL IS REQUIRED TO OPERATE THE RECTIFIER.

In TN-S Systems, no 4-pole input switches or circuit breakers should be used. If you have to use for other reason a 4-pole switch, you have to be aware that the neutral against the ground is floating. For the UPS itself this is not a problem.



1.5.1 PREPARATION FOR THE INPUT CABLING


NOTE!

Before proceeding read the chapter [ELECTRICAL INSTALLATION](#) (Section 1) and insure before starting connecting the cable to the UPS that:

- Mains voltage (INPUT VOLTS) and frequency (FREQUENCY) correspond to the values indicated on the Nameplate of the UPS.
- **Earth connection** is performed in accordance with the prescribed IEC Standards or with local regulations;
- UPS is connected to the mains through a Low Voltage (LV)-Distribution Board with a separate mains line (protected with a circuit breaker or fuse) for the UPS.

Provide input fuses and cables according to [Section 2, chapter 2.1.3](#) or in accordance with the prescribed IEC Standards or with the local regulations.

The input of the UPS must be fitted with circuit breakers or other kind of protection. The circuit breakers will be connected between the mains supply and the UPS and will provide additional protection to the UPS in the event of overloads and short circuits.

1.5.1.1 **Mains Supply and Earth connection**

To ensure protection of personnel during the installation of UPS make sure that the connections are performed under the following conditions:

- No mains voltage is present
 - All Loads are shut down and disconnected
 - The UPS System is shut down and voltage-free
 - The UPS System is fitted in its correct position
 - Maintenance Bypass IA1 is open and in position OFF;
 - Parallel Isolators IA2 is in position OFF
 - Remove Terminal cover of the UPS
1. Connect first the Earthing wire coming from the Low Voltage-Distribution Board to the terminal "PE".
 2. Connect the input power cable coming from the Low Voltage-Distribution Board to the terminals of the UPS showed in [Section 2, chapter 2.1.2.1](#)
 3. Keep the phase rotation in clock-wise sense.


NOTE!

INPUT NEUTRAL IS REQUIRED TO OPERATE THE RECTIFIER.

Under the connection terminal of the UPS there is a cable-fixing rail to ensure that the cables have been fastened properly.

NOTE: The **UPS** is provided with facilities for both single feed (one common input cable for rectifier and bypass) and dual feed (separate input cable for rectifier and bypass).

1.5.1.2 Single Input Feed

To achieve correct Input Cabling see Drawing [Section 2, chapter 2.1.3](#)

For single input feed connect the mains input cable to UPS Terminal Block according to the following table:

MAINS INPUT CABLE	UPS TERMINAL
Phase L1	1L1
Phase L2	1L2
Phase L3	1L3
NEUTRAL	1N
EARTH	PE

For minimum recommended Input Cable Sections and Fuse Ratings [Section 2, chapter 2.1.3](#)

Under the connection terminal of the UPS there is a cable-fixing rail to ensure that the cables have been fastened properly.

1.5.1.3 Dual Input Feed

To achieve correct input cabling see Terminal Block in [Section 2, chapter 2.1.3](#)

NOTE: The UPS is supplied (as standard version) with facilities for a single cable feed (for rectifier and bypass).

If dual feed is required unscrew the terminal bridges between

UPS TERMINAL Rectifier		UPS TERMINAL Bypass
1L1	●	● 2L1
1L2	●	● 2L2
1L3	●	● 2L3
1N	●	● 2N

For dual input feed connect the mains input cables to UPS Terminal according to following tables:

MAINS INPUT CABLE	UPS TERMINAL Rectifier	BYPASS INPUT CABLE	UPS TERMINAL Bypass
Phase L1	1L1	Phase L1	2L1
Phase L2	1L2	Phase L2	2L2
Phase L3	1L3	Phase L3	2L3
NEUTRAL	1N	NEUTRAL	2N
EARTH	PE	EARTH	PE

For minimum recommended Input Cable Sections and Fuse Ratings [Section 2, chapter 2.1.3](#)

Under the connection terminal of the UPS there is a cable-fixing rail to ensure that the cables have been fastened properly.

1.5.1.4 Preparation for the Output Cabling

Before you start connecting the loads, ensure that the UPS rated powers (OUTPUT POWER) on the nameplates (on the front side of the UPS) is equal to or larger than the total load requirements.

The output of the UPS must be fitted with circuit breakers or other kind of protection. These circuit breakers will be connected between the loads and the UPS and will provide additional protection to the UPS in the event of overloads and short circuits.

These circuit breakers will enable the protection of each load separately.

The size of the circuit breakers depends on the load rating of the load sockets.

The circuit breakers must comply with the prescribed IEC Standards. It is recommended to provide a separate output distribution board for the load.

The following values should be indicated on the output distribution board:

Maximum total load rating;

Maximum load rating of the load sockets.

If a common distribution board is used (sockets for Mains and UPS voltage), ensure that on each socket there is an indication of the applied voltage ("Mains" or "UPS").

Output power cable ratings should be in accordance with the recommended cable sections and fuses ratings or in accordance with the prescribed IEC Standards or with the local regulations.

Under the connection terminal of the UPS there is a cable-fixing rail to ensure that the cables have been fastened properly.

Ensure that the earth connection is performed in accordance with the prescribed IEC Standards or with the local regulations.

1.5.1.5 Connection of the Load

To ensure protection of the personnel during the installation of the UPS make sure that the connections are performed under the following conditions:

No mains voltage is present;

All loads are shut down and disconnected;

PMC is shut down and voltage-free.

Before connecting the output power cables make sure that:

UPS is placed in its final and correct position;

Maintenance bypass is in position OFF;

Parallel Isolator IA2 is in position OFF

Remove the terminal cover of the UPS.

Connect the output power cable coming from the LV-Distribution Board to the terminals of the UPS as shown in drawing in [Section-2, Paragraph 2.1.3](#) (Front view of the [PowerWave 33](#))

Installation Checklist

- ☐ All packing materials and restraints have been removed from each cabinet.
- ☐ Each cabinet in the UPS system is placed in the installed location.
- ☐ All conduits and cables are properly routed to the UPS and auxiliary cabinets.
- ☐ All power cables are properly sized and terminated.
- ☐ A ground conductor is properly installed.
- ☐ Battery cabinet installation instructions have been completed.
- ☐ Air conditioning equipment is installed and operating properly.
- ☐ The area around the installed UPS system is clean and dust-free. (It is recommended that the UPS be installed on a level floor suitable for computer or electronic equipment.
- ☐ Adequate workspace exists around the UPS and other cabinets.
- ☐ Adequate lighting is provided around all UPS equipment.
- ☐ Any optional accessories are mounted in their installed location and properly wired.
- ☐ Summary alarms and/or building alarms are wired appropriately. (OPTIONAL)
- ☐ Startup and operational checks performed by authorized service personnel.
- ☐ All network connections are completed.

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2.1 BLOCK DIAGRAM

2.1.1 WIRING AND BLOCK DIAGRAMS

The customer has to supply the wiring to connect the UPS to the local power source. The installation inspection and initial start up of the UPS and extra battery cabinet must be carried out by a qualified service personnel such as a licensed service engineer from the manufacturer or from an agent authorized by the manufacturer.

2.1.2 RECOMMENDED CABLE SECTIONS & FUSE RATINGS

2.1.2.1 Terminal connections overview

UPS Range Terminals (T) Connection Bar (B)	Battery (+ / N / -) +PE	Input Bypass 3+N (N, 2L1, 2L2, 2L3)	Input Rectifier 3+N+PE (N, 1L1, 1L2, 1L3)	Output load 3+N+PE (N, 3L1, 3L2, 3L3)	Max. cable section admissible (mm ²)	Tightening Torque (Nm)
60kVA (Fig.1)	4 x M8	4 x 35 mm ²	4 x 35 mm ² + PE M8	4 x 35 mm ² + PE M8	35	3.5
80kVA (Fig.1)	4 x M8	4 x 50 mm ²	4 x 50 mm ² + PE M8	4 x 50 mm ² + PE M8	50	5
100kVA (Fig.1)	4 x M8	4 x 70 mm ²	4 x 70 mm ² + PE M8	4 x 70 mm ² + PE M8	95	8
120kVA (Fig.2)	4 x M10	4 x M10	5 x M10	5 x M10	185	Max. 50
160kVA (Fig.2)	4 x M10	4 x M10	5 x M10	5 x M10	185	Max. 50
200kVA (Fig.2)	4 x M10	4 x M10	5 x M10	5 x M10	240	Max. 50

Fig. 1: 60-80-100 kVA

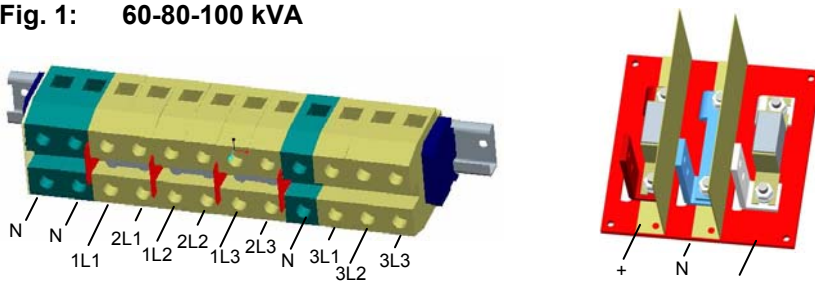
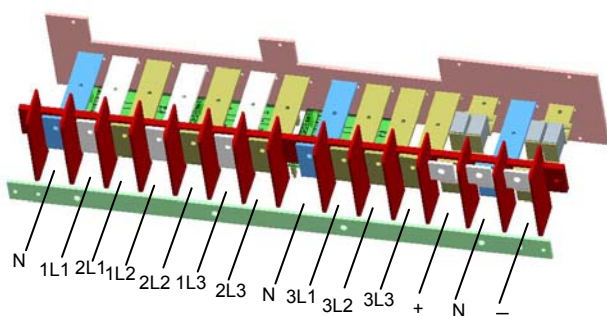
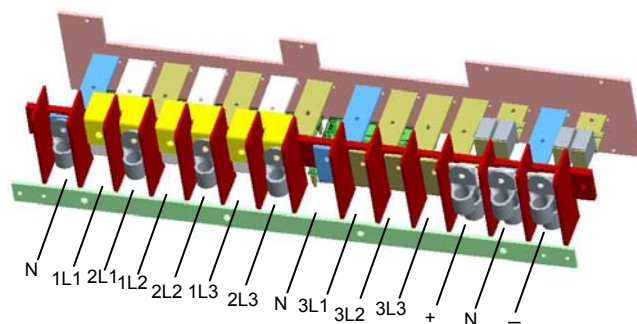


Fig. 2: 120-160-200 kVA

Dual input feed connections



Single input feed connections



2.1.3 CONNECTION DIAGRAM POWERWAVE 33

Cable Sections and Fuse Ratings recommended. Alternatively, local standards to be respected

Block Diagram

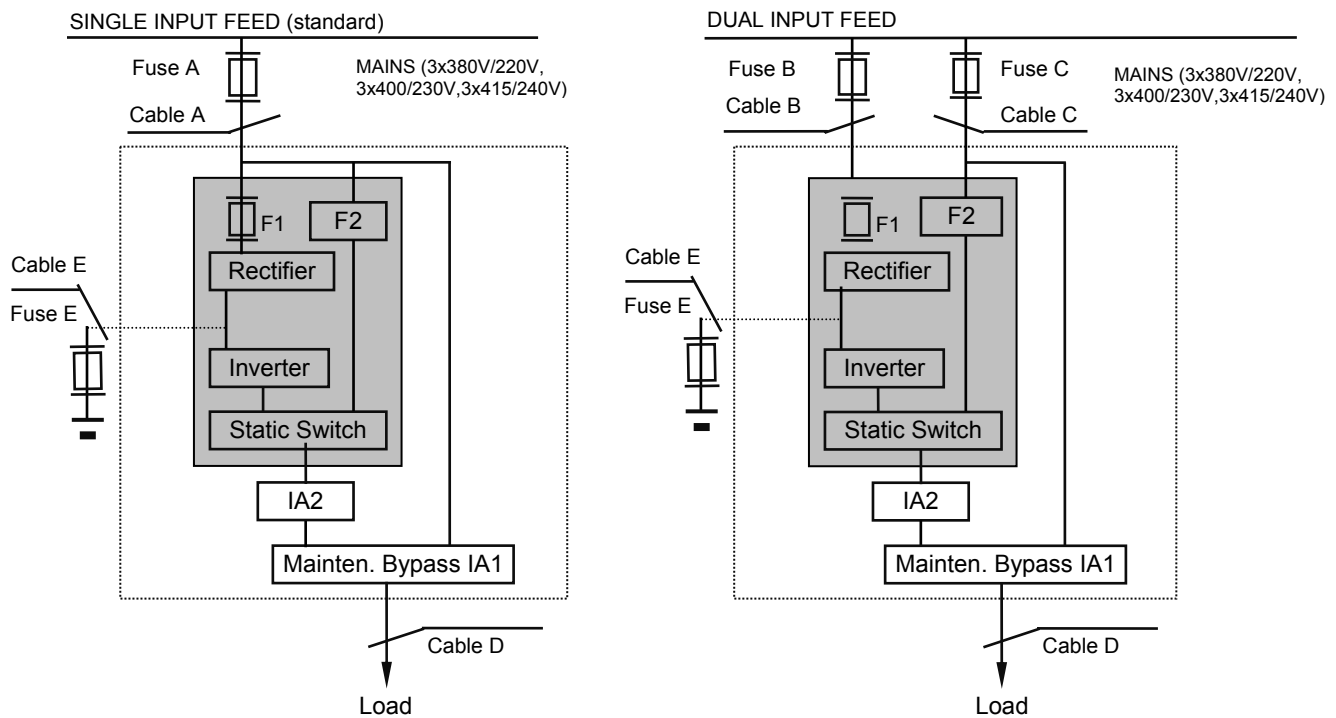


Figure 3.3: Block Diagram PowerWave 33 from 60-200 KVA

STANDARD VERSION (SINGLE INPUT FEED)

Power (kVA)	Fuse A (Agl/CB)	Cable A (IEC 60950-1:2001)	Cable D (IEC 60950-1:2001)	Fuse E +/N/-	Cable E +/N/-
60	3x100	5x35	5x35	3x125A	3x35+ PE
80	3x125	5x50	5x50	3x160A	3x50+ PE
100	3x160	5x50	5x50	3x250A	3x95+ PE
120	3x200	5x70	5x70	3x250A	3x120+ PE
160	3x250	5x120 or 5x(2x50)	5x120 or 5x(2x50)	3x350A	3x(2x70)+ PE
200	3x315	5x185 or 5x(2x70)	5x185 or 5x(2x70)	3x450A	3x(2x95)+ PE

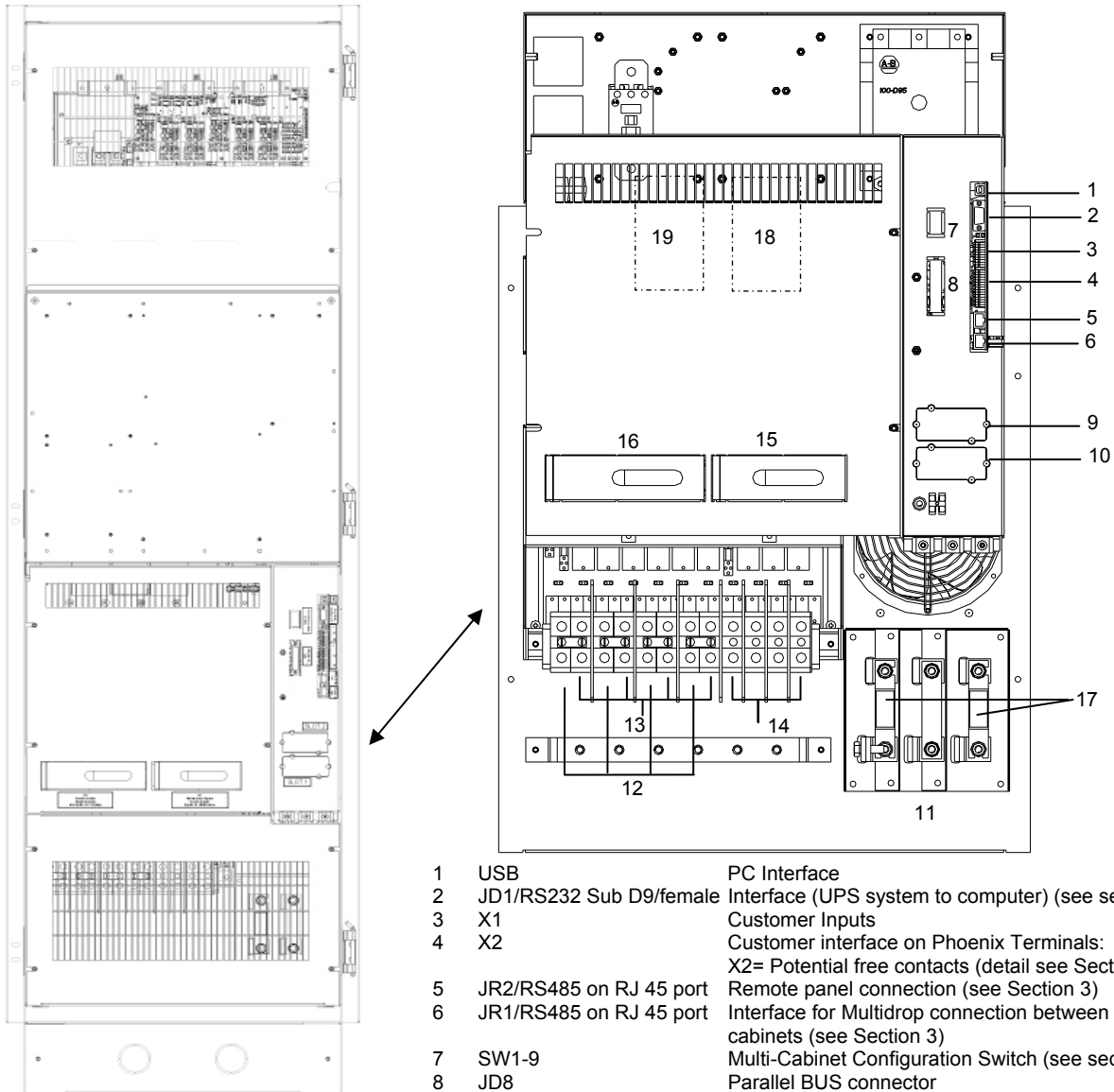
VERSION ON REQUEST (DUAL INPUT FEED)

Power (kVA)	Fuse B (Agl/CB)	Cable B (IEC 60950-1:2001)	Fuse C (Agl/CB)	Cable C (IEC 60950-1:2001)	Cable D (IEC 60950-1:2001)	Fuse E +/N/-	Cable E +/N/-
60	3x100	5x35	3x100	5x35	5x35	3x125A	3x35+ PE
80	3x125	5x50	3x125	5x50	5x50	3x160A	3x50+ PE
100	3x160	5x50	3x160	5x50	5x50	3x250A	3x95+ PE
120	3x200	5x70	3x200	5x70	5x70	3x250A	3x120+ PE
160	3x250	5x120 or 5x(2x50)	3x250	5x120 or 5x(2x50)	5x120	3x350A	3x(2x70)+ PE
200	3x315	5x185 or 5x(2x70)	3x315	5x185 or 5x(2x70)	5x185	3x450A	3x(2x95)+ PE

2.2 FRONT VIEW

2.2.1 FRONT VIEW OF POWERWAVE 33

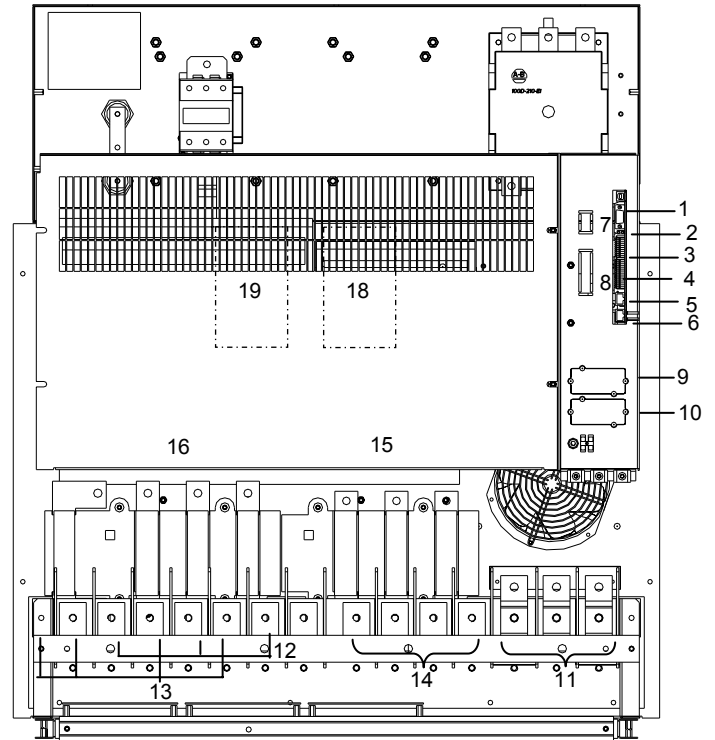
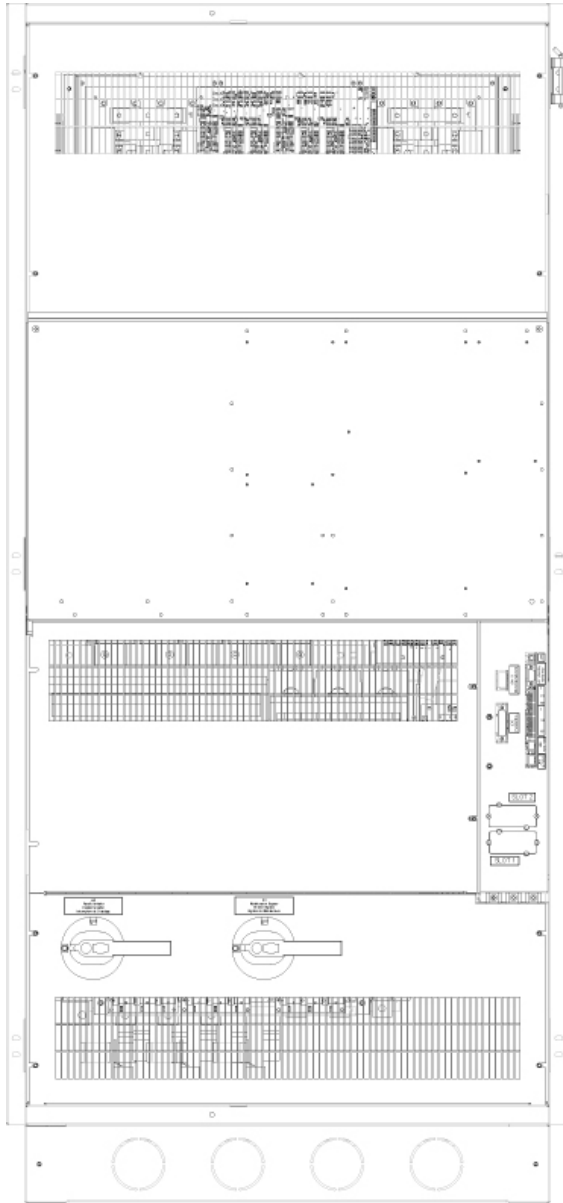
2.2.1.1 Front View PW33 60-100kVA and Connection Terminals



- | | | | |
|--|---|---|--|
| 1 | USB | PC Interface | |
| 2 | JD1/RS232 Sub D9/female | Interface (UPS system to computer) (see section 3 / 1.1) | |
| 3 | X1 | Customer Inputs | |
| 4 | X2 | Customer interface on Phoenix Terminals:
X2= Potential free contacts (detail see Section 3 / 1.2) | |
| 5 | JR2/RS485 on RJ 45 port | Remote panel connection (see Section 3) | |
| 6 | JR1/RS485 on RJ 45 port | Interface for Multidrop connection between several UPS cabinets (see Section 3) | |
| 7 | SW1-9 | Multi-Cabinet Configuration Switch (see section 4) | |
| 8 | JD8 | Parallel BUS connector | |
| ONLY For paralleling cabinets use optional adapter: | | | |
| | JD5 | Parallel BUS - Input Connector | |
| | JD6 | Parallel BUS - Output Connector | |
| 9 | SNMP | Slot for optional SNMP card ONLY | |
| 10 | Newavewatch | Slot for optional Modem/Ethernet card ONLY | |
| 11 | Battery terminal + / N / - for | | |
| 12 | Input Rectifier terminal for Single feed | | |
| 13 | Input Bypass terminal for Dual Input feed | | |
| 14 | Output Load terminal | | |
| 15 | IA1 | Maintenance Bypass | |
| 16 | IA2 | Parallel Isolator | |
| 17 | F3 Battery Fuse A/B | | |
| 18 | F2 Bypass Line Fuse | | |
| 19 | F1 Rectifier Fuse | | |

see section 2.1.2
pag.2

2.2.1.2 Front View PW33 120-200kVA and Connection Terminals



- | | | | |
|--|---|---|-------------------------------|
| 1 | USB | PC Interface | |
| 2 | JD1/RS232 Sub D9/female | Interface (UPS system to computer) (see section 3 / 1.1) | |
| 3 | X1 | Customer Inputs | |
| 4 | X2 | Customer interface on Phoenix Terminals:
X2= Potential free contacts (detail see Section 3 / 1.2) | |
| 5 | JR2/RS485 on RJ 45 port | Remote panel connection (see Section 3) | |
| 6 | JR1/RS485 on RJ 45 port | Interface for Multidrop connection between several UPS cabinets (see Section 3) | |
| 7 | SW1-9 | Multi-Cabinet Configuration Switch (see section 4) | |
| 8 | JD8 | Parallel BUS connector | |
| ONLY For paralleling cabinets use optional adapter: | | | |
| | JD5 | Parallel BUS - Input Connector | |
| | JD6 | Parallel BUS - Output Connector | |
| 9 | SNMP | Slot for optional SNMP card ONLY | |
| 10 | Newavewatch | Slot for optional Modem/Ethernet card ONLY | |
| 11 | Battery terminal + / N / - for | | |
| 12 | Input Bypass terminal for Dual Input feed | | } see section 2.1.2
pag. 2 |
| 13 | Input Rectifier terminal for Single feed | | |
| 14 | Output Load terminal | | |
| 15 | IA1 | Maintenance Bypass | |
| 16 | IA2 | Parallel Isolator | |
| 17 | F3 Battery Fuse A/B | | |
| 18 | F2 Bypass Line Fuse | | |
| 19 | F1 Rectifier Fuse | | |

2.3 BATTERY CONNECTIONS

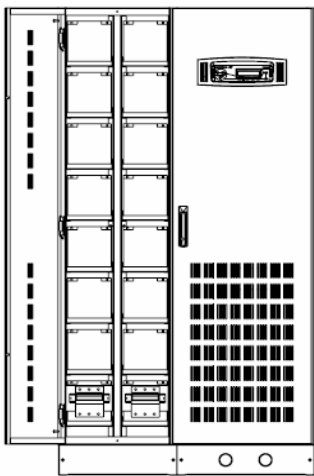
2.3.1 BATTERY ENCLOSURES A & B AND EXTERNAL BATTERY

2.3.1.1 Battery Enclosures A & B only for 60-100kVA

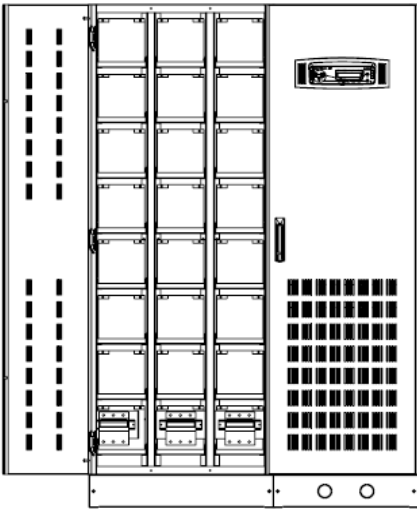
In **PowerWave 33** there is a possibility to have additional battery enclosure. In the drawing below different Battery enclosures are shown.

NOTE: Within the battery enclosures A & B only 28Ah or 24 Ah battery are allowed (40-50 blocks)

Battery Enclosure A (max. 80 blocks)



Battery Enclosure B (max.120 blocks)



NOTE: Set-up the correct number of battery blocks on Control Panel (Menu: Service-Set-Up).

The integrated battery enclosures are part of the UPS, therefore cannot be defined as a separate battery cabinet	UPS & BAT- ENC A Only for 60, 80 and 100kVA	UPS & BAT- ENC B Only for 60, 80 and 100kVA
BAT- ENC A & B		
Configuration accommodates:	80 Batt. Blocks for 28Ah mounted on 16 shelves (5 blocks/shelf)	120 Batt. Blocks for 28Ah mounted on 24 shelves (5 blocks/shelf)

The integrated battery enclosures are part of the UPS, therefore cannot be defined as a separate battery cabinet	UPS & BAT- ENC A Only for 60, 80 and 100kVA	UPS & BAT- ENC B Only for 60, 80 and 100kVA
Strings : Terminals :	2 3 x M8	3 3 x M8
Fuse Type (Very Fast acting)	2 x 3 x 100A	3 x 3 x 100A
Dimensions of UPS and battery Side (WxHxD)	970x1820x750	1180x1820x750
Weight w/o trays and w/o batteries (kg)	20	30
Battery configuration with BAT-ENC A & B	Batt. Config. (2x40)x28Ah	Batt. Config. (3x40)x28Ah

2.3.1.2 Examples of Battery Autonomy at full load with standard battery cabinets and standard battery configuration

28Ah battery							
UPS Range		60kVA	80kVA	100kVA	120kVA	160kVA	200kVA
BAT- ENC	Battery configuration	Autonomy time @ PF=0.8					
	Batt. Enclosure A (2x40)x28Ah Batt. Enclosure B (3x40)x28Ah	13 22	9 15	7 12			
	Max blocks allowed	40-50	40-50	40-50	40-50	40-50	50

NOTE: For UPS-Systems PowerWave 33 it is allowed to use 40-50 (only even numbers) of 12V-battery blocks in the range from 60 to 160kVA, the 200kVA power only 50 blocks are allowed.

2.3.1.3 Connection of External Battery for PowerWave 33

It is normally recommended for redundant systems to provide each UPS with its own separate battery. In this way the redundancy is extended also to the batteries. In the Figure 3.2.3 the drawing shows how to connect the batteries in the external battery cabinet and the PowerWave 33 frame.

**NOTE!**

ALL THE OPERATIONS IN THIS MANUAL MUST BE PERFORMED BY AUTHORISED ELECTRICIANS OR BY QUALIFIED INTERNAL PERSONNEL. DO NOT OPERATE IN CASE OF PRESENCE OF WATER OR MOISTURE. BY OPENING OR REMOVING THE UPS-COVERS YOU RUN RISK OF EXPOSURE TO DANGEROUS VOLTAGES.

To ensure protection of the personnel during the installation of the UPS make sure that the connections are performed under the following conditions:



- No mains voltage is present in the UPS
- All the loads are disconnected
- The UPS and the external battery are voltage-free

To verify the complete shut down of the **PowerWave 33** perform following steps:

- 1) Make sure that the fuses feeding the UPS in the input Distribution Board are all open and no power is fed to the UPS.
- 2) Make sure the "MAINTENANCE BYPASS"(IA1) is open (position "OFF")
- 3) Make sure the battery fuses in the external battery cabinet or racks and on the UPS are open.
- 4) Connect Earth (**PE**) between the UPS and external battery cabinet.
- 5) Connect the corresponding **+** , **N**, **–** terminals between UPS and external battery cabinet according to drawing

2.3.1.4 Terminals for External Battery connection

External Battery for separate Batteries per UPS

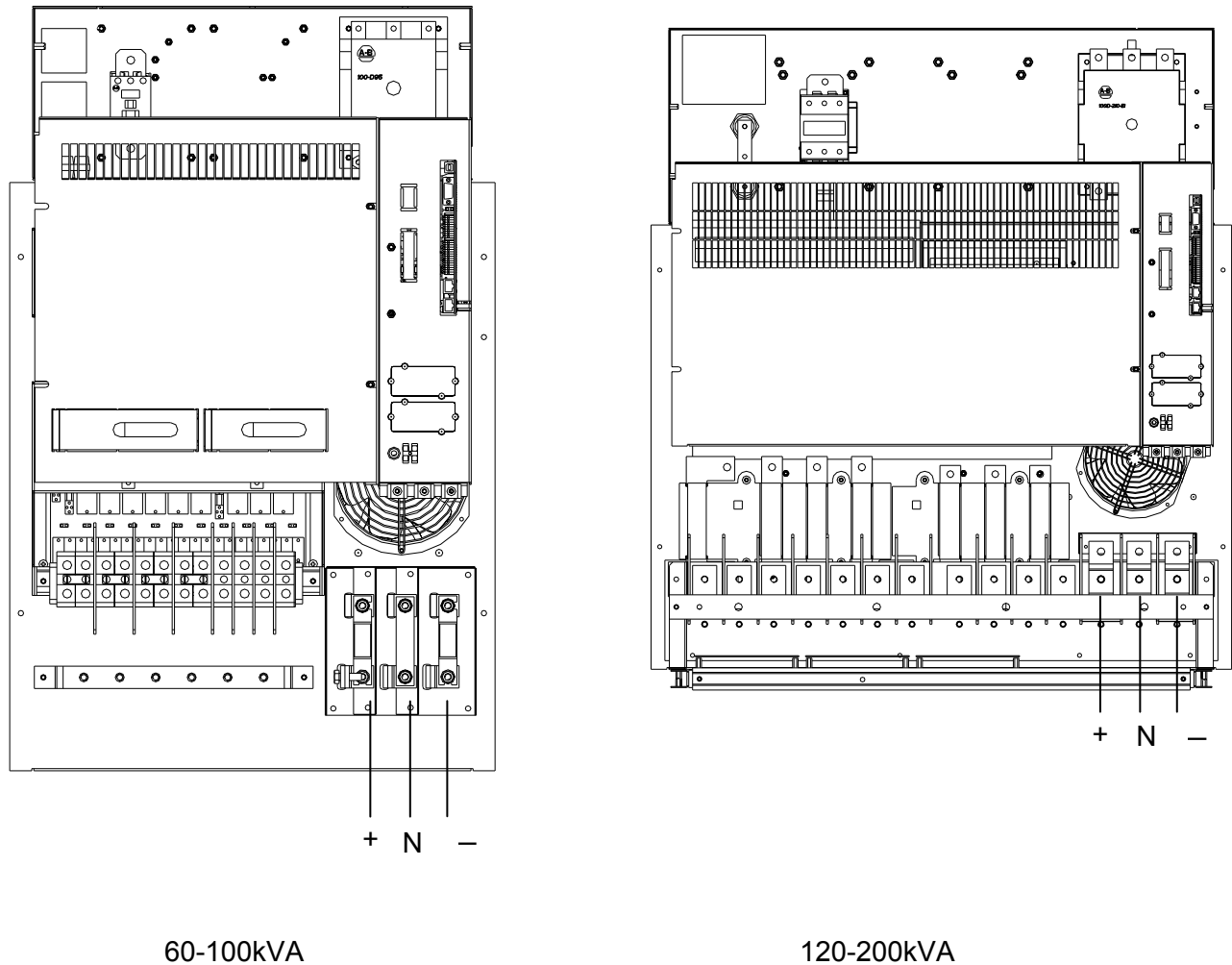


Fig. 3.2.3 Connection of external separate batteries

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- 3.1.1 SMART PORT JD1 (SERIAL RS 232 / SUB D9 / FEMALE) AND USB PORT2
- 3.1.2 CUSTOMER INTERFACE AND DRY PORTS (VOLT-FREE CONTACTS).....3
 - 3.1.2.1 Input Interfaces Terminal block X1.....3
 - 3.1.2.2 Output Interfaces Terminal blocks X2 (DRY PORTs)3
- 3.1.3 JR1 / RS485 INTERFACE FOR MULTIDROP4

3.1 INTERFACING

Each UPS is provided with communication port and a communication card, which provides system information

- Input Interfaces X1 (Phoenix terminals)
- Output Interfaces : X2 DRY PORTs ,volt-free contacts (Phoenix terminals)
- USB port /RS232: Interface (UPS system to computer)
- JD1 / RS232 Sub D9 / female : Interface (UPS system to computer)
- JR2 / RS485 on RJ 45 port: Remote panel connection (NOT AVAILABLE AT THE MOMENT)
- JR1 / RS485 on RJ 45 port: Interface for Multidrop connection between several UPS cabinets
- SLOT 1 / SNMP Slot
- SLOT 2 / Newavewatch™ Slot

3.1.1 SMART PORT JD1 (SERIAL RS 232 / SUB D9 / FEMALE) AND USB PORT

The **SMART PORT JD1** and **USB port** located on the UPS itself is an intelligent RS 232 serial port that allows the UPS to be connected to a computer. The connector is a standard D-Type, 9-pin, female, and the USB is a standard USB port.

When installed the optional SMART PORT, the software WAVEMON allows the computer to monitor the mains voltage and the UPS status continuously.

In the event of any changes the computer terminal will display a message.

(For details see our Monitoring Package: **WAVEMON**).

The Fig. 1.1 shows how to connect a PC to the UPS with different Sub-D connectors.

a)Interface Cable (UPS End)
(9-Pin, D-Type female)

Interface cable (Computer End)
(9-Pin, D-Type male)

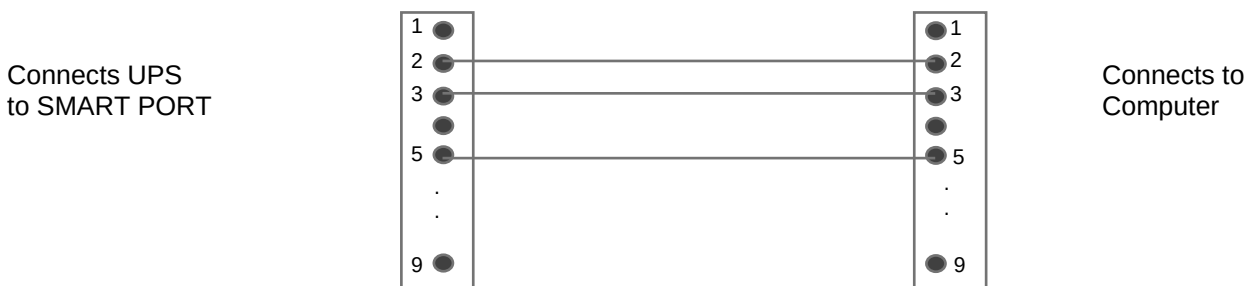


Figure 1.1 Connector Cable - PC Serial Port with 9-Pin Connection

3.1.2 CUSTOMER INTERFACE AND DRY PORTS (VOLT-FREE CONTACTS)

All the Input and Output interfaces are connected to Phoenix terminals (cable 0.5 mm²)

3.1.2.1 Input Interfaces Terminal block X1

- Connection of Remote Shut down facilities, Generator Operation, Customers specials (*see Section 9, chapter 1.2 OPTIONS*)

3.1.2.2 Output Interfaces Terminal blocks X2 (DRY PORTS)

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

All voltage free contacts are rated 60 VAC max. and 500 mA max.:

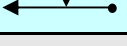
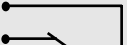
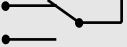
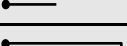
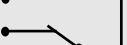
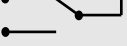
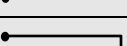
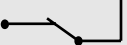
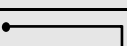
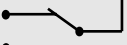
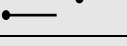
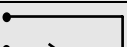
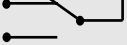
Block	Terminal	Contact	Signal	On Display	Function
X1	X1 / 10	GND 	GND		12 Vdc source
	X1 / 9	IN 	+12Vdc		(Max 200mA load)
	X1 / 8	GND 	GND		Remote Shut down
	X1 / 7	IN 	+12Vdc		(Do not remove the factory mounted bridge until an external remote shut down is connected)
	X1 / 6	GND 	GND		Temperature Battery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

Figure 1.2 Phoenix Terminals (X1,X2) Connection

On the Interface board are located two LED's:

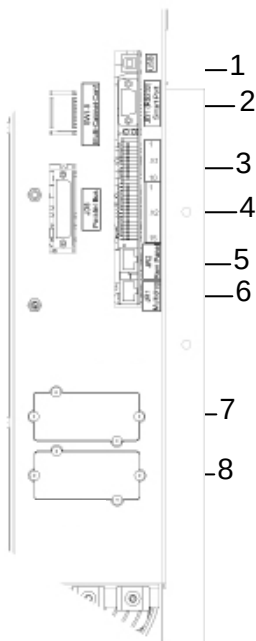
- Green LED showing the status of the Interface:
 - Fast Blinking: 2 times/sec = Interface is Master (1st Cabinet of a parallel System)
 - Slow Blinking: 1 times/sec = Interface is Slave (2nd,... 10th cabinet of a // - System)
- Red LED Board Alarm (indicates a possible replacement of the board)

On the Master board the following ports are active:

- The Input ports (X1)
- The Output port (X2)

3.1.3 JR1 / RS485 INTERFACE FOR MULTIDROP

The **Computer Interface JR1** located on the distribution part is an intelligent RS485 serial port that allows to get from several UPS cabinets which are connected in parallel the complete system information by using the Multidrop connection kit. (For details see user manual Multidrop kit). The connector JR1 is a standard RJ45 port.



- | | | |
|--|---------------------------|--|
| 1 | USB | PC Interface |
| 2 | JD1/RS232 Sub D9/female | Interface (UPS system to computer) (see section 3 / 1.1) |
| 3 | X1 | Customer Inputs |
| 4 | X2 | Customer interface on Phoenix Terminals:
X2= Potential free contacts (detail see Section 3 / 1.2) |
| 5 | JR2 / RS485 on RJ 45 port | Remote panel connection |
| 6 | JR1 / RS485 on RJ 45 port | Interface for Multidrop connection between several UPS cabinets |
| 7 | SNMP | Slot for optional SNMP card ONLY |
| 8 | Newavewatch™ | Slot for optional Modem/Ethernet card ONLY |
| 9 | JD8 | Parallel BUS connector |
| ONLY For paralleling cabinets use optional adapter: | | |
| | JD5 | Parallel BUS - Input Connector |
| | JD6 | Parallel BUS - Output Connector |

Example : Distribution Interfaces

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4.1 OPERATION

COMMISSIONING

The PowerWave 33 is a high quality electronic machine, that must be commissioned by a fully trained and authorized NEWAVE field service engineer before being put into use.

The commissioning of the UPS involves the connection of the UPS and battery, the checking of the electrical installation and operating environment of the UPS, the controlled start-up and testing of the UPS and customer training.



WARNING!

OPERATIONS INSIDE THE UPS MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR FROM AN AGENT AUTHORIZED BY THE MANUFACTURER.

CONTROL PANEL



WARNING!

ONLY PERSONS WHICH HAVE BEEN TRAINED BY SERVICE TECHNICIANS OF THE MANUFACTURER OR HIS AUTHORIZED SERVICE PARTNERS ARE ALLOWED TO OPERATE ON THE CONTROL PANEL WITH CLOSED DOORS. ALL OTHER INTERVENTIONS ON THE UPS SYSTEM HAVE TO BE DONE ONLY BY SERVICE TECHNICIANS OF THE MANUFACTURER.

The user-friendly control panel is composed of three parts:

- POWER MANAGEMENT LCD DISPLAY (PMD);
- LED INDICATORS;
- KEYS.

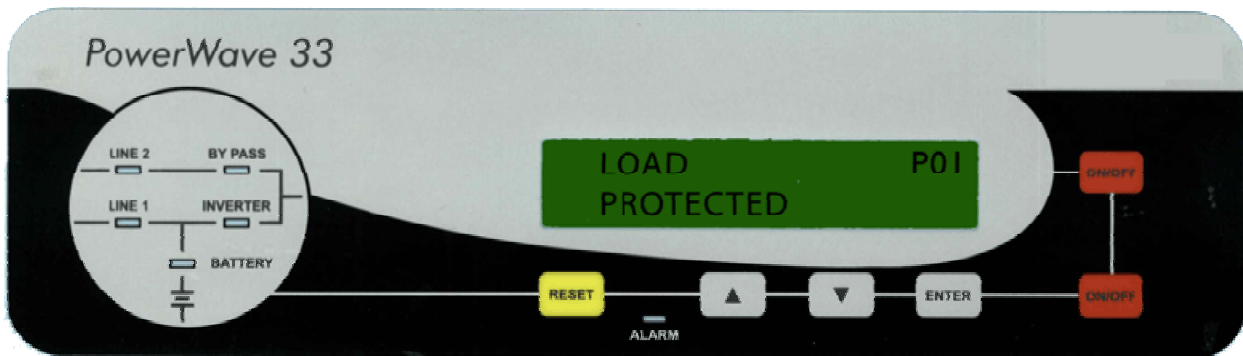


Figure 1.1 Control Panel

4.1.1.1 Power Management Display (PMD)

The 2 x 20 character LCD simplifies the communication with the UPS and provides the necessary monitoring information about the UPS. The menu driven LCD enables the access to the:

- EVENT REGISTER;
- Monitor the input and output U, I, f, P,
- Battery runtime;
- To perform commands like start-up and shut-down of UPS and
- Load transfer from INVERTER to BYPASS and vice-versa;
- DIAGNOSIS (SERVICE MODE);
- Adjustments and testing.

4.1.1.2 LED Indicators

The mimic diagram serves to indicate 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 colours 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 is supplying power to the critical load. When the battery is supplying the load due to mains failure the LED-indicator BATTERY is flashing.

The LED-indicator ALARM is a visual indication of any internal or external alarm condition. At the same time an audible alarm will be activated.

INDICATOR	INDICATOR STATUS	MEANING
ALARM	OFF	No alarm condition
	RED	Alarm condition
LINE 1	GREEN	Mains rectifier available
	RED	Mains rectifier not available
LINE 2	GREEN	Mains bypass available
	RED	Mains bypass not OK or not available
	OFF	UPS is turned off
BY-PASS	GREEN	Load on bypass (Bypass-or Eco-Mode)
	OFF	Bypass not operating (switched-off)
INV	GREEN	Load on inverter
	RED	Inverter fault or load not transferable to inverter
	OFF	Inverter not operating (switched-off)
BATTERY	GREEN	Battery OK
	RED	Battery fault or battery is discharged
	Flashing GREEN	Battery in discharge or battery fuse open

4.1.1.3 Keys

The keys allow the user to operate the UPS to perform settings and adjustments, to start-up and shutdown the UPS, to monitor on the LCD display the voltages, currents, frequencies and other values.

KEYS	FUNCTION
ON/OFF ON/OFF	Serve to switch-on (press both keys simultaneously), or shutdown the UPS (press both keys simultaneously)
UP (↑)	Move upwards through the menu
DOWN (↓)	Move downwards through the menu.
RESET	Cancel the audible alarm. If the alarm condition was only transient the LED-indicator ALARM would also extinguish otherwise it will remain on (red).
ENTER	Confirms a chosen menu item.

4.1.2.4 ON/OFF Start-up and Shutdown Buttons



IN THE CASE THAT THE PARALLEL UPS SYSTEM HAS TO BE TURNED OFF, THEN BOTH ON/OFF BUTTONS ON ALL UPS MODULES HAVE TO BE PUSHED. IN THIS CASE THE POWER SUPPLY TO THE LOAD WILL BE INTERRUPTED.

4.2.1.5 Definition of a Single/ Multi-Cabinet Chain (DIP Switch SW1-9)

By means of the DIP Switch SW1-9, which is located on the bottom right front of the UPS, it is possible to determine the “position” of the UPSs when are in parallel configuration:

- “**First**” UPS in the parallel configuration chain
- “**Middle**” UPS in the parallel configuration chain (there may be more than one)
- “**Last**” UPS in the parallel configuration chain.

NOTE: If a UPS is a **Single UPS** then it is seen as the “**First**” and “**Last**” in an imaginary chain. For more details concerning the positions of the DIP Switch SW1-9 please refer to “**CONTENS SECTION-6**” point “**6.1.2.4 DIP Switch 1-9**”.

Description of the LCD

4.1.1.4 Status Screens

DESCRIPTION	LCD-DISPLAY
1 Load is protected by UPS power (load is supplied by inverter(Normal Operation))	LOAD PROTECTED S
2 Load is not protected by UPS power it is supplied by mains power (load on bypass)	LOAD NOT PROTECTED S
3 Load supply completely interrupted. UPS has been switched off by “ON/OFF” buttons	LOAD OFF SUPPLY FAILURE S
4 The UPS/module is not supplying load anymore. The output switch is open	LOAD DISCONNECTED PARALLEL SWITCH OPEN S

NOTE: On the right hand side of the LCD there is a 3-digit indicator defining the UPS “Position” in the Multi-UPS system.

- S** stands for **Single** UPS. The system consists only of one UPS.
- P01** stands for **Parallel** UPS in a Multi- UPS system and 01 stands for the first UPS (**MASTER**) in the Multi- UPS system.
- P02** stands for **Parallel** UPS in a Multi- UPS system and 02 stands for the second UPS (**SLAVE**) in the Multi- UPS system.
- P03** stands for **Parallel** UPS in a Multi- UPS system and 03 stands for the third UPS (**SLAVE**) in the Multi- UPS system.

The definition of the UPS “Position” in a parallel system and frame is achieved in the Menu Service Set-Up.

DESCRIPTION	LCD-DISPLAY
Single UPS Systems	SYSTEM CONFIGURATION SINGLE S
Parallel System e.g. first UPS cabinet	SYSTEM CONFIGURATION PARALLEL P01
Parallel System e.g. second UPS cabinet / Slave	LOAD OFF SUPPLY FAILURE P02

The max no. of UPS units is 10.

4.1.1.5 Main Menu Screen

DESCRIPTION

- 1 Logging Control. A log of the last 64 events is stored in the Power Management Display.
- 2 In Menu Measurements: monitor voltages, power, frequencies, currents, autonomy etc.
- 3 The Command Menu enables to perform the commands "Load to inverter", Load to bypass, battery test.
- 4 The UPS Data are the UPS personalized information "serial number"
- 5 Various settings can be performed by the user: Date/Time, automatic battery test, etc.
- 6 Various adjustments can be performed by the service staff

LCD-DISPLAY

→ EVENT LOG
MEASUREMENTS
→ MEASUREMENTS
COMMANDS
→ COMMANDS
UPS DATA
→ SET-UP DATA
SET-UP USER
→ SET-UP USER
SET-UP SERVICE
→ SET-UP SERVICE
NO MORE MENU

4.1.1.6 Event Log Screen

DESCRIPTION

- 1 Logging Control; a log of the last 64 events is stored in the Power Management Display.
- 2 Every stored event is identified with a sequential number and time stamp.
- 3 By press ENTER the code of the event will be displayed. (Press ENTER to come back to the previous indication)
- 4 All events and alarms are indicated with their date and time of appearance.

LCD-DISPLAY

01	05-10-08	14-38-59
LOCAL LOAD OFF		
02	05-10-08	14-38-56
LOCAL LOAD TO BYP		
02	8104	
LOCAL LOAD TO INV		
03	05-10-08	14-37-14
LOCAL LOAD TO INV		

4.1.1.7 Measurements Screen

DESCRIPTION

- 1 Battery Runtime
- 2 UPS-Output Frequency
- 3 Bypass Frequency.
- 4 Battery Voltage
- 5 Battery Charger Current
- 6 Discharge Current.
- 7 Rectifier Voltage of all three phases
- 8 Bypass Voltage of all three phases

LCD-DISPLAY

BATT. RUN TIME (MIN)		
00h 00m		
OUTPUT FREQUENCY (HZ)		
50.00		
BYPASS FREQUENCY (HZ)		
50.00		
BATTERY VOLTAGE (V)		
+ 0.0 - 0.0		
BATT. CHARGE CUR. (A)		
+ 0.0 - 0.0		
DISCHARGE CURRENT (A)		
00.00		
RECTIFIER VOLTAGE (V)		
230	230	230
BYPASS VOLTAGE (V)		
230	230	230

- 9 Output Voltage of all three phases
- 10 Output Current of all three phases
- 11 Active Output Power of all three phases
- 12 Reactive Output Power of all three phases
- 13 Apparent Output Power of all three phases
- 14 Output Power of all three phases
- 15 Battery capacity

OUTPUT VOLTAGE (V)		
230	230	230
OUTPUT CURRENT (A)		
00.00	00.00	00.00
ACTIVE POWER (KW)		
00.00	00.00	00.00
REACTIVE POWER (kVar)		
00.00	00.00	00.00
APPARENT POWER (KVA)		
00.00	00.00	00.00
OUTPUT POWER (%)		
00.00	00.00	00.00
BATT. CAPACITY (%)		
00.00		

4.1.1.8 Commands Screen

DESCRIPTION

- 1 Transfer Load to inverter
- 2 Transfer Load to bypass.
- 3 Battery Test

LCD-DISPLAY

→ LOAD TO INVERTER LOAD TO BYPASS
→ LOAD TO BYPASS PERFORM BATT.TEST
→ PERFORM BATT.TEST NO MORE COMMANDS

4.1.1.9 UPS Data

DESCRIPTION

- 1 These general UPS Data are installed at the manufacturing plant
- 2 Manufacturing date
- 3 EPROM Version
- 4 Actual Date and Time

LCD-DISPLAY

UPS SERIAL NUMBER NW-nnnnnn	
DATE OF MANUFACTURE 15-01-2008	
EPROM VERSION V-000	
DATE dd-mm-yyyy	TIME hh:mm:ss

4.1.1.10 Set-Up User

DESCRIPTION

- 1 Set-up Language

LCD-DISPLAY

→ SET LANGUAGE SET DATE AND TIME
ENGLISH FRANCAIS DEUTCH DUTCH SPANISH POLISH PORTOGUESE

2 Set-up Date and Time

3 Set-up battery test

4 Set-up operation with Gen-Set

→ SET-UP DATE/TIME SET-UP BATT. TEST
DD-MM-YY HH-MM-SS
→ SET BATTERY TEST SET GENERATOR OP.
DAY OF MONTH (1-31)
HOUR OF DAY (1-24)
REPETITIVE (Y/N) YES/NO
→ SET GENERATOR OP. NO MORE SETTINGS
BATT.CHARGE LOCK YES/NO
BYPASS LOCK YES/NO

4.1.1.11 Set-Up Service

DESCRIPTION

- 1 This Menu is reserved for authorized service engineers. It is not to be used by End-Users
- 2 Type in password

LCD-DISPLAY

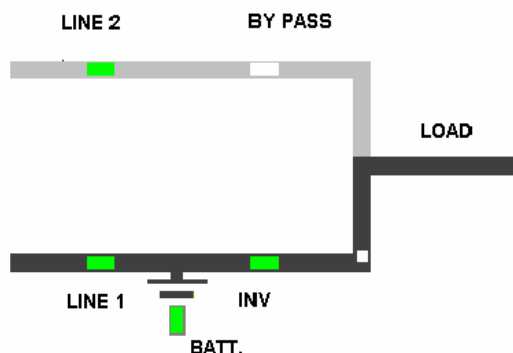
→ SET-UP SERVICE PASSWORD
→ PASSWORD.

Password is necessary to enter: Service Manual

OPERATING MODES

4.1.1.12 Mode "ON LINE" (INVERTER MODE)

The ON-LINE-Mode is the UPS-Operating Mode in which the load is supplied through the RECTIFIER and INVERTER.



LED Indicator	Colour
LINE 1	Green
LINE 2	Green
BYPASS	OFF
INVERTER	Green
BATTERY	Green

Using the control panel (see figure 1.1), the UPS can easily be transferred to the ON-LINE-Mode. The ON-LINE-Mode provides the highest degree of protection, especially in the event of a mains disturbance or failure.

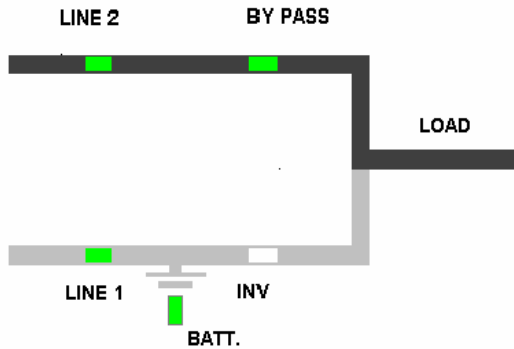
This operating mode is always recommended if the critical loads (computer systems) will not tolerate any interruption of the supply (not even the shortest).

In the unlikely event of an inverter fault or overload condition the UPS will transfer the load automatically and without interruption to the static bypass-mains supply (transfer time = 0).

4.1.1.13 Mode "OFF-LINE" (ECO- or BYPASS MODE)

In the "OFF-Line Mode", the load is supplied from the mains through the static bypass.

Using the control panel (see figure 1.1), the UPS may be easily transferred to "Bypass Mode".



LED Indicator	Colour
LINE 1	Green
LINE 2	Green
BYPASS	Green
INVERTER	OFF
BATTERY	Green

When the UPS is operating in "Bypass Mode", the efficiency of the system is higher. In the event of a mains failure the load will automatically be transferred from mains to inverter within 5 msec (this is valid for single and parallel systems). The battery charger remains active in the "Bypass-Mode".

The "Bypass-Mode", is recommended only if the loads can tolerate interruptions of 3-5 ms (transfer time from Bypass Mode to ON-LINE Mode).



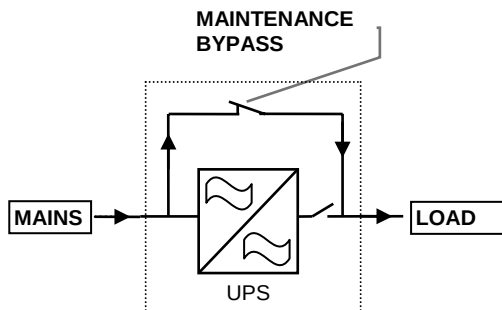
NOTE!

TO HAVE TO MOST ESSENTIAL SECURITY LEVEL, WE RECOMMEND TO RUN THE UPS ON NORMAL OPERATION MODE, MEANS UPS MODE.

4.1.1.14 "MAINTENANCE BYPASS" - Mode

The Maintenance Bypass Mode is performed by means of the IA1 BYPASS SWITCH on the front of the UPS:

POSITION OF SWITCH	EFFECT
ON	Bypass-Switch Closed (Load supplied directly from mains) LCD-indication: "MANUAL BYP IS CLOSED" LED Indicators will indicate as shown in table below.
OFF	Bypass-Switch Open – Normal operating condition (Load supplied by inverter) LCD-indication "MANUAL BYP IS OPEN" LED Indicators will indicate as shown in table below.



LED Indicator	Bypass Switch	
	ON	OFF
LINE 1	Green	Green
LINE 2	Green	Green
BYPASS	Green	OFF
INVERTER	RED	Green
BATTERY	Green	Green

Before transferring the load to Maintenance Bypass (IA1) always make sure all the UPS-modules are in the "Bypass-Mode" or "ECO-Mode".



NOTE!

ON OPERATION MODE „MANUAL BYPASS“ THE LOAD IS NOT PROTECTED AGAINST ANY MAINS FAILURES OR MAINS DISTURBANCES.

4.1.1.15 Parallel Isolator (IA2)

Every UPS-unit is provided with an output parallel isolator (IA2) which, when opened isolates the corresponding unit from the PARALLEL BUS and from the LOAD. Once IA2 is open there is no power coming from its inverter.

In redundant parallel configurations it is used to isolate a unit from the parallel system without the need of transferring the load to bypass.

POSITION	EFFECT
ON	Normal Operation (Load supplied by UPS)
OFF	UPS-Module isolated from Parallel Bus for maintenance or module replacement (UPS-Module not supplying load)

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5.1 OPERATION - PROCEDURES

5.1.1 START-UP PROCEDURE



WARNING!

THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR FROM A AGENT AUTHORIZED BY THE MANUFACTURER.

Situation of UPS-System before switching it on:

1. Make sure the fuses for the supply of UPS-System in the Input Distribution Board on site are open.
2. Make sure all the input and output cabling has been performed correctly.
3. Verify that the Parallel Isolator Switch IA2 is open (Position OFF).
4. Verify that the Maintenance Switch IA1 is open and in Position OFF.
5. Make sure that the internal battery enclosure fuses and/or the external battery cabinets fuses are open.
6. Bypass fuses F2 are inserted.

Start up procedure of PowerWave 33:

1. Insert fuses for the supply of UPS-System in the Input Distribution and check the input phase rotation.
 - The LED-indicators LINE 1 and battery on UPS-Module is lit – green
 - On LCD-Display “LOAD OFF, SUPPLY FAILURE” will appear.
2. UPS 1:
Press both “ON/OFF” Main Buttons to switch on UPS.
LCD panel must display: “LOAD DISCONNECTED PARALLEL SWITCH OPEN” and the LED-indicator will appear as shown below:

LED Indicator	Colour
LINE 1	Green
LINE 2	Green
BYPASS	Green
INVERTER	OFF
BATTERY	Flashing Green

3. Check Command: LOAD TO INVERTER
LED indicator will appear as shown below:

LED Indicator	Colour
LINE 1	Green
LINE 2	Green
BYPASS	OFF
INVERTER	Green
BATTERY	Flashing Green

4. Scroll through the menu measurement and check their correctness
5. Check battery polarity and voltage.

6. If the battery polarity and voltage are correct insert battery enclosure and/or external battery fuses (breakers).
7. Testing of Parallel Functions
(The load fuses in output Distribution Board are still open i.e. the loads are disconnected!).
All UPS-Modules are on INVERTER MODE
8. Press simultaneously the two ON/OFF buttons on the UPS-control panel (PMD) on all control panels to turn the modules OFF. On the LCD's message "LOAD OFF, SUPPLY FAILURE" will appear
9. Close Parallel Isolator IA2-1 (position ON) of Module 1, on LCD: "PARALLEL SW CLOSED" will appear.
10. Press simultaneously the two ON/OFF buttons on the UPS-control panel (PMD) to turn the UPS ON. On output Terminal Block there is now UPS power and on all LCD's: "LOAD PROTECTED" will appear.
11. Close Parallel Isolator IA2-1 (position ON) of Module 2, on LCD: "PARALLEL SW CLOSED" will appear.
12. Press simultaneously the two ON/OFF buttons on the UPS-control panel (PMD) to turn the UPS ON. On output Terminal Block there is now UPS power and on all LCD's: "LOAD PROTECTED" will appear. **(now the two units are operating in parallel)**
13. Perform step 11. and 12. until all the unit of the system are complete switched in parallel.
14. Load transfer to Maintenance Bypass
On the control panel go to Menu COMMANDS and choose command "LOAD TO BYPASS", (for parallel operation is enough to give the order in one of the units) and transfer the load to mains.
Close Maintenance Bypass Switch IA1 (position ON)
On LCD: "MANUAL BYP IS CLOSED" will appear and the LED-indicator will indicate as shown below:

LED Indicator	Colour
LINE 1	Green
LINE 2	Green
BYPASS	Green
INVERTER	RED
BATTERY	Green
15. Connect Load to the UPS Output
Insert fuses in output Distribution Board
Verify on control Panel that the load is on bypass
16. Open Maintenance Bypass Switch IA1
On LCD: "MANUAL BYP IS OPEN" will appear followed by "LOAD NOT PROTECTED"
17. Check on LCD the Output Powers, Voltages Currents and Frequencies.
18. Load transfer to Inverter
On control panel go to Menu COMMANDS, choose command "LOAD TO INVERTER" and transfer the load to inverter.
On all LCD's: "LOAD PROTECTED" will appear
19. Check the output Voltages and Currents once again.

THE LOAD IS NOW PROTECTED BY THE POWERWAVE 33

5.1.2 SHUTDOWN PROCEDURE



WARNING!

THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR FROM A AGENT AUTHORIZED BY THE MANUFACTURER.

The **POWERWAVE 33** may be shutdown completely, if the load does not need input power for an extended period of time.

It may be switched to Maintenance Bypass Mode for service or maintenance purposes, or transferred to the OFF-LINE Mode (ECO-Mode), if the load does not need the highest degree of protection.

The load may be disconnected by means of the two ON/OFF (LOAD-OFF) buttons for security reasons.

Complete Shutdown procedure of POWERWAVE 33:

Only in case there is no need to supply the load, the UPS System can be completely shutdown. The following procedures can only be executed after the load has completely been de-energized.



NOTE!

IN THE CASE THAT THE PARALLEL UPS SYSTEM HAS TO BE TURNED OFF, THEN BOTH ON/OFF BUTTONS ON ALL UPS MODULES HAVE TO BE PUSHED. IN THIS CASE THE POWER SUPPLY TO THE LOAD WILL BE INTERRUPTED.

1. Verify that the loads are shutdown and that there is no need for power supply to the load.
2. If the loads are all disconnected, press simultaneously both ON/OFF-Buttons on UPS-Control Panel on all three Control Panels.
On the LCD: "LOAD OFF, SUPPLY FAILURE" will appear and the LED-indicator will indicate as shown below:

LED Indicator	Colour
LINE 1	Green
LINE 2	OFF
BYPASS	OFF
INVERTER	OFF
BATTERY	Green

3. Open all Parallel Isolator Switches IA2.
4. Open battery fuses/breakers on external battery cabinets or racks.
5. Open the mains fuses/breaker in the building distribution panel.



NOTE!

MAKE SURE THE INTERNAL DC-CAPACITORS (ELCO) HAVE BEEN DISCHARGED WAITING AT LEAST 10 MINUTES.

THE POWERWAVE 33 IS NOW VOLTAGE FREE.

5.1.3 LOAD TRANSFER: FROM INVERTER OPERATION TO MAINTENANCE BYPASS

If it is necessary to perform service or maintenance on the UPS it is possible to transfer the UPS to MAINTENANCE BYPASS.



WARNING!

THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR FROM A AGENT AUTHORIZED BY THE MANUFACTURER.

Situation of UPS-System before starting the Transfer Procedure to Maintenance Bypass:

The load is protected by PowerWave 33 running in normal operation. (The UPS is operating on inverter).

1. Using LCD panel, select the COMMANDS menu, choose command "LOAD TO BYPASS" and transfer the load to mains. (for parallel operation is enough to give the order in one of the units)
On LCD panel "LOAD NOT PROTECTED" will appear.
2. Close Maintenance Bypass Switch IA1 (position ON). (for parallel operation close all IA1)
On LCD: "MANUAL BYP IS CLOSED" will appear and the mimic panel will show:

LED Indicator	Colour
LINE 1	Green
LINE 2	Green
BYPASS	Green
INVERTER	RED
BATTERY	Green

3. Press simultaneously the two ON/OFF buttons on the UPS-control panel (PMD) on all control panels.
On the LCD's message "LOAD OFF, SUPPLY FAILURE" will appear and the mimic panel will show:

LED Indicator	Colour
LINE 1	Green
LINE 2	OFF
BYPASS	OFF
INVERTER	OFF
BATTERY	Flashing Green

4. Open the Parallel Isolators IA2 on all UPSs
5. Open battery fuses/breakers on the external battery cabinets or racks.



NOTE!

THE UPS SYSTEM IS STILL POWERED (DANGEROUS VOLTAGE).



NOTE!

THE LOAD IS NOW SUPPLIED BY MAINS AND IS THEREFORE NOT PROTECTED THROUGH THE UPS

5.1.4 LOAD TRANSFER: FROM MAINTENANCE BYPASS TO INVERTER OPERATIONS

This procedure describes the sequence of operations to be done in order to restart the UPS and restore ON-LINE mode (Load on Inverter).



WARNING!

THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR FROM A AGENT AUTHORIZED BY THE MANUFACTURER.

Situation of UPS-System before starting the Transfer Procedure to ON-LINE mode:

The load is supplied directly by Input Mains power and the UPS is OFF.

1. Close battery fuses/breakers in the external battery cabinets or racks.
2. On the LCD's: "LOAD OFF, SUPPLY FAILURE" will appear and the mimic panel will show:

LED Indicator	Colour
LINE 1	Green
LINE 2	OFF
BYPASS	OFF
INVERTER	OFF
BATTERY	Flashing/Green

3. Close all Parallel Isolators IA2 and check message "PARALLEL SW CLOSED" on LCD of each UPS.
4. Press simultaneously the two ON/OFF buttons on the UPS-control panel (PMD). Unit will start-up and after about 60 seconds the mimic panel will show:

LED Indicator	Colour
LINE 1	Green
LINE 2	Green
BYPASS	Green
INVERTER	RED
BATTERY	Green

5. Make sure that the bypass LED is green, then open the Maintenance Bypass Switch IA1 of each unit (position OFF).
6. Using LCD panel, select the COMMANDS menu and choose command "LOAD TO INVERTER" (for parallel operation is enough to give the order in one of the units). This will transfer the LOAD to Inverter on the complete system (all units). On LCD panel "LOAD PROTECTED" will appear.

THE LOAD IS NOW SUPPLIED BY INVERTER POWER AND IS PROTECTED

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6.1 MULTI-CABINET CONFIGURATION

6.1.1 CONCEPT OF MULTI-CABINET CONFIGURATION

The **POWERWAVE 33** UPS may be paralleled for power capacity or for redundancy up to 10 units. The standard version is not provided with this feature which is optional and field upgradable.

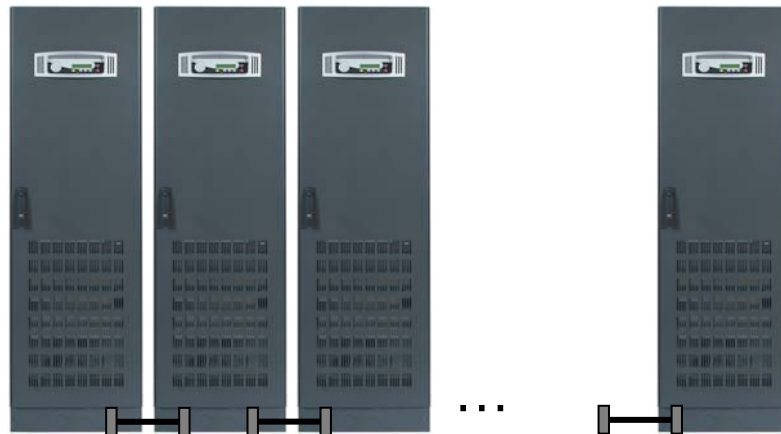


Fig. 1.1. **POWERWAVE 33** Multi-Cabinet Chain.

The Multi-Cabinet Chain is based on a decentralized bypass architecture i.e. every UPS is provided with its own static bypass. In a parallel system there is always one Master UPS and the other UPSs are slaves. If at any time the master is faulty the next UPS (former slave) will immediately take over the master function and the former master will switch off.

Every UPS unit in a parallel configuration is provided with a proper output parallel Isolator (IA2) which, when opened isolates the corresponding unit from the parallel system. Once the parallel isolator (IA2) of a unit is open that unit is isolated from the rest of the parallel system and therefore does not provide power to the output.

For example if you perform the command "LOAD TO BYPASS" on any unit, all the units will transfer the load simultaneously to mains and if you perform the command "LOAD TO INVERTER" on any unit all the UPS's will simultaneously transfer the load to the inverters.

The **POWERWAVE 33** is paralleled for redundancy (highest availability) or for power parallel systems.

IMPORTANT: The BYPASS MODE (ECO-MODE) function of a parallel systems is the same as in single units of **POWERWAVE 33**. If in a parallel UPS system the load is transferred to the BYPASS (load on mains) and if the mains fails, the UPS's will all be automatically transferred to inverter within 5msec.

6.1.2 INSTALLATION INSTRUCTIONS

6.1.2.1 Introduction



WARNING!

THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR FROM A AGENT AUTHORIZED BY THE MANUFACTURER.

NOTE: IN ORDER TO ACHIEVE EQUAL LOAD SHARING BETWEEN THE UPS-CABINETS, THE INPUT CABLE LENGTHS FROM THE INPUT DISTRIBUTION BOARD TO THE UPS AND FROM THE OUTPUT CABLE TO THE OUTPUT DISTRIBUTION BOARD SHOULD BE THE SAME RESPECTIVELY. WHEN CABLING THE UPS'S BEWARE TO CONNECT INPUT AND OUTPUT WIRES TO THE CORRESPONDING TERMINALS, RESPECTING THE SAME PHASE SEQUENCE ON ALL UPS CABINETS. EXAMPLE: PHASE1 OF UPS1 = PHASE1 OF UPS2 = = PHASE1 OF UPS n

6.1.2.2 Paralleling of UPS-Cabinets

6.1.2.2.1 Connection of Parallel Communication Cables (BUS-lines)

For the correct performance of different parallel functions and operations the parallel units communicate continuously between each other. This is achieved by means of the so-called communication BUS-Lines.

After terminating the input and output cabling of each single UPS, it is necessary to connect the units together to form the parallel system. For this purpose a communication BUS line is connected sequentially between the units. Connect communication BUS lines according to Figure 1.2.



NOTE!

CONNECT THE BUS CABLES ONLY WITH SWITCHED OFF UPS AND OPENED PARALLEL ISOLATORS IA2. RESPECT THE FOLLOWING CONNECTION SEQUENCES.

1. Fit the Parallel Adapter over the Connector JD8 on all UPS-cabinets
2. Set DIP Switch SW2-2 on each Parallel Adapter depending on the UPS Cabinet in the parallel cabinet configuration (see section 6 chapter 1.2.2.2)
3. Connect PORT JD6 on Parallel Adapter of UPS-Cabinet 1 and PORT JD5 of Parallel Adapter of UPS-Cabinet 2 with the corresponding BUS-Cable;
4. Connect PORT JD6 on Parallel Adapter of UPS-Cabinet 2 and PORT JD5 of UPS-Cabinet 3 with the corresponding BUS-Cable
5. Continue in the same manner for the remaining UPS-Cabinets.

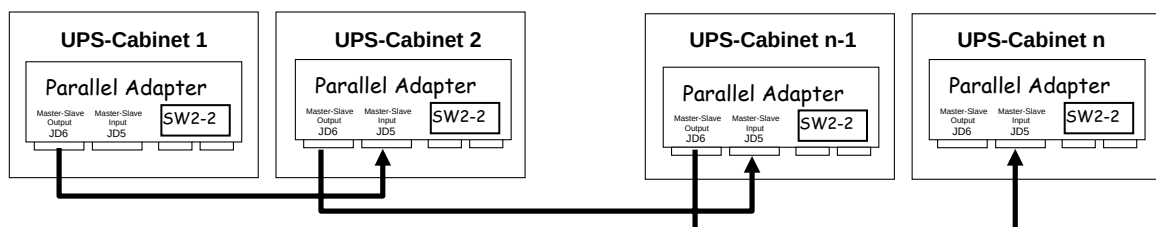
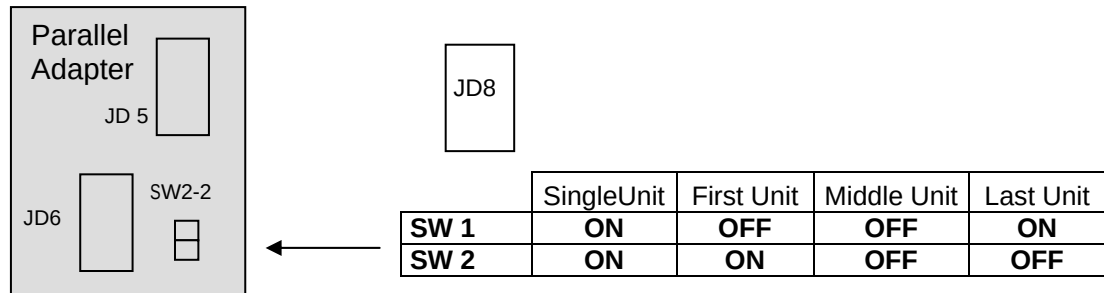


Figure 1.2. Connection of the Bus Lines when paralleling UPS-Cabinets by means of Parallel Adapters.

6.1.2.2.2 Parallel Adapter and DIP-Switch SW2-2

If the UPS-CABINETS are paralleled the Parallel Adapter will be placed on the Connector JD8 on the distribution panel and the communications cables between the cabinets will be connected through the connectors JD5 and JD6, as we are doing now.

NOTE: set the Switch SW2-2 correctly according to the corresponding cabinet configuration.



6.1.2.3 DIP-Switch SW1-9 Settings

Before starting up the parallel system it is necessary to set the DIP Switches SW1-1 and SW1-9 to their correct positions.

6.1.2.4 DIP Switch SW1-9

The DIP Switch SW1-9 is located on every Cabinet (POWERWAVE 33TM) With this switch it is possible to determine the “**position of an POWERWAVE 33TM - Cabinet**” in a Multi-Cabinet Chain. Define each **POWERWAVE 33TM - Cabinet** in a Multi-Cabinet Chain as:

1. The “**First**”,
2. The “**Middle**” (there may be more than one) and
3. The “**Last**”

Cabinet in the Multi-Cabinet Chain by setting the DIP Switch SW1-9 on each cabinet according to the Table below:

SW1-9	Single UPS	First UPS	Middle UPS	Last UPS
1	ON	ON	OFF	ON
2	ON	OFF	OFF	ON
3	ON	ON	OFF	OFF
4	ON	ON	OFF	ON
5	ON	ON	OFF	ON
6	ON	ON	OFF	ON
7	ON	ON	OFF	ON
8	ON	ON	OFF	ON
9	ON	ON	OFF	ON

After having set the SW1-9 on all the **POWERWAVE 33TM** - Cabinets correctly the UPS's may be commissioned

6.1.2.5 ON/OFF – Main Buttons

The ON/OFF-Buttons serve to shutdown the UPS-system for service or maintenance or for emergency reasons.



WHEN BOTH ON/OFF BUTTONS ON ALL UPS MODULES IN A PARALLEL SYSTEM ARE PUSHED THE POWER SUPPLY TO THE LOAD WILL BE INTERRUPTED.

6.1.2.6 Parallel Isolator (IA2)

Every UPS-unit (Means each Module) is provided with a parallel isolator IA2. The parallel isolator is an important element of the UPS-unit, that allows the isolation of a Modul from the parallel system without the need to transfer the load to bypass.



IA2 OPEN:
THE CORRESPONDING UPS-MODULE IS ISOLATED FROM THE OUTPUT. THERE IS NO COMMUNICATION BETWEEN THE ISOLATED UNIT AND THE REST OF THE PARALLEL SYSTEM. THE ISOLATED UPS-MODULE MAY BE REPLACED WITHOUT COMPROMISING THE REST OF THE SYSTEM.

IA2 CLOSED:
THE CORRESPONDING UPS IS BEING ADDED TO THE REST OF THE PARALLEL SYSTEM.
IMPORTANT: BEFORE CLOSING THE IA2 OF A UPS-MODULE BE SURE THAT THE STATUS OF THAT UPS-MODULE IS THE SAME AS OF THE REST OF THE OPERATING UPS-MODULE WITH CLOSED IA2. EXAMPLE: IF ALL UPS'S WITH CLOSED IA2 ARE ON INVERTER, MAKE SURE THAT THE UNIT ON WHICH ISOLATOR IA2 IS BEING CLOSED IS ALSO ON INVERTER.

6.1.2.7 Maintenance Bypass (IA1)

There are two types of Parallel System Configurations: redundant and capacity parallel systems (see SECTION 5).

6.1.2.7.1 Redundant Parallel Configuration

In a redundant parallel system a UPS-module may easily be isolated from the parallel system by opening the respective isolator (IA2). It is now possible to operate or shut down this unit without influencing the rest of the parallel system. The rest of the parallel system will continue to protect the load. The isolated UPS-Module may be replaced without the need of transferring the load to bypass by means of the Maintenance Bypass (IA1).

6.1.2.7.2 Capacity Parallel Configuration

In the event of a fault in one of the UPS-Modules in a capacity parallel system the load will automatically be transferred to static bypass (mains). In order to replace the faulty module the load must be transferred to mains by means of Maintenance Bypass (IA1).

6.1.2.8 ECO-MODE (BYPASS MODE) in Parallel Systems

The Eco-Mode function in a Parallel System is the same as in Single Systems. If in a **PowerWave 33** Parallel System the load is supplied by the mains(load on mains) and in the event of mains failure, **all UPS's will automatically transfer the load back to the inverters with 5msec.**



In order to provide the load with maximum protection NEWAVE always recommends that the load be supplied by the inverter (ON-LINE-Mode).

6.1.3 COMMISSIONING OF PARALLEL CONFIGURATION



WARNING!

THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR FROM A AGENT AUTHORIZED BY THE MANUFACTURER.

6.1.3.1 Start-up of a Parallel Configuration

Before starting up a parallel Configuration verify that:

1. All the input and output cabling has been performed correctly according to section 2 of this User Manual;
2. The parallel communication cables have been connected correctly according to Paragraph 6.1.2.2.1
3. All the DIP Switches for POWERWAVE 33TM - Cabinets been set correctly according to Paragraphs 6.1.2.2.2 and 6.1.2.4
4. All the internal (if any) and /or external battery cabinets/racks have been connected correctly

The start-up of a parallel Configuration may be performed in analogy to the start-up procedures for a single PowerWave 33 - Cabinet described in Paragraph 1.1 of section 5.

6.1.3.2 Shutdown of Parallel Configuration

Before shutting-down of a Parallel Configuration make sure that the loads do need power protection and that they are disconnected.



The UPS may be shut down completely if the loads do not need any power supply. Therefore the steps in this Paragraph are to be performed only after the load has been disconnected and does not need any power supply.

To perform a complete shutdown of a Parallel Configuration proceed in analogy to the shutdown procedures described in Paragraph 1.2 of section 5.

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7.1 MAINTENANCE

7.1.1 INTRODUCTION



WARNING!

THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR FROM A AGENT AUTHORIZED BY THE MANUFACTURER.

To ensure an optimum operation of the **PowerWave 33** and a continuous and efficient protection of the connected load it is recommended to check the batteries every 6 months, depending on the ambience temperature.

7.1.2 USER RESPONSIBILITIES

There are no user serviceable parts contained within the UPS so the maintenance responsibilities of the user are minimal. To maximize the useful working life and reliability of the UPS and its batteries, the environment in which the UPS operates should be kept cool, dry, dust and vibration free. The batteries should be hold fully charged.

7.1.3 ROUTINE MAINTENANCE

The UPS is designed to receive regular preventative maintenance inspections. These preventative maintenance inspections are essential to ensure that both the useful working life and the reliability of the UPS are maximized. When the UPS is commissioned, the commissioning field service engineer will attach a service record book to the front of the UPS and this will be used to record the full service history of the UPS.

Preventative maintenance inspections involve working inside the UPS, which contains hazardous AC and DC voltages. Only NEWAVE trained or agreed service personnel and authorized field service engineers are fully aware of all of the hazardous areas within the UPS.

During a preventative maintenance inspection the field service engineer will carry out the following checks:

- Site/enivrement conditions;
- Integrity of electrical installation;
- Cooling airflow;
- Rectifier operation and calibration;
- Inverter operation and calibration;
- Static switch operation;
- Battery status;
- Load characteristics;
- Integrity of alarm and monitoring systems;
- Operation of all installed options

7.1.4 BATTERY TEST

The battery test takes approx. 3 minutes and should be performed only if:

- there are no alarm conditions
- the battery is fully charged
- mains is present.

The battery testing can be carried out independently of the operation mode (OFF-LINE or ON-LINE) and whether or not the load is connected. The battery test procedure can be performed from the UPS front panel. See "Operation" [Section-4, Paragraph 4.1.1.10](#)

7.1.5 BATTERY MAINTENANCE

The battery maintenance shall be performed by a service engineer from the manufacturer or from an agent authorized by the manufacture.

7.1.6 BATTERY DISPOSAL AND RECYCLING

Batteries contain dangerous substances that will harm the environment if thrown away. If you change the batteries yourself, call qualified organizations for battery disposal and recycling.



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8.1 TROUBLESHOOTING

8.1.1 ALARMS

In the event of an alarm condition the red LED-Indicator "Alarm" and the audible alarm will turn on.

In this case proceed as follows:

1. Silence the audible alarm by pressing the button "Reset".
2. Identify the cause of the alarm condition by means of the EVENT LOG in the MAIN menu.
(see [Section-4, Paragraph 4.1.1.6](#))
3. In case of doubts please contact the nearest Service centre.
4. Fault identification and rectification information is given below.

8.1.2 MENU, COMMANDS, EVENT LOG AND MEASUREMENTS

In section 4 there is a detailed description of the Menu, Commands, Event Log and Measurements that can be operated and displayed on the LCD. The List of Alarms and Messages are shown below.

8.1.3 FAULT IDENTIFICATION AND RECTIFICATION

The major alarm conditions that will be encountered are:

Alarm Condition	Meaning	Suggested Solution
UPS FAULT	There is a fault in the UPS and therefore normal operation cannot be guaranteed	Call the authorised service centre for assistance
MAINS BYP/RECT FAULT	Mains power supply is outside prescribed tolerance	The input power to UPS is too low or missing. If site power appears to be OK, check the input circuit breakers etc. supplying the UPS
OUTPUT SHORT	There is a short circuit at the output of UPS (on load side)	Check all output connections and repair as required.
OVERLOAD	Load exceeds the UPS rated power	Identify which piece of equipment is causing the overload and remove it from the UPS. Do not connect laser printers, photocopiers, electric heaters, kettles etc. to the UPS
OVERTEMPERATURE	UPS temperature has exceeded the allowed value	Check the ambient temperature of the UPS is less than 30° C. If the ambient temperature is normal call the authorised service centre for assistance.
BATTERY CHARGER OFF	The attached battery and the battery charger set-up do not correspond or battery charger fault	Call the authorised service centre for assistance.
INVERTER FAULT	Inverter is faulty.	Call the authorised service centre for assistance.
SYNCHRON FAULT	The inverter and mains are not synchronised.	The frequency of the input voltage to the UPS is outside operational limits and the UPS static bypass has been temporarily disabled.
BATTERY IN DISCHARGE	Battery is near end of autonomy	Shutdown load connected to UPS before the UPS switches itself off to protect its batteries
MANUAL BYP IS CLOSED	Maintenance Bypass closed. Load supplied by mains	This alarm is only displayed if the UPS is on Maintenance Bypass

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9.1 OPTIONS

9.1.1 INTRODUCTION

The **PowerWave 33** is provided with the following accessories:

- REMOTE SHUT DOWN FACILITIES
- GENERATOR ON FACILITIES
- 2 CUSTOMER IN FUNCTIONS (ON REQUEST)
- TEMPERATURE SENSOR FOR TEMP. DEPENDING BATTERY CHARGING
- SOFTWARE FOR AUTOMATIC SHUTDOWN AND MONITORING
- SNMP INTERFACES FOR NETWORK MANAGEMENT AND REMOTE MONITORING
- MODEM/ETHERNET INTERFACE FOR NEWAVEWATCH™ MANAGEMENT SOFTWARE

9.1.2 REMOTE SHUT DOWN

The REMOTE SHUT DOWN **must** use a normally closed contact, which opens to operate the remote shut down sequence. Usually the shut down procedure is disabled and it should be activated by a Hardware Code on "Setup Service" menu". Please contact your distributor to enable this operation.

The remote shutdown on terminal port X1/7.. X1/8 is located on the **PowerWave 33** frame on communication card with terminal blocks X1. See [Section-3, Paragraph 3.1.2.2](#) for details.

In order to allow removal, maintenance or testing of any remote shut down facility without disturbing the normal operation of the UPS, it is recommended that a terminal block, with linking facilities, be installed between the UPS and the stop button.

1. Use a screened cable with 1 pair (section of wires 0.5 mm²) and maximum length of 100 m.
2. Connect the cable as shown in Fig. 1.2

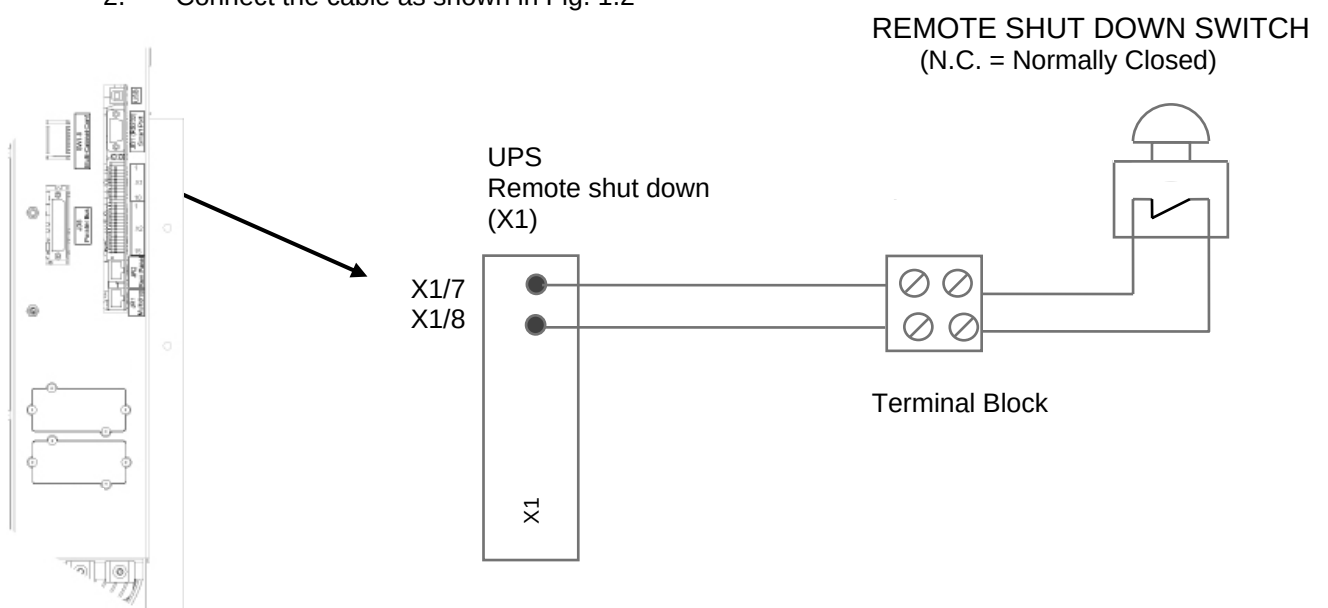


Fig 1.2 Drawing of the wiring for the REMOTE SHUT DOWN SWITCH.

9.1.3 GENERATOR ON FACILITIES

The Generator ON facility must use a normally open contact that closes to indicate that a generator is running and supplying input power to UPS. It is located at the bottom of the **PowerWave 33** frame on communication card with terminal blocks X1. See [Section-3, Paragraph 3.1.2.2](#) for details

When used, this facility disables the UPS static bypass and prevents the UPS from transferring the load on to the generator power supply and/or block the battery charger during the time the UPS is supplied from the genset. Please refer to [Section-4, Paragraph 4.1.1.10](#)

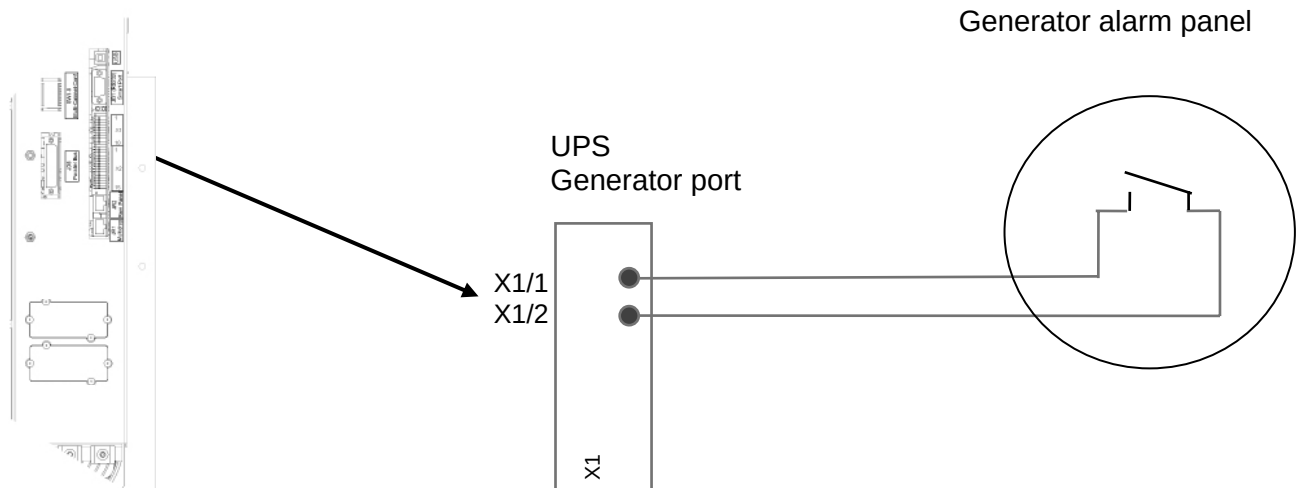


Figure 1.3: Generator ON Connection

9.1.4 WAVEMON SHUTDOWN AND MANAGEMENT SOFTWARE

9.1.4.1 Why is UPS Management important?

By combining a UPS with network management products, such as an SNMP protocol, System-administrators are guaranteed their data and their system will constantly be protected from corruption or data loss even in the event of an extended power failure or when batteries reach a critical low state. In the event of a power disturbance system administrators can also monitor their network from a central location, allowing an early detection of problems. In fact utility power is unreliable at times, ensuring that all network systems have constant power can be a difficult task. The situation becomes even more complex if systems are managed across a Local Area Network (LAN) or Wide Area Network (WAN) around the world.

When a power failure occurs action can be taken to protect the system and its valuable data. If no action is initiated by the operator, this event can seriously damage the system. The UPS software will react automatically in such a case and shutdown the operating system. NEWAVE has found it important to have a complete solution for its UPS and is able to offer a wide range of monitoring/remote controls for assuring the maximum protection degree to the NEWAVE customers.

9.1.4.2 WAVEMON Shutdown and Monitoring Software

WAVEMON Software is an external monitoring and shutdown software which was designed to operate with all NEWAVE UPS products, both with the DRY PORT (Relays) on Terminal block X2 and RS232 port JD11 on the communication card

The software packet consists of a CD ROM for most diffused operating systems (Windows, Unix, OS/2, DEC VMS, Novell, Apple), a standard connection and a user manual.

The dry port X2 with voltage-free contacts may also be used for automatic shutdown in connection with **WAVEMON Software**. It is necessary to provide a cable of 0.5 mm² to connect Terminals X2 of the UPS and the serial port of the server.

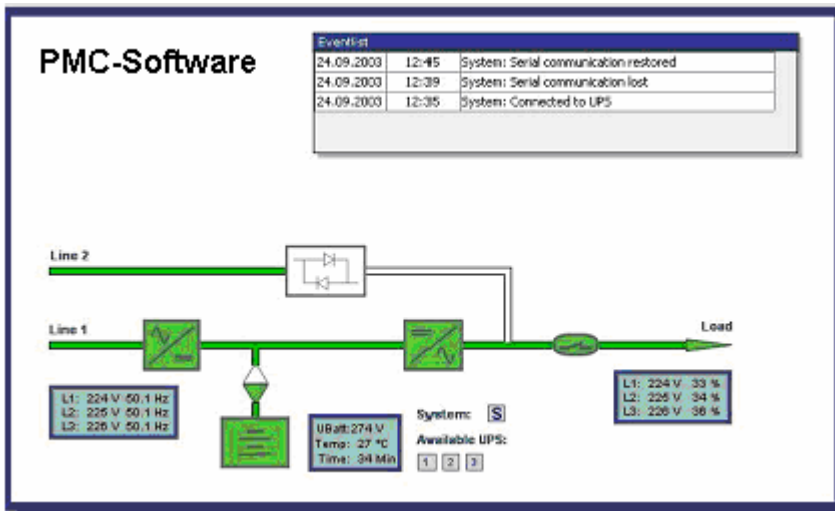


Figure 1.4.2. Monitoring image.

The main characteristics of **WAVEMON Software** are:

- Automatic unattended master/slave shutdown in heterogeneous networks
- On-screen autonomy time / battery time countdown
- On-screen server log off and shutdown procedure
- Extensive logging of all UPS activity and power quality data, with timestamp
- Scheduled UPS economy mode, service mode, other systems status
- Graphical user interface for Windows compatible platforms
- Automatic unattended local shutdown
- Special software modules to close and save open MS-Office documents.
- Compatible for all optional modules like UPSDIALER, SNMP adapters, Temperature sensors, etc.

The UPS-Management Software is a client-/server-application for networks and local workstations. Basically **WAVEMON-Software** consists of two parts: the server-module of the UPS-Management Software is **UPSServ**, which communicates via RS-232 cable with the UPS. Working as a background process the UPSServ collects messages, received from the UPS. The UPSServ interprets received messages and makes them available to the client-module **UPSCli** and to any SNMP-based management station.

When UPSServ detects voltage variations or a power failure it can execute various so called system „event routines“, which for example may shutdown the server or send warning to connected users. These system event routines which are a part of the UPS-Management Software can be adjusted to your demands.

The UPS management software includes with every serial number the licence for using the UPS service on one server with one UPS and an unlimited numbers of connected WINDOWS workstations. When operating with two or more servers a licence for every additional server is required. It doesn't matter if the UPS service runs at that location or if the server is halted by a UPS service via remote command. The same regulations are applicable to the use of remote send/receive modules RCCMD and multiserver shutdown under NT, UNIX and other operating systems. The service programs are generally delivered as a single-licence. To use a single CD ROM to shutdown multiple servers you have to purchase additional CD license keys.

Parallel/redundant UPS systems are also manageable by the software.

The main principle is: let introduce a shutdown of a Server only when strictly necessary. A correct Parallel Handling has therefore to manage a parallel system as a whole and always considering redundancy. Following statements apply:

- Every alarm on any unit is immediately notified, but ...
- ... a reaction to a serious fault is introduced only when the minimum number of UPS –Modules necessary to supply the load exhibits an alarming situation.
- The real Battery autonomy time of the (whole) parallel system is computed continuously.
- Maintenance on a redundant unit may be executed without annoyance to the management system (supervisor).

In order to be managed, a NEWAVE UPS can be integrated into a network in two ways:

1. By means of the server which is being powered by the UPS and is integrated in the network. In most of the cases the server is used as sub-agent and you only need the PMC-Software without any SNMP Adapter. You need a standard serial connection between the RS232 JD11 port of the UPS and the RS232 port of the computer/server.
2. In some situations it is preferable to interface the network via an SNMP adapter. By this way up to 50 computers can be shut down in a RCCMD environment. RCCMD (Remote Console Command) is an additional software module, which can be triggered by the SNMP device to executes a command (typically a shutdown command) on a remote system.

9.1.5 SNMP CARD/ADAPTER FOR NETWORK MANAGEMENT /REMOTE MONITORING

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 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 software with SNMP functionality for Novell, OS/2, 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.

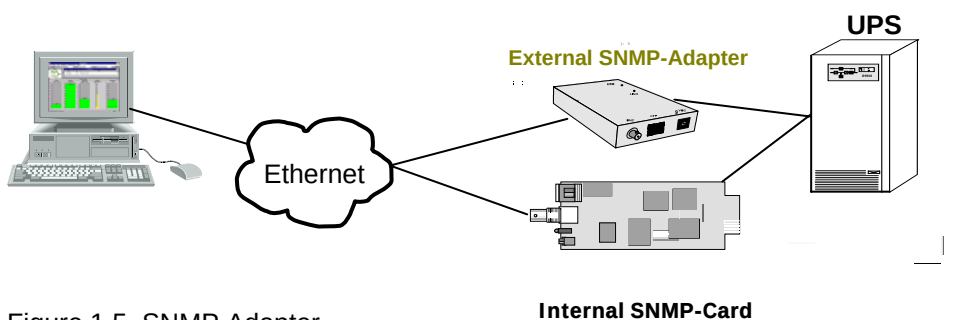


Figure 1.5 SNMP Adapter

The adapter may be configured via Telnet, HTTP (Web-Browser) or serial connection (Terminal). For normal operation at least one network connection (Ethernet) is required.

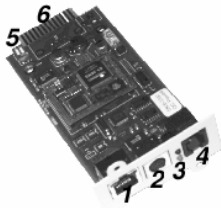
The SNMP adapter can be used, utilizing the RCCMD send function, for an automatic network wide shut down or just for informing connected users. The shut down procedure can be initiated on a low residual battery autonomy time (downtime) or by a countdown timer which is started at the beginning of the alarm. A shut down is therefore possible without extra input from the operator, and is fully software controlled.

The small (125x70 mm) External SNMP adapter comes with following interfaces:



1. RJ-45 connector for 10/100 Base-T(auto switchable)
2. Serial Port for configuration (COM2) or optional ModBus interface.
3. Error/Link LED for UPS status
4. Aux Port
5. DIP Switch
6. Serial Port to the UPS (COM1)
7. DC Supply (9 VDC or 9-36 VDC supply, depending on model);

Figure 1.5.1 External SNMP Adapter



The Internal SNMP-Card can be inserted into an appropriate extension slot of the **PMC**. This adapter communicates via the serial port of the UPS and makes a direct multiple server shut down possible without additional SNMP management software.

Figure 1.5.2 Internal SNMP Adapter

For detailed information please see Software Manual provided with the PMC-Software CD ROM. **RCCMD - Remote Console Command module** for a multi-server shutdown. This stand-alone software module is designed to receive and execute a command issued by a remote device. Thanks to RCCMD it is possible to execute a shutdown in an heterogeneous multiplatform network. The new release RCCMD2 is an application available for all Operating Systems, analogous to PMC-Software. Our SNMP Interfaces are compatible to RCCMD.

9.1.6 MODEM/ETHERNET CARD / NEWAVEWATCH™ MANAGEMENT SOFTWARE

Newavewatch™ is a redundant remote monitoring and management service which is a part of the Premium Power Protection Concept, providing you with peace-of-mind protection, knowing the mission critical facility is under careful, continuous watch 24/7/365. 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 before they become a crisis. Acquire key performance parameter and productivity information in real-time to empower you with the details needed to better understand machine performance and faster troubleshoot downtime events.

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

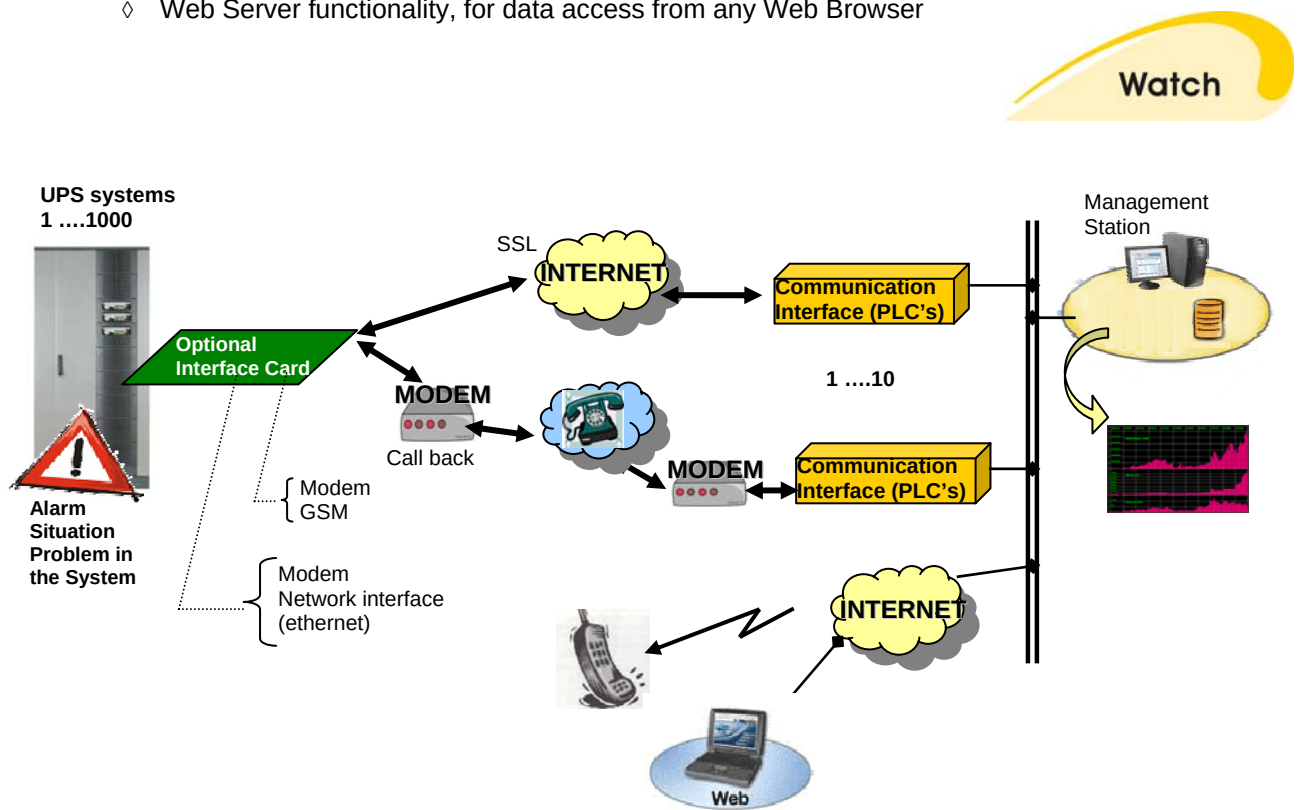
Total transparency of information and actions performed like Notification of all critical status changes, Coordination of equipment service, Reporting of all alarms with priorities.

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 exportable 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



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PowerWave 33 Technical Specifications

PowerWave 33 highlights at a glance

- 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 savings during installation and the entire life-cycle(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

High end power protection
Power range: 60-200KVA

Specifications are subject to change without notice

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10.1 POWERWAVE 33 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 centralization, resilient and easily adaptable power protection concepts are required. POWERWAVE 33 is the foundation for continuous power protection availability of network-critical infrastructures in enterprise data centers where business continuity has paramount importance and in process control environment where manufacturing continuity is essential.

POWERWAVE 33 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.

The POWERWAVE 33 UPS features innovations that combine to deliver the industry's best key values like: enhanced power performance, parallel capability and connectivity's interaction

Newave's 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 33 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 Centres 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 33 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 33 that can support to give answers to tender and end-user requirements. The POWERWAVE 33 was designed to respond to the most stringent safety, EMC and other important UPS standards.

POWERWAVE 33 is a stand-alone UPS which can be paralleled for power protection increase and/or for redundancy purpose. It offers 6 different power ranges: 60-80-100-120-160-200kVA . Up to 10 UPS can be paralleled together to achieving the maximum power capacity of 2000kVA using common or separate battery configuration.

Key Features of POWERWAVE 33:

- | | |
|---|--|
| • Best in class efficiency | <i>Energy-Operational cost savings (TCO)</i> |
| • Compact size,
Small Footprint | <i>Space-saving of expensive floor space</i> |
| • Blade-server-friendly power
Full power from 0.9 lead to 0.73 lag | <i>No de-rating with leading PF loads</i> |
| • Very low input current distortion THDi
THDi = < 3.5% @ 100% load | <i>Gen-set power and installation cost saving</i> |
| • Input Power Factor near unity | <i>Cost savings during installation and the entire lifecycle (TCO)</i> |

10.2 TECHNICAL CHARACTERISTICS

10.2.1 MECHANICAL CHARACTERISTICS POWERWAVE 33 60-100kVA

POWERWAVE 33 without battery enclosure



Power range	kVA	60	80	100
Dimensions (WxHxD)	mm	550x1820x750	550x1820x750	550x1820x750
Weight	kg	230	240	245
Colour		Graphite grey (RAL 7024)		

POWERWAVE 33 with Battery Enclosure A



Max. Power connection	kVA	60	80	100
Dimensions (WxHxD) with 80 battery blocks	mm	970x1820x750	970x1820x750	970x1820x750
Weight without battery	kg	250	260	285
Weight with battery with 80 block of 28Ah	kg	1140	1150	1175
Colour		Graffito grey (RAL 7024)		

**POWERWAVE 33
with Battery Enclosure B**

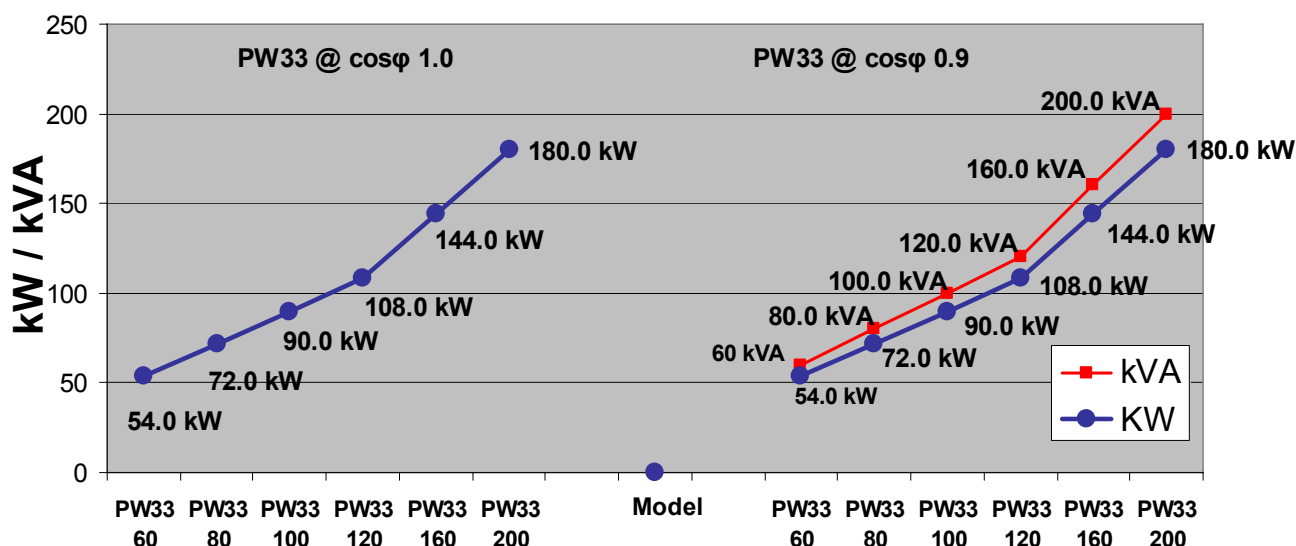

Max. Power connection	kVA	60	80	100
Dimensions (WxHxD) with 120 battery blocks	mm	1180x1820x750	1180x1820x750	1180x1820x750
Weight without battery	kg	260	270	295
Weight with battery with 120 block of 28Ah		1590	1600	1625
Colour		Graphite grey (RAL 7024)		

10.2.2 MECHANICAL CHARACTERISTICS POWERWAVE 33 120-200kVA
POWERWAVE 33


Max. Power connection	kVA	120	160	200
Dimensions (WxHxD)	mm	850x1820x750	850x1820x750	850x1820x750
Weight	kg	280	290	310
Colour		Graphite grey (RAL 7024)		

10.2.3 POWER SELECTION TABLE PowerWave 33

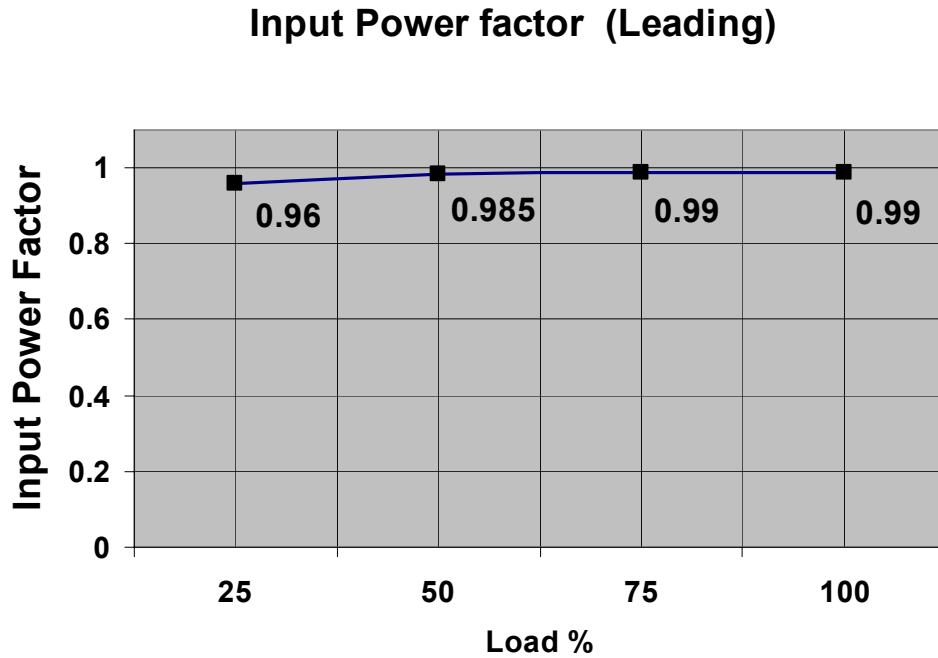
POWERWAVE 33: Power 60-200kVA (using 40 battery blocks)



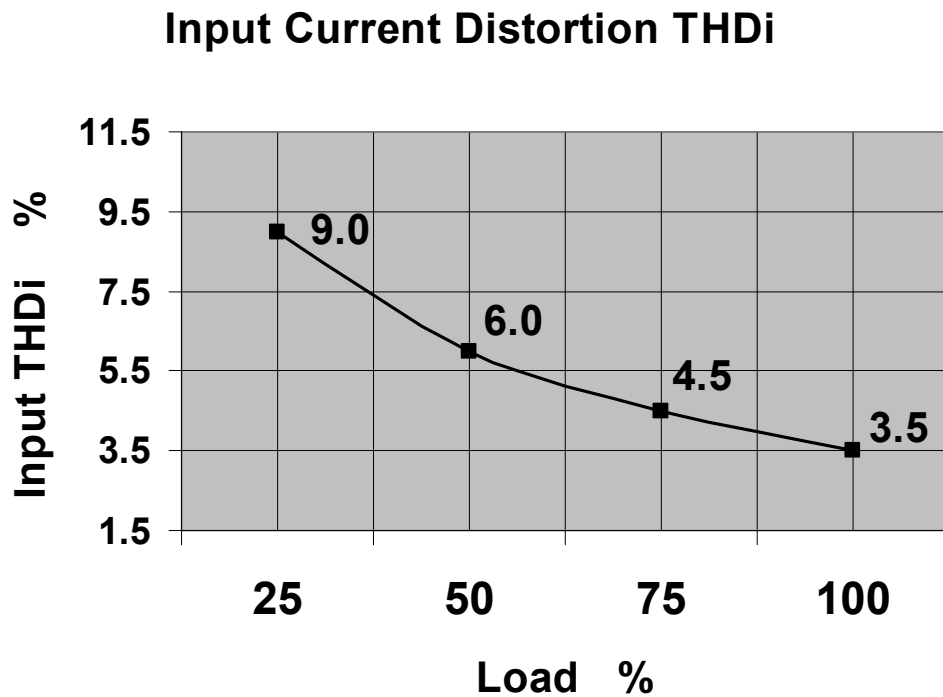
10.3 INPUT CHARACTERISTICS

UPS Model		PW 33 60	PW 33 80	PW 33 100	PW 33 120	PW 33 160	PW 33 200
Output Rated Power	kVA	60	80	100	120	160	200
Nominal Input Voltage	V	3x380/220V+N, 3x400V/230V+N, 3x415/240V+N					
Input Voltage Tolerance (ref to 3x400/230V) for Loads in %:	V	(-23%/+15%) 3x308/177 V to 3x460/264 V for <100 % load (-30%/+15%) 3x280/161 V to 3x460/264 V for < 80 % load (-40%/+15%) 3x240/138 V to 3x460/264 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 Distortion THDi		Sine-wave THDi = 3.5 % @ 100% load					
Max. Input Power with rated output power and charged battery (output $\cos\phi = 1.0$)	kW	57.5	76.6	95.7	114.9	153.2	191.5
Max. Input Current with rated output power and charged battery (output $\cos\phi = 1.0$)	A	83.3	111	138.7	166.5	222	277
Max. Input Power with rated output power and discharged battery (output $\cos\phi = 1.0$)	kW	63.3	84.3	105.3	126.4	168.5	210.7
Max. Input Current with rated output power and discharged battery (output $\cos\phi = 1.0$)	A	91.7	122.2	152.6	183.2	244.2	305.4

10.3.1 GRAPH: INPUT PF VERSUS % LOAD



10.3.2 GRAPH: INPUT DISTORTION THDi VERSUS % LOAD

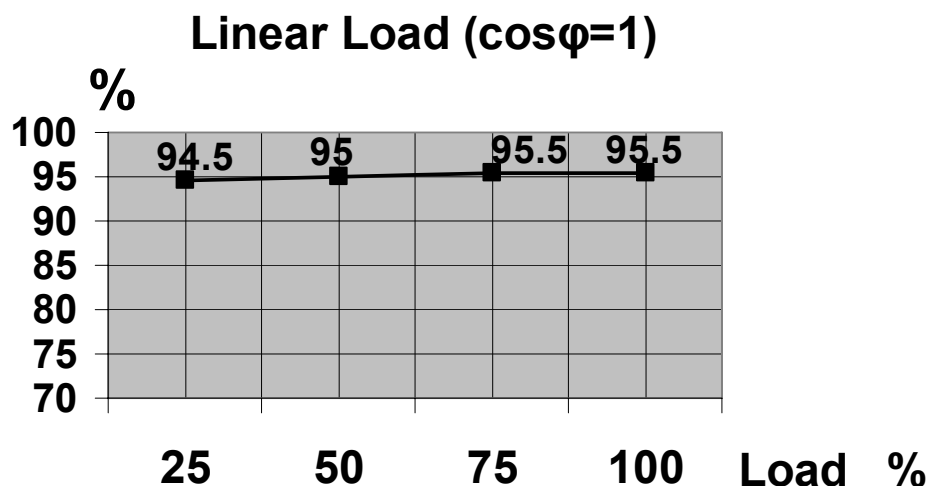


10.4 BATTERY CHARACTERISTICS

UPS Range		60kVA	80kVA	100kVA	120kVA	160kVA	200kVA
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 ready		Standard (temp. sensor optional)					
Battery Test		Automatic and periodically (adjustable)					
Battery Type		Maintenance free VRLA or NiCd					

10.5 OUTPUT CHARACTERISTICS

UPS Range		60kVA	80kVA	100kVA	120kVA	160kVA	200kVA
Output Rated Power	kVA	60	80	100	120	160	200
Output Rated Power	KW	54	72	90	108	144	180
Output Current In @ cosphi 1.0 (400 V)	A	78.3	104.3	130.4	156.5	208.7	260.9
Output Rated Voltage	V	3x380/220V or 3x400/230V or 3x415/240V					
Output Voltage Stability	%	Static: < +/- 1% Dynamic (Step load 0%-100% or 100%-0%) < +/- 4%					
Output Voltage Distortion	%	With Linear Load < 2% With Non-linear Load (EN62040-3:2001) < 4%					
Output Frequency	Hz	50 Hz or 60 Hz					
Output Frequency Tolerance	%	Synchronized with mains < +/- 2% (selectable for bypass operation) or < +/- 4% Free running +/- 0.1 %					
Bypass operation		At Nominal Input voltage of 3x400 V +/- 15 % or 190 V to 264 V ph-N					
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 10 min. 150 % load 60 sec.					
Output short capability (RMS)	A	Inverter : 2 x In during 250 ms Bypass : 10 x In during 10 ms					
Crest - Factor		3 : 1					

10.5.1 GRAPH: AC – AC EFFICIENCY with Linear load @ $\cos\phi$ 1

10.5.2 GRAPH: Output Power in KW and KVA VERSUS $\cos\phi$ (using 50 battery blocks)

		PW33 60		PW33 80		PW33 100		PW33 120		PW33 160		PW33 200	
	$\cos\phi$	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
	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	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
Ind.	0.60	45	75	60	100	75	125	90	150	120	200	150	250

Changes of this table without notice – modifications reserved

10.6 ENVIRONMENTAL CHARACTERISTICS

UPS range		60kVA	80kVA	100 kVA	120 kVA	160 kVA	200 kVA
Audible Noise with 100% / 50% Load	dBA	< 65			< 69		
Operation temperature	°C	0 – 40					
Ambient Temperature for Batteries (recommended)	°C	20 – 25					
Storage Temperature	°C	-25 - +70					
Battery Storage Time at Ambient Temperature		Max. 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		Max. 95% (non-condensing)					
Accessibility		Totally front accessibility for service and maintenance (no need for side, top or rear access)					
Positioning		Min. 20 cm rear space (required for fan)					
Input and Output Power Cabling		From the bottom on the front					
Efficiency AC-AC up to (at cosφ 1.0) (depending on UPS power)	%	Load	:	100 %	75 %	50%	25%
				95.5%	95.5%	95%	94.5%
Eco-Mode efficiency at 100% load	%	99 %					

10.7 STANDARDS

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

10.8 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 Temp. 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 Newavewatch TM	Newavewatch TM card (optional) for Premium Power Protection

10.8.1 POWER MANAGEMENT DISPLAY (PMD)

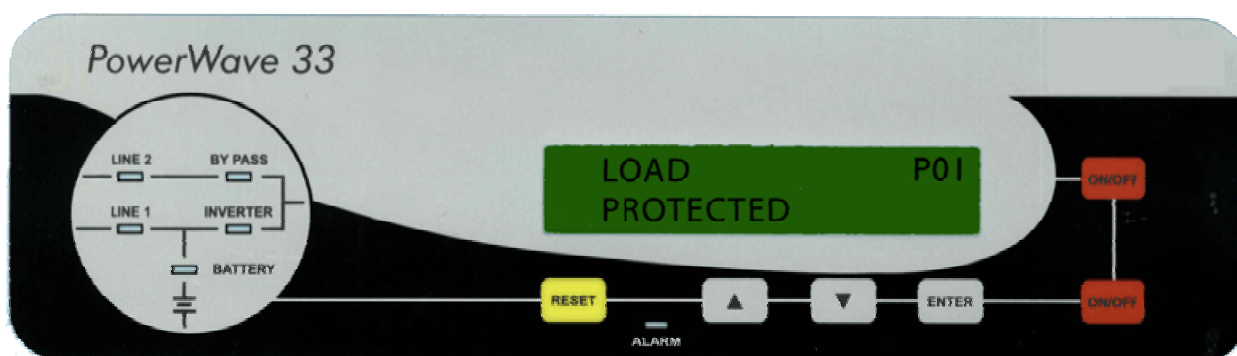
The user-friendly PMD consists of three parts the MIMIC DIAGRAM, CONTROL KEYS and LCD that provides the necessary monitoring information about the UPS.

10.8.2 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.

10.8.3 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 and finally it serves for the DIAGNOSIS (SERVICE MODE) for adjustments and testing (for more details see the USER MANUAL of PowerWave 33).



Power Management Display (PMD) of PowerWave 33

10.8.4 CUSTOMER INTERFACES (Terminals X1, X2)

10.8.5 CUSTOMER INPUTS DRY PORTs: Terminal block X1

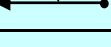
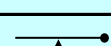
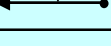
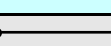
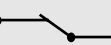
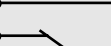
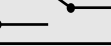
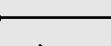
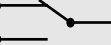
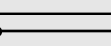
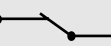
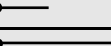
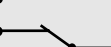
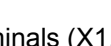
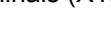
Connection of Remote Shut down facilities, Generator Operation, Customers specials
(see UM Section 9 / OPTIONS)

10.8.6 CUSTOMER OUTPUTS DRY PORTs : Terminal blocks X2

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

All voltage free contacts are rated 60 VAC max. and 500 mA max.:

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

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

Phoenix Spring Terminals (X1, X2) Connection

10.9 OPTIONS

- Modem/Ethernet card or Modem/GSM card for Newavewatch™ Management Software
- SNMP card and WaveMon Management Software , Modbus Protocol, USB
- External Battery Cabinets
- Parallel kit, Synchron kit
- In/output Transformer for special voltages
- Back-feed protection
- Temp. sensor for battery temp. control

10.9.1 MODEM/ETHERNET CARD / Newavewatch™ MANAGEMENT SOFTWARE

Newavewatch™ is a redundant remote monitoring and management service which is a part of the Premium Power Protection Concept, providing you with peace-of-mind protection, knowing the mission critical facility is under careful, continuous watch 24/7/365. 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 before they become a crisis.

Acquire key performance parameter and productivity information in real-time to empower you with the details needed to better understand machine performance and faster troubleshoot downtime events.

Early warning system, so problems can be addressed before they become a real threat to the load.

Professional experts, your virtual service technician onside.

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?

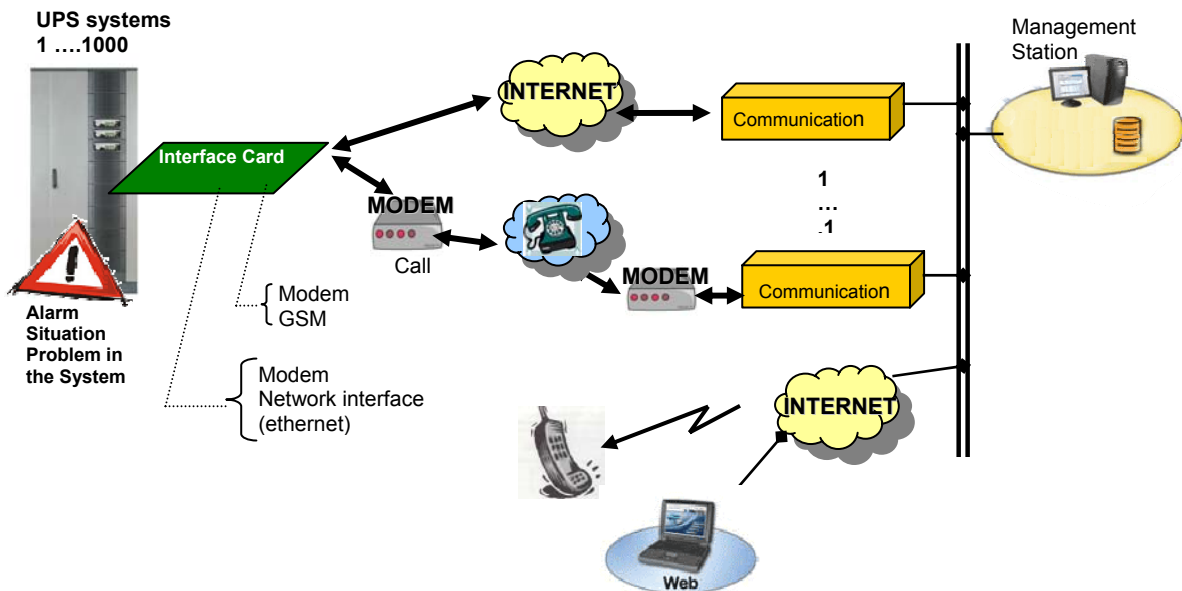
- Redundant and secure communication
- Alarm acknowledgment
- Priority driven Management (with escalation)

Comprehensive Management System

- Reception and management of alarm calls from UPS
- Storage of UPS Data in a database exportable 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:

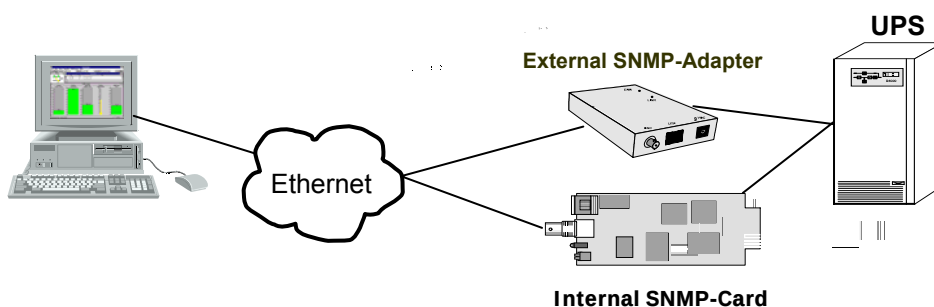
- Current status ("single" and "parallel" operation)
- Measured values for single or three phase
- Recording function including graphs with zooming capabilities for selected measured values
- Display of event log file
- Display of UPS Parameters
- Web Server functionality, for data access from any Web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



10.9.2 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, 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.



10.9.3 BATTERY ENCLOSURES

The integrated battery enclosures are part of the UPS, therefore cannot be defined as a separate battery cabinet		UPS & BAT- ENC A Only for 60, 80 and 100kVA	UPS & BAT- ENC B Only for 60, 80 and 100kVA
BAT- ENC A & B			
Configuration accommodates:	Max.	80 Batt. Blocks for 28Ah mounted on 16 shelves (5 blocks/shelf)	120 Batt. Blocks for 28Ah mounted on 24 shelves (5 blocks/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 Side (WxHxD)	mm	970x1820x750	1180x1820x750
Weight w/o trays and w/o batteries	kg	20	30
Battery configuration with BAT-ENC A & B		Batt. Config. (2x40)x28Ah	Batt. Config. (3x40)x28Ah

10.10 BATTERY AUTONOMIES

10.10.1 EXAMPLES OF BATTERY AUTONOMY AT FULL LOAD WITH STANDARD BATTERY CABINETS AND STANDARD BATTERY CONFIGURATION

28Ah battery							
UPS Range		60kVA	80kVA	100kVA	120kVA	160kVA	200kVA
BAT- ENC	Battery configuration	Autonomy time @ PF=0.8					
	Batt. Enclosure A (2x40)x28Ah	13	9	7			
	Batt. Enclosure B (3x40)x28Ah	22	15	12			

10.11 INSTALLATION PLANNING

Clearances	X	Y
Minimum	200 mm	900 mm

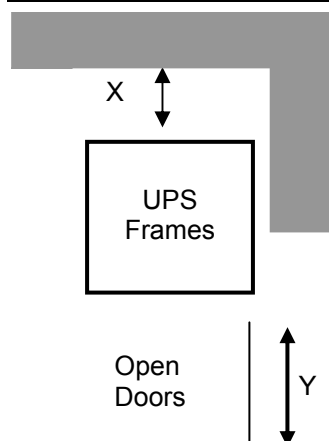


Figure 1: UPS space recommendation

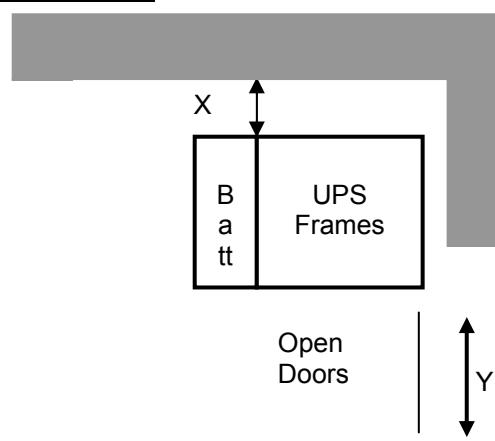


Figure 2 : UPS + Battery space recommendation

UPS Frame type	60-100 kVA	60-80-100 kVA (with battery enclosure A & B)	120-200 kVA
Dimensions (WxHxD) mm	550x1820x750	A: 970x1820x750 B: 1180x1820x750	850x1820x750
Accessibility	Totally front accessibility for service and maintenance (no need for side, top or rear access)		
Positioning	Min. 200 mm rear space (required for fan)		
Input and Output Power Cabling	From the bottom on the front		

10.11.1 HEAT DISSIPATION PER UPS RANGE WITH NON-LINEAR LOAD

UPS Range		60kVA	80kVA	100kVA	120kVA	160kVA	200kVA
Heat Dissipation with 100% Non-linear Load per range (EN 62040-1-1:2003)	W	2970	3690	4950	5940	7920	9900
Heat Dissipation with 100% Non-linear Load per range (EN 62040-1-1:2003)	BTU/h	10141	13521	16901	20281	27642	33802
Airflow (25° - 30°C) with 100% Non-linear Load per range (EN 62040-1-1:2003)	m³/h	1300	1500	1700	2500	2500	2500
Heat Dissipation without load	W	800	800	800	1000	1000	1000

10.12 WIRING AND BLOCK DIAGRAMS FOR ALL UPS FRAMES

The customer has to supply the wiring to connect the UPS to the local power source. The installation inspection and initial start up of the UPS and extra battery cabinet must be carried out by a qualified service personnel such as a licensed service engineer from the manufacturer or from an agent authorised by the manufacturer. More details and procedure are mentioned in the user manual.

10.12.1 TERMINAL CONNECTIONS OVERVIEW

UPS Range Terminals (T) Connection Bar (B)	Battery (+ / N / -) +PE	Input Bypass 3+N (N,2L1,2L2,2L3)	Input Rectifier 3+N+PE (N,1L1,1L2,1L3)	Output load 3+N+PE (N,3L1,3L2,3L3)	Max. cable section admissible (mm ²)	Tightening Torque (Nm)
60kVA (Fig.1)	4 x M8	4 x 35 mm ²	4 x 35 mm ² + PE M8	4 x 35 mm ² + PE M8	35	3.5
80kVA (Fig.1)	4 x M8	4 x 50 mm ²	4 x 50 mm ² + PE M8	4 x 50 mm ² + PE M8	50	5
100kVA (Fig.1)	4 x M8	4 x 70 mm ²	4 x 70 mm ² + PE M8	4 x 70 mm ² + PE M8	95	8
120kVA (Fig.2)	4 x M10	4 x M10	5 x M10	5 x M10	185	Max. 50
160kVA (Fig.2)	4 x M10	4 x M10	5 x M10	5 x M10	185	Max. 50
200kVA (Fig.2)	4 x M10	4 x M10	5 x M10	5 x M10	240	Max. 50

Fig. 1: 60-80-100 kVA

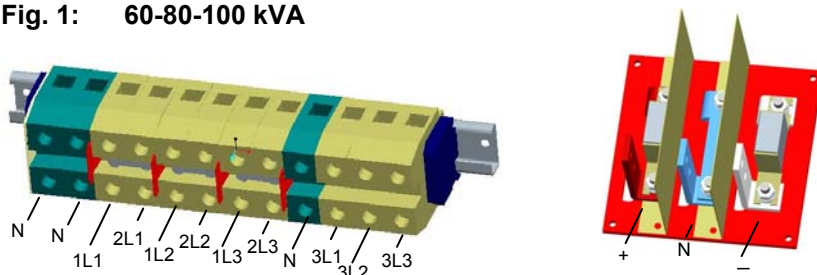
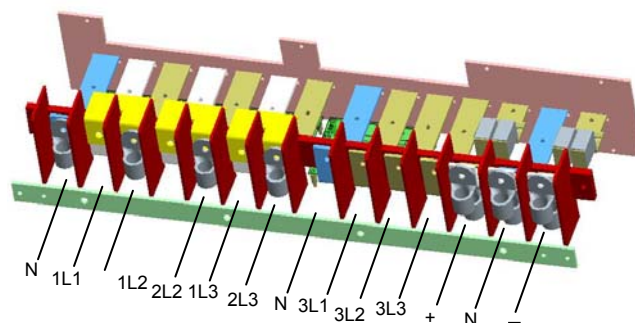
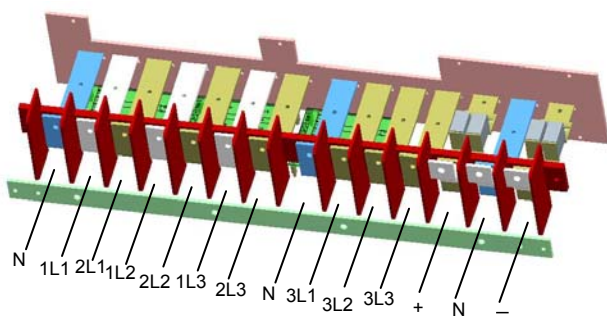


Fig. 2: 120-160-200 kVA

Dual input feed connections

Single input feed connections



10.12.2 INPUT FEED RATINGS

Cable Sections and Fuse Ratings recommended. Alternatively, local standards to be respected

Block Diagram

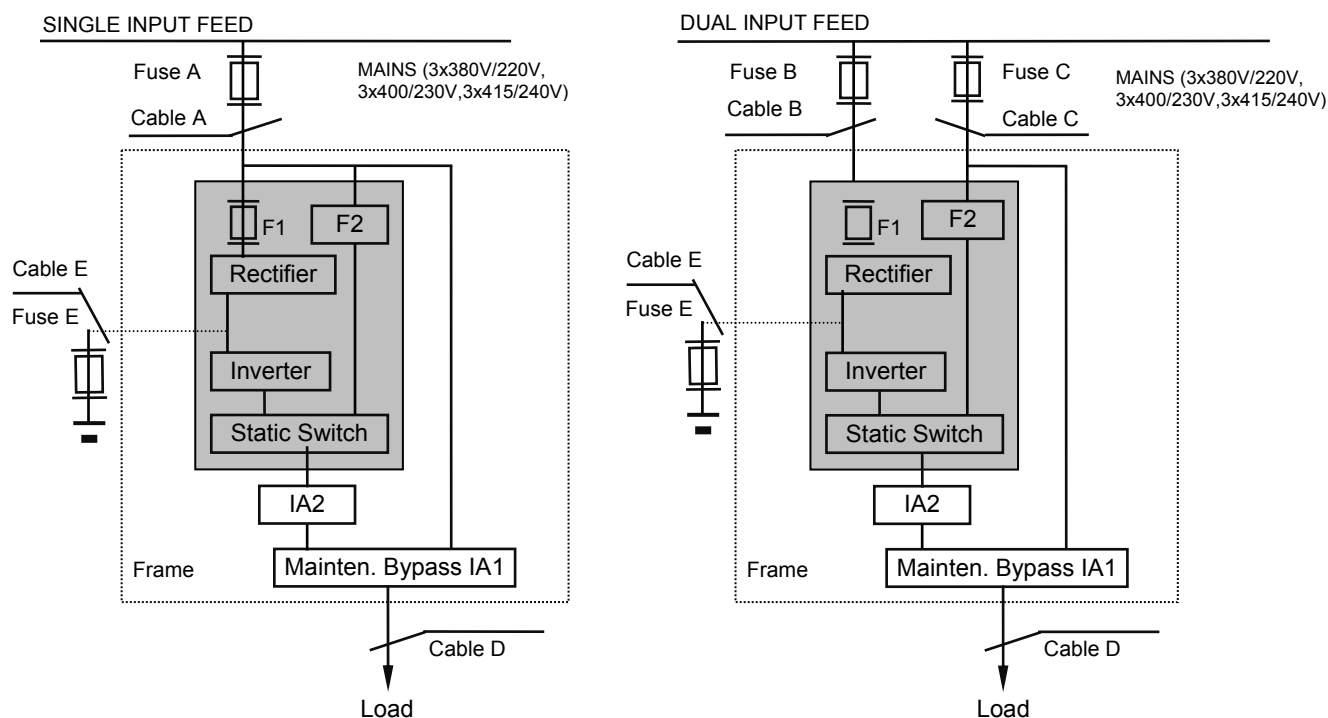


Figure 3.3: Block Diagram PowerWave 33 from 60-200 KVA

STANDARD VERSION (SINGLE INPUT FEED)

Power (kVA)	Fuse A (Agl/CB)	Cable A (IEC 60950-1:2001)	Cable D (IEC 60950-1:2001)	Fuse E +/N/-	Cable E +/N/-
60	3x100	5x35	5x35	3x125A	3x35+ PE
80	3x125	5x50	5x50	3x160A	3x50 + PE
100	3x160	5x50	5x50	3x250A	3x95 + PE
120	3x200	5x70	5x70	3x250A	3x120 + PE
160	3x250	5x120 or 5x(2x50)	5x120 or 5x(2x50)	3x350A	3x(2x70) + PE
200	3x315	5x185 or 5x(2x70)	5x185 or 5x(2x70)	3x450A	3x(2x95) + PE

VERSION ON REQUEST (DUAL INPUT FEED)

Power (kVA)	Fuse B (Agl/CB)	Cable B (IEC 60950-1:2001)	Fuse C (Agl/CB)	Cable C (IEC 60950-1:2001)	Cable D (IEC 60950-1:2001)	Fuse E +/N/-	Cable E +/N/-
60	3x100	5x35	3x100	5x35	5x35	3x125A	3x35+ PE
80	3x125	5x50	3x125	5x50	5x50	3x160A	3x50+ PE
100	3x160	5x50	3x160	5x50	5x50	3x250A	3x95+ PE
120	3x200	5x70	3x200	5x70	5x70	3x250A	3x120+ PE
160	3x250	5x120 or 5x(2x50)	3x250	5x120 or 5x(2x50)	5x120	3x350A	3x(2x70) + PE
200	3x315	5x185 or 5x(2x70)	3x315	5x185 or 5x(2x70)	5x185	3x450A	3x(2x95) + PE