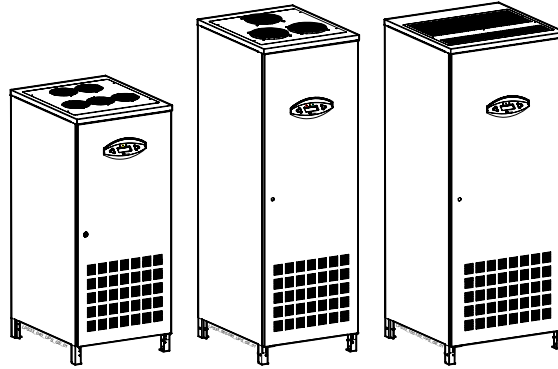


GE Consumer & Industrial Power Protection



Operating Manual Uninterruptible Power supply

Digital Energy™ *LP 33 Series*

40 – 60 – 80 – 100 – 120 kVA
400 VAC CE / Series 0

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Certified
Quality System
ISO 9001
Reg.No.CSQ 9130.GELE

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Dear Customer,

We thank you for selecting our products and are pleased to count you amongst our very valued customers at **GE**.

We trust that the use of the **LP 33 Series** Uninterruptible Power Supply system, developed and produced to the highest standards of quality, will give you complete satisfaction.

Please read carefully the Operating Manual, which contains all the necessary information and describes all you need to know about the use of the UPS.

Thank you for choosing **GE** !

Manufactured by:



GE Consumer & Industrial SA
General Electric Company
CH – 6595 Riazzino (Locarno)
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Table of contents

Page

1	SAFETY RULES.....	6
1.1	IMPORTANT SAFETY RULES.....	7
1.2	SAFETY SYMBOLS AND WARNINGS.....	10
2	INTRODUCTION.....	11
2.1	GENERAL DESCRIPTION.....	11
3	DESCRIPTION.....	12
3.1	PRINCIPAL DIAGRAM AND MAIN ELEMENTS DESCRIPTION.....	12
3.2	OPERATION MODES.....	13
3.3	RPA PARALLEL SYSTEM.....	16
3.4	UPS PARALLELED ON THE SAME BATTERY.....	17
3.5	SERVICE AND TECHNICAL SUPPORT.....	18
3.6	WARRANTY.....	18
3.7	RECYCLING AT THE END OF SERVICE LIFE.....	19
4	INSTALLATION.....	20
4.1	TRANSPORT.....	20
4.1.1	Dimensions and weight.....	21
4.2	DELIVERY.....	22
4.3	STORAGE.....	22
4.3.1	Storage of the UPS.....	22
4.3.2	Storage of the battery.....	23
4.4	PLACE OF INSTALLATION.....	24
4.5	VENTILATION AND COOLING.....	27
4.6	UNPACKING.....	28
4.7	ELECTRICAL WIRING.....	29
4.7.1	Fuse discrimination (co-ordination of breakers tripping).....	30
4.7.2	Fuse ratings.....	31
4.7.3	Input / output cable ratings.....	32
4.8	ELECTRICAL CONNECTION.....	33
4.8.1	Power connection with common input mains for LP 33 Series / 40 - 60 - 80 kVA.....	33
4.8.2	Power connection with common input mains for LP 33 Series / 100 - 120 kVA.....	35
4.8.3	Power connection with separate input mains for LP 33 Series / 40 - 60 - 80 kVA (option).....	37
4.8.4	Power connection with separate input mains for LP 33 Series / 100 - 120 kVA (option).....	39
4.8.5	RPA system - Control bus connection.....	41
4.9	UPS FUNCTIONING AS FREQUENCY CONVERTER.....	44
5	LAYOUT.....	45
5.1	LAYOUT LP 33 SERIES / 40 KVA.....	45
5.2	LAYOUT LP 33 SERIES / 60 - 80 KVA.....	46
5.3	LAYOUT LP 33 SERIES / 100 - 120 KVA.....	47
6	SYSTEM HANDLING.....	48
6.1	CONTROL PANEL.....	48
6.2	COMMAND PUSH BUTTONS AND SWITCHES.....	49

7	LCD SCREEN.....	50
7.1	METERING SCREENS (<i>METERING</i>)	50
7.2	EVENT SCREENS (<i>ALARM</i>).....	52
7.2.1	Alarms list.....	52
7.2.2	Messages list.....	55
7.2.3	Event report <i>LP 33 Series</i>	58
7.3	MENU SCREENS (MENU)	59
7.3.1	User parameters screen	60
8	OPERATION	64
8.1	PROCEDURES FOR SINGLE <i>LP 33 SERIES</i>	64
8.1.1	Start-up of the LP 33 Series.....	64
8.1.2	UPS shutdown with load transfer on manual bypass (Q2)	66
8.1.3	Start-up following the operation on manual bypass (Q2)	68
8.1.4	Complete shutdown	69
8.1.5	Restore to normal operation after "total off"	70
8.1.6	Restore to normal operation after "EPO – Emergency Power Off"	71
8.2	PROCEDURES FOR PARALLEL SYSTEM <i>LP 33 SERIES</i>	72
8.2.1	Parallel System start-up of the LP 33 Series.....	72
8.2.2	Parallel UPS shutdown with load transfer on manual bypass (Q2).....	74
8.2.3	Start-up following the operation on maintenance bypass (Q2)	76
8.2.4	Shutdown of a single unit in a parallel system	77
8.2.5	Start-up an additional unit in a parallel system	78
8.2.6	Complete shutdown of a parallel system.....	79
8.2.7	Restore to normal operation after "total off"	80
8.2.8	Restore to normal operation after "EPO – Emergency Power Off"	81
9	CUSTOMER INTERFACE.....	82
9.1	SERIAL PORT J27 - RS232	83
9.2	RELAY CARD	84
9.3	EPO (EMERGENCY POWER OFF).....	85
10	OPTIONS.....	86
10.1	OPTIONS GENERAL VIEW	86
10.2	OPTIONS ASSEMBLY AND CONNECTION	87
10.2.1	Customer Interface	87
11	MAINTENANCE	90
11.1	GENERAL MAINTENANCE.....	90
11.2	COOLING FAN MAINTENANCE	90
11.3	OTHER COMPONENTS WITH LIMITED LIFETIME.....	90
11.4	BATTERY MAINTENANCE	90
11.5	SERVICE REQUIRED.....	91
12	NOTES	92
12.1	NOTES FORM	92
13	ANNEX.....	93
13.1	TECHNICAL DATA SHEET	93
13.2	SCHEMATICS	93

1 SAFETY RULES

With this document, **GE** gives to the user all the necessary information about the correct use of the UPS.

Please read carefully this **Operating Manual** before installing or operating the UPS.

We recommend that this manual be kept next to the UPS for future references.

If any problems are encountered with the procedures contained in this manual, please contact the nearest **Service Centre** before you proceed.

All UPS installation, maintenance and service work should be performed by qualified service personnel only.

The **KNOWLEDGE** and the **FULLY** compliance of the safety instructions and the warning contained in this manual are

THE ONLY CONDITION

to avoid any dangerous situations during installation, operation, maintenance work, and to preserve the maximum reliability of the UPS system.



NOTE !

LP 33 Series / 40 - 60 - 80 - 100 - 120 kVA is a product for restricted sales distribution to informed partners.

Installation restrictions or additional measures may be needed to prevent disturbances.

While every care has been taken to ensure the completeness and accuracy of this manual, **GE** assumes no responsibility or liability for any losses or damages resulting from the use of the information contained in this document.

GE

Refuses any responsibility in case of non-observance, unauthorised alterations or improper use of the delivered UPS.

1.1 IMPORTANT SAFETY RULES

GENERAL

- Move the UPS in an upright position in its original package to the final destination room.
- To lift the cabinets, use a forklift or lifting belts with spreader bars.
- Check for sufficient floor and elevator loading capacity.
- Check carefully the integrity of the UPS equipment.
In case you note some visible damage, do not put the UPS under voltage, but contact the nearest *Service Centre*.
- **WARNING: RISK OF ELECTRICAL SHOCK.**
Apart the front hinged lockable doors, do not remove any covers, there are no user serviceable parts inside.
- After switching off takes 5 minutes for the DC capacitors to discharge because a lethally high voltage remains at the terminals of the electrolytic capacitors.
- All maintenance and service work should be performed by qualified service personnel.
- The outlet-bars may be electrically live, even when the UPS is disconnected from the mains.
- Dangerous voltages may be present during battery operation.
- The battery protections must be removed before any maintenance or service work.
- Be aware that the inverter can restart automatically after the utility voltage is restored.

INSTALLATION

- This UPS must be installed and connected only by trained personnel.
- Verify accurately during Commissioning and Maintenance of the UPS, for the following:
Damaged components, squeezed wires and cables, or not correctly inserted plugs.
- After removing the sidewalls of the UPS, make sure that all earth connections when reassembling, are correctly reattached.
- This UPS is intended for use in a controlled indoor environment free of conductive contaminants and protected against animals intrusion.
- High earth leakage current: Earth connection essential before connecting to AC input.
- Switching OFF the unit does not isolate the UPS from the mains.
- Do not install the UPS in an excessively humid environment or near water.
- Avoid spilling liquids on or dropping any foreign object into the UPS.
- The unit must be placed in a sufficiently ventilated area; the ambient temperature should not exceed 35°C (95°F).
- Optimal battery life is obtained if the ambient temperature does not exceed 25°C (77°F).
- It is important that air can move freely around and through the unit.
- Do not block the air vents.
- Avoid locations in direct sunlight or near heat sources.

STORAGE

- Store the UPS in a dry location; storage temperature must be within -25°C to 55°C (-13°F to 131°F).
- If the unit is stored for a period exceeding 3 months, the batteries must be recharged periodically (time depending on storage temperature).

BATTERY

- The battery-voltage is dangerous for person's safety.
- When replacing the battery, use the same number, voltage (V) and capacity (Ah).
Do not connect battery strings of different type in parallel.
- Proper disposal or recycling of the battery is required.
Refer to your local codes for disposal requirements.
- Never dispose of battery in a fire: they may explode.
- Do not open or mutilate battery: their contents (electrolyte) may be extremely toxic.
If exposed to electrolyte, wash immediately with plenty of water.
- Avoid charging in a sealed container.
- Never short-circuit the batteries.
- When working with batteries, remove watches, rings or other metal objects, and only use insulated tools.



WARNING !

The UPS contains hazardous voltages.

Observe carefully the safety instructions to prevent risk of electrical shock.

RPA

Redundant Parallel
Architecture

Parallel version secured with RPA

When included in the text, this symbol refers to operation needed only for parallel system.

Safety instructions when working with battery



EXTERNAL BATTERY MUST BE INSTALLED AND CONNECTED TO THE UPS BY QUALIFIED SERVICE PERSONNEL.
INSTALLATION PERSONNEL MUST READ THIS ENTIRE SECTION BEFORE HANDLING THE UPS AND BATTERY.

DANGER!

Full voltage and current are always present at the battery terminals.

The battery used in this system can provide dangerous voltages, extremely high currents and a risk of electric shock.

If the terminals are shorted together or to ground they may cause severe injury.

You must be extremely careful to avoid electric shock and burns caused by contacting battery terminals or shorting terminals during battery installation.

Do not touch uninsulated battery terminals.

A qualified service person, who is familiar with battery systems and required precautions, must install and service the battery.

The installation must conform to national and local codes.

Keep unauthorised personnel away from the battery.

The qualified service person must take these precautions:

- 1 Wear protective clothing, such as rubber gloves and boots and protective eye wear
Batteries contain caustic acids and toxic materials and can rupture or leak if mistreated.
Remove rings and metal wristwatches or other metal objects and jewelry.
Do not carry metal objects in your pockets where the objects can fall into the battery cabinet.
- 2 Tools must have insulated handles and must be insulated so that they will not short battery terminals.
Do not allow a tool to short between individual or separate battery terminals or to the cabinet or rack.
Do not lay tools or metal parts on top of the battery, and do not lay them where they could fall onto the battery or into the cabinet.
- 3 Install the battery as shown on the drawing provided with the battery.
When connecting cables, never allow a cable to short across a battery's terminals, the string of battery, or to the cabinet or rack.
- 4 Align the cables on the battery terminals so that the cable lug will not contact any part of the cabinet or rack, even if the battery is moved.
Keep the cable away from any sharp metal edges.
- 5 Install the battery cables in such a way that the UPS or battery cabinet doors cannot pinch them.
- 6 Do not connect the battery terminal to Ground.
If any battery terminal is inadvertently grounded, remove the source of the ground.
Contacting any part of a grounded battery can cause a risk of electric shock.
- 7 To reduce the risk of fire or electric shock, install the battery in a temperature and humidity controlled indoor area, free of contaminants.
- 8 Battery system chassis ground (earth) must be connected to the UPS chassis ground (earth).
If you use conduits, this ground conductor must be routed in the same conduit as the battery conductors.
- 9 Where conductors may be exposed to physical damage, protect the conductors in accordance with all applicable codes.
- 10 If you are replacing the battery or repairing battery connections, shut OFF the UPS and remove the battery fuses.


1.2 SAFETY SYMBOLS AND WARNINGS


Safety warnings

The text of this manual contains some warnings to avoid risk to the persons and to avoid damages to the UPS system and the supplied critical loads.

The non-observance of the warnings reminding hazardous situations could result in human injury and equipment damages.

Please pay attention to the meaning of the following warnings and symbols:


	WARNING ! Referred to procedures or operations which could cause damages to the persons or to the system, when not correctly operated.
---	--


	NOTE ! Warns the user about important operations or procedures described in this manual.
---	--

Safety symbols


When the text includes one or more of the following symbols, that means exist a potentially hazardous situations.


Please remind the meaning of each symbol.


	CAUTION Related to all the potentially hazardous situations which may result in injury.
---	---

	DANGER OF PARTS ELECTRICALLY LIVE Related to all the situation with potentially hazardous voltage.
---	--

	DANGER OF EXPLOSION Used to indicate conditions where exploding parts can cause serious injury.
---	---

	DANGER OF CRUSHING Used when moving the equipment due to the heavy weight.
---	--

	DANGER OF OVERHUNG LOAD Used when the equipment is lifted by a crane.
---	---

	DO NOT TOUCH Risk of parts with hazardous voltages or parts in movement.
---	--

2 INTRODUCTION

2.1 GENERAL DESCRIPTION

The **LP 33 Series Uninterruptible Power Supply** (UPS) provides the energy supply for critical loads which need a reliable, continuous free from voltage disturbances and frequency fluctuations supply.

In case the *mains fails*, or it exceeds the permitted tolerances, the energy to supply the *load* is furnished by the **battery** with a backup time dependent on its capacity, until the mains recovers.



LP 33 Series is a truly *VFI* double conversion **Uninterruptible Power Supply** (UPS), equipped with *automatic bypass*, where the **load** is normally supplied by the **inverter**.



LP 33 Series can be configured, if chosen, for the **ECO Mode** permitting the maximum energy saving.

The main typical performances of the **LP 33 Series** system are the following:

- ***VFI (Voltage Frequency Independent) double conversion technology to provide an excellent quality power supply.***
- ***Input power factor 0.98 (.***
- ***Input current THD <9% (<5% with optional).***
- ***Automatic bypass and manual bypass to improve reliability and maintenance.***
- ***Microprocessor controlled supervision.***
- ***Dual AC inputs (optional).***
- ***ECO Mode operation.***
- ***Compact and agreeable design expressly conceived for "Office environment".***
- ***Low level acoustic sound, to avoid noise to the persons operating in the same environment.***
- ***Multi-language LCD screen.***
- ***Total battery management: SBM (Superior Battery Management)***
- ***Wide rectifier input voltage tolerance: 320 ÷ 460 VAC (phase - phase).***
- ***Wide rectifier input frequency tolerance: +/-10% (45 ÷ 55 for 50 Hz and 54 ÷ 66 for 60 Hz).***
- ***RPA (Redundant Parallel Architecture) up to 4 units.***
- ***GE Connectivity.***
- ***Compliance with European standard 50091-2.***

3 DESCRIPTION

3.1 PRINCIPAL DIAGRAM AND MAIN ELEMENTS DESCRIPTION

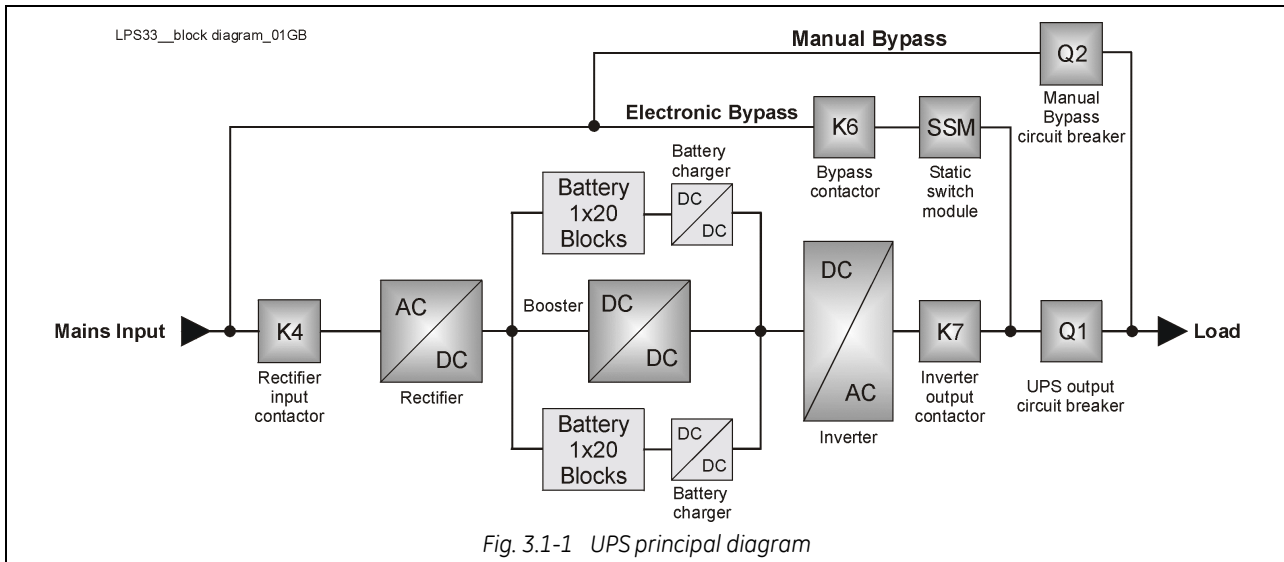


Fig. 3.1-1 UPS principal diagram

The Uninterruptible Power Supply System **LP 33 Series** can be divided into the following main elements:

Electronics

The UPS is designed with a microprocessor-controlled supervision and diagnostic system. Communication between user and UPS is achieved by the **front panel** consisting of an LCD screen, displaying the operation modes, the measurements and the events / alarms.

Rectifier

The **rectifier** converts the 3-phase mains voltage into a controlled and regulated DC-voltage, supply power to the **inverter** and to charge the **battery** through the **battery-charger**.

Inverter

The **inverter** converts the DC voltage into a three-phase sinusoidal with constant amplitude and frequency, which is completely independent from the AC-input voltage.

Automatic Bypass

The **automatic bypass** consists of a static semiconductor-switch (SSR: Static Switch Relay), used to provide an uninterrupted transfer of the **load** from **inverter** to **mains** when operating in **VFI (Voltage Frequency Independent) Mode**.

If chosen the **ECO Mode**, the SSM transfer the **load** from **mains** to **inverter** in case the utility fails.

Back-Feed Protection

All **LP 33 Series** UPS's are equipped with an automatic system for the protection against voltage back feeding towards Utility, through the Bypass (Applied Standard IEC 62040-1).

This protection works automatically by opening **contactor K6** (in series with the thyristors of the static switch) and eventually **K7**, and acts in case of internal defects of the system, or due to wrong manipulations on the **maintenance bypass Q2**.

Manual Bypass

The **manual bypass** consists of a pair of manual switches **Q1** and **Q2**, which allow the isolation of the UPS from the **load**, while still supplying the **load** with power directly from the **mains**.

Battery

The **battery**, normally stored by the **battery-charger**, supplies the DC energy to **inverter** in the event of **mains** failure.

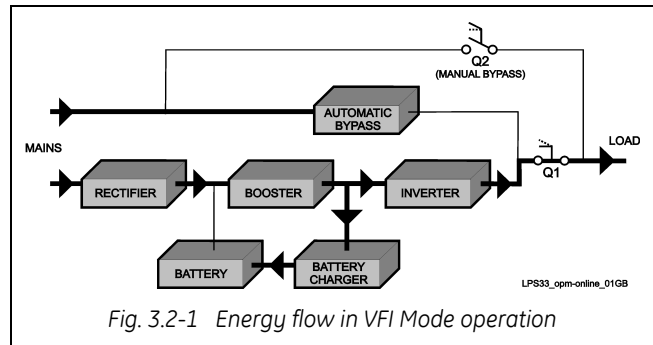
3.2 OPERATION MODES

This section describes the different possible operation modes of the UPS explaining the function of the main modules of the UPS.

VFI (Voltage Frequency Independent) mode operation

Under normal conditions the **load** is permanently powered by the **inverter** with constant amplitude and frequency.

The **rectifier**, powered by the **mains**, supplies the **inverter** and the **battery-charger** keeps the **battery** fully charged.



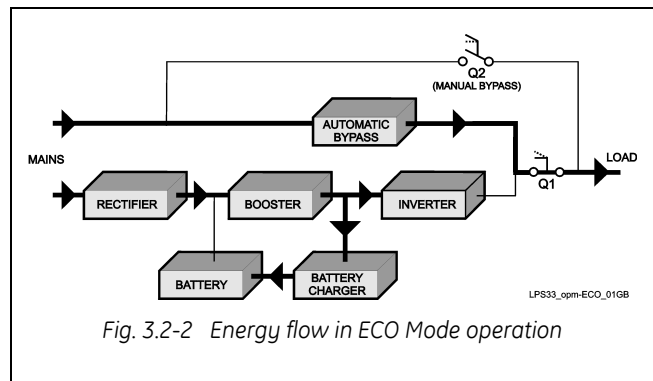
The **inverter** converts the DC voltage in a new AC sine wave voltage with constant amplitude and frequency independently from the input **mains** power.

ECO Mode operation

When the **ECO Mode** is selected, and the **mains** power is available, the **load** is normally powered through the **automatic bypass**.

When the mains voltage is detected out of the prescribed tolerances, the **load** is automatically transferred to the **inverter**.

When the **mains** recovers, the **load** returns to the **automatic bypass** after a variable time defined by the control unit.



The **ECO Mode** can be configured directly by the user for higher efficiency, considering the **mains** reliability and criticality of the **load**.

The selection between the two operation modes "**VFI Mode** and **ECO Mode**", or switching between operation modes at required time, can be done through the UPS **control panel** (see Section 7.3.1-5).

RPA

Redundant Parallel
Architecture

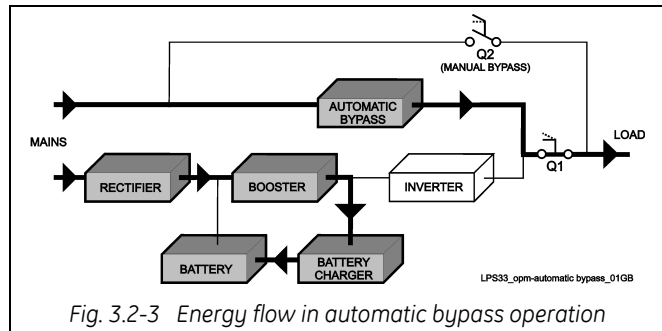
In case of parallel system

ECO Mode cannot be enabled for RPA Parallel System.

Attention: A single unit equipped with a RPA - Parallel board, must be considered as parallel, thus disabling ECO Mode.

Automatic bypass operation

In **VFI** (Voltage Frequency Independent) operation mode, the **load** is permanently supplied by the **inverter** but, in case of trouble on the **inverter**, or when overload or short-circuit on the output occur, if the **mains** voltage do not exceed the admitted tolerances, the **load** is instantly transferred to the **mains** through the **automatic bypass**, taking advantage of the higher short circuit power.



When the **inverter** recovers, the **load** will be re-transferred automatically to the **inverter**.

RPA

Redundant Parallel
Architecture

In case of parallel system

Each unit has its own bypass.

All the bypasses in the system work together, their control being managed in the same manner by all units.

The units are continuously exchanging information before taking such decision.

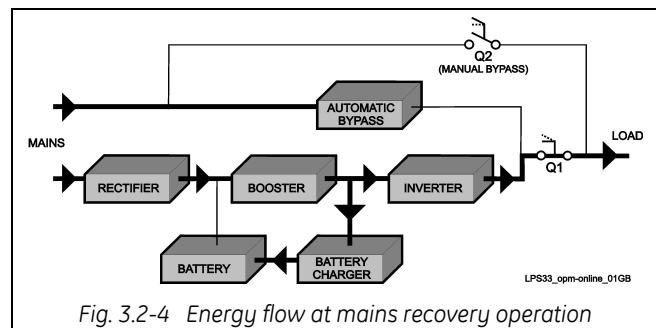
In case the inverter of one unit fails, its bypass remains operating.

It is excluded only if the unit is separated from the common bus by opening its output switch Q1.

Mains recovery operation

As soon as the **mains** recovers, the **rectifier** starts up automatically supplying the **inverter** and the **battery-charger** recharges the **battery**.

In case the **inverter** has been shut down following a complete discharge of the **battery**, when the **mains** recovers the system start up automatically.



When the energy stored in the **battery** is sufficient to ensure a minimum time of operation with the actual load, in case of a future **mains** failure, the **load** will be retransferred to **inverter** (if selected **VFI Mode**).

RPA

Redundant Parallel
Architecture

In case of parallel system

When the AC input power recovers, the rectifiers will start up sequentially according to their number in the parallel system in order to avoid an initial inrush current.

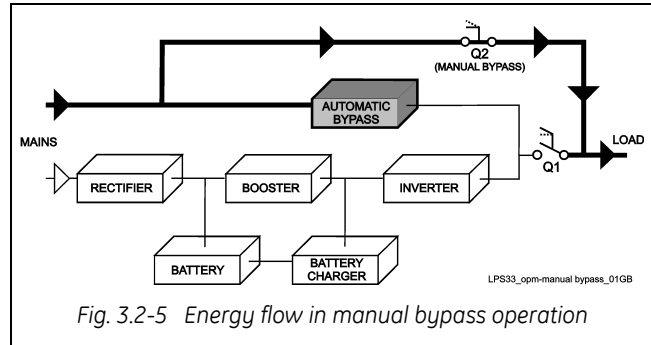
The inverters will start up automatically, but only when the battery has recharged enough for a minimum runtime with the present load.

When enough inverters to supply the load have been restarted, the load will be transferred from the automatic bypass back to the inverter bus-bars.

Manual bypass operation

The **manual bypass** circuit consisting of **Q1** and **Q2** manual switches, permits the transfer of the **load** directly to the **mains** without interruption, leaving the UPS galvanically separated from the output **load**.

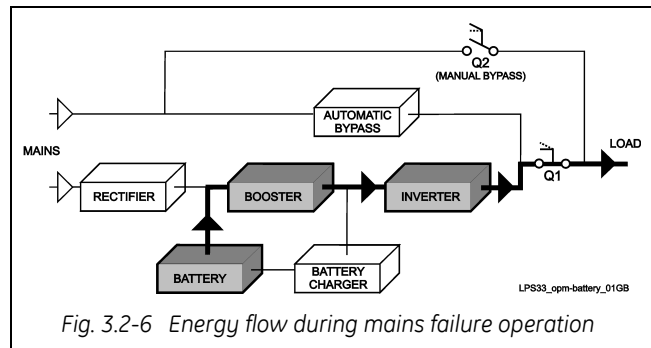
This type of operation is normally used when the UPS system must be completely turned off for maintenance or reparation.



Mains failure operation

In the event of a **mains** power failure, the **rectifier** and the **battery-charger** turn OFF, while the **inverter** continues to supply the **load** without interruption using the energy stored in the **battery**.

During the **battery** discharge, the LCD screen displays the remaining autonomy, based on the **battery** capacity and the applied **load**.



In the event of an extended mains failure, before the **battery** is fully discharged, the alarm “**stop operation**” warns the user that the UPS will start the shutdown procedures when the indicated time expired (normally 3 minutes).

RPA

Redundant Parallel
Architecture

In case of parallel system

With parallel system for power capacity:

- With the **bypass mains power available** as the warning “battery low” occurs on one unit, after timeout (selectable) the load is transferred to mains.
- With **missing bypass mains power** as the warning occurs on one unit, the system starts the timeout (selectable) of “Stop operation” and then the output load shuts down.

With redundant parallel system:

- As the warning battery low occurs on one unit unnecessary to support the present load, after timeout (selectable) this unit shuts down and the load is shared between the other units. As the warning occurs on one unit necessary to support the present load, the system starts the timeout (selectable) of “stop operation” and then the output load shuts down.

3.3 RPA PARALLEL SYSTEM

The **RPA** (Redundant Parallel Architecture) allows to extend the unit to a parallel system with 2, 3, or 4 units **LP 33 Series** connected on the same bus, which ensure the highest reliability rate and increase the power availability.

Parallel system for power capacity

Two or more units can be paralleled in order to achieve output power superior to the maximum power delivered by a single UPS unit.

The maximum total load shared between the n parallel units can achieve the 100% of the installed nominal power system.

In the event of one unit fails, the load will be suddenly transferred to the mains by the bypass.

Parallel system for redundancy

The parallel system can be defined redundant only in case the nominal power rating of $n-1$ units of n parallel units is sufficient to supply the required load power.

The load in a *parallel redundant system*, is equally shared by n units connected on the output bars.

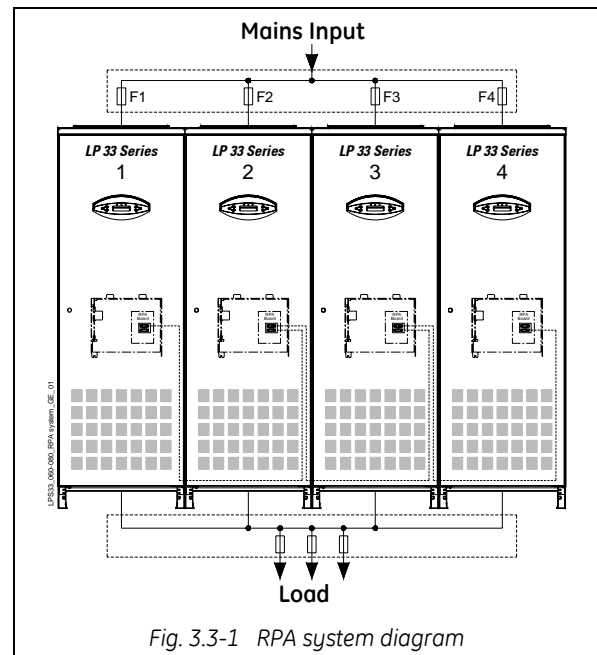


Fig. 3.3-1 RPA system diagram

Should one of the parallel units trip off-line, the remaining ($n-1$) units will share the load maintaining the applications protected by inverter until the normal situation restores.

Load sharing between parallel units

The control bus exchanging the data between the microprocessors of the paralleled units provide for a constant proportional load sharing in every load condition.

Management and synchronisation of the parallel system

All the units are identical without master and slaves.

One unit is arbitrarily selected as the reference (the first unit connected on power bus) being this unit the first synchronised with the mains voltage, and all the other units synchronise with the first one.

In case the reference unit fails or it is excluded from the parallel power bus any other unit will take over the reference role.

The AC input power source of all the bypasses must be the same for all the units of the parallel system excluding any phase shift between them.

Control bus of the parallel system

A high-speed serial bus, guarantees communication, synchronization and load sharing between the UPS modules.

Each module controls its own function, while the Master (each unit can be Master) controls and commands the status of the system.



NOTE !

No transformers, fuses or automatic circuit breakers should be inserted between the unit's output and the load common bus-bars.

3.4 UPS PARALLELED ON THE SAME BATTERY

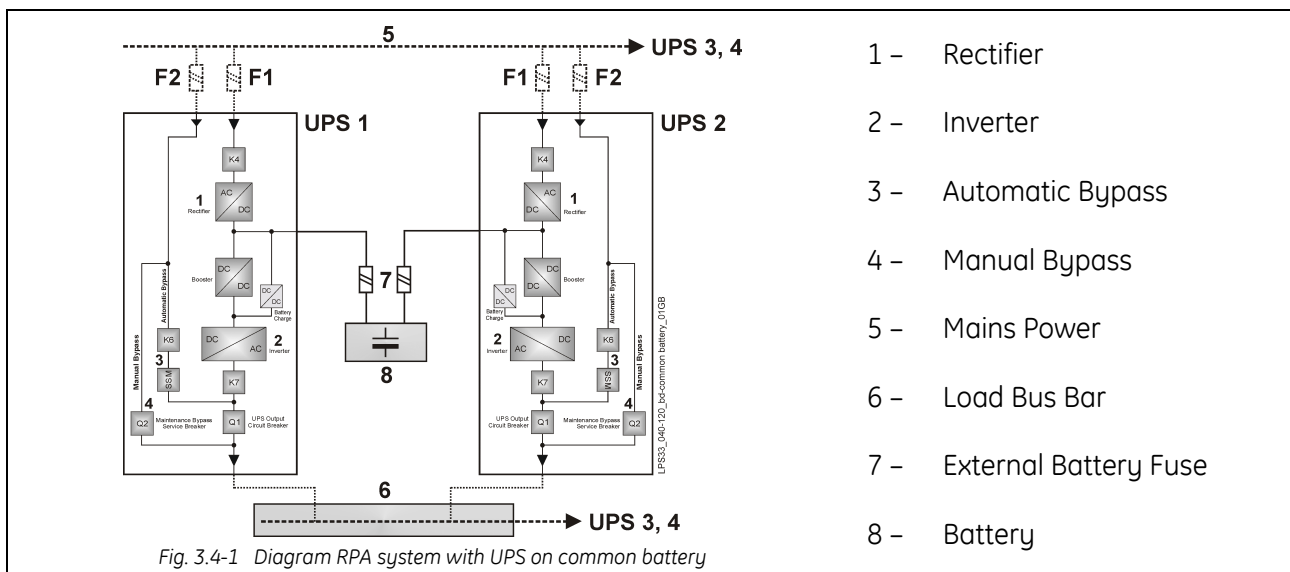


NOTE !

A parallel system with a *Common Battery* for two or more *UPS*, requires a particular installation and adequate setting of some parameters, (accessible only through password), and can therefore only be done by a qualified GE engineer.

Usually each *UPS Unit* runs with its own *Battery*.

In case of parallel units running with a *Common Battery* (max. 4 UPS - see Fig. 3.4-1), the sharing circuit between the individual *UPS* is integrated in the communication bus of the system in order to assure an equal sharing of the *Rectifiers* output currents.



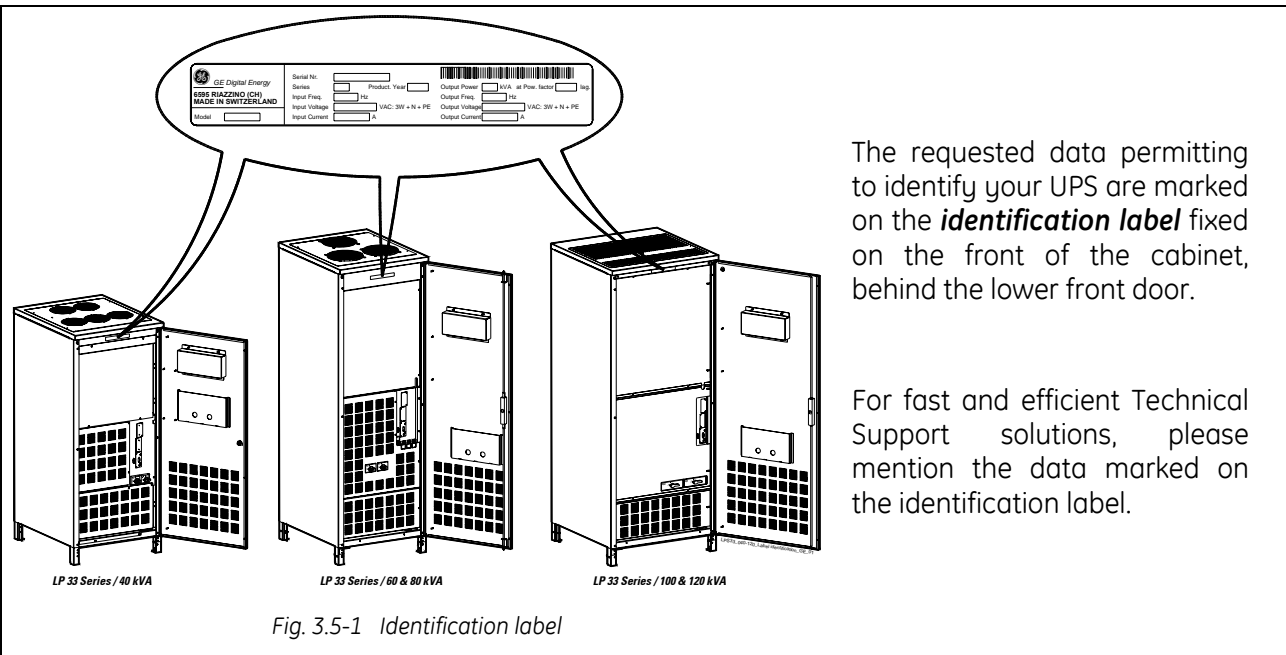
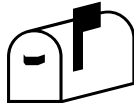
Pay attention to the following recommendations:

- The units delivered for this functioning mode needs a special parameters setting, so they must be prepared in advance before the installation.
- The installation must be performed only with the UPS system completely shut down.
- The AC *Rectifiers* input power (5) must be the same, with clockwise phase rotation for each unit.
- Each *Rectifier* must be set for the same floating DC voltage and the same *Battery* current limitation.
- It is mandatory to install the fuses / MCB (7) on each line connecting the *Rectifiers* to the common *Battery* for maintenance / safety reasons (see Section 4.7.2).
- In case a unit must be powered down for maintenance, switch-OFF the concerned unit before open the DC fuses / MCB on the *Battery* line (7).
- It is recommended to connect an external NO free contact "*Battery Fuses*" to the UPS and to enable the function by setting the parameter (see Section 7.1).
- If an emergency generator set supplies the UPS, and the free contact "*Generator ON*" is connected to the *Customer Interface*, connect a separate NO free contact on each parallel unit.
- The parameters enabling the *Battery test*, both manual and automatic, must be set in the same mode on all the units sharing a *Common Battery*.
- Do not connect the temperature sensor for automatic *battery floating voltage* compensation.
- Do not enable the function *Boost charge*.

3.5 SERVICE AND TECHNICAL SUPPORT

For any request of technical support please contact your local **Service Centre**.

Stamp of your local Service Centre (see page 3)



3.6 WARRANTY

GE, operating through its authorised agents, warrants that the standard products will be free of defects in materials and workmanship for a period of 24 months (12 months for battery), after the date of the invoice, or such other period as may be specified.



NOTE !

This warranty does not cover failures of the product which result from incorrect installation, misuse, alterations by persons other than authorised agents, or abnormal working conditions.

3.7 RECYCLING AT THE END OF SERVICE LIFE



NOTE !

This product has been designed to respect the environment, using materials and components respecting eco-design rules.

It does not contain CFCs (Carbon Fluor Clorid) or HCFCs (Halogen Carbon Fluor Clorid).



GE, in compliance with environment protection recommends to the *User* that the UPS equipment, at the end of its service life, must be recovered conforming to the local applicable regulations.



WARNING !

Leads contained in the batteries is a dangerous substance for the environment, therefore it must be correctly recycled by specialised companies!

4 INSTALLATION

4.1 TRANSPORT






The UPS is fixed on transport socket suitable for forklift, which include a special layer of *Ethafoam* to protect the equipment against the transport shock. Normally the UPS is packaged with carton box. On request the equipment can be packaged in wooden case.

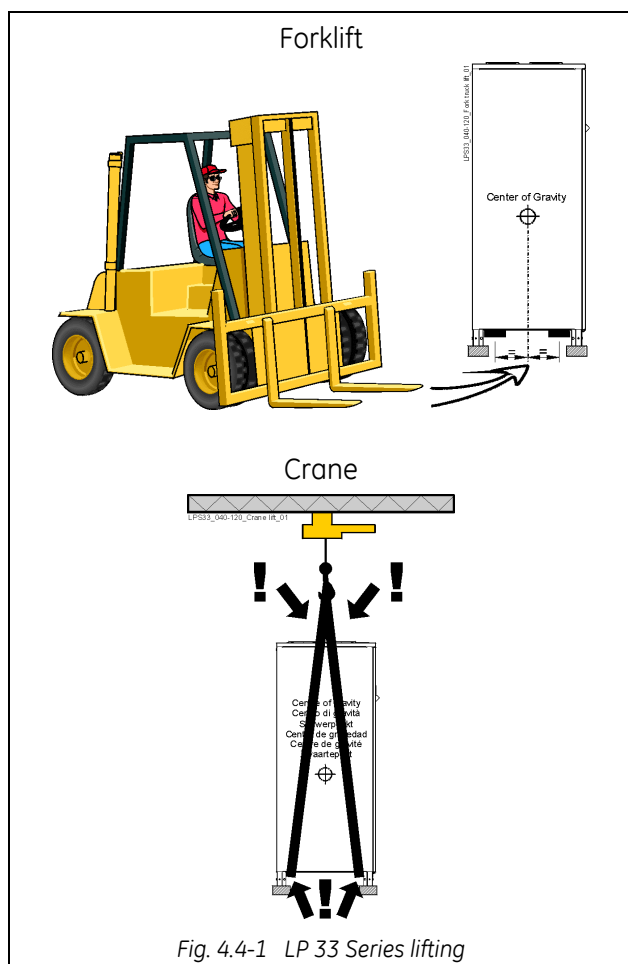
The UPS must be moved in **upright position**.

Do not tilt cabinets **more than $\pm 10^\circ$** during handling.

Move the UPS in its **original package** to the final destination room.

Do not stack other package on top: they could damage the upper side of the cabinet.


	<p>NOTE !</p> <p>When moving the UPS, pay attention to:</p>	 <p>FRAGILE</p>	 <p>SENSITIVE TO DAMPNESS</p>	 <p>SENSITIVE TO HEAT</p>	 <p>SENSITIVE TO FROST</p>
---	--	---	--	--	---



Forklift

The UPS may be lifted with a forklift in upright position from right and left side.






Take note of the centre of gravity marked on the package.


<p>NOTE !</p> <p>Check for sufficient floor and elevator loading capacity.</p> <p>Transport UPS only in upright position.</p> <p>Do not stack other package on top of the UPS.</p>

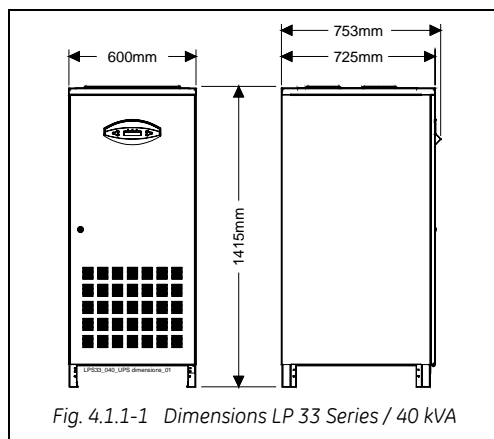
Crane

If the UPS has to be lifted by crane, use suitable carrying belts taking note of the centre of gravity marked on the package.

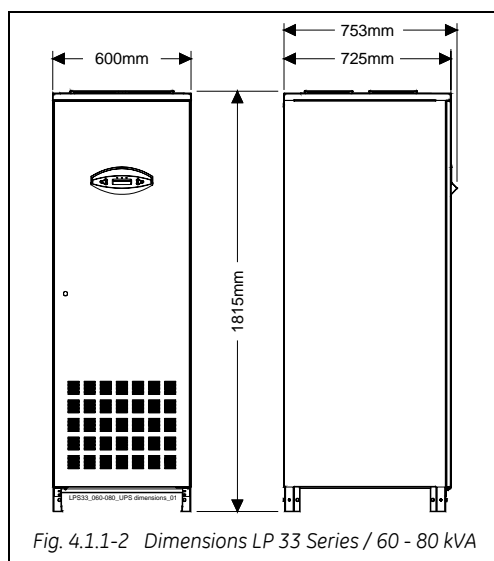
Take all necessary precautions to avoid damage to the cabinet while hoisting the UPS.

	<p>WARNING !</p> <p>When loading / downloading and when moving the UPS, it is forbidden:</p> <p>When loading / downloading and when moving the UPS, pay attention to:</p>	 	 
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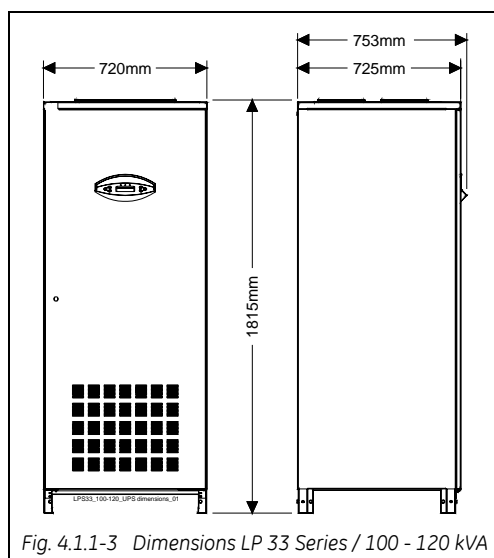
4.1.1 Dimensions and weight



LP 33 Series / 40 kVA	
Dimensions (W x D x H)	600mm x 753mm x 1415mm 23.63" x 29.64" x 55.71"
UPS standard weight	220 Kg / 485 lbs
UPS floor loading	510 Kg/m ²
UPS standard shipping	235 Kg / 519 lbs



LP 33 Series / 60 - 80 kVA		
Dimensions (W x D x H)	600mm x 753mm x 1815mm 23.63" x 29.64" x 71.46"	
UPS standard weight	60 kVA 280 Kg / 618 lbs	80 kVA 290 Kg / 640 lbs
UPS floor loading	60 kVA 644 Kg/m ²	80 kVA 667 Kg/m ²
UPS standard shipping	60 kVA 300 Kg / 662 lbs	80 kVA 310 Kg / 684 lbs



LP 33 Series / 100 - 120 kVA		
Dimensions (W x D x H)	720mm x 753mm x 1815mm 28.35" x 29.64" x 71.46"	
UPS standard weight	100 kVA 360 Kg / 794 lbs	120 kVA 375 Kg / 827 lbs
UPS floor loading	100 kVA 690 Kg/m ²	120 kVA 719 Kg/m ²
UPS standard shipping	100 kVA 385 Kg / 849 lbs	120 kVA 400 Kg / 882 lbs

NOTE !

The weight of each single piece is marked outside the package!

4.2 DELIVERY

When delivered, check carefully the **package integrity** and the **physical conditions of the UPS equipment**.

In case of any damage sustained during transport, immediately inform the carrier and contact your local **Service Centre**.

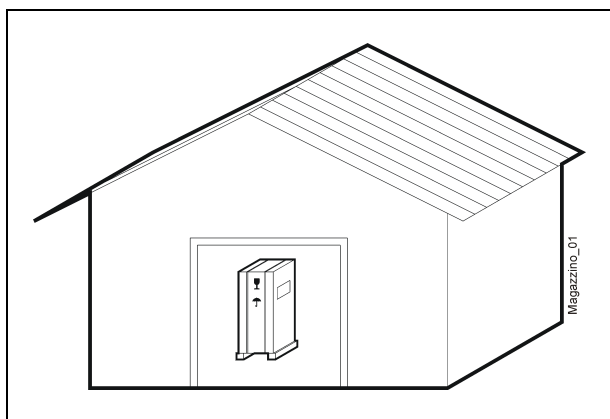
A **detailed report** of the damage is necessary for any insurance claim.



NOTE !

A damaged UPS must never be installed or connected to mains or battery!

4.3 STORAGE



The equipment is carefully packed for transport and storage so that it is in a perfect condition when eventually installed.

Never leave an UPS outside the building and do not store the UPS one on top of the other.

It is recommended to store the UPS in its original package in a **dry, dust free room and far away from chemical substances, with temperature not exceeding -25°C to 55°C (-13°F to 131°F)**.

4.3.1 Storage of the UPS

Some important functions of the UPS, such as the customised functions, are defined by parameters stored in a **RAM memory**.

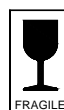
The RAM is supplied by a small **backup battery** located on the *Control Unit board*.

If the storage time of the UPS exceeds **1 year**, these functions **should be verified** by an authorised *Service Centre* before putting the UPS into operation.



NOTE !

In case of storage of the UPS pay attention to:



4.3.2 Storage of the battery

In case of extended storage, when the delivery includes maintenance free batteries, keep in mind that **they are subject to auto-discharging process**.

To avoid permanent damages to the battery, you must observe the following instructions:

- The storage time without charging the battery depends on the temperature of the storage ambient.
- The optimal ambient temperature for the batteries is **20°C** (68°F).
For storage temperature higher than **20°C** (68°F), the storage time will decrease.
- Each additional **10°C** (18°F) over the nominal temperature of **20°C** (68°F) will decrease the storage time, without freshening charge, by half.

In case of a *maintenance free battery*, the storage time without charging the *battery* is approximately:

6 months with storage temperature 20°C (68°F)

3 months with storage temperature 30°C (86°F)

2 months with storage temperature 35°C (95°F)



NOTE !

In case of *battery* storage pay attention to:



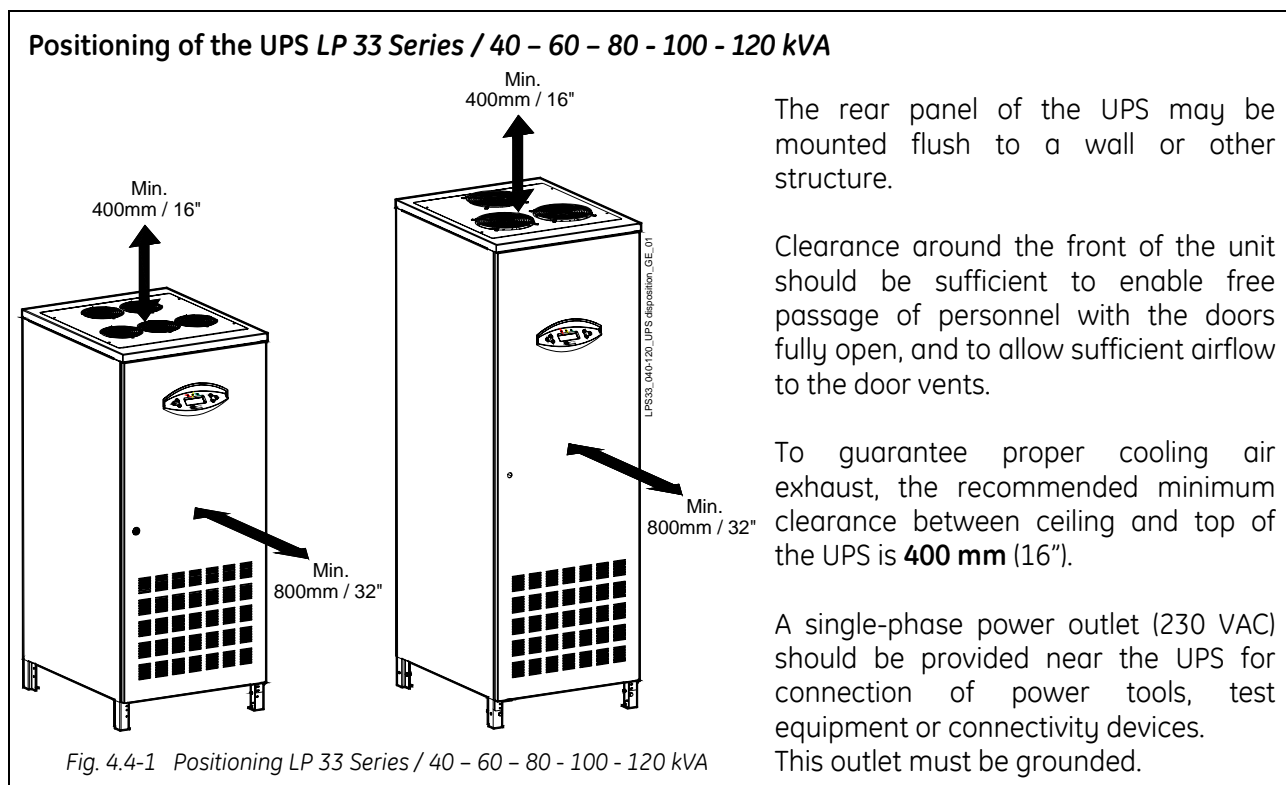
4.4 PLACE OF INSTALLATION

The UPS should be installed in a **restricted area** where only qualified personnel should be admitted.

The place of installation **should be clean, dust-free**, and provided with proper **ventilation or air-conditioning**.

Verify for **sufficient floor load capacity** (see Section 4.1.1).

We strongly advice that the ambient temperature should not exceed **20° ÷ 25°C / 68° ÷ 77°F** (max. 35°C / 95°F). See Section 4.5.



The **LP 33 Series** UPS can radiate radio frequency energy.

Although some **RFI** (Radio Frequency Interference) filtering is inherent to the UPS there is no guarantee that the UPS will not influence sensitive devices such as cameras and monitors that are positioned close by.

If interference is expected, the UPS should be moved away from the sensitive equipment.



NOTE !

Operating temperature is very important for *valve regulated battery* (maintenance free).

Operation at temperatures higher than 20°C (68°F) will reduce life expectancy.

Respect the prescription VDE 0510, those of the battery supplier and other local standards.

The installation and cabling of the battery must be done by qualified people.

Opening for input and output cable connections LP 33 Series

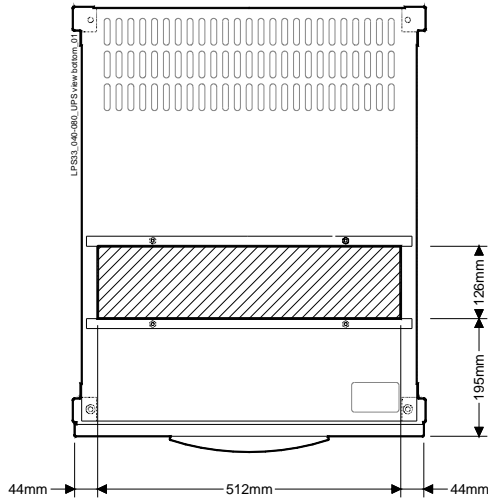


Fig. 4.4-2 LP 33 Series / 40 - 60 - 80 kVA - Opening on the bottom cabinet

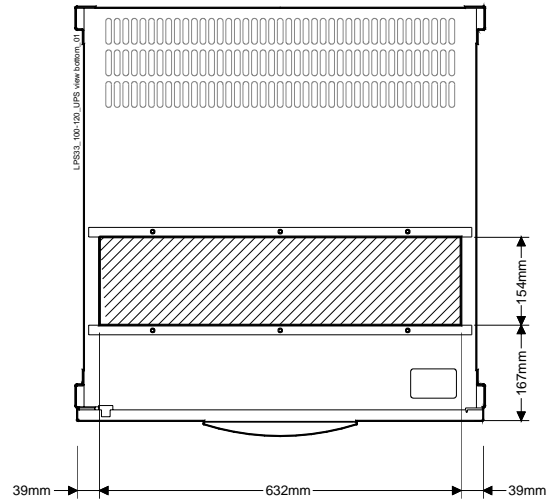


Fig. 4.4-3 LP 33 Series / 100 - 120 kVA - Opening on the bottom cabinet

LP 33 Series opening is provided on the bottom of the UPS for the connection of input and output cables.

Pay attention to the position of this opening, when choosing the placement of the UPS.

Fixing of the UPS cabinet LP 33 Series on the floor

The UPS cabinet is free standing and normally does not require to be bolted to the floor.

The UPS cabinet can be fixed however to the floor by bolting it with the supporting blocks to the floor.

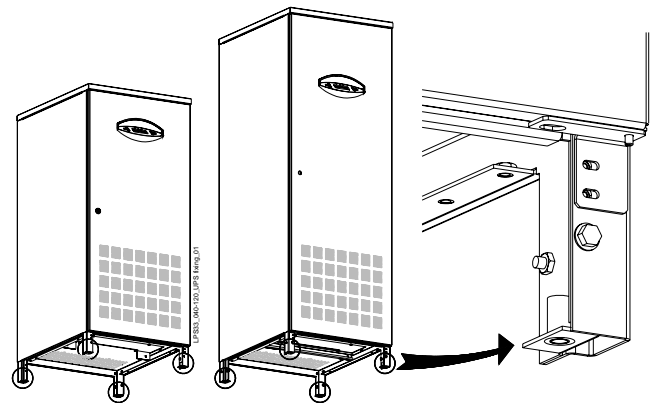


Fig. 4.4-4 Fixing of the UPS cabinet on the floor

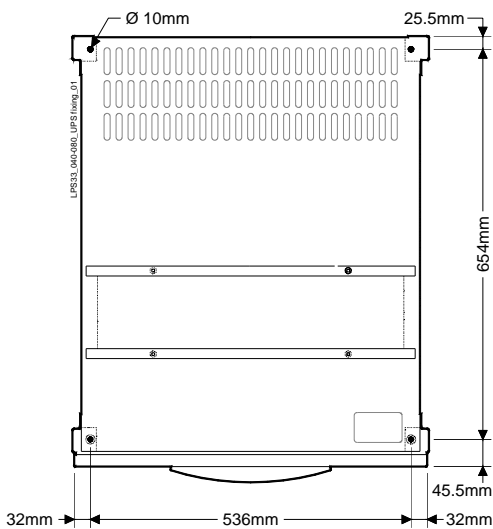


Fig. 4.4-5 LP 33 Series / 40 - 60 - 80 kVA - UPS cabinet floor fixing points

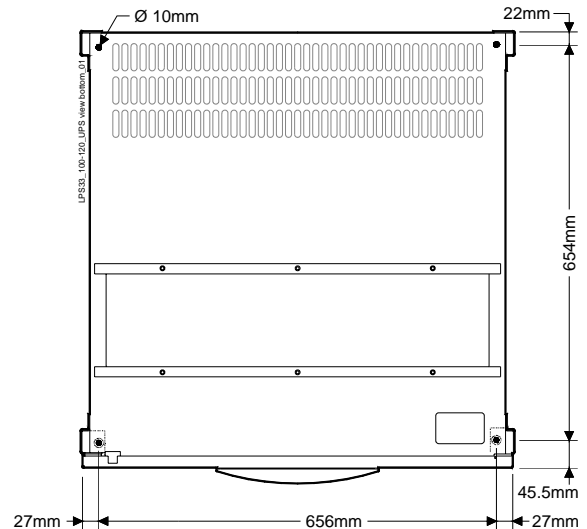


Fig. 4.4-6 LP 33 Series / 100 - 120 kVA - UPS cabinet floor fixing points

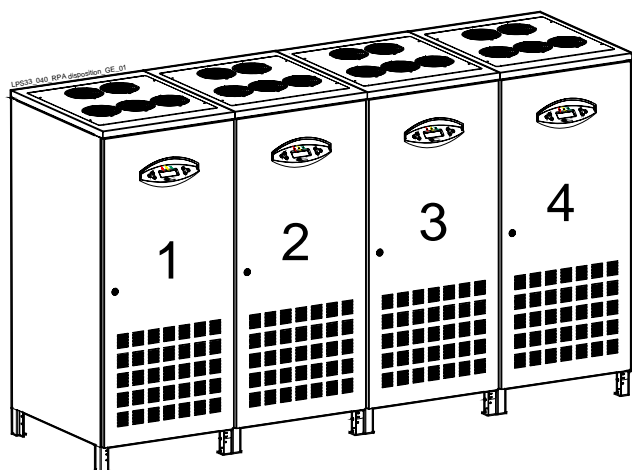


Fig. 4.4-7 LP 33 Series / 40 kVA – RPA parallel system disposition

RPA

Redundant Parallel Architecture

In case of parallel system, try to place the UPS modules in sequence of their numbers (marked on the packing).

If the units are positioned "side by side", the side panels must be mounted on all units.

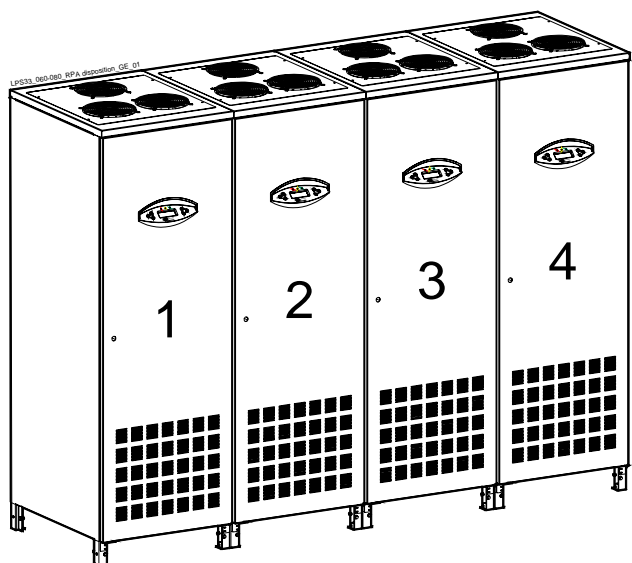


Fig. 4.4-8 LP 33 Series / 60 - 80 kVA – RPA parallel system disposition

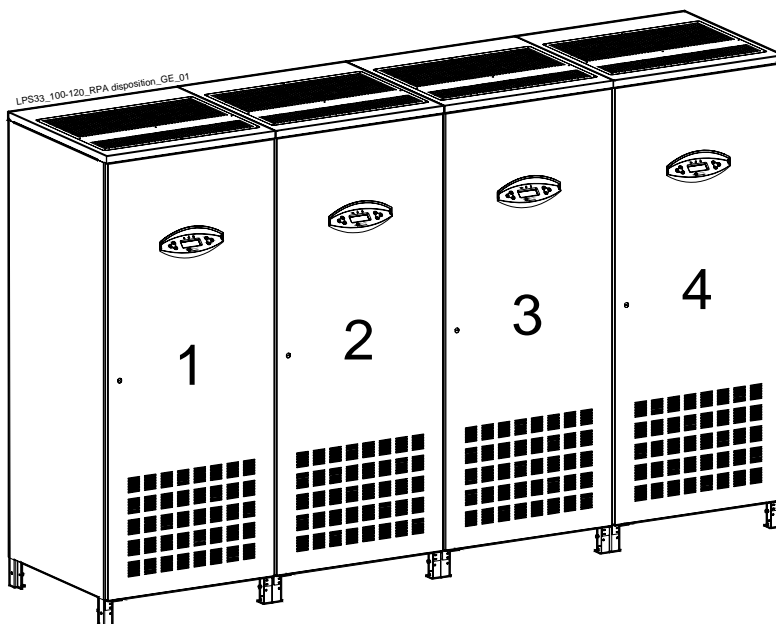
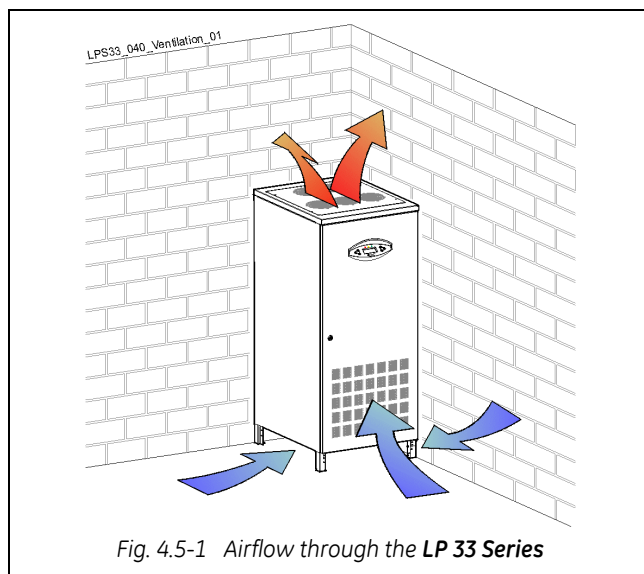


Fig. 4.4-9 LP 33 Series / 100 - 120 kVA – RPA parallel system disposition

4.5 VENTILATION AND COOLING

The heat produced by the UPS is transferred to the environment by its internal blowers.



Airflow through the UPS

It is important that the cooling air can freely flow through the air inlets and outlets of the UPS.

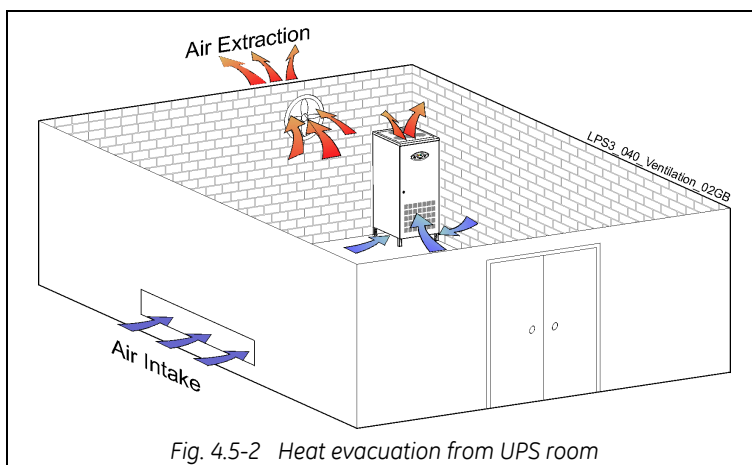


NOTE !

Do not put any object on the top of the cabinet: it might obstruct the air flow.

Heat evacuation from UPS room

The heat must be evacuated from the environment with a proper cooling / ventilation system provided by the user.



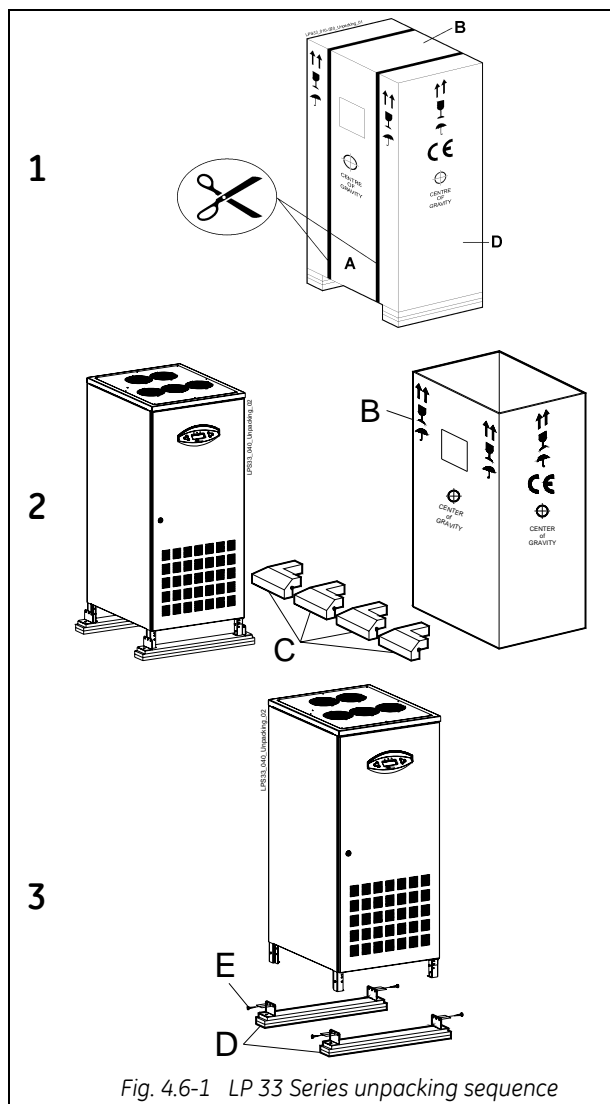
Air volume and losses of the UPS

The approximate minimum air volume needed to evacuate the heat generated by the UPS, for **inlet temperature max. 35°C (95°F)**, for the standard version at inverter nominal load with **PF = 0.8 lag.** and **battery charged**, are the following:

UPS model	Air volume		Losses	
	VFI Mode	ECO Mode	VFI Mode	ECO Mode
LP 33 Series / 40 kVA	725 m³/h	100 m³/h	2.48 kW	0.33 kW
LP 33 Series / 60 kVA	1010 m³/h	170 m³/h	3.45 kW	0.58 kW
LP 33 Series / 80 kVA	1450 m³/h	190 m³/h	4.97 kW	0.65 kW
LP 33 Series / 100 kVA	1815 m³/h	290 m³/h	6.21 kW	0.97 kW
LP 33 Series / 120 kVA	2175 m³/h	350 m³/h	7.45 kW	1.17 kW

4.6 UNPACKING

Move the equipment in it's original packing, carton box or wooden case, until the place of installation and remove the packing and the transport sockets only just before installing the UPS.



Procedure for the unpacking of the UPS:

- Make sure to have sufficient space around the UPS before you start unpacking.
- Cut the two straps "A" fixing the carton box.
- Remove package "B".
- Remove the protection "C" outside the cabinet and the accessories bag.
- Use a forklift to raise the UPS from the floor.
- Remove the two wooden plates "E".

Included in the delivery you can find the following parts:

- Control Bus cables (only for RPA parallel system)
- CD-ROM connectivity
- An accessories bag



NOTE !

A damaged UPS must never be installed or connected to *mains* or *battery*!
In case of any damage sustained during the transport, immediately inform the shipping agent!
A detailed report of the damage is necessary for any indemnity claim.



Packing material recycling

GE, in compliance with environment protection, use only environmentally friendly material.
UPS packing materials must be recycled in compliance with all applicable regulations.

4.7 ELECTRICAL WIRING



WARNING !

The connections to and from the UPS must be executed by **QUALIFIED PERSONNEL ONLY**.

Refer to the "*Safety prescriptions - Installation*" described on *Section 1*.

The cabling of the UPS-system has to be done according to the power installed.

Exceptions are only allowed to suit local prescriptions.

For correct rating of fuses and cable sections for input mains, output load and battery, see data indicated in sections 4.7.2 and 4.7.3.

Before connecting the UPS, verify that the mains voltage and frequency, the output load voltage, the frequency and the battery data (cells number, floating voltage, autonomy) are according to the local requirements.

Protection of the UPS mains input, must be exclusively with 3 pole breakers.

The UPS needs the connection of the Neutral to the input, to guarantee the function in TN mode.

Caution when using **four-pole circuit breakers** as protection to the load of the UPS.

A potential problem exists for situations with non-linear loads: **the neutral current could be greater than the phase currents**.

Avoid to run the input cables in parallel with the output cables to prevent them from noise induction.

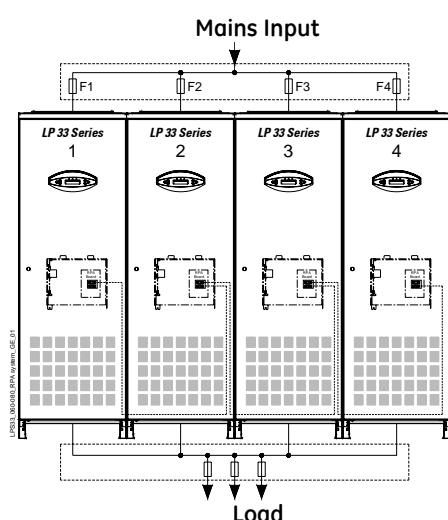


Fig. 4.7-1 RPA Parallel System

RPA

Redundant Parallel Architecture

In order to ensure a correct load sharing between the parallel units, when the *load* is supplied by *mains*, it is recommended to keep the cable size and length from the input distribution board to the output bus-bar the same for each parallel unit.

Mains Bypass input voltage must be the same for all units, thus avoiding phase shift or phase rotation problems.

To avoid mutual induction effect, the input cables must be run in separate conduit from the output cables.



No transformers, fuses or automatic circuit breakers should be inserted between the unit's output and the load common bus-bars.

The delivery and installation of fuses and input / output connections of the UPS are at the customer's expense, unless agreed otherwise.



NOTE !

In case of non observance of the required minimum distances on both UPS sides (see section 4.4) it is recommended to provide an additional length of the input/output cables so that the UPS can be moved for maintenance purpose.

It is recommended to use flexible input/output conductors with suitable length to admit a sufficient displacement.

4.7.1 Fuse discrimination (co-ordination of breakers tripping)

In order to ensure the circuit selectivity in **case of short- circuit at load level**, special care must be taken in choosing the fuse ratings installed in the output distribution.

When a short-circuit on the output occurs, if the *mains* voltage does not exceed the admitted tolerances, the *load* is instantly transferred to the *mains* through the *automatic bypass*, taking advantage of the higher short circuit power.

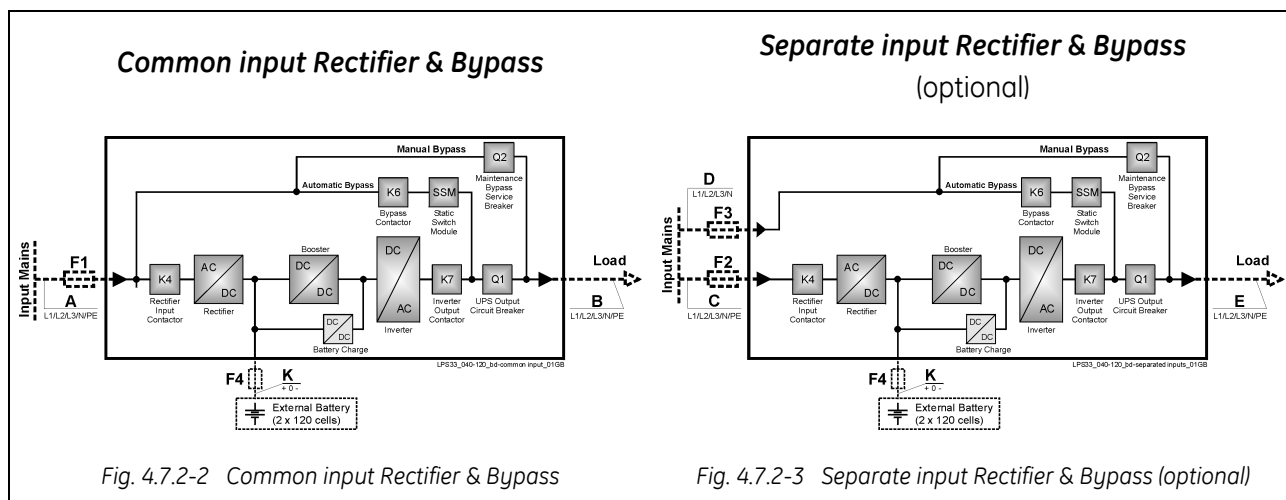
To ensure a correct co-ordination of the breakers tripping, the fuses supplying the *bypass* line must be at **least 1,6 time bigger** than the largest fuse in the output distribution.

If the selectivity must be ensured **also in case of mains failure** (that means inhibit *automatic bypass*), the largest fuse in the output distribution must be lower than **20% of the UPS rated current for each phase**.

4.7.2 Fuse ratings

If ELCB breakers are prescribed to protect the input connections, consider the high leakage current towards the earth generated by the noise-suppressor capacitors.

If strongly prescribed, the ELCB breakers should be the largest type suitable for non-linear current and for delayed operation.



UPS rating	Fuses AgL or equivalent MTCB for mains voltages 3x380/220V, 3x400/230V, 3x415/240V			
	F1	F2	F3	F4 (external battery)
LP 33 Series / 40 kVA	3 × 63 A	3 × 63 A	3 × 63 A	3 × 80 A
LP 33 Series / 60 kVA	3 × 100 A	3 × 100 A	3 × 100 A	3 × 125 A
LP 33 Series / 80 kVA	3 × 125 A	3 × 125 A	3 × 125 A	3 × 160 A
LP 33 Series / 100 kVA	3 × 160 A	3 × 160 A	3 × 160 A	3 × 200 A
LP 33 Series / 120 kVA	3 × 200 A	3 × 200 A	3 × 200 A	3 × 250 A

4.7.3 Input / output cable ratings

Cables size indicated below do not consider a possible line voltage.



NOTE !

The values given in the tables below do correspond to European Standards (EN) and Swiss standards (SEV/ASE).

In any case the local standards must be respected.

Common input Rectifier & Bypass

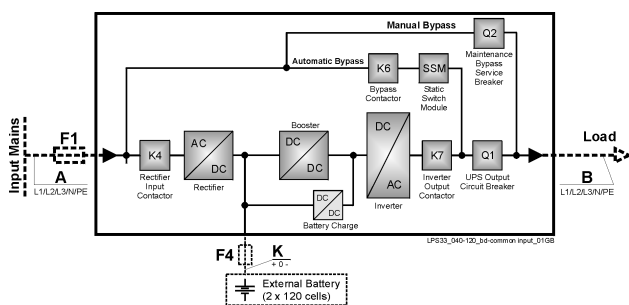


Fig. 4.7.3-1 Common input mains

Separate input Rectifier & Bypass
(optional)

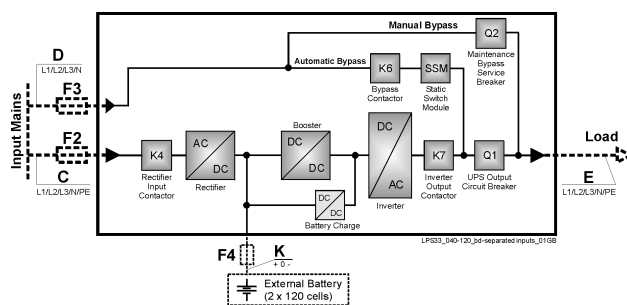


Fig. 4.7.3-2 Separate input mains (optional)

UPS rating	Cable sections A, B, C, D, E and K recommended by EN - European Standards			
	A / B / C	D	E	K
LP 33 Series / 40 kVA	5 x 10 mm ²	4 x 10 mm ²	5 x 10 mm ²	4 x 16 mm ²
LP 33 Series / 60 kVA	4 x 25 + 16 mm ²	4 x 25 mm ²	4 x 25 + 16 mm ²	3 x 35 + 25 mm ²
LP 33 Series / 80 kVA	4 x 35 + 25 mm ²	4 x 35 mm ²	4 x 35 + 25 mm ²	3 x 50 + 25 mm ²
LP 33 Series / 100 kVA	4 x 50 + 25 mm ²	4 x 50 mm ²	4 x 50 + 25 mm ²	3 x 70 + 35 mm ²
LP 33 Series / 120 kVA	4 x 70 + 35 mm ²	4 x 70 mm ²	4 x 70 + 35 mm ²	3 x 120 + 70 mm ²

UPS rating	SEV/ASE cable sections recommended in Switzerland			
	A / B / C	D	E	K
LP 33 Series / 40 kVA	5 x 16 mm ²	4 x 16 mm ²	5 x 16 mm ²	3 x 25 + 16 mm ²
LP 33 Series / 60 kVA	4 x 35 + 25 mm ²	4 x 35 mm ²	4 x 35 + 25 mm ²	3 x 50 + 25 mm ²
LP 33 Series / 80 kVA	4 x 50 + 25 mm ²	4 x 50 mm ²	4 x 50 + 25 mm ²	3 x 70 + 35 mm ²
LP 33 Series / 100 kVA	4 x 70 + 35 mm ²	4 x 70 mm ²	4 x 70 + 35 mm ²	3 x 95 + 50 mm ²
LP 33 Series / 120 kVA	4 x 95 + 50 mm ²	4 x 95 mm ²	4 x 95 + 50 mm ²	3 x 150 + 95 mm ²



NOTE !

According to EMC standards, the connection between the UPS and an external battery must be done using a shielded cable!

4.8 ELECTRICAL CONNECTION

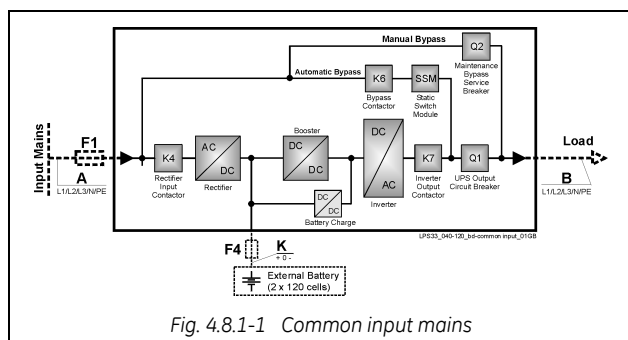


WARNING !

The connections to and from the UPS must be executed by **QUALIFIED PERSONNEL ONLY**.

Refer to the "*Safety prescriptions*" described on *Section 1*.

4.8.1 Power connection with common input mains for LP 33 Series / 40 - 60 - 80 kVA

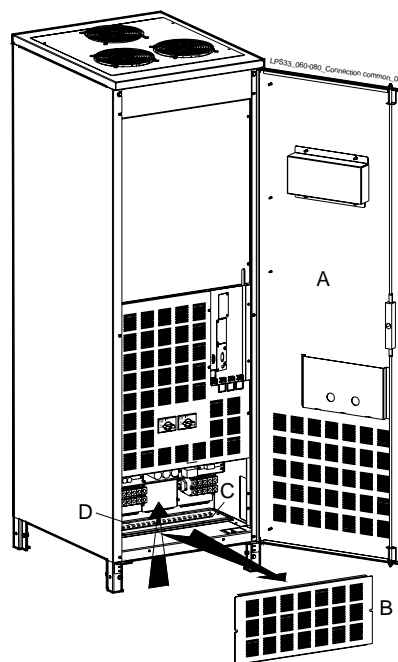
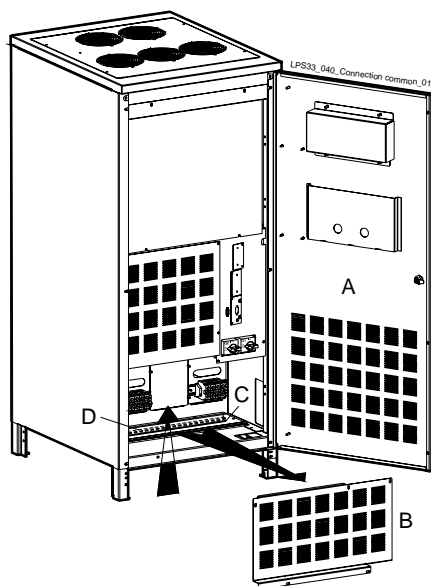


Common input mains

The UPS delivered in standard version has **common input mains**.

Only one input line (*F1*) supplies both *rectifier* and *bypass* input terminals.

Bear in mind that when the mains fuses are opened there is a supply failure to the *rectifier* as well as to the *automatic bypass* and *manual bypass*.



Access to the AC terminals

- 1 - Open the front door "A" of the UPS cabinet.
- 2 - Remove the front panel "B".
- 3 - Cut an opening into rubber "C" to allow cable passage.
- 4 - Fix the cables on profile "D" with the enclosed cable ties.



NOTE !

For UPS correct operation, the input mains phase rotation must be clock-wise.

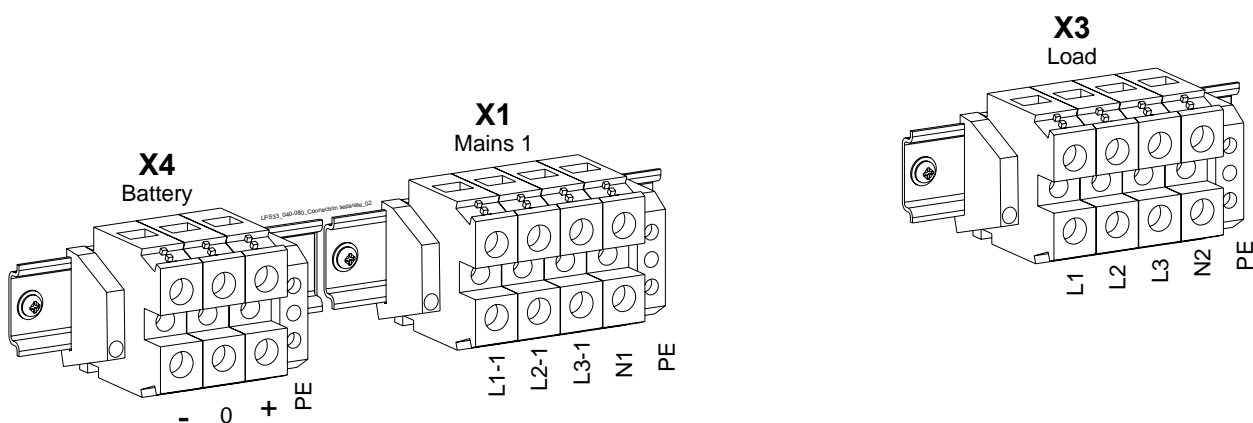


Fig. 4.8.1-4 Terminals for common input mains

X1 Mains 1 - Input mains connection

L1 = Rectifier + Bypass Phase L1
L2 = Rectifier + Bypass Phase L2
L3 = Rectifier + Bypass Phase L3
N1 = Mains Neutral **PE** = Main Ground

X3 Load - Output load connection

L1 = Load Phase L1
L2 = Load Phase L2
L3 = Load Phase L3
N2 = Load Neutral **PE** = Load Ground



NOTE !

Input/output terminals must be tightened with a proper screwdriver applying torsion force: 2.5 Nm for LP 33 Series / 40 kVA 3 Nm for LP 33 Series / 60 - 80kVA.

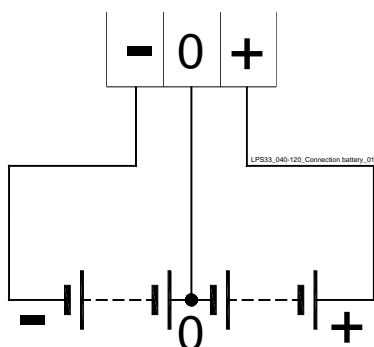


Fig. 4.8.1-5 External battery connection

X4 Battery - External battery connection

- = Negative pole of the battery
0 = Central point of battery blocks
+ = Positive pole of the battery
PE = Battery cabinet ground



WARNING !

Before closing the "external battery fuses", verify for correct polarity of the battery connection.



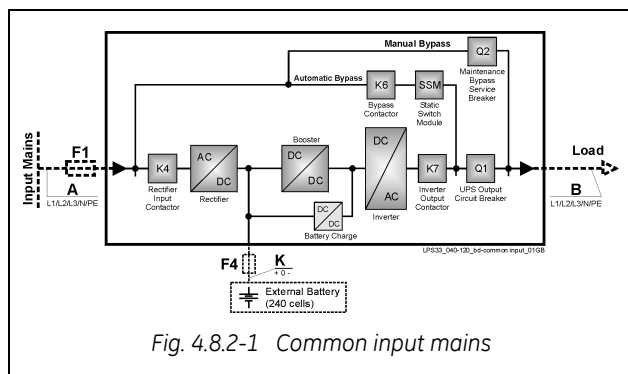
NOTE !

To meet standards concerning electromagnetic compliance, the connection between the UPS and external *Battery* must be done by using a shielded cable or suitable shielded (metal) conduit!

This UPS is only designed to operate in a wye-configured electrical system with a solidly grounded neutral.

If the UPS is equipped with an input transformer, the secondary of the transformer must be wye-configured with neutral solidly grounded.

4.8.2 Power connection with common input mains for LP 33 Series / 100 - 120 kVA

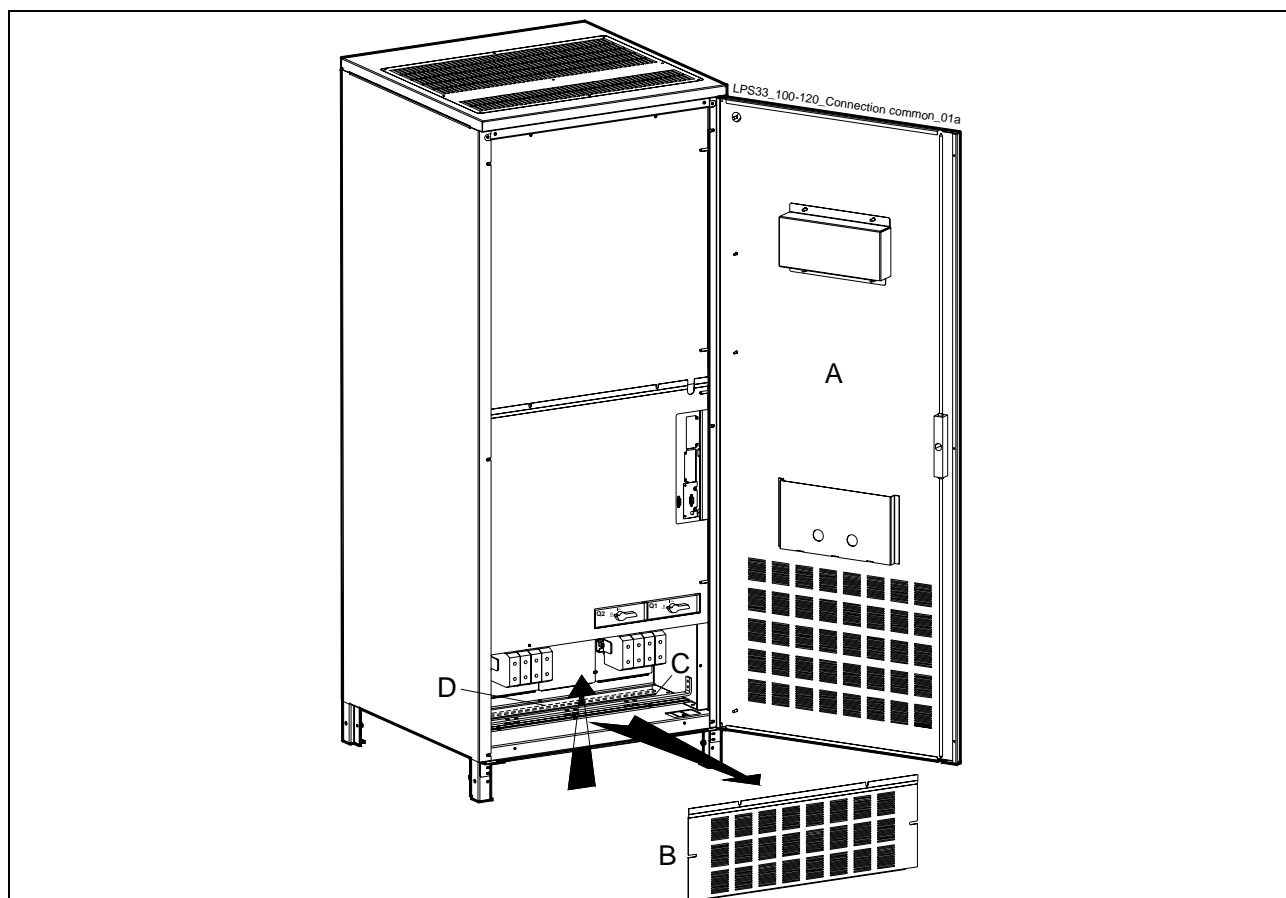


Common input mains

The UPS delivered in standard version has **common input mains**.

Only one input line (F1) supplies both *rectifier* and *bypass* input terminals.

Bear in mind that when the mains fuses are opened there is a supply failure to the *rectifier* as well as to the *automatic bypass* and *manual bypass*.



Access to the AC terminals

- 1 - Open the front door "A" of the UPS cabinet.
- 2 - Remove the front panel "B".
- 3 - Cut an opening into rubber "C" to allow cable passage.
- 4 - Fix the cables on profile "D" with the enclosed cable ties.



NOTE !

For UPS correct operation, the input mains phase rotation must be clock-wise.

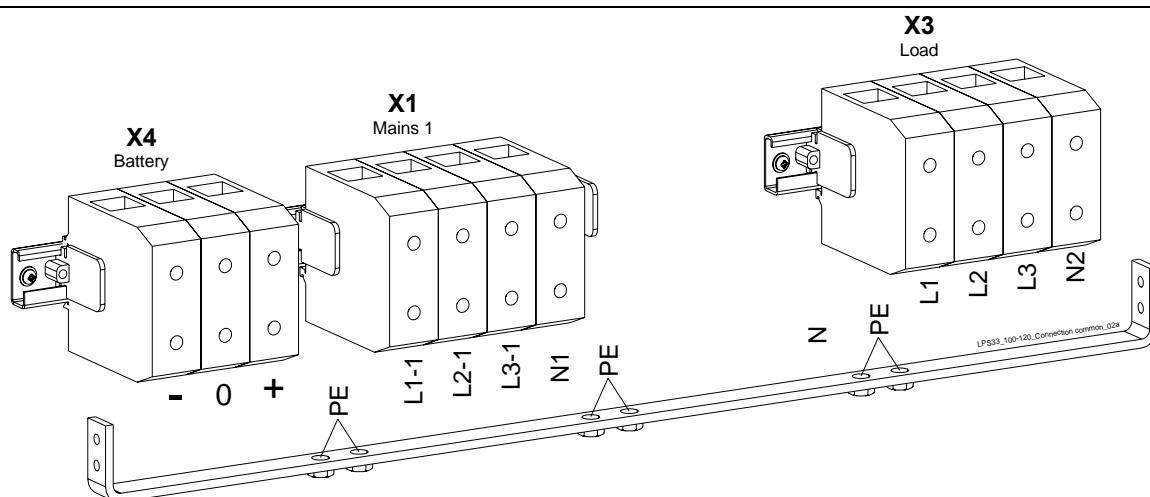


Fig. 4.8.2-3 Terminals for common input mains

X1 Mains 1 - Input mains connection

L1 = Rectifier + Bypass Phase L1
L2 = Rectifier + Bypass Phase L2
L3 = Rectifier + Bypass Phase L3
N1 = Mains Neutral **PE** = Main ground

X3 Load - Output load connection

L1 = Load Phase L1
L2 = Load Phase L2
L3 = Load Phase L3
N2 = Load Neutral **PE** = Load Ground

Main ground (PE) cables must be connected to bus-bar with **M8** bolts.



NOTE !

Input/output terminals must be tightened with a proper screwdriver applying torsion force: 10 Nm for LP 33 Series / 100 - 120kVA.

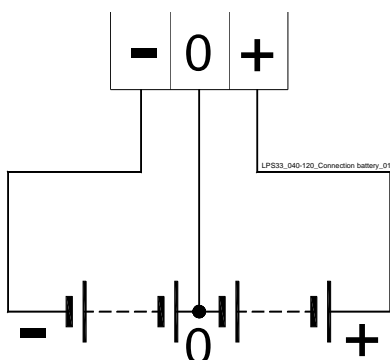


Fig. 4.8.2-4 External battery connection

X4 Battery - External battery connection

- = Negative pole of the battery
0 = Central point of battery blocks
+ = Positive pole of the battery
PE = Battery cabinet ground



WARNING !

Before closing the "external battery fuses", verify for correct polarity of the battery connection.



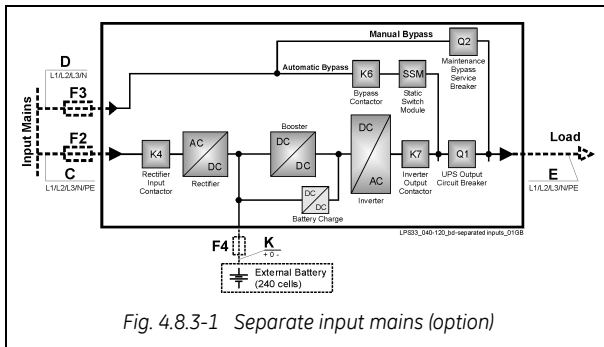
NOTE !

To meet standards concerning electromagnetic compliance, the connection between the UPS and external Battery must be done by using a shielded cable or suitable shielded (metal) conduit!

This UPS is only designed to operate in a wye-configured electrical system with a solidly grounded neutral.

If the UPS is equipped with an input transformer, the secondary of the transformer must be wye-configured with neutral solidly grounded.

4.8.3 Power connection with separate input mains for LP 33 Series / 40 - 60 - 80 kVA (option)



Separate input mains

On request, the UPS can be delivered for **separate input mains**.

Two independent lines (F2 and F3) supply separately the *rectifier* and the *bypass* inputs

With this configuration, when the *rectifier-input* fuses are opened, the *automatic bypass* and the *maintenance bypass* are supplied by the other line.

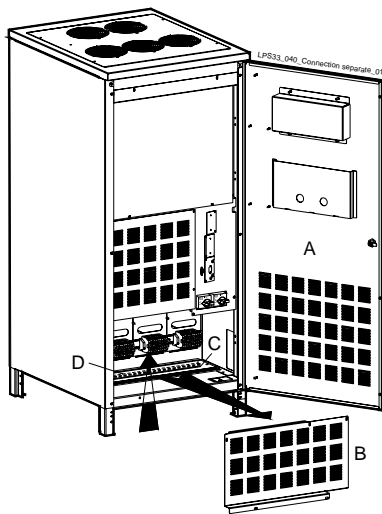


Fig. 4.8.3-2 LP 33 Series / 40 kVA - Power IN / OUT connections

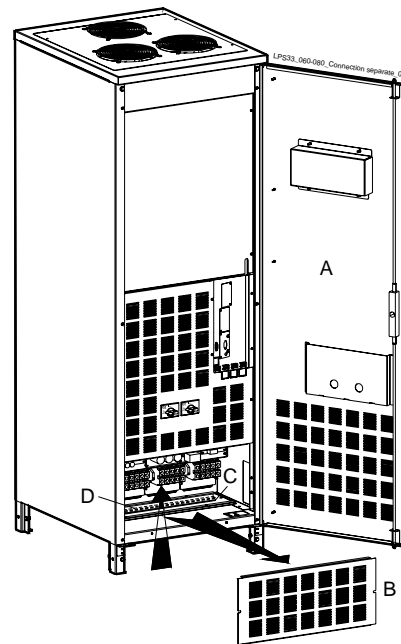


Fig. 4.8.3-3 LP 33 Series / 60 - 80 kVA - Power IN / OUT connections

Access to the AC terminals

- 1 - Open the front door "A" of the UPS cabinet.
- 2 - Remove the front panel "B".
- 3 - Cut an opening into rubber "C" to allow cable passage.
- 4 - Fix the cables on profile "D" with the enclosed cable ties.



NOTE !

For UPS correct operation, the input mains phase rotation must be clock-wise.



NOTE !

Neutral of *rectifier* input and neutral of *bypass* input must be coming from the same input bar.

Inside the UPS, neutrals N1 and N are connected together.

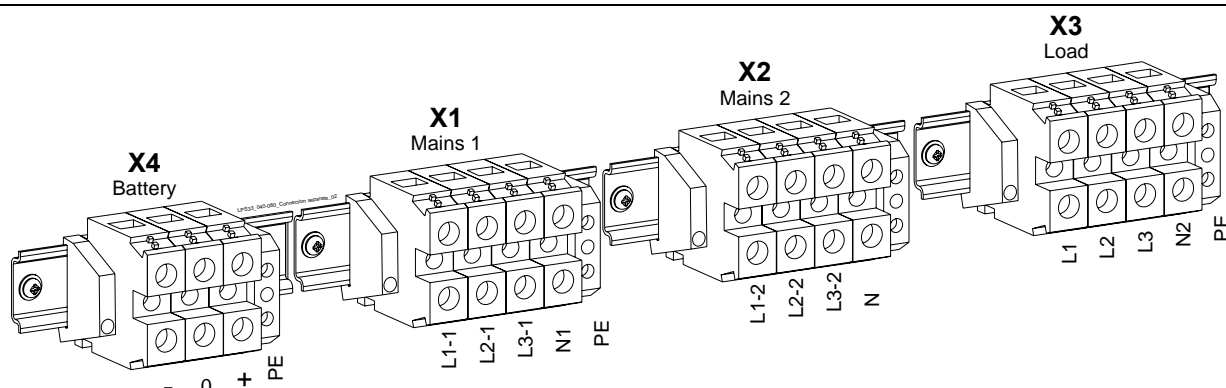


Fig. 4.8.3-4 Terminals for separated input mains

X1 Mains 1

Rectifier input mains connection

L1-1 = Rectifier Phase L1

L2-1 = Rectifier Phase L2

L3-1 = Rectifier Phase L3

N1 = Mains Neutral

PE = Main Ground

X2 Mains 2

Bypass input mains connection

L1-2 = Bypass Phase L1

L2-2 = Bypass Phase L2

L3-2 = Bypass Phase L3

N = Mains Neutral

X3 Load - Output load connection

L1 = Load Phase L1

L2 = Load Phase L2

L3 = Load Phase L3

N2 = Load Neutral **PE** = Load Ground



NOTE !

Input/output terminals must be tightened with a proper screwdriver applying torsion force:

2.5 Nm for LP 33 Series / 40 kVA

3 Nm for LP 33 Series / 60 - 80kVA

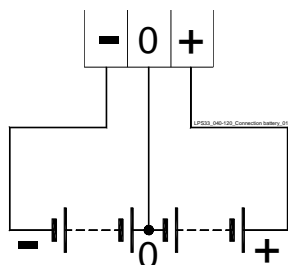


Fig. 4.8.3-5 External battery connection

X4 Battery - External battery connection

- = Negative pole of the battery

0 = Central point of battery blocks

+ = Positive pole of the battery

PE = Battery cabinet ground



WARNING !

Before closing the "external battery fuses", verify for correct polarity of the battery connection.



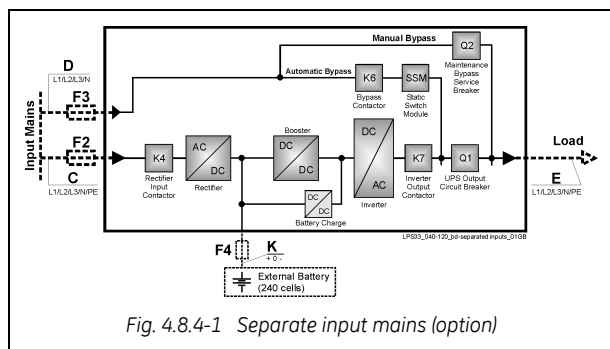
NOTE !

To meet standards concerning electromagnetic compliance, the connection between the UPS and external *Battery* must be done by using a shielded cable or suitable shielded (metal) conduit!

This UPS is only designed to operate in a wye-configured electrical system with a solidly grounded neutral.

If the UPS is equipped with an input transformer, the secondary of the transformer must be wye-configured with neutral solidly grounded.

4.8.4 Power connection with separate input mains for LP 33 Series / 100 - 120 kVA (option)



Separate input mains

On request, the UPS can be delivered for **separate input mains**.

Two independent lines (F2 and F3) supply separately the *rectifier* and the *bypass* inputs

With this configuration, when the *rectifier-input* fuses are opened, the *automatic bypass* and the *maintenance bypass* are supplied by the other line.

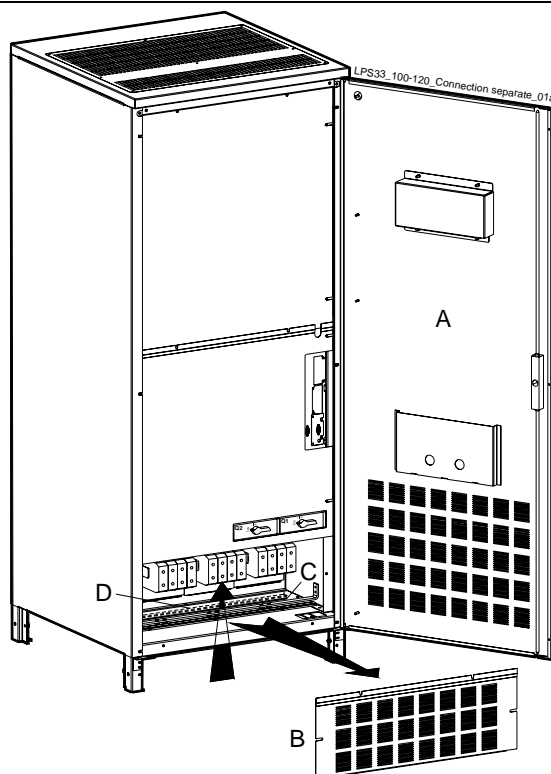


Fig. 4.8.4-2 LP 33 Series / 100 - 120 kV - Power IN / OUT connections

Access to the AC terminals

- 1 - Open the front door "A" of the UPS cabinet.
- 2 - Remove the front panel "B".
- 3 - Cut an opening into rubber "C" to allow cable passage.
- 4 - Fix the cables on profile "D" with the enclosed cable ties.



NOTE !

For UPS correct operation, the input mains phase rotation must be clock-wise.

Neutral of *rectifier* input and neutral of *bypass* input must be coming from the same input bar.

Inside the UPS, neutrals N1 and N are connected together.

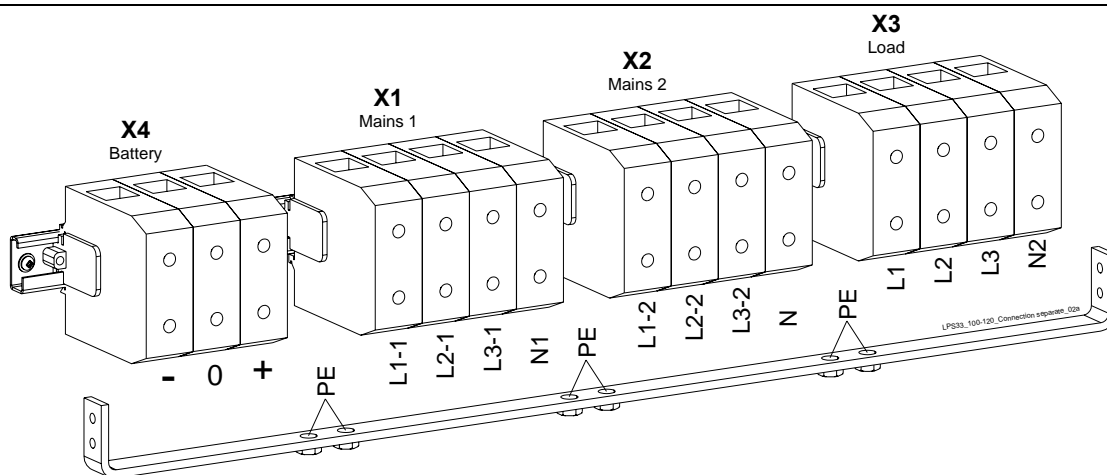


Fig. 4.8.4-3 Terminals for separated input mains

X1 Mains 1

Rectifier input mains connection

- L1-1** = Rectifier Phase L1
- L2-1** = Rectifier Phase L2
- L3-1** = Rectifier Phase L3
- N1** = Mains Neutral
- PE** = Main Ground

X2 Mains 2

Bypass input mains connection

- L1-2** = Bypass Phase L1
- L2-2** = Bypass Phase L2
- L3-2** = Bypass Phase L3
- N** = Mains Neutral

Main ground (PE) cables must be connected to bus-bar with **M8** bolts.

X3 Load - Output load connection

- L1** = Load Phase L1
- L2** = Load Phase L2
- L3** = Load Phase L3
- N2** = Load Neutral
- PE** = Load Ground



NOTE !

Input/output terminals must be tightened with a proper screwdriver applying torsion force:
10 Nm for LP 33 Series / 100 - 120kVA

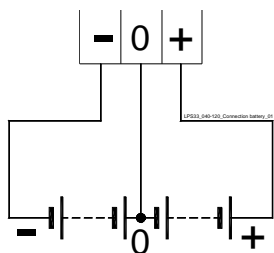


Fig. 4.8.4-4 External battery connection

X4 Battery - External battery connection

- = Negative pole of the battery
- 0** = Central point of battery blocks
- +** = Positive pole of the battery
- PE** = Battery cabinet ground



WARNING !

Before closing the "external battery fuses", verify for correct polarity of the battery connection.



NOTE !

To meet standards concerning electromagnetic compliance, the connection between the UPS and external *Battery* must be done by using a shielded cable or suitable shielded (metal) conduit!

This UPS is only designed to operate in a wye-configured electrical system with a solidly grounded neutral.

If the UPS is equipped with an input transformer, the secondary of the transformer must be wye-configured with neutral solidly grounded.

4.8.5 RPA system - Control bus connection



WARNING !

This operation must be performed by trained personnel before the initial start-up (ensure that the UPS installation is completely powered down).

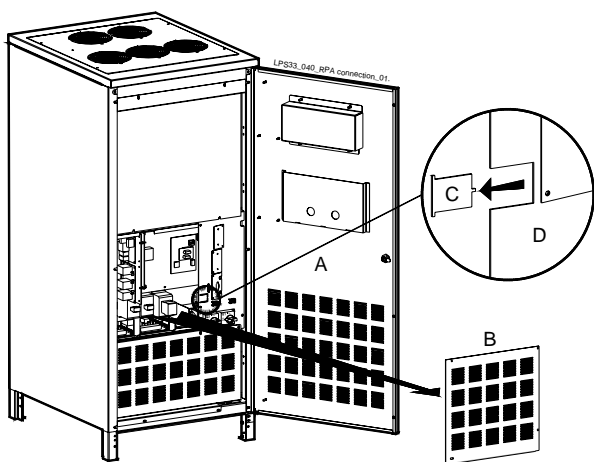


Fig. 4.8.5-1 LP 33 Series / 40 kVA - Access to the RPA board

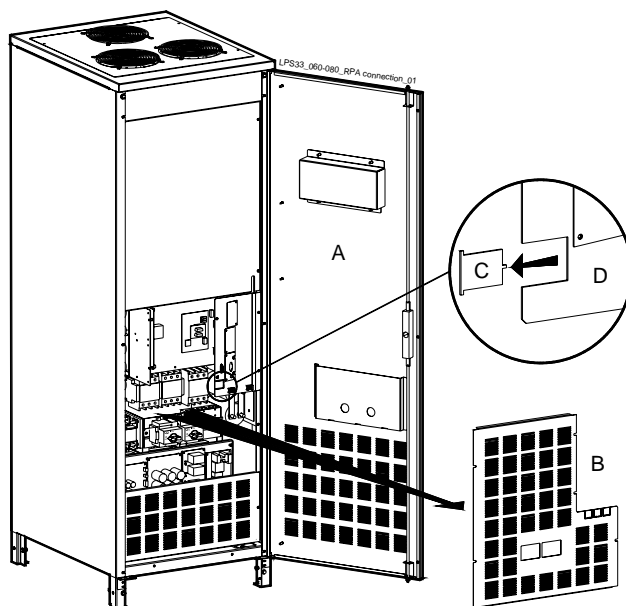


Fig. 4.8.5-2 LP 33 Series / 60 - 80 kVA - Access to the RPA board

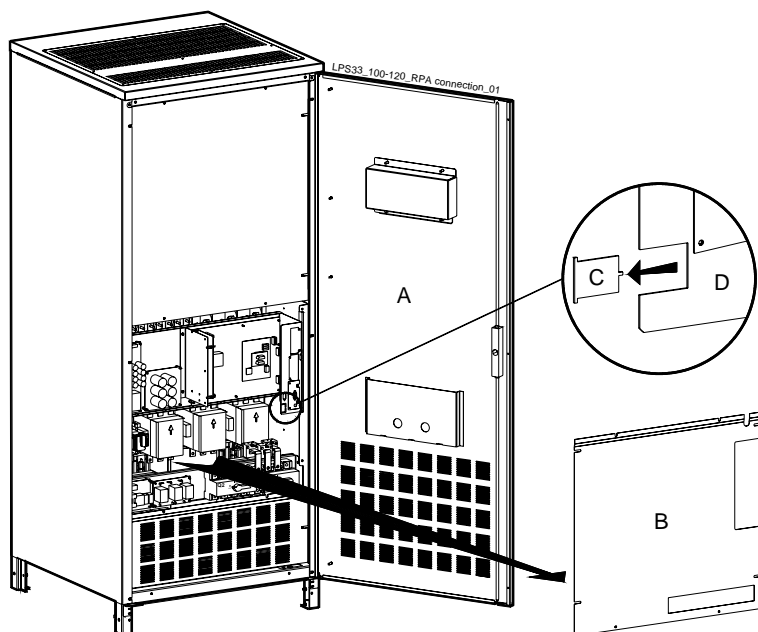


Fig. 4.8.5-3 LP 33 Series / 100 - 120 kVA - Access to the RPA board

Access to the RPA board

- 1 - Open the front door "A" of the UPS cabinet.
- 2 - Remove the front panel "B".
- 3 - Remove with appropriate tool the metallic window "C" from the metal screen "D".



NOTE !

Put in place the front panel "B" paying attention to not damaging the control bus cables.

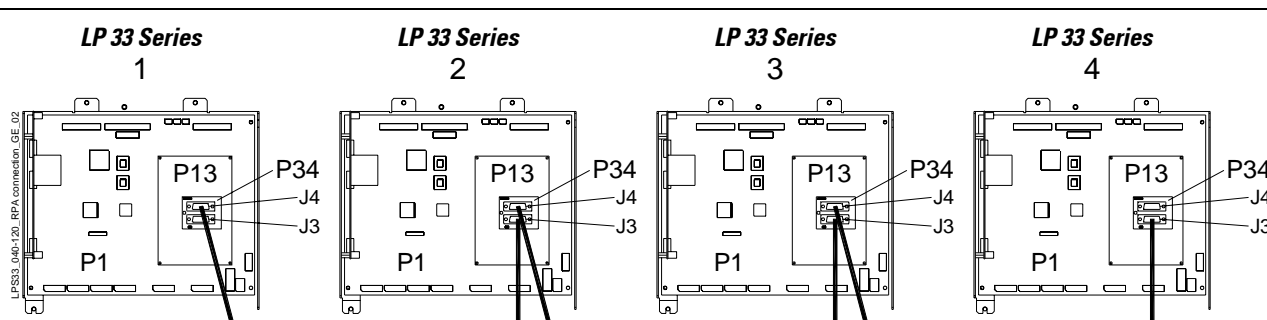


Fig. 4.8.5-4 Bus connection RPA parallel system

Bus connection RPA parallel system

Connect the control bus cable between the parallel units as indicated in the diagram Fig. 4.8.5-4.



NOTE !

Provide that the connectors *J3* and *J4* are properly fixed with the included screws.

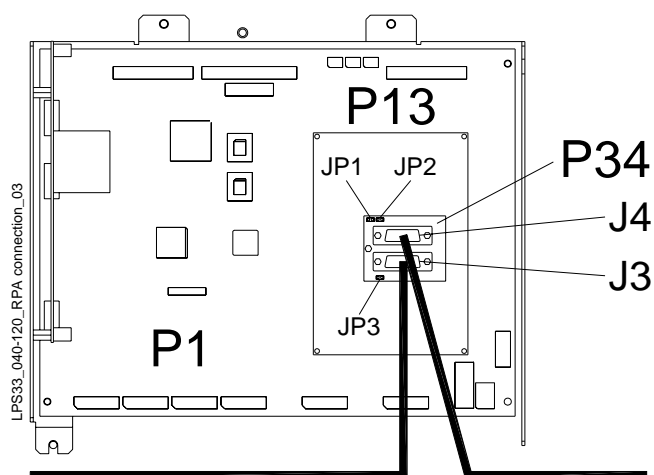


Fig. 4.8.5-5 Connection to board "P34 - Connector adapter RPA"



NOTE !

The jumper *JP1 - JP2 - JP3* must be removed only on the intermediate units, where the connectors *J3* and *J4* are both inserted.

Do not insert or remove *J3* and *J4* from the board "P34 - Connector adapter RPA" when the parallel system is operating.



NOTE !

Connection and commissioning of an additional UPS to an existing parallel system, must be performed by a service engineer from of your *Service Centre*.

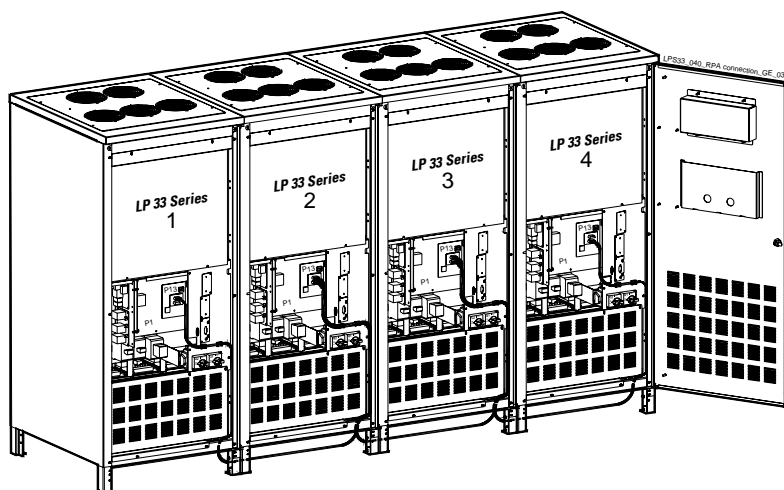


Fig. 4.8.5-6 LP 33 Series / 40 kVA - Control bus location RPA parallel system

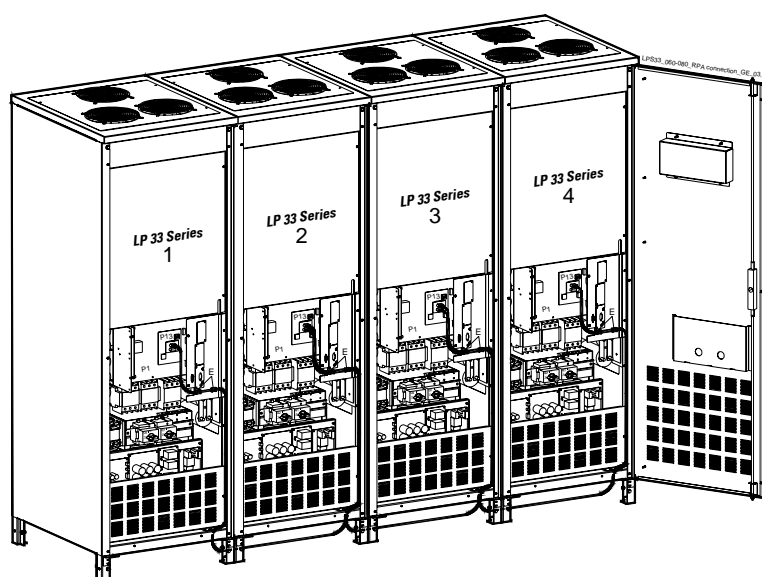


Fig. 4.8.5-7 LP 33 Series / 60 - 80 kVA - Control bus location RPA parallel system

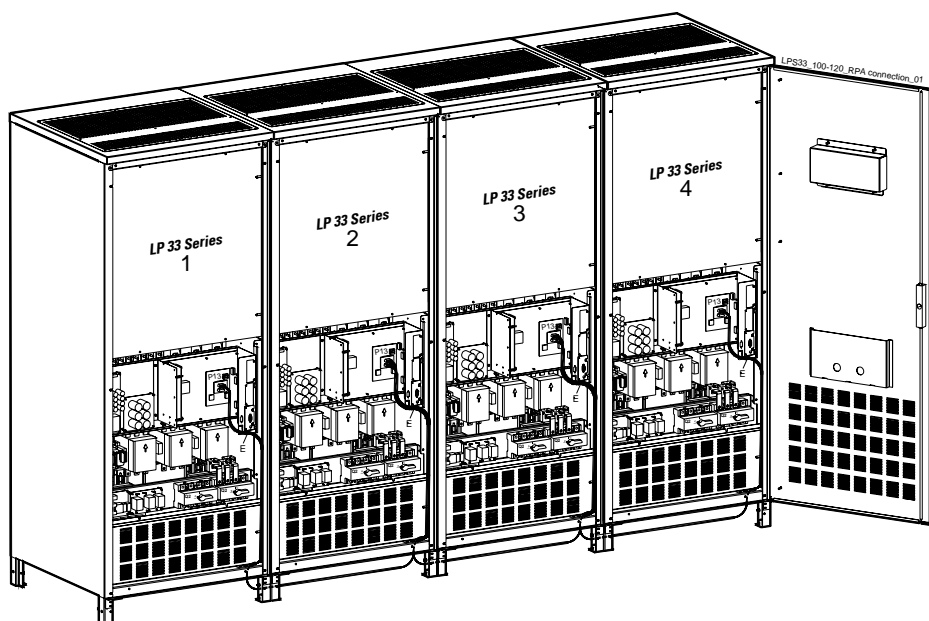


Fig. 4.8.5-8 LP 33 Series / 100 - 120 kVA - Control bus location RPA parallel system

Control bus location RPA parallel system

Place the cables and connect them as indicated in the diagram Fig. 4.8.5-6/7/8 following these procedures:

- Fix the *control bus cables* with the appropriate tie-wrap "E".
- Place the cables between the parallel units in separated protected conduit to avoid they could be accidentally interrupted.

It is important to place the units in sequence of their assigned number.

A unit number from **P1** to **P4** is displayed on the **control panel**.

This number is also marked inside and outside the packaging.

The standard length of the control bus cable between two parallel unit is **8 m / 26 ft.**

4.9 UPS FUNCTIONING AS FREQUENCY CONVERTER

When the UPS **LP 33 Series** is delivered as frequency converter (different output frequency with respect to the input frequency), **the automatic bypass and manual bypass functions are disabled**.

Therefore the *load* cannot be transferred to mains in case of overload, short circuit, or inverter failure.

In cases where the UPS needs to be powered down for maintenance purposes, the critical load must also be powered down during this time.

When the set-up parameters of the UPS are set for *frequency converter*, the **ECO Mode** operation is automatically disabled.

The UPS delivered as *frequency converter* has the following differences:

- *Automatic bypass disabled* by setting of dedicated parameter (access protected by password reserved to service engineer).
- The handle of the switch *Q2 - manual bypass* is removed to avoid accidental wrong manipulations.
- *Mains bypass* disabled by removing the fuse *F3* fitted on the board *P2 - Power Supply*.



WARNING !

In case a UPS delivered as frequency converter should be set on site for UPS standard version, the operation must be performed by a qualified service engineer.

Notices for installation:

- For UPS with *common AC input* follows the standard procedure described in *Section 4.8.1*.

Notices for start up procedures:

- Follow the standard procedure indicated in *Section 8.1*.

Notices for shutdown procedures:

- Follow the standard procedure indicated in *Section 8.1*.



NOTE !

The inverter can be turned off only by pressing the push-button *total off*.

5 LAYOUT

5.1 LAYOUT LP 33 Series / 40 kVA

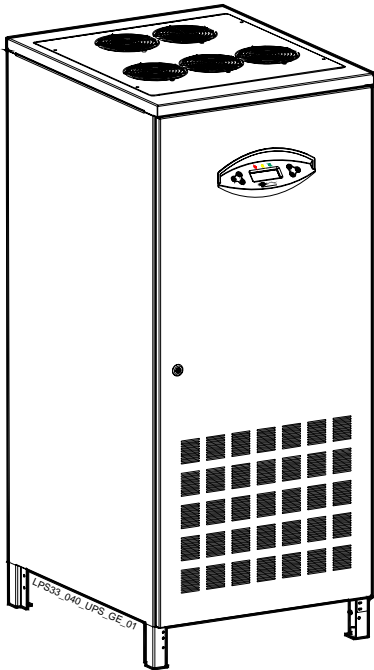


Fig. 5.1-1 General view

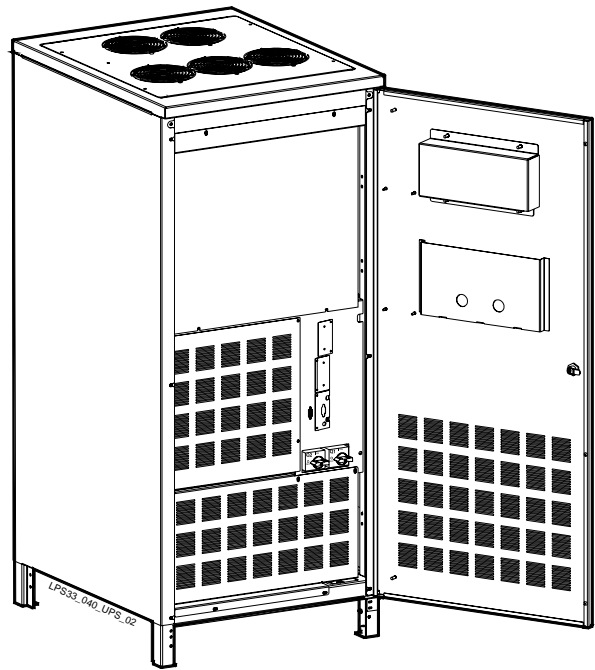


Fig. 5.1-2 General view with open door

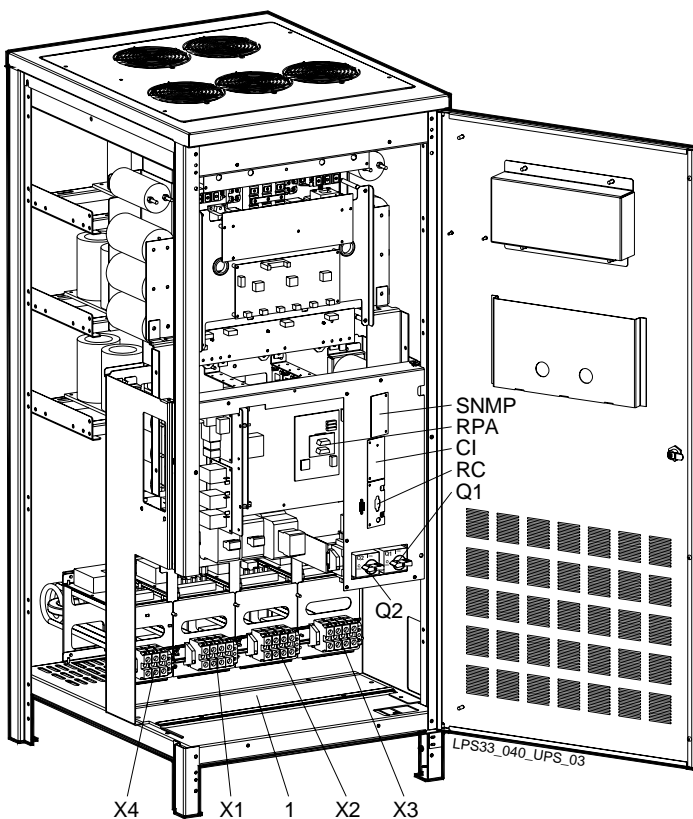


Fig. 5.1-3 General view without protection panels

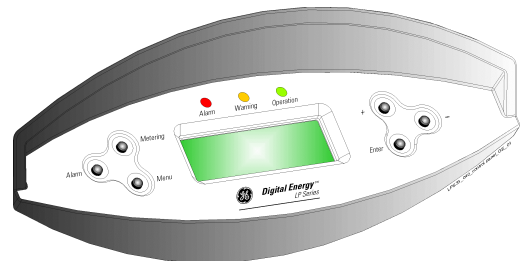


Fig. 5.1-4 Control panel

- 1** Opening for input and output of cables
- CI** Customer Interface Board (optional)
- Q1** UPS output switch
- Q2** Manual bypass switch
- RC** Relay card
- RPA** RPA board (optional)
- SNMP** Advanced SNMP Card (optional)
- X1** Terminals for common mains input connection (rectifier + bypass)
- X2** Terminals for separate mains input connection (optional)
- X3** Terminals for load output connection
- X4** Terminals for external battery connection

5.2 LAYOUT LP 33 Series / 60 - 80 kVA

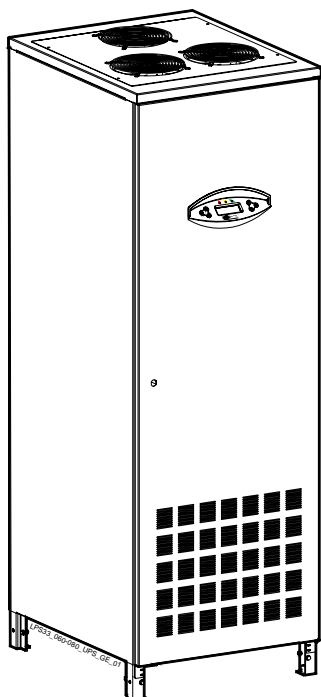


Fig. 5.2-1 General view

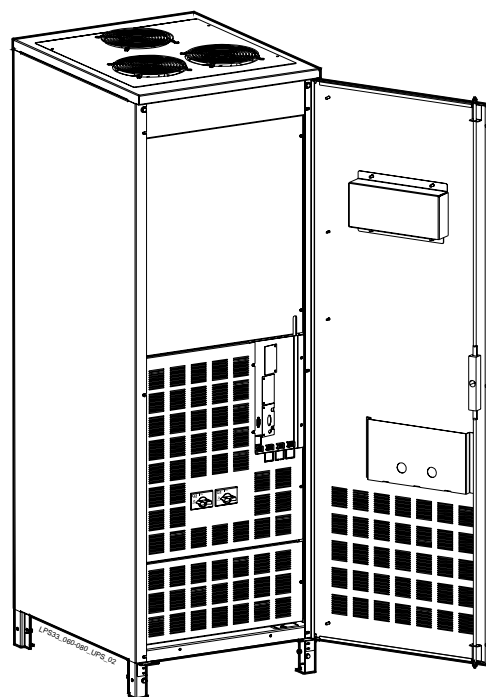


Fig. 5.2-2 General view with open door

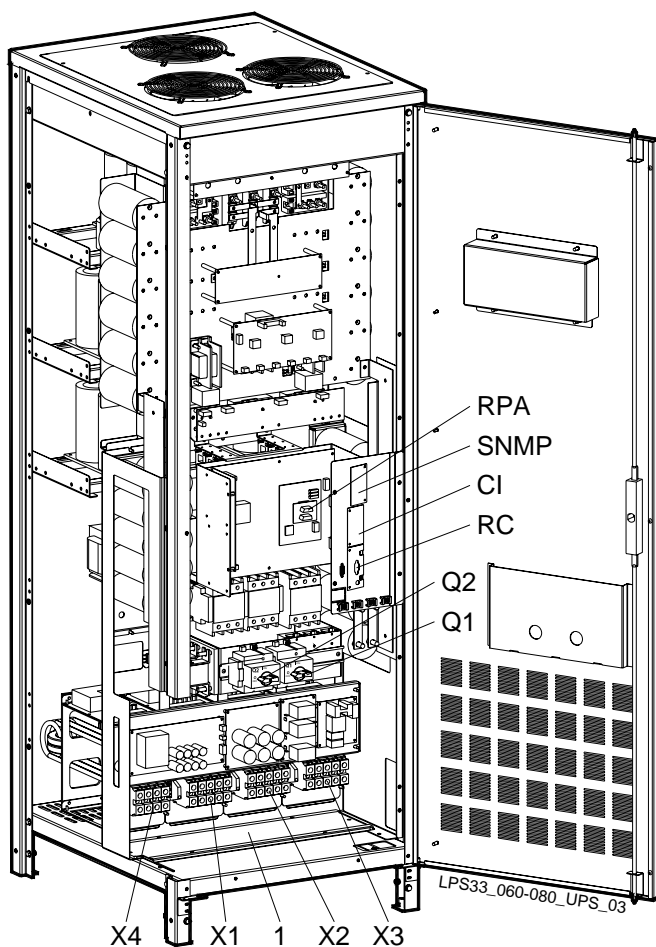


Fig. 5.2-3 General view without protection panels

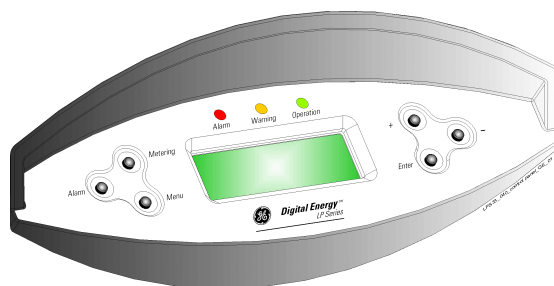


Fig. 5.2-4 Control panel

- 1 Opening for input and output of cables
- CI Customer Interface Board (optional)
- Q1 UPS output switch
- Q2 Manual bypass switch
- RC Relay card
- RPA RPA board (optional)
- SNMP Advanced SNMP Card (optional)
- X1 Terminals for common mains input connection (rectifier + bypass)
- X2 Terminals for separate mains input connection (optional)
- X3 Terminals for load output connection
- X4 Terminals for external battery connection

5.3 LAYOUT LP 33 Series / 100 - 120 kVA

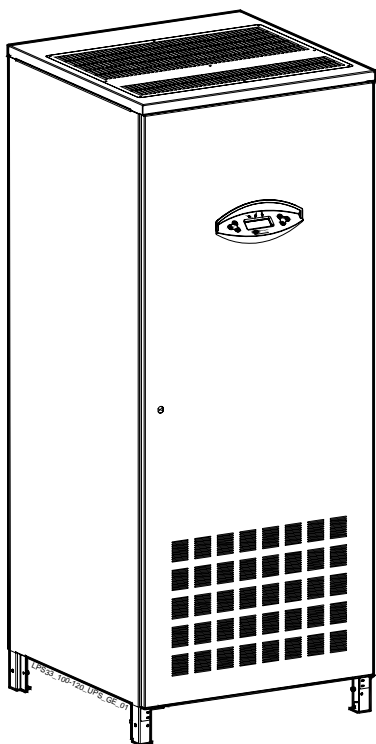


Fig. 5.3-1 General view

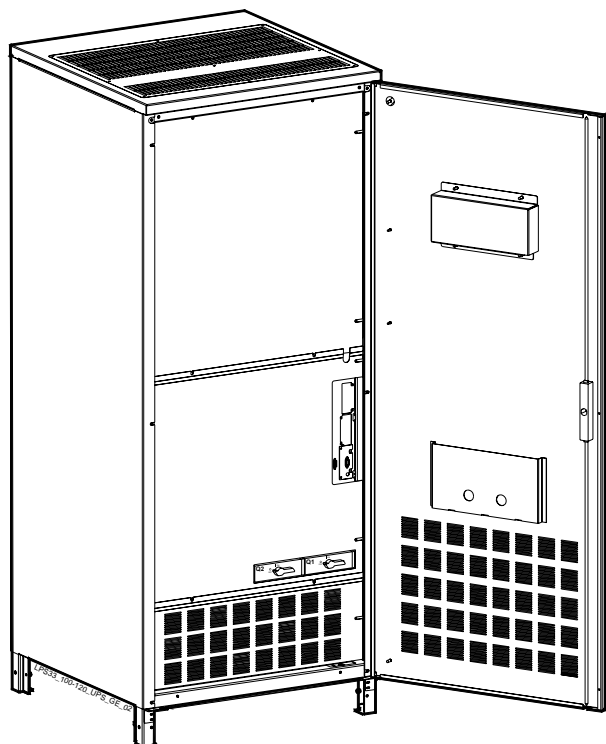


Fig. 5.3-2 General view with open door

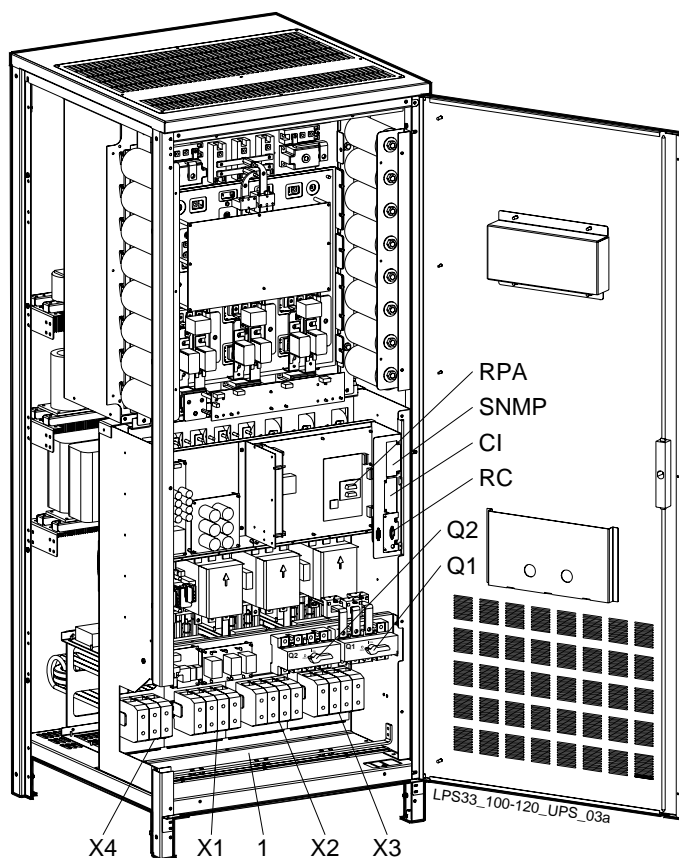


Fig. 5.3-3 General view without protection panels

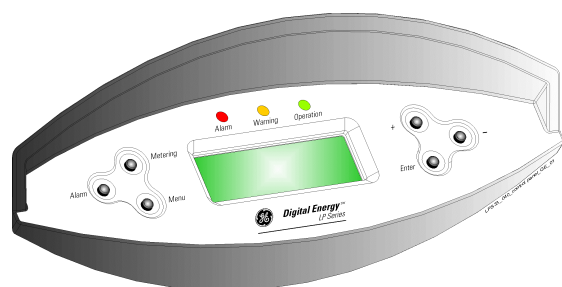
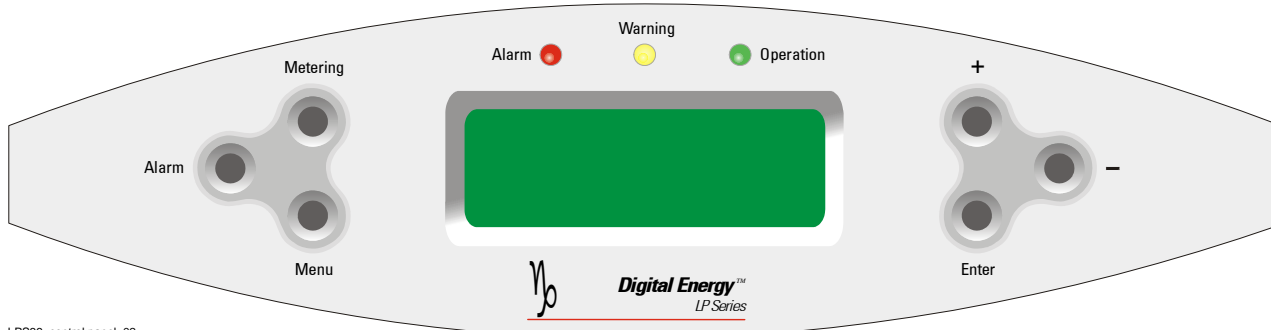


Fig. 5.3-4 Control panel

- 1** Opening for input and output of cables
- CI** Customer Interface Board (optional)
- Q1** UPS output switch
- Q2** Manual bypass switch
- RC** Relay card
- RPA** RPA board (optional)
- SNMP** Advanced SNMP Card (optional)
- X1** Terminals for common mains input connection (rectifier + bypass)
- X2** Terminals for separate mains input connection (optional)
- X3** Terminals for load output connection
- X4** Terminals for external battery connection

6 SYSTEM HANDLING

6.1 CONTROL PANEL



LPS33_control panel_02

Fig. 6.1-1 Control panel

- LCD screen** Shows the UPS system data, events messages and UPS setting. The data is displayed on 4 rows, 20 characters each, allowing the operator to select between 7 languages: *English, German, French, Spanish, Italian, Finnish or Polish*. If there is no keypad activity during 1 minute the LCD screen will return to default screen.
- Metering** Shows electric parameters, operating statistics and some information screens (see Section 7.1).
- Alarm** Shows in chronological order, all the events occurred (alarms, messages, commands, handling, etc.) and resets general alarm / buzzer (see Section 7.2).
- Menu** Allows the user to adapt certain features of the UPS to his needs, to reset the command *total off*, to test the *LEDs panel*, and to command the *inverter ON/OFF* (see Section 7.3).
- +** Scroll to following screen. Entering in *PARAMETER MENU/USER*, allows to select the horizontal editable position.
- Entering in *Alarm* and *Metering*, scroll to previous screen. Entering in *menu* allows to select the row including the needed command.
- Enter** Confirms the selected command. Entering in *PARAMETER MENU/USER* allows the user to change the parameters.
- LED Alarm (red)** It warns about the imminent inverter stop and the consequent load shutdown as result of:
- the *battery* is fully discharged and the *load* cannot be transferred on *mains* (default parameter = 3 min.).
 - overtemperature (default = 3 min.) or overload condition (125%-10 min, 150%-1 min.) and the *load* cannot be transferred on *mains*.
- LED Warning (yellow)** When blinking, it means the UPS is in alert condition with the buzzer sounding. The *yellow LED* will remain lit after pressing the key *Alarm*. It remains lit also when the output switch Q1 is open or battery disconnected.
- LED Operation (green)** When lit, it means the UPS is correctly operating and the *load* is powered by the *inverter*. When blinking, it means *SERVICE REQUIRED*

6.2 COMMAND PUSH BUTTONS AND SWITCHES

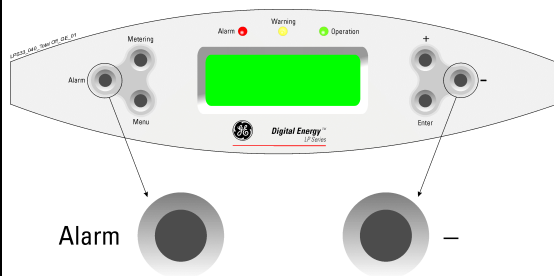


Fig. 6.2-1 Command total off

total off

Press simultaneously the keys "**Alarm**" and "-" on the control panel.

This will cause the opening of all *contactors* (K4, K6 and K7), shutdown of *booster*, *Inverter*, *battery-charger* and *SSM*.

RPA

Redundant Parallel Architecture

In a parallel system pressing **total off** on one unit all the units will shut down.



NOTE !

Using the command *total off*, the *load* will be immediately powered down.

To restart the unit, command **total off** must be restored entering the screen

MENU/RESET TOTAL OFF

LAMP TEST
RESET TOTAL OFF *

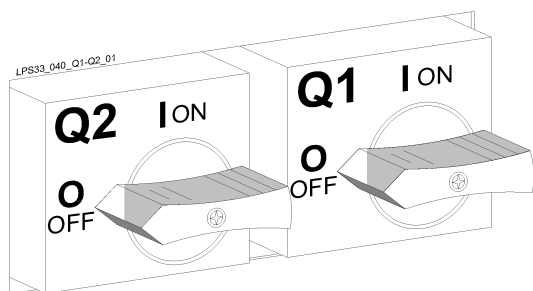


Fig. 6.2-2 Q1 and Q2 switches

Q1 - UPS output switch

Q2 - Manual bypass switch



NOTE !

Do not switch ON Q1 and Q2 with *Inverter ON*.



NOTE !

Mains failure of long duration or low Battery voltage will cause the automatic shutdown of the UPS, thus preventing damage to the Battery.

7 LCD SCREEN

Shows the UPS system data, events messages and UPS setting.

The data is displayed on 4 rows, 20 characters each, allowing the operator to select between 7 languages: **English, German, French, Spanish, Italian, Finnish and Polish.**

If there is no keypad activity during 1 minute the LCD screen will return to default screen.

7.1 METERING SCREENS (*Metering*)

This menu allows, when the keypad *Metering* is pressed, to show on the LCD panel a series of screens containing metering information about AC and DC parameters.

LP 33 60kVA P1
APPLICATION ON UPS
= 53%
SERVICE REQUIRED

1. UPS family, nominal rating and for RPA: P + No. UPS.
2. Load status: application on UPS, on utility, supply off, manual bypass (appl. on manual dev.) and *ECO Mode*.
3. The load amount as a percentage of the nominal load (referred to the most loaded phase).

4. The signalling, combined with the green *LED Operation* blinking, is done only in case the respective parameter (protected by password) has been enabled. See *Section 11.4*.

Udcp=400V Udcn=400V
Ubp=273V Ubn=273V O
Charge Level = 100%
Autonomy = 9min

1. Booster DC voltage + pole (*Udcp*) and – pole (*Udcn*).
2. Battery DC voltage + pole (*Ubp*), – pole (*Ubn*) and the status *SBM* (Superior Battery Management).

The functionality of *SBM* can help to reduce the Battery recharging time, and improve the lifetime of the Battery.

Beside the indication of the Battery voltage on the display, a letter shows, according to the table below, the operational status of *SBM*:

Sigle	Status of charger	Charger voltage	Description
O	OFF	240 VDC	Battery open circuit voltage
T	ON	Boost (294 VDC)	Boost charge with new Battery
F	ON	Floating (273 VDC)	Battery charged
L	ON	Floating (273 VDC)	Normal charge
B	ON	Boost (294 VDC)	Boost charge
E	ON	Boost (294 VDC)	Battery equalization

Access to the Parameters for setting the *SBM* mode is password protected.
Please call your *Service Centre*.

3. Battery charge level.
4. Estimated battery backup time with actual load.

MAINS
f=50.0Hz
U1=228V U2=230V
U3=229V

1. Mains input voltage information screen.
2. Mains input frequency.
3. Mains line voltage L1 and L2 phases.
4. Mains line voltage L3 phase.

RECTIFIER
f=50.0Hz
U1=228V U2=230V
U3=229V

1. Rectifier input voltage information screen.
2. Mains input frequency.
3. Input line voltage L1 and L2 phases.
4. Input line voltage L3 phase.

INVERTER: U1=230V
U2=230V U3=230V
Frequency = 50.0Hz
Synchronized

1. Inverter voltage information screen.
2. Output inverter line voltage L1, L2 and L3 phases
3. Output frequency.
4. Synchronisation status inverter with respect to mains.

LOAD ON PHASE
U1=230V I1=44A 51%
U2=230V I2=46A 53%
U3=230V I3=43A 50%

1. Load on output phases information screen.
2. Voltage, current and load percentage phase L1.
3. Voltage, current and load percentage phase L2.
4. Voltage, current and load percentage phase L3.

MISCELLANEOUS
Battery Temp. = +25°C
UPS Oper Time= 450h
INV Oper Time= 430h

1. Screen informing about the battery and time of operation.
2. Battery temperature.
3. Operating time (CPU powered) for the UPS (hours).
4. Operating time with inverter supplying the load (hours).

MAINS FAULTS STAT.
Minor = 100
Major = 150
Overloads = 30

1. Screen informing about the quality of the input power.
2. The quantity of bypass mains out of tolerance faults.
3. The quantity of rectifier mains out of tolerance faults.
4. The total number of detected output overloads.

IDENTIFICATION
LP 33 60kVA P1
SW Version: x.x
S/N: L0060-0105-0001

1. Screen containing the data identifying the unit.
2. UPS family, nominal rating and for RPA: P + no. UPS.
3. The software version implemented on the control board.
4. The serial number of the unit.

ECO MODE RATE 100%
NR FAST TRANSIENT
<2ms >2ms >5ms >10ms
25 10 7 3

1. Screen containing the statistic evaluation in % (100= good; 0= bad) of the utility, for the *ECO Mode* operation.
4. The number of fast transients occurred on the bypass utility on the last seven days.

7.2 EVENT SCREENS (Alarm)

Each of the following listed **alarms** or **messages** can be displayed on the LCD screen or transmitted to a PC through the serial port *RS232* or the *SNMP card* (optional).

Entering the **Alarm** mode, the *LCD screen* displays a sequence of screens corresponding to the last 256 alarms & events, each screen indicating:

01.01.2005 12:15:45
NR=255 Status=A588
4580: INVERTER AND
MAINS SYNCHRONIZED

1. The exact date and time when the event occurred.
2. The number (255 being the most recent) and status code.
3. The software version implemented on control board and explicit text description of the event.

7.2.1 Alarms list

Are defined **alarms**: all the events which activate the *LED Warning* (yellow) and the *buzzer* in order to alert the user about an abnormal situation.

Code	Alarm	Meaning
4000	SETUP VALUES LOST	Parameters are lost and have been replaced with default values.
4001	REGULATION BOARD FAILURE	Voltage supply +/-15 VDC has been detected out of tolerance on the P1 – Control board or the programmable circuits are defective.
4004	UPS FAILURE	The master unit detected the slave unit missing on the communication bus even though switch Q1 is still closed.
4100	RECTIFIER FUSES FAILURE	The trip indicator mounted on rectifier input fuses indicates a blown fuse. The rectifier is turned Off (K4 open) and the load will be supplied by the battery.
4102	K4 CLOSING FAILURE	K4 not closed despite a closing command being done. The rectifier is switched OFF.
4103	K4 OPENING FAILURE	K4 not open despite an opening command being done. The rectifier is switched OFF.
4110	RECTIFIER MAINS OUT OF TOLERANCE	Rectifier input mains has been detected out of tolerance (voltage, frequency or phase).
4115	LOW BATTERY VOLTAGE	The battery has been discharged and reached "stop operation" time-out (default 3 minutes), the inverter will be shut down. It restarts automatically only when the battery has recovered energy to ensure min. a "stop operation" time to the actual load.
4116	HIGH BATTERY VOLTAGE	Dangerous high UDC-Voltage. Causes Inverter shutdown. Inverter restarts automatically after return to normal floating voltage.
4118	BATTERY FAULT	During battery test the DC voltage falls under the critical level. If the boost voltage has not been reached within 24 hours, then the charge voltage returns to floating voltage. Battery test is stopped.

Code	Alarm	Meaning
4130	TURN ON RECT. OR SHUTDOWN UPS	Rectifier and inverter are OFF. The DC power supply is discharging the battery slowly. Rectifier must be restarted or battery must be disconnected in order to avoid damages.
4140	RECTIFIER CONTROL FAILURE	Rectifier voltage hasn't reached the set value. Probably fault on regulation loop. The DC capacitors are not equally charged (more of 50 VDC of difference). The rectifier is switched OFF.
4301	INVERTER FUSES FAILURE	Inverter output fuses blown. Signalled by electronic detector. Inverter can be started manually after replacement of fuses.
4304	K7 CLOSING FAILURE	K7 not closed despite a closing command being done. Signalled by auxiliary contact. Load will be supplied by mains.
4305	K7 OPENING FAILURE	K7 not open despite an opening command being done. Signalled by auxiliary contact. Load will be supplied by mains.
4312	INV. VOLTAGE OUT OF TOLERANCE	Inverter output voltage is out of the tolerances defined in respective parameter ($\pm 10\%$). Inverter is switched OFF.
4320	ISMAX DETECTION	Detection of inverter bridge (Is) current limitation cause inverter OFF and automatic restart (message 320). After 3 times inverter switches OFF for persistent Is max detection in time. Inverter switch OFF, and it can be restarted manually.
4340	INVERTER CONTROL FAILURE	The slave oscillator is not synchronised with the master, thus causing the shutdown of it's inverter.
4347	OSCILLATOR FAILURE	Auto calibration of the Inverters freerun frequency was not possible. The oscillator frequency of this unit is out of tolerance.
4402	RECTIFIER CANNOT BE TURNED ON	The rectifier cannot be turned on because the DC link voltage has not reached the requested value.
4404	K6 CLOSING FAILURE	K6 not closed despite a closing command being done. Signalled by auxiliary contact. The load cannot be supplied by electronic bypass.
4405	K6 OPENING FAILURE	K6 not open despite an opening command being done. Signalled by auxiliary contact.
4410	BYPASS MAINS OUT OF TOLERANCE	The mains bypass voltage is out of the tolerances ($\pm 10\%$). K6 opens, synchronisation with mains is inhibited and transfer to mains is blocked.
4520	NO INVERTER POWER	The load supplied by utility is over 100%. The load remains blocked on utility as long as alarm overload is active.
4530	LOAD LOCKED ON MAINS	Load is locked on mains because 3 transfers on mains have been detected in a short time (default 30 seconds). Transfer will be free again after a time defined by respective parameter (default 30 seconds).

Code	Alarm	Meaning
4531	LOAD ON MAINS BY ERROR DETECTOR	Load is transferred to mains because the error detector detected a disturbance on the output voltage.
4563	EMERGENCY OFF ACTIVATED	Alarm after detection of an Emergency Off from an external safety device connected on Customer Interface. Consequently K4, K6 and K7 open and shut down inverter, booster and rectifier.
4570	OVERLOAD	The UPS-System is in an overload condition >125% on inverter, or >150% on mains. A sequence of "stop operation" starts. Time out depending on load quantity.
4571	OVERLOAD: LOAD ON MAINS	With mains bypass supply available and load >115%, the load is transferred on mains. Load will be transferred again automatically on inverter when load will be <100%.
4581	INVERTER AND MAINS NOT SYNCH.	The voltages of mains and inverter are not synchronised, which causes the opening of K6.
4697	BATTERY OVERTEMPERATURE	The battery temperature exceeds the value inserted in parameter. Disabled with parameter (service only).
4698	BATTERY POWER INSUFFICIENT	In case of utility failure, with the actual load, the autonomy time would result below "stop operation" time (default 3 minutes).
4700	DC LOW	Battery voltage is at the lowest limit. Shutdown of inverter until the battery voltage reaches the value in respective parameter.
4900	LOAD LOCKED ON INVERTER	The load is locked on Inverter following 3 load transfers within 30 seconds. After time out of the value in respective parameter (default 30 seconds), bypass will be free.
4955	OVERTEMPERATURE	An overtemperature condition has been detected on inverter. Elapsed "stop operation" time, inverter shutdown. With mains available, load is transferred on mains.
4998	LOAD OFF DUE TO EXTENDED OVERLOAD	Load Off after time-out of "stop operation" for overload on inverter or bypass (time depending on the % of overload).
4999	LOAD OFF DUE TO UBATT OR TEMP.	Load Off after time-out of "stop operation" with missing mains due to battery low voltage or overtemperature condition.

7.2.2 Messages list

Are defined **messages**: all the recorded events which are referred to the operation status coherent with the normal situation of the UPS.

Code	Message	Meaning
4111	RECTIFIER MAINS OK	Rectifier input mains is again within the admitted tolerance (voltage, frequency and phase).
4114	UPS SHUTDOWN (LOW BATT VOLTAGE)	The UPS is in Load OFF status, resulting in Battery supply for the power supply. Should the Battery voltage decrease to a value below of the one set in a parameter, then power supply will shutdown to avoid damage to the Battery.
4119	BATTERY TEST STARTED	Start of manual or automatic battery test. Rectifier output voltage is decreased to the value defined by respective parameter.
4120	BATTERY TEST STOPPED	End battery test. End of manual or automatic battery test. Rectifier output voltage is restored to floating voltage.
4141	ISMAX DETECTION BOOSTER	Detection of persistent booster (Is) current limitation.
4161	RECTIFIER ON	Rectifier received the command to switch ON.
4162	RECTIFIER OFF	Rectifier received the command to switch OFF for: input mains out of tolerance / EPO / UDC max.
4163	GENERATOR ON	Customer Interface (X1 / 11, 22) received a Gen set ON signalling. Operating mode dependent on setting of respective parameters.
4164	GENERATOR OFF	Customer Interface (X1 / 11, 22) received a Gen set OFF signalling. Function bypass enabled dependent on setting of respective parameter.
4302	INVERTER CANNOT BE TURNED ON	Inverter cannot be switched on because one of the following conditions are still present: <ul style="list-style-type: none"> - Overtemperature; - Low battery voltage; - Inverter fuses; - Overload; - K7 opening failure; - High battery voltage; - DC low; - EPO (Emergency Power Off).
4303	INVERTER CANNOT BE TURNED OFF	Inverter cannot be switched OFF, because the load cannot be transferred on mains (voltage out of tolerance, not synchronising, bypass blocked).
4361	INVERTER ON	The command to start the inverter has been activated on the control panel.
4362	INVERTER OFF	The command to switch OFF the inverter has been done by the control panel or automatically for alarm detection.

Code	Message	Meaning
4411	BYPASS MAINS OK	Bypass input mains is again within the admitted tolerance (voltage, frequency and phase).
4500	COMMAND LOAD OFF	Disconnection of the load by opening K4, K6 and K7 for: EPO / Total Off / Overload / Stop operation.
4521	NO BYPASS POWER	With the load supplied by electronic bypass, a mains failure or K6 opening occurred.
4534	MULTIPLE LOAD TRANSFER	2 transfers inverter-mains have been detected in a short time, defined by respective parameter (default 30 seconds).
4535	BYPASS LOCKED	Transfer on mains not enabled due to settings of respective parameters. Contactor K6 is open.
4536	BYPASS FREE	Settings of respective parameters enable bypass transfer on mains. Contactor K6 can be closed.
4561	TOTAL OFF	Push-button Total Off behind the front door has been pressed, with the output circuit breaker Q1 closed.
4562	DETOUR ON	The auxiliary contact indicates that manual bypass Q2 has been closed.
4564	DETOUR OFF	The auxiliary contact indicates that manual bypass Q2 has been opened.
4567	COMMAND LOAD ON MAINS	The control unit received a command to transfer the load on mains.
4568	COMMAND LOAD ON INVERTER	The control unit received a command to transfer the load on inverter.
4572	NO MORE OVERLOAD	End of the overload condition previously detected with alarm 4570.
4580	INVERTER AND MAINS SYNCHRONIZED	The voltages of inverter and mains bypass are synchronised.
4582	COMMAND NOT TO SYNCHRONIZE	Command not to synchronise with mains has been done for: mains bypass out of tolerance (4410) or setting respective parameters.
4583	COMMAND TO SYNCHRONIZE	Command to synchronise with mains has been done for: mains BP OK (4410) or setting respective parameters.
4600	COMMAND UPS ON	The <i>ECO Mode</i> function has been disabled or the programmed time is expired. The UPS returns to <i>VFI Mode</i> supplying the load normally by inverter.
4601	COMMAND UPS STAND BY	The function <i>ECO Mode</i> is enabled, and according to the time program the UPS will run in <i>ECO Mode</i> , supplying the load normally by mains.
4602	Q1 OPEN	The auxiliary contact indicates that the output switch Q1 has been opened.
4603	Q1 CLOSED	The auxiliary contact indicates that the output switch Q1 has been closed.
4699	BATTERY TEST IMPOSSIBLE	Not possible to start battery test (it is postponed) for: - No mains rectifier or bypass; - Battery not fully charged; - Load is below 10% or above 80%.

Code	Message	Meaning
4763	REMOTE CONTROL ON	Inverter can be started or shutdown by remote control. Commands source can be chosen depending on the value of respective parameter (password required): 0 = Only local panel. 1 = Only serial port on CI (TLC). 2 = Both.
4764	REMOTE CONTROL OFF	Inverter can be started or shutdown by remote control. Commands source can be chosen depending on the value of respective parameter (password required): 0 = Only local panel. 1 = Only serial port on CI (TLC). 2 = Both.

7.2.3 Event report LP 33 Series

In case of failure or malfunction, before calling the nearest **Service Centre** please note the most important identification data of your UPS and the most recent events displayed.

In order to make the diagnosis easier for our **Diagnostic Centre** we suggest you make a copy of this page, fill it in with the requested data, and send it by fax.

LP 33 Series

User:

.....

.....

.....

LP 33 Series / kVA

UPS No.: - - Series:

Responsible:

Date: / / Signature:

Event No.	Code	Status	Date	Hour
255				
254				
253				
252				
251				
250				
249				
248				
247				
246				
245				
244				
243				
242				
241				
240				
239				
238				
237				
236				
235				
234				
233				
232				
231				
230				

Description of repair action taken:

.....

.....

.....

.....

.....

Actual situation:

.....

.....

.....

.....

.....

Remarks:

.....

.....

.....

.....

.....

7.3 MENU SCREENS (Menu)

Pressing the *menu* keypad a series of screens will be displayed, permitting the user to set some functions of the UPS, to restore the command **total off**, to perform the **LEDs TEST**, and to switch the **inverter ON/OFF**.

LP 33 60kVA P1
UPS ON

1. UPS family, nominal rating and for RPA: P + No. UPS.
2. The operating mode of the UPS (UPS ON/OFF).

COMMAND MENU
INVERTER ON *
INVERTER OFF

1. Screen inverter command.
2. Inverter ON.
3. Inverter OFF.
(The visualisation of *, indicates the Inverter status).

LAMP TEST
RESET TOTAL OFF *

1. Signalling LEDs test and buzzer test.
2. Restore the output supply following the command *total off* (the asterisk * beside the text means that the command *total off* has been activated with Q1 closed).

PARAMETER MENU

LEVEL 1: USER
LEVEL 2: SERVICE

1. Screen parameters set-up for user and service.
3. Level 1: this first level not protected by password allows the user to modify some parameters of the UPS (see Section 7.3.1).
4. Level 2: access protected by password reserved for service engineers.

ALARMS
UPS FAILURE
CALL SERVICE

1. Screen indicating the presence of alarm condition and the consequent operation mode.
2. UPS status: UPS shutdown due to UPS FAILURE (fuse blown) or abnormal conditions for UPS (OVERTEMPERATURE or MAINS FAILURE).
3. Action needed following the alarm condition CALL SERVICE or output statement which can be APPLIC.
ON UTILITY if the output is powered by mains or
APPLIC. PROTECTED when the load is normally powered by the inverter.

7.3.1 User parameters screen

This screen allows the user to modify some parameters permitting to adapt some functions of the UPS to his/her needs, described as follows.

This screen can be accessed by entering *MENU/PARAMETER MENU/LEVEL 1: USER* and confirming with the key **Enter**.

PARAMETER MENU

LEVEL 1: USER
LEVEL 2: SERVICE

In **PARAMETER MENU** the buttons **+** **/** **-** **Enter** perform the following functions:

- +** This key allows to scroll forward to the next screen and, once the key **Enter** has been pressed, to move the horizontal selection to the next editable position.
- This key allows to move the selection to the next parameter and, once the key **Enter** has been pressed, to change the value of the selected character by the underscore cursor.
- Enter** Start the editing for the currently selected parameter.

1. Date and time set-up

DATE AND TIME

D M Y

Date: 01.01.2005

Hour: 12:15:45

1. Date and time setup.
2. **D** = Day **M** = Month **Y** = Year.
3. Date set-up: the set value is thoroughly checked to be a correct format "**dd.mm.yyyy**".
4. Time set-up: the set value is thoroughly checked to be a correct format "**hh.mm.ss**".
The time is specified in 24 hour format.

2. Modem protocol set-up

PROTOCOL SETUP

Modem enabled = N

Init=BEQV1X3&D0S0=2

Alarm=N Delay=30s

1. Modem protocol set-up.
2. **Y**: enables or **N**: disables the modem call.
3. **Init**: this parameter presents the modem initialisation string. It can be 39 characters long and considers that a blank character terminates the string.
If no blank character is found then all 39 characters are used
4. **Alarm**: **Y/N** controls the automatic events signalling through modem.
If this parameter is set to **Y** (yes) the UPS itself will call the remote location when a new event occurs.

Delay: This parameter controls the delay between the occurrence of a new event and the modem dialling.
It is useful because since the events typically do not occur isolated but in certain sequences, you can eliminate the need for multiple dial-outs for such a sequence of events.

3. Telephone numbers set-up

Tel1:	
Tel1 enabled:	N
Tel2:	
Tel2 enabled:	N

Tel1: This parameter specifies a first tel. number to be used for modem dial-out.
The telephone number has a maximum of 39 characters and cannot contain intermediate blank.
If the desired number is shorter than 39 characters, finish the string with blanks.

Tel1 enabled: this parameter Y/N specifies if the **first telephone number** will be used for dial-out.

Tel2: it records the second dial-out number.

Tel2 enabled: this parameter Y/N specifies if the **second telephone number** will be used for dial-out.

Tel3: it records the third dial-out number.

Tel3 enabled: this parameter Y/N specifies if the **third telephone number** will be used for dial-out.

Tel4: it records the fourth dial-out number.

Tel4 enabled: this parameter Y/N specifies if the **fourth telephone number** will be used for dial-out.


4. LCD Display

LCD Display
UPS NAME: LP 33
Language = ENGLISH

1. LCD display screen.
2. **UPS name:** the user can choice the name of the UPS model showed on the main page (11 digits).
4. **Language:** his parameter allows the choice of language used to display the information.
Valid choices are *English, German, French, Spanish, Italian, Finnish and Polish.*

5. Operation mode selection (VFI Mode or ECO Mode)

ECO MODE <u>Y</u>
d1 d2 d3 d4 d5 d6 d7
HOURS SELECTED
24 24 12 12 12 12 12

	NOTE ! The ECO Mode can only be activated on single units.
---	---

1. **ECO Mode**
This parameter (values **Y** / **N**) enables or disables the operation in *ECO Mode*.

If the value is **Y** and the current time is in the interval for the current day, the *ECO Mode* is active.

The activation / disactivation of *ECO Mode* is indicated each time in the event list.

In order to check the *inverter* function, at least **1 minute** of *VFI Mode* must be programmed during the week (the **Y** / **N** parameter is automatically disabled if this condition is not satisfied).

In case this minimum time in *VFI Mode* is not respected, the *ECO Mode* will be disabled.

If the value is **N**, the UPS is normally operating in **VFI / double conversion** mode at all times.

2. **d1 ÷ d7: Enabling time in function of weekdays.**

For the weekdays from **d1** to **d7** (*Saturday to Friday*) the edit mode (edit day) allows to define time intervals when the UPS is operating in *ECO Mode*.

The hour is given in 24-hour format.

These intervals are defined by:

ECO START: the hour of the day after which the *ECO Mode* is enabled.
The *ECO Mode* is enabled until the following *ECO STOP* time is reached (the *ECO STOP* time of the same day if this is later than the *ECO START* time, the *ECO STOP* time of the following day otherwise).

ECO STOP: the hour of the day before which the *ECO Mode* is enabled.

The *ECO Mode* is enabled starting from the preceding *ECO START* time (the *ECO START* time of the same day if this is earlier than the *ECO STOP* time, the *ECO START* time of the previous day otherwise).

Identical times for *ECO START* and *ECO STOP* maintain the existing mode only in case the previous command was *ECO START* and the following command will be *ECO STOP*.

3. **HOURS SELECTED:** The number of *ECO Mode* hours per weekday (from **d1** - *Saturday* to **d7** - *Friday*) is displayed in the operation mode parameter window (ceiling value).

To better understand the *ECO Mode* programming modes, some typical examples are shown:

Example 1: For continuous *ECO Mode* set the *ECO START* times to 00:00 and the *ECO STOP* times to 23:59 for all weekdays, but almost 1 day must have 1 minute of *VFI* programming: i.e **d2 - Sunday** 00:00 to 23:58).

Weekday	d1 - Saturday	d2 - Sunday	d3 - Monday	d4 - Tuesday	d5 - Wednesday	d6 - Thursday	d7 - Friday
ECO START	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ECO STOP	23:59	23:58	23:59	23:59	23:59	23:59	23:59

Example 2: *ECO STOP* before *ECO START*.

ECO START 18:00, *ECO STOP* 06:00 for weekday **d4 - Tuesday**.

Means that on **d4 - Tuesday** the *ECO Mode* is active between 00:00 and 06:00 and between 18:00 and 23:59.

Weekday	d1 - Saturday	d2 - Sunday	d3 - Monday	d4 - Tuesday	d5 - Wednesday	d6 - Thursday	d7 - Friday
ECO START	00:00	00:00	00:00	18:00	00:00	00:00	00:00
ECO STOP	23:59	23:59	23:59	06:00	23:59	23:59	23:59

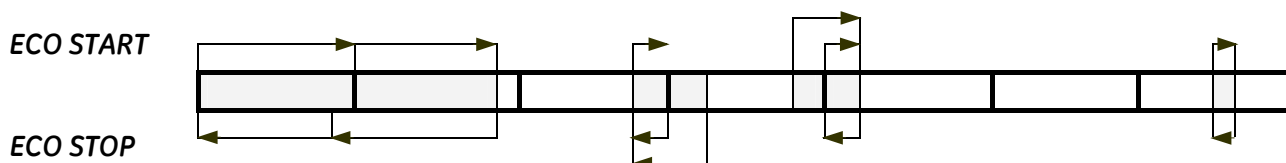
Example 3: *ECO Mode* during the night and week-end.

If the *ECO Mode* must be enabled all nights (**d3 - Monday ÷ d7 - Friday**) between 18:00 in the evening and 06:00 of the following morning and during all Saturday (**d1**) and Sunday (**d2**), the corresponding parameters are:

Weekday	d1 - Saturday	d2 - Sunday	d3 - Monday	d4 - Tuesday	d5 - Wednesday	d6 - Thursday	d7 - Friday
ECO START	00:00	00:00	18:00	18:00	18:00	18:00	18:00
ECO STOP	23:59	23:59	06:00	06:00	06:00	06:00	06:00

Example 4: If the *ECO Mode* must be enabled on *Monday (d3)* and *Tuesday (d4)* between 18:00 in the evening and 06:00 of the following morning, on *Friday (d7)* between 12:00 and 13:00, during all *Saturday (d1)* and on *Sunday (d2)* until 20:00, the corresponding parameters are.

Weekday	d1 - Saturday	d2 - Sunday	d3 - Monday	d4 - Tuesday	d5 - Wednesday	d6 - Thursday	d7 - Friday
ECO START	00:00	00:00	18:00	18:00	00:00	00:00	12:00
ECO STOP	23:59	20:00	23:59	06:00	06:00	00:00	13:00



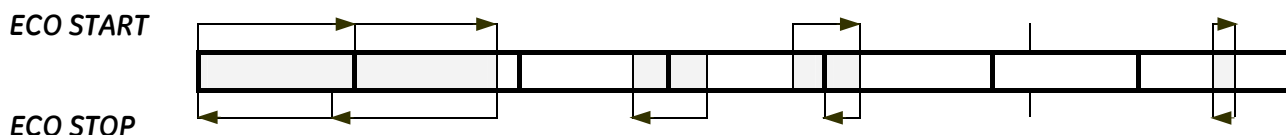
In dark colour are displayed the times with *ECO Mode* operation.

The arrows indicate the conditions given by the *ECO START* and *ECO STOP* times introduced with the parameters.

Note that on day **d6 - Tuesday** the interval has length 0 (zero), therefore the *ECO Mode* is not enabled on this day.

Example 5: An equivalent set of parameters for Example 4 is.

Weekday	d1 - Saturday	d2 - Sunday	d3 - Monday	d4 - Tuesday	d5 - Wednesday	d6 - Thursday	d7 - Friday
ECO START	00:00	00:00	18:00	18:00	06:00	09:00	12:00
ECO STOP	23:59	20:00	18:00	06:00	06:00	09:00	13:00



The *ECO Mode* is active from 18:00 of weekday **d3 - Monday** until 06:00 of weekday **d4 - Tuesday** (as indicated by the *ECO STOP* time of weekday **d4 - Tuesday**).

The *ECO STOP* time of weekday **d3 - Monday** has no effect as it is followed by the *ECO STOP* time of weekday **d4 - Tuesday**.

It can be, without change of meaning, any time between 18:00 and 23:59.

Similarly, the *ECO Mode* is active from 18:00 of weekday **d4 - Tuesday** until 06:00 of weekday **d5 - Wednesday**.

The *ECO START* time of weekday **d5 - Wednesday** has no effect as it is preceded by the *ECO START* time of weekday **d4 - Tuesday**.

It can be, without change of meaning, any time between 00:00 and 06:00.



To avoid undesired *ECO Mode* operation, verify:

- Date and Time (first page of parameter).
- *ECO Mode* screen how many hours of *ECO Mode* operation have been selected for each day of the week.



NOTE !

The *ECO Mode* becomes active only if the load is supplied from inverter.

8 OPERATION

8.1 PROCEDURES FOR SINGLE LP 33 Series

8.1.1 Start-up of the LP 33 Series

	<p>Before connecting hazardous voltages, make sure that:</p> <ul style="list-style-type: none">• The connection to the electrical system has been performed by qualified personnel;• The <i>equipment frame</i> has been correctly grounded to the <i>main earth</i>;• Make sure that <i>mains input</i> protection is removed;• All the <i>panels</i> removed to allow the UPS connection have been correctly reinstalled;• The UPS switches Q1 and Q2 are OFF (Pos. 0);• The <i>external battery fuses</i> are removed.
--	--

This procedure must be performed for the first start-up following the installation, with the UPS completely switched Off and not powered.

This procedure presupposes that the *load* is not yet supplied by the UPS system.

	<p>NOTE !</p> <p>The UPS can be started-up using the <i>battery supply</i> in case the <i>input mains</i> should be unavailable.</p> <p>To avoid an incidental <i>battery</i> discharge, it is recommended to proceed to the UPS start-up having the <i>input mains</i> available.</p>
--	---

1. **Switch ON the mains power at the input distribution panel.**

As a result the UPS performs a self-test and the *LCD* will show the following screen:

```
EXECUTING MAINBOARD
SELF TEST
000000000000
SELF TEST OK!
```

	<p>NOTE !</p> <p>In case the alarm "4410 - Mains bypass out of tolerance" persists, check the phases rotation of the input mains.</p>
--	--

2. **Insert the external battery fuses.**

Continue ►

3. **Switch On the output switch Q1 (Pos. II).**

The output will be supplied by the *mains* through the *bypass*.

LP 33 60kVA
APPLICAT. ON UTILITY
= 53%

Verify, selecting the screen *METERING/Udcp* and *Udcn*, that the booster voltage has reached about **400 VDC**.

Udcp=**400V** Udcn=**400V**
Ubp=273V Ubn=273V F
Charge level = 100%
Autonomy = 900min

4. **Switch On the inverter entering the screen:**

MENU/COMMAND MENU/INVERTER ON

COMMAND MENU
INVERTER ON *
INVERTER OFF

Some seconds later the *load* will be transferred on *inverter* and the main screen will display: **APPLICATION ON UPS**

LP 33 60kVA
APPLICATION ON UPS
= 53%

5. **Operation mode selection.**

LP 33 Series is delivered normally selected for permanent *VFI* operation.

ECO Mode can be enabled and the *ECO Mode START* time & *ECO Mode STOP* time can be programmed for each day of the week (see Section 7.3.1-5).

END OF PROCEDURE



NOTE !

Even if the UPS is delivered with the *battery* fully charged, they could be partially discharged during transportation or storage.

It is recommended to recharge the battery during a few hours in order to provide the complete *battery* energy stored to the load in the event of *mains failure*.

8.1.2 UPS shutdown with load transfer on manual bypass (Q2)

The purpose of this procedure is to supply the *load* directly by *mains* through **manual bypass Q2**.

This procedure is normally performed when the UPS must be completely switched OFF for maintenance or service purpose, performed by an authorised *Service Centre*.



NOTE !

This procedure must not be performed if the UPS is used as *frequency converter*.

1. Switch OFF the inverter by entering the screen:

MENU/COMMAND MENU/INVERTER OFF

Attention: to switch OFF permanently the *inverter* the key **Enter** must be pressed **2 times**.

COMMAND MENU
INVERTER ON
INVERTER OFF *

The output will be supplied by the mains through the *automatic bypass*.

LP 33 60kVA
APPLICAT. ON UTILITY
= 53%

2. Switch ON the maintenance bypass Q2 (Pos. I).

LP 33 60kVA
APPL. ON MANUAL DEV.
= 53%

3. Switch OFF the output switch Q1 (Pos. 0).

4. Perform the command total off press simultaneously the keys "Alarm" and "-" on the control panel.

5. Remove the external battery fuses.

Continue ►

6. **In order to discharge the DC link capacitors, start once more the inverter through the screen:**

MENU/COMMAND MENU/INVERTER ON

Remark: command *INVERTER ON* will be enabled only when the inverter voltage of each phase decreases below **7 VAC** (about 30 seconds).

Before proceeding to step **7**, check on the display panel that the *DC link voltage* (both polarities) *Udcp* and *Udcn* has reached the max. voltage of **5 VDC** (about 30 seconds).

COMMAND MENU
INVERTER ON *

INVERTER: U1= **7V**
U2= **7V** U3= **7V**
Frequency = 50.0Hz
Synchronized

Udcp= **5V** Udcn= **5V**
Ubp=0V Ubn=0V 0
Charge level = 0%
Autonomy = 0min

7. **Switch OFF the inverter by entering the screen:**

MENU/COMMAND MENU/INVERTER OFF

COMMAND MENU
INVERTER ON
INVERTER OFF *

The load is now powered directly by *mains* through the *manual bypass Q2*.

END OF PROCEDURE



WARNING !

The UPS cabinet contains parts electrically live.
Apart from the front door, do not open any other part of the UPS.



NOTE !

With separate mains inputs, it's possible to disconnect mains rectifier.

8.1.3 Start-up following the operation on manual bypass (Q2)

This procedure presupposes that the *load* is powered by the *manual bypass* switch:

- The *inverter* is switched OFF;
- The *manual bypass* switch Q2 is switched ON (pos. I);
- The output switch Q1 is switched OFF (Pos. 0);
- The *external battery* fuses are removed.



NOTE !

This procedure must not be used if the UPS is used as *frequency converter*.

1. **Insert the external battery fuses.**
2. **Switch ON the output switch Q1 (Pos. I).**
3. Only in case it has been previously activated (* present beside the text *RESET TOTAL OFF*), restore the command **total off** by entering the screen: **MENU/RESET TOTAL OFF**

LED TEST
RESET TOTAL OFF *

4. **Switch OFF the maintenance bypass Q2 (Pos. 0).**
Verify, selecting the screen *METERING/Udcp* and *Udcn*, that the *booster* voltage has reached about **400 VDC**.

Udcp=400V	Udcn=400V
Ubp=273V	Ubn=273V F
Charge level	= 100%
Autonomy	= 900min

5. **Switch ON the inverter by entering the screen:**
MENU/COMMAND MENU/INVERTER ON

COMMAND MENU
INVERTER ON *
INVERTER OFF

Some seconds later the *load* will be transferred on *inverter* and the main screen will display: **APPLICATION ON UPS**

LP 33 60kVA
APPLICATION ON UPS
= 53%

END OF PROCEDURE

8.1.4 Complete shutdown

As a result of this procedure the UPS is completely switched OFF and not powered.



NOTE !

This procedure involves all equipment powered by UPS, to be shut down.

1. Perform the command *total off* press simultaneously the keys "Alarm" and "-" on the control panel.
2. Switch OFF the output switch Q1 (Pos. 0).
3. Remove the external battery fuses.

4. In order to discharge the DC link capacitors, start once more the inverter through the screen:

MENU/COMMAND MENU/INVERTER ON

Remark: command *INVERTER ON* will be enabled only when the inverter voltage of each phase decreases below **7 VAC** (about 30 seconds).

Before proceeding to step 5, check on the display panel that the DC link voltage (both polarities) *Udcp* and *Udcn* has reached the max. voltage of **5 VDC** (about 30 seconds).

COMMAND MENU
INVERTER ON *
INVERTER OFF

INVERTER: U1= **7V**
U2= **7V** U3= **7V**
Frequency = 50.0Hz
Synchronized

Udcp= **5V** Udcn= **5V**
Ubp=0V Ubn=0V 0
Charge level = 0%
Autonomy = 0min

5. Switch OFF the inverter by entering the screen:

MENU/COMMAND MENU/INVERTER OFF

COMMAND MENU
INVERTER ON
INVERTER OFF *

6. Switch OFF the mains power at the AC input distribution panel.

END OF PROCEDURE



CAUTION !

If the above procedure is not completely performed, it could cause serious damages to the UPS.



WARNING !

In case the procedure described on step "4 - discharge DC link capacitors" cannot be completely performed, the DC capacitors could be charged with dangerous voltage for about 5 minutes.

Wait until capacitors are completely discharged before starting the UPS again.
Apart from the front door, do not open any other part of the UPS.

8.1.5 Restore to normal operation after "total off"



NOTE !

Make sure the UPS to be status of the activation of "total off", i. e. Q1 closed, Q2 open and external battery protection connected.

View of the LCD screen after pressing the button "total off":

- All Contactors are open.
- *Booster, inverter and Static-Switch* shutdown.

LP 33 60kVA
APPLICAT. SUPPLY OFF
= 0%

1. Reset "total off".

Restore the command "total off" by entering the screen:
MENU/RESET TOTAL OFF

The load is supplied by the *mains* through the *automatic bypass*.

The *booster* starts automatically.

The LCD screen must display the status:

APPLICATION ON BYPASS

LED TEST
RESET TOTAL OFF *

LP 33 60kVA
APPLICATION ON BYPASS
= 53%

2. Switch ON the inverter by entering the screen:

MENU/COMMAND MENU/INVERTER ON

COMMAND MENU
INVERTER ON *
INVERTER OFF

The LCD screen must display the status: **APPLICATION ON UPS**

LP 33 60kVA
APPLICATION ON UPS
= 53%

END OF PROCEDURE

8.1.6 Restore to normal operation after "EPO – Emergency Power Off"



NOTE !

Make sure the UPS to be status of the activation of EPO, i. e. Q1 closed, Q2 open and external battery protection connected.

View of the LCD screen after pressing the button "EPO":

- All Contactors are open.
- *Booster, inverter and Static-Switch* shutdown.

LP 33 60kVA
APPLICAT. SUPPLY OFF
= 0%

1. Reset the button "EPO".

Press *Alarm*, to reset *alarm* and *buzzer*.

01.01.2005 12:15:45
NR=255 Status=A588
4563: EMERGENCY OFF
ACTIVATED

2. Reset the UPS by entering the screen:

MENU/COMMAND MENU/INVERTER OFF

COMMAND MENU
INVERTER ON
INVERTER OFF *

The load is supplied by the *mains* through the *automatic bypass*.

The *booster* starts automatically.

The LCD screen must display the status:

APPLICATION ON BYPASS

LP 33 60kVA
APPLICATION ON BYPASS
= 53%

3. Switch ON the inverter by entering the screen:

MENU/COMMAND MENU/INVERTER ON

COMMAND MENU
INVERTER ON *
INVERTER OFF

The *load* will be automatically transferred from *mains* to the *inverter*.


The LCD screen must display the status: **APPLICATION ON UPS**

LP 33 60kVA
APPLICATION ON UPS
= 53%

END OF PROCEDURE


8.2 PROCEDURES FOR PARALLEL SYSTEM *LP 33 Series*

8.2.1 Parallel System start-up of the *LP 33 Series*

	<p>Before connecting hazardous voltages, make sure that:</p> <ul style="list-style-type: none"> • The connection to the electrical system has been performed by qualified personnel; • The <i>equipment frame</i> has been correctly grounded to the <i>main earth</i>; • Make sure that <i>mains input</i> protection is removed; • All the <i>panels</i> removed to allow the UPS connection have been correctly reinstalled; • The UPS switches <i>Q1</i> and <i>Q2</i> are OFF (Pos. 0); • The <i>external battery fuses</i> are removed.
---	---

This procedure must be performed for the first start-up following the installation, with all the units completely switched Off and not powered.

This procedure presupposes that the *load* is not yet supplied by the UPS system.


	<p>NOTE !</p> <p>The UPS can be started-up using the <i>battery supply</i> in case the <i>input mains</i> should be unavailable.</p> <p>To avoid an incidental <i>battery</i> discharge, it is recommended to proceed to the UPS start-up having the <i>input mains</i> available.</p>
---	---

1. Switch ON the mains power for each unit at the input distribution panel.

As a result each unit performs a self-test and the *LCD* will show the following screen:

```
EXECUTING MAINBOARD
SELF TEST
000000000000
SELF TEST OK!
```

The *LCD* screen will display the number of the unit in the parallel system (**P1**, **P2**, **P3** or **P4**).

	<p>NOTE !</p> <p>In case the alarm "4410 - Mains bypass out of tolerance" persists, check the phases rotation of the input mains.</p>
---	---

2. Insert the external battery fuses on each unit.

Continue ►

3. **Switch ON the output switch Q1 (Pos. I) on each unit.**

When the last Q1 will be closed, the output will be supplied by the *mains* through all *bypass*.

LP 33 60kVA P1
APPLICAT. ON UTILITY
= 53%

Verify, selecting the screen METERING/*Udcp* and *Udcn*, that the booster voltage has reached about **400 VDC**.

Udcp=**400V** Udcn=**400V**
Ubp=273V Ubn=273V F
Charge level = 100%
Autonomy = 900min

4. **Switch ON the inverter on the first unit entering the screen:**

MENU/COMMAND MENU/**INVERTER ON**

COMMAND MENU
INVERTER ON *
INVERTER OFF

5. **Switch ON the inverter on the other units by entering the screen: MENU/COMMAND MENU/INVERTER ON.**

(Do not start the next *inverter* until the sequence of the previous one ends – about 10 seconds).

COMMAND MENU
INVERTER ON *
INVERTER OFF

Some seconds later the *load* will be transferred on inverter and the main screen of each unit will display: **APPLICATION ON UPS**

LP 33 60kVA P1
APPLICATION ON UPS
= 53%

END OF PROCEDURE



NOTE !

Even if the UPS is delivered with the *battery* fully charged, they could be partially discharged during transportation or storage.

It is recommended to recharge the battery during a few hours in order to provide the complete *battery* energy stored to the load in the event of *mains failure*.

8.2.2 Parallel UPS shutdown with load transfer on manual bypass (Q2)

The purpose of this procedure is to supply the *load* directly by *mains* through **manual bypass Q2**.

This procedure is normally performed when the UPS must be completely switched OFF for maintenance or service purpose, performed by an authorised *Service Centre*.

1. **Switch OFF the inverter on each unit entering the screen:**
MENU/COMMAND MENU/INVERTER OFF

Attention: to switch OFF permanently the *inverter* the key **Enter** must be pressed **2 times**.

COMMAND MENU
INVERTER ON
INVERTER OFF *

The output will be supplied by the mains through all *automatic bypass*.

LP 33 60kVA P1
APPLICAT. ON UTILITY
= 53%

2. **Switch ON the maintenance bypass Q2 (I) on each unit.**

LP 33 60kVA P1
APPL. ON MANUAL DEV.
= 53%

3. **Switch OFF the output switch Q1 (0) on each unit.**

4. **Perform the command total off on each unit, press simultaneously the keys "Alarm" and "-" on the control panel.**

5. **Remove the external battery fuses on each unit.**

Continue ►

6. **In order to discharge the DC link capacitors, start once more the inverter on each unit through the screen:**

MENU/COMMAND MENU/INVERTER ON

Remark: command *INVERTER ON* will be enabled only when the inverter voltage of each phase decreases below **7 VAC** (about 30 seconds).

Before proceeding to step **7**, check on the display panel that the *DC link voltage* (both polarities) *Udcp* and *Udcn* has reached the max. voltage of **5 VDC** (about 30 seconds).

COMMAND MENU
INVERTER ON *

INVERTER: U1= **7V**
U2= **7V** U3= **7V**
Frequency = 50.0Hz
Synchronized

Udcp= **5V** Udcn= **5V**
Ubp=0V Ubn=0V 0
Charge level = 0%
Autonomy = 0min

7. **Switch OFF the inverter on each unit entering the screen:**

MENU/COMMAND MENU/INVERTER OFF

COMMAND MENU
INVERTER ON
INVERTER OFF *

The load is now supplied directly from the mains through the manual switches Q2.

END OF PROCEDURE



WARNING !

The UPS cabinet contains parts electrically live.
Apart from the front door, do not open any other part of the UPS.



NOTE !

With separate mains inputs, it's possible to disconnect mains rectifier.

8.2.3 Start-up following the operation on maintenance bypass (Q2)

This procedure presupposes that the *load* is powered by the *manual bypass* switch:

- The *inverter* is switched OFF;
- The *manual bypass* switch Q2 is switched ON (Pos. I);
- The output switch Q1 is switched OFF (Pos. 0);
- The external *battery* fuses are removed.

1. **Insert the external battery fuses on each unit.**

2. **Switch ON the output switch Q1 (Pos. I) on each unit.**

3. Only in case it has been previously activated (* present beside the text *RESET TOTAL OFF*), restore the command "*total off*" **on any one of the units** by entering the screen:
MENU/RESET TOTAL OFF

LED TEST
RESET TOTAL OFF *

4. **Open the maintenance bypass switch Q2 (Pos. 0) on each unit.**

Verify, selecting the screen *METERING/Udcp* and *Udcn*, that the booster voltage has reached about **400 VDC** on each unit.

Udcp=400V	Udcn=400V
Ubp=273V	Ubn=273V F
Charge level	= 100%
Autonomy	= 900min

5. **Switch ON the inverter on each unit entering the screen:**

MENU/ COMMAND MENU /INVERTER ON

(Do not start the next *inverter* until the sequence of the previous one ends – about 10 seconds).

COMMAND MENU
INVERTER ON *
INVERTER OFF

The *load* will be automatically transferred from *mains* to the *inverters* as the needed power requested from the applied load is achieved on *inverter* side.

The main screen of each unit will display:

APPLICATION ON UPS

LP 33 60kVA P1
APPLICATION ON UPS
= 53%

END OF PROCEDURE

8.2.4 Shutdown of a single unit in a parallel system

The purpose of this procedure is to separate one unit from the parallel system.

1. **Switch OFF the inverter only on this unit entering the screen:**
MENU/COMMAND MENU/INVERTER OFF

Attention: to switch OFF permanently the *inverter* the key **Enter** must be pressed **2 times**.

COMMAND MENU
INVERTER ON
INVERTER OFF *

2. **Switch OFF the output switch Q1 (0) only on this unit.**

3. **Perform the command total off only on this unit, press simultaneously the keys "Alarm" and "-" on the control panel.**

4. **Remove the external battery fuses only on this unit.**

5. **In order to discharge the DC link capacitors, start once more the inverter only on this unit through the screen:**

MENU/COMMAND MENU/INVERTER ON

COMMAND MENU
INVERTER ON *
INVERTER OFF

Remark: command *INVERTER ON* will be enabled only when the inverter voltage of each phase decreases below **7 VAC** (about 30 seconds).

INVERTER: U1= **7V**
U2= **7V** U3= **7V**
Frequency = 50.0Hz
Synchronized

Before proceeding to step **6**, check on the display panel that the *DC link voltage* (both polarities) *Udcp* and *Udcn* has reached the max. voltage of **5 VDC** (about 30 seconds).

Udcp= **5V** Udcn= **5V**
Ubp=0V Ubn=0V O
Charge level = 0%
Autonomy = 0min

6. **Switch OFF the inverter only on this unit entering the screen:**
MENU/COMMAND MENU/INVERTER OFF

COMMAND MENU
INVERTER ON
INVERTER OFF *

7. **Switch OFF the mains power only on this unit at the AC input distribution panel.**

END OF PROCEDURE



WARNING !

In case the unit should be disconnected and removed from the operating system, the operation must be performed by qualified persons.

If an intermediate unit must be disconnected from a parallel system pay attention do not open the control bus: keep the plugs J3 and J4 connected to the board "P34 - Connector adapter RPA" (see Section 4.8.5).

8.2.5 Start-up an additional unit in a parallel system



Before connecting hazardous voltages, make sure that:

- The connection to the electrical system has been performed by qualified personnel;
- The *equipment frame* has been correctly grounded to the *main earth*;
- Make sure that *mains input* protection is removed;
- All the *panels* removed to allow the UPS connection have been correctly reinstalled;
- The UPS switches Q1 and Q2 are OFF (Pos. 0);
- The external *battery* fuses are removed.

This procedure must be performed when the *load* is supplied by the other units of the UPS system and an additional unit must be switched ON and connected to the parallel bus in order to share the load with each other.

This unit must be completely switched OFF and not powered.

1. Switch ON the mains power at the input distribution pane on this unit.

As a result the UPS performs a self-test and the LCD will show the following screen:

EXECUTING MAINBOARD
SELF TEST
000000000000
SELF TEST OK!



NOTE !

In case the alarm "4410 - Mains bypass out of tolerance" persists, check the phases rotation of the input mains.

2. Insert the external battery fuses on this unit.

3. Switch ON the output switch Q1 (Pos. I) on this unit.

LP 33 60kVA P2
APPLICAT. ON UTILITY
= 53%

Verify, selecting the screen *METERING/Udcp* and *Udcn*, that the booster voltage has reached about **400 VDC** of this unit.

Udcp=400V Udcn=400V
Ubp=273V Ubn=273V F
Charge level = 100%
Autonomy = 900min

4. Switch ON the inverter of this unit entering the screen: MENU/COMMAND MENU/INVERTER ON

COMMAND MENU
INVERTER ON *
INVERTER OFF

When the inverter will be synchronised, the unit will be automatically connected with the parallel bus-bar and the load will be shared with the other units.

The main screen of each unit will display:

APPLICATION ON UPS

LP 33 60kVA P2
APPLICATION ON UPS
= 53%

END OF PROCEDURE

8.2.6 Complete shutdown of a parallel system

As a result of this procedure the parallel system is completely switched OFF and not powered.



NOTE !

This procedure involves all equipment powered by parallel system, to be shut down.

1. Perform the command total off on any one of the units, press simultaneously the keys "Alarm" and "-" on the control panel.
2. Switch OFF the output switch Q1 (Pos. 0) on each unit.
3. Remove the external battery fuses on each unit.

4. In order to discharge the DC link capacitors, start once more the inverter on each unit through the screen:

MENU/COMMAND MENU/INVERTER ON

Remark: command *INVERTER ON* will be enabled only when the inverter voltage of each phase decreases below **7 VAC** (about 30 seconds).

Before proceeding to step 5, check on the display panel that the DC link voltage (both polarities) *Udcp* and *Udcn* has reached the max. voltage of **5 VDC** (about 30 seconds).

COMMAND MENU
INVERTER ON *

INVERTER: U1= **7V**
U2= **7V** U3= **7V**
Frequency = 50.0Hz
Synchronized

Udcp= **5V** Udcn= **5V**
Ubp=0V Ubn=0V 0
Charge level = 0%
Autonomy = 0min

5. Switch OFF the inverter on each unit entering the screen:

MENU/COMMAND MENU/INVERTER OFF

COMMAND MENU
INVERTER ON
INVERTER OFF *

6. Switch OFF the mains power of each unit at the AC input distribution panel.

END OF PROCEDURE



CAUTION !

If the above procedure is not completely performed, it could cause serious damages to the UPS.



WARNING !

In case the procedure described on step "4 - discharge DC link capacitors" cannot be completely performed, the DC capacitors could be charged with dangerous voltage for about 5 minutes.

Wait until capacitors are completely discharged before starting the UPS again.
Apart from the front door, do not open any other part of the UPS.

8.2.7 Restore to normal operation after "total off"



NOTE !

Make sure the all units of the parallel system to be status of the activation of "total off", i. e. Q1 closed, Q2 open and external battery protection connected.

View of the LCD screen after pressing the button "total off":

- All Contactors are open.
- *Booster, inverter and Static-Switch* shutdown.

LP 33 60kVA P1
APPLICAT. SUPPLY OFF
= 0%

1. Reset "total off" of the parallel system.

Restore the command "total off", on any one of the units, by entering the screen: **MENU/RESET TOTAL OFF**

The load is supplied by the *mains* through the *automatic bypass*.

The *booster* starts automatically.

The LCD screen must display on all Units the status:

APPLICATION ON BYPASS

LED TEST
RESET TOTAL OFF *

LP 33 60kVA P1
APPLICATION ON BYPASS
= 53%

2. Switch ON the inverter on first unit by entering the screen:

MENU/COMMAND MENU/INVERTER ON

In case of sufficient output power, the output will transfer to *Inverter*.

COMMAND MENU
INVERTER ON *
INVERTER OFF

3. Switch ON the inverter on the other units by entering the screen: **MENU/COMMAND MENU/INVERTER ON**

(Do not start the next *inverter* until the sequence of the previous one ends – about 10 seconds).

As soon as the output power of the *inverters* is sufficient to supply the *load*, the output of the units with running *inverter* will transfer to *inverter*.

The LCD screen must display on all Units the status:

APPLICATION ON UPS

COMMAND MENU
INVERTER ON *
INVERTER OFF

LP 33 60kVA P1
APPLICATION ON UPS
= 53%

END OF PROCEDURE

8.2.8 Restore to normal operation after "EPO – Emergency Power Off"



NOTE !

Make sure the all units of the parallel system to be status of the activation of *EPO*, i. e. Q1 closed, Q2 open and external battery protection connected.

View of the *LCD* screen after pressing the button "*EPO*":

- All *Contactors* are open.
- *Booster, inverter and Static-Switch* shutdown.

LP 33 60kVA P1
APPLICAT. SUPPLY OFF
= 0%

1. Reset the button "*EPO*".

Press *Alarm*, to reset *alarm and buzzer*.

01.01.2005 12:15:45
NR=255 Status=A588
4563: EMERGENCY OFF
ACTIVATED

2. Reset all *UPS* by entering the screen:

MENU/COMMAND MENU/INVERTER OFF

The load is supplied by the *mains* through the *automatic bypass*.

The *booster* starts automatically.

The *LCD* screen must display on all *Units* the status:

APPLICATION ON BYPASS

COMMAND MENU
INVERTER ON
INVERTER OFF *

LP 33 60kVA P1
APPLICATION ON BYPASS
= 53%

3. Switch ON the inverter on first unit by entering the screen:

MENU/COMMAND MENU/INVERTER ON

In case of sufficient output power, the output will transfer to *Inverter*.

COMMAND MENU
INVERTER ON *
INVERTER OFF

4. Switch ON the inverter on the other units by entering the screen: *MENU/COMMAND MENU/INVERTER ON*

(Do not start the next *inverter* until the sequence of the previous one ends – about 10 seconds).

As soon as the output power of the *inverters* is sufficient to supply the *load*, the output of the units with running *inverter* will transfer to *inverter*.

The *LCD* screen must display on all *Units* the status:

APPLICATION ON UPS

COMMAND MENU
INVERTER ON *
INVERTER OFF

LP 33 60kVA P1
APPLICATION ON UPS
= 53%

END OF PROCEDURE

9 CUSTOMER INTERFACE

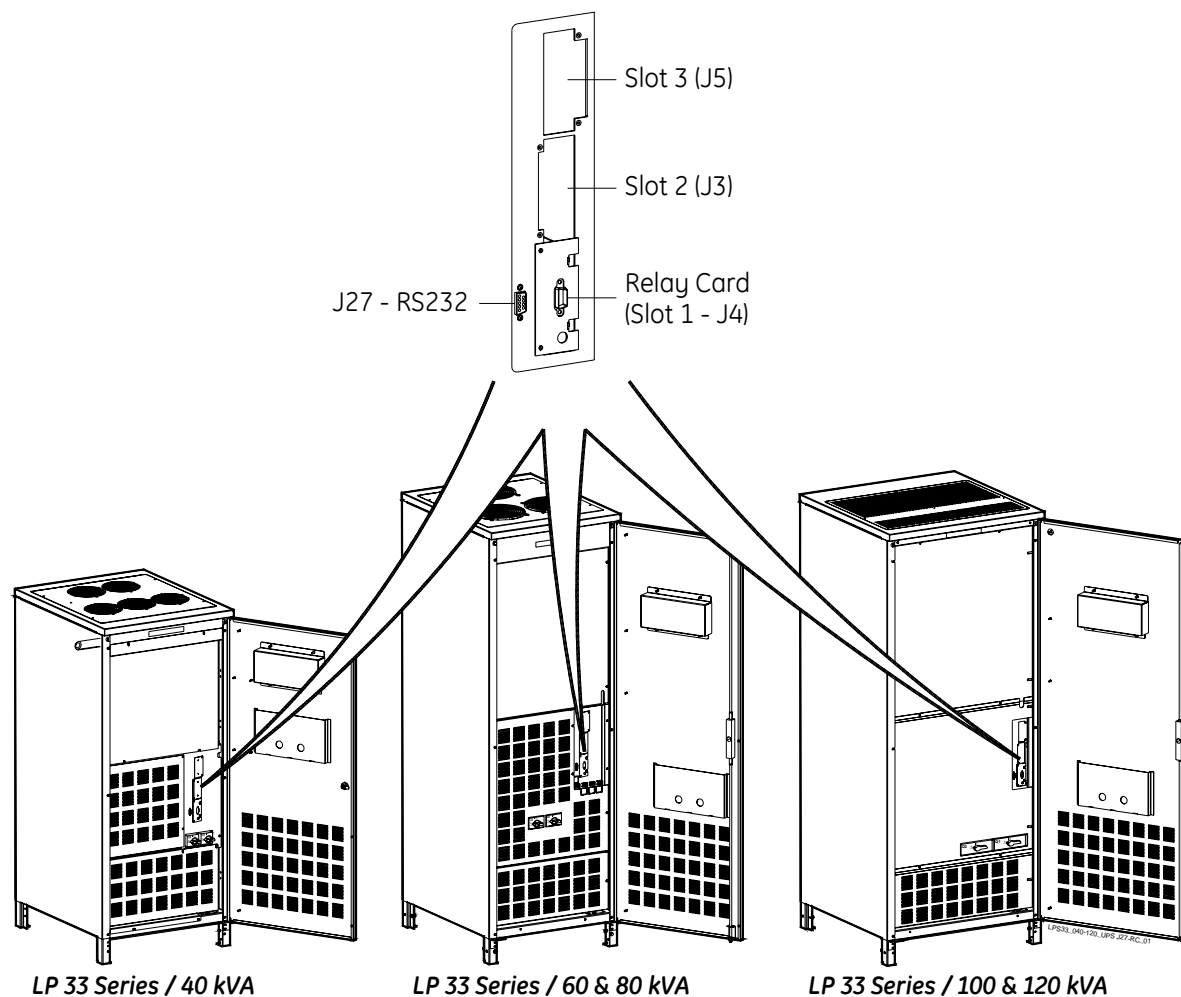


Fig. 9-1 Slot connectivity

LP 33 Series is supplied by a standard **Serial Port J27 - RS232** (see Section 9.1) and a **Relay Card** (see Section 9.2).

List of possible connectivity configurations on LP 33 Series

Slot 1 - J4	Slot 2 - J3	Slot 3 - J5	Slot 1 - J4 + Slot 2 - J3
Relay Card (standard)			
Relay Card (standard)	Advanced SNMP Card (Optional)		
Relay Card (standard)	Advanced SNMP Card (Optional)	Advanced SNMP Card (Optional)	
			Customer Interface (optional)
		Advanced SNMP Card (Optional)	Customer Interface (optional)

9.1 SERIAL PORT J27 - RS232

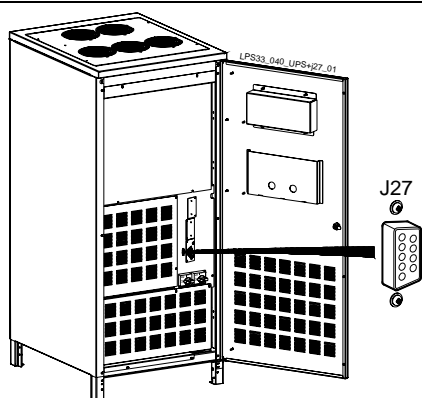


Fig. 9.1-1 LP 33 Series / 40 kVA - Serial Port J27 - RS232

Serial Port J27 - RS232 (sub - D, female 9 pin)

Total remote management of the system using new generation software **JUMP** (Java Universal Management Platform) for system protection and management of systems using **GE** UPS's.

JUMP system is written in **JAVA** and supports virtually all platforms having "JAVA Runtime Environment" version 1.1 or higher.

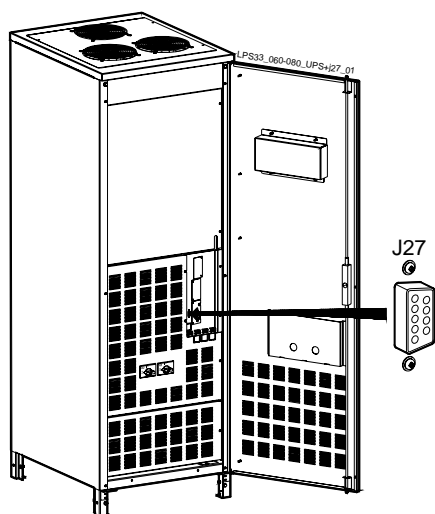


Fig. 9.1-2 LP 33 Series / 60 - 80 kVA - Serial Port J27 - RS232

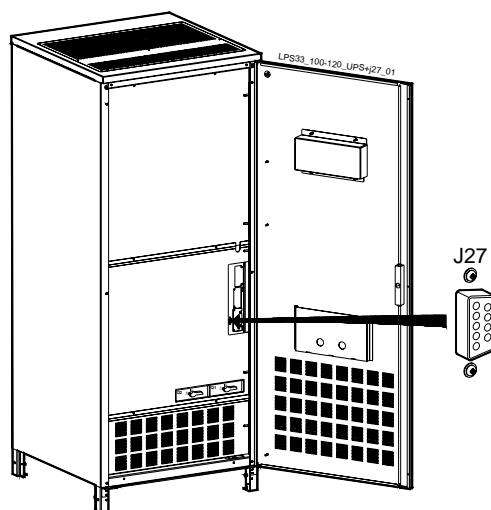


Fig. 9.1-3 LP 33 Series / 100 - 120 kVA - Serial Port J27 - RS232



The serial port J27 - RS232 is enabled on all the units of the parallel system.

Serial port J27 - RS232 connection to PC with RS232 1:1 cable DB9m - DB9f

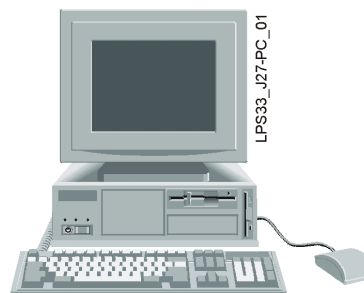
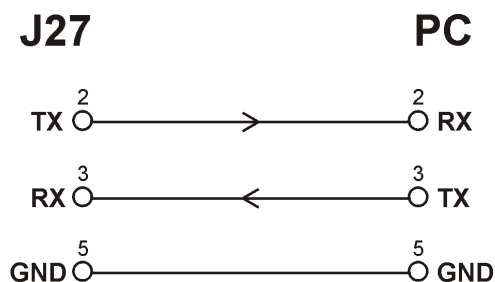
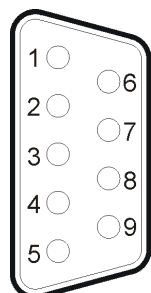


Fig. 9.1-2 Serial port J27 - RS232 connection to PC

9.2 RELAY CARD



WARNING !

Connections described in this chapter shall be done only by a trained person or **SERVICE ENGINEERS**.

The **Relay Card**, allows the programming of **4 output channels** on dry contacts, which can be read on either terminal **J3** or plug **J4** (sub - D - male 9 pin).

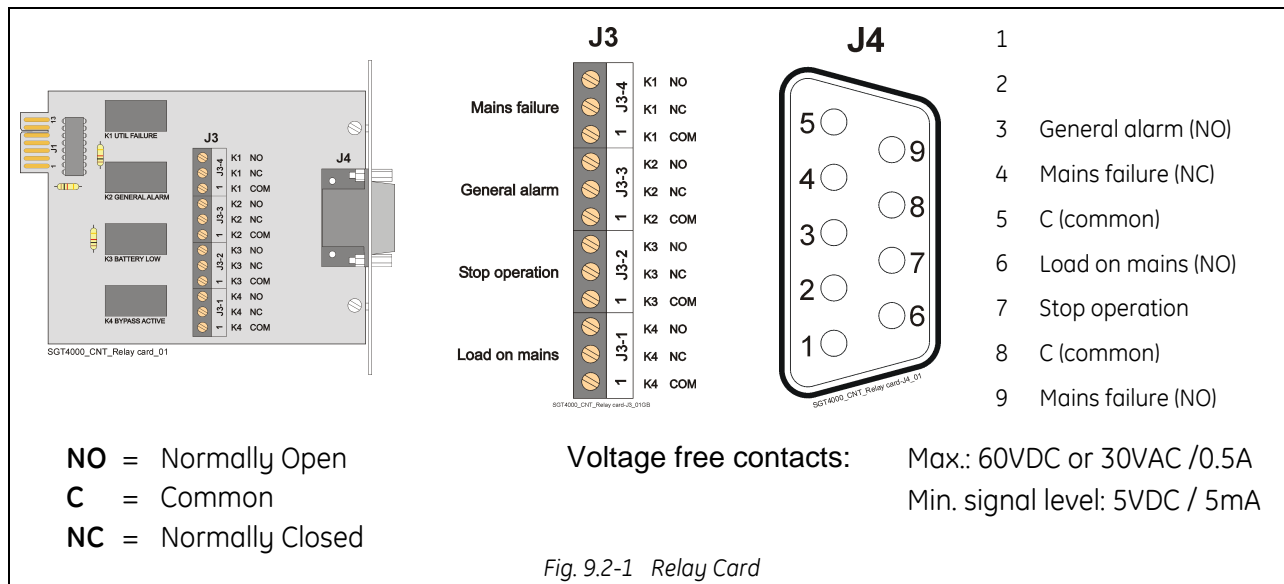


Fig. 9.2-1 Relay Card

Output signals on voltage-free contacts

On terminals **J3** or **J4** connector **4 of the following 28 signals** can be selected from the display (access only with password): **MENU / PARAMETER MENU / LEVEL 2: SERVICE**.

- | | |
|-----------------------------------|--------------------------------|
| 0 - No signal | 15 - Battery discharge |
| 1 - Buzzer | 16 - Manual bypass ON |
| 2 - General alarm (NO) | 17 - Rectifier ON |
| 3 - Load on mains | 18 - Inverter ON |
| 4 - Stop operation | 19 - Battery boostcharge |
| 5 - Load on inverter | 20 - Battery earth fault |
| 6 - Mains failure | 21 - Battery fault |
| 7 - DC overvoltage | 22 - Relay input 1 |
| 8 - Low battery | 23 - Relay input 2 |
| 9 - Overload | 24 - Relay output ON |
| 10 - Overtemperature | 25 - Relay output OFF |
| 11 - Inverter-mains not synchrony | 26 - EPO (Emergency Power Off) |
| 12 - Bypass locked | 27 - ECO Mode ON |
| 13 - Bypass mains failure | 28 - General alarm (NC) |
| 14 - Rectifier mains failure | |



NOTE !

The function **GEN-ON** is not available on the **Relay Card**.
 In case this function is needed, the optional **Customer Interface** card must be installed (see Section 10.2.1).

9.3 EPO (EMERGENCY POWER OFF)



WARNING !

Connections described in this chapter shall be done only by a trained person or **SERVICE ENGINEERS**.

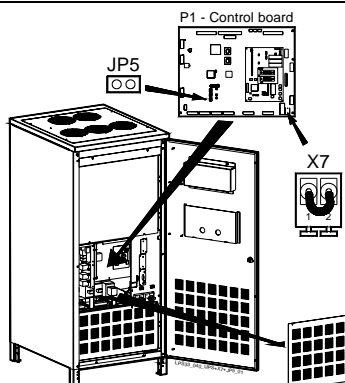


Fig. 9.3-1 LP 33 Series / 40 kVA - Terminals X7 - EPO

An external Emergency switch (NC - Normally Closed voltage-free contact) can be connected on terminals **X7 / 1, 2** of the **P1 - Mainboard**.



NOTE !

Check that the **Jumper JP5** is not installed on the **P1 - Control board**.

RPA
Redundant Parallel
Architecture

In a parallel system a separate NC (Normally Closed) contact must be connected individually to each unit.

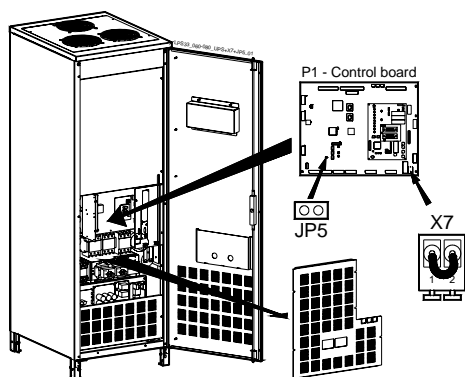


Fig. 9.3-2 LP 33 Series / 60 - 80 kVA - Terminals X7 - EPO

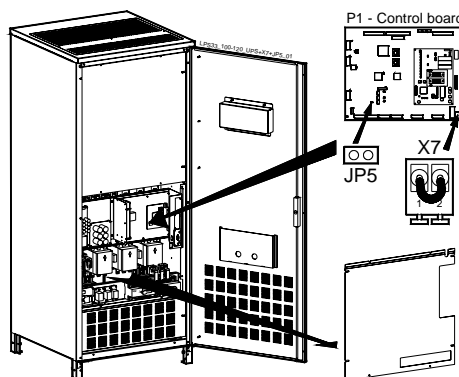


Fig. 9.3-3 LP 33 Series / 100 - 120 kVA - Terminals X7 - EPO

When activated, this switch causes the immediate shutdown of *booster, battery-charger, inverter*; and the *contactors K4, K6 and K7*.



NOTE !

This procedure could imply a load shutdown.

When the **EPO** has been activated, the system must be restored as following:

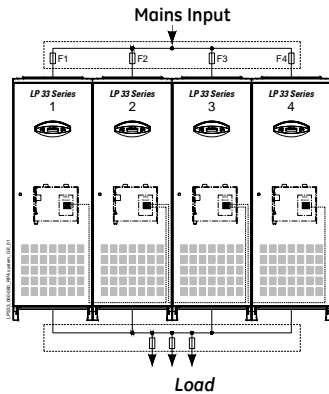
- Press the push-button **EPO** (contact on X7 / 1, 2 is closed again).
- Perform the command **INVERTER OFF** entering the screen:
MENU/COMMAND MENU/INVERTER OFF.
- Start the inverter entering the screen:
MENU/COMMAND MENU/INVERTER ON.

COMMAND MENU
INVERTER ON
INVERTER OFF *

COMMAND MENU
INVERTER ON *
INVERTER OFF

10 OPTIONS

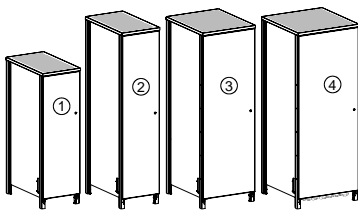
10.1 OPTIONS GENERAL VIEW



RPA kit

Redundant Parallel Architecture

Allows to extend the unit to a parallel system with 2, 3, or 4 units connected on the same bus, which ensure the highest reliability rate and increase the power availability without prior investments.



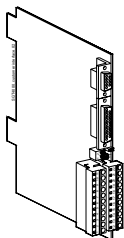
Battery Extension Packs

Extended run-time versions are equipped with additional batteries housed in the UPS itself, to increase the back-up time of the UPS when the *mains* fails.

Additional battery cabinets

Depending on model the battery extensions can be housed in additional cabinets with the same design of the UPS cabinet, delivered with the necessary protection and connection material.

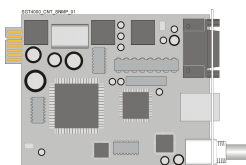
For extended run-time versions and additional cabinets see enclosed *Data Sheets*.



Customer Interface

The *Customer Interface* allows the client the exchange of information (monitoring and control) with the following interfaces:

- Serial port RS232.
- 6 programmable output channels.
- 2 programmable input channels, of which one for *GEN-ON*.
- *EPO* (Emergency Power Off).



Advanced SNMP Card

Simple Network Management Protocol

The *Advanced SNMP Card* is an Interface to the *Ethernet Network*, and provides UPS information via the standard *SNMP* protocol.

The UPS can therefore be managed by a *Network Management System (NMS)* or by our applications (for instance *JUMP*), which uses this information to determine the state of the UPS in order to guarantee safe and orderly shutdown of the server, when needed.

JUMP

Java®
Universal Management Platform

Connectivity Software

JUMP Software Suite / IRIS Service, etc.

Software application for the control and monitoring of the UPS.

10.2 OPTIONS ASSEMBLY AND CONNECTION



WARNING !

The installation and cabling of the options must be performed by **QUALIFIED SERVICE PERSON**.

Make sure that the UPS installation is completely powered down.

Refer to the "Safety prescriptions - Installation" described on Section 11.

10.2.1 Customer Interface

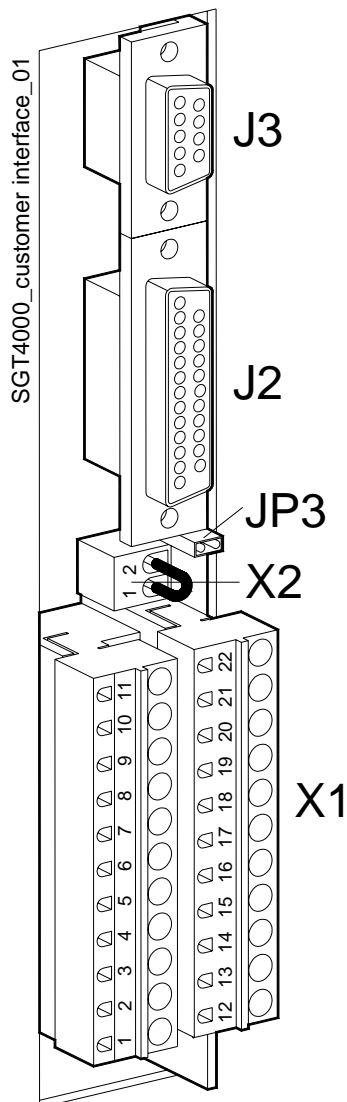


Fig. 10.2.1-1 Customer Interface

C = Common
NO = Normally Open
NC = Normally Closed

Serial port J3 - RS232 (sub - D - female 9 pin)

The serial port **J3** allows an advanced communication mode between the UPS and any computer through the **JUMP** protocol (*Java Universal Management Platform*). The software is compatible with the most used operating systems as: *Novell, UNIX, VMS, Windows Platforms, Apple, 3COM, LINUX, IBM LANserver e IBM AS/400.*

Pin 2: TX (out)

Pin 3: RX (in)

Pin 5: GND

J2 (sub - D female 25p) - Output signals on voltage-free contacts

J2 / 1, 2, 3	NO, C, NC	Mains failure
J2 / 4, 5, 6	NO, C, NC	Load on inverter
J2 / 7, 8, 9	NO, C, NC	Stop operation
J2 / 14, 15, 16	NO, C, NC	Load on mains
J2 / 17, 18, 19	NO, C, NC	General alarm (NO)
J2 / 20, 21, 22	NO, C, NC	Buzzer



Signals on terminals **X1** and on connector **J2** are in parallel and therefore not separated galvanically from each other. The programmable signals on **X1** and **J2** will be disabled with **Q1** open, with the exception of the signals for:

16 - Manual bypass ON
24 - Relay output ON
25 - Relay output OFF
26 - EPO

X1 - Output signals on voltage-free contacts

X1 / 1, 2, 3	NO, C, NC	Mains failure
X1 / 4, 5, 6	NO, C, NC	Load on inverter
X1 / 7, 8, 9	NO, C, NC	Stop operation
X1 / 12, 13, 14	NO, C, NC	Load on mains
X1 / 15, 16, 17	NO, C, NC	General alarm (NO)
X1 / 18, 19, 20	NO, C, NC	Buzzer

X2 - Terminals EPO connection (Emergency Power Off)

X2 / 1, 2 (or J2 / 12, 25)	NC	EPO (Emergency Power Off)
----------------------------	----	---------------------------



To enable this function, remove jumper **JP3** on the *Customer Interface* and the cable on the terminal **X2 / 1, 2**. (See Fig. 10.2.1-1).

Verify if the cable on the terminal **X7 / 1, 2** and jumper **JP5** on the **P1 - Control board** are OFF (see Fig. 10.2.1-3).

Programmable functions on input contacts

X1/10, 21 or J2/10, 23	Programmable
X1/11, 22 or J2/11, 24	Programmable / Generator ON (NO)

Output signals on voltage-free contacts

On terminals **X1** or **J2** connector **6** of the following **28 signals** can be selected from the display (access only with password): **MENU / PARAMETER MENU / LEVEL 2: SERVICE.**

0 - No signal	15 - Battery discharge
1 - Buzzer	16 - Manual bypass ON
2 - General alarm (NO)	17 - Rectifier ON
3 - Load on mains	18 - Inverter ON
4 - Stop operation	19 - Battery boostcharge
5 - Load on inverter	20 - Battery earth fault
6 - Mains failure	21 - Battery fault
7 - DC overvoltage	22 - Relay input 1
8 - Low battery	23 - Relay input 2
9 - Overload	24 - Relay output ON
10 - Overtemperature	25 - Relay output OFF
11 - Inverter-mains not synchrony	26 - EPO (Emergency Power Off)
12 - Bypass locked	27 - ECO Mode ON
13 - Bypass mains failure	28 - General alarm (NC)
14 - Rectifier mains failure	

Programmable functions on input contacts (X1 - J2)

Some UPS functions can be activated by parameters (access with password only) when an external NO contact is closed on:

No function
Inverter OFF
Print all

Inverter On
Generator ON
Status relay

Voltage free contacts: Max. DC / AC: 24V / 1.25A
IEC 60950 (SELV circuit)
Min. signal level: 5VDC / 5mA

Gen Set signalling

If an Emergency generator set supplies the UPS in case of utility failure and the generator is particularly unstable in frequency, it should be suitable to install the signal "generator on" on terminals **X1 / 11, 22** (Normally Open voltage-free contact) or on connector **J2 / 11, 24** (see Fig. 10.2.1-1 / X1 and J2).

Since the Parameter for of the reading of the Generator function is password protected, call the nearest **Service Centre** for it's activation.

When this contact closes, it causes the change of certain settable functions such as:

- Enabling or disabling of synchronisation and consequently the load transfer to generator.
- The battery recharge inhibition during the generator operation, or after what delay from generator start the battery will start to be recharged.

Consult your nearest **Service Centre** for more information.



In a parallel system a separate NO (Normally Open) contact must be connected to each individual unit.

EPO (Emergency Power Off)

An external Emergency switch (NC - Normally Closed voltage-free contact) can be connected on terminals **X2 / 1, 2** or connector **J2 / 12, 25** of the *Customer Interface* (see Fig. 10.2.1-1 / X2 & J2).

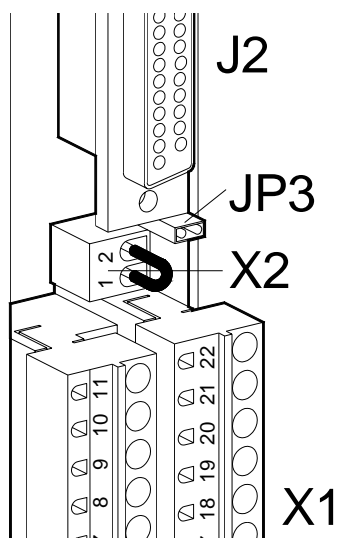


Fig. 10.2.1-2 PCB Customer Interface

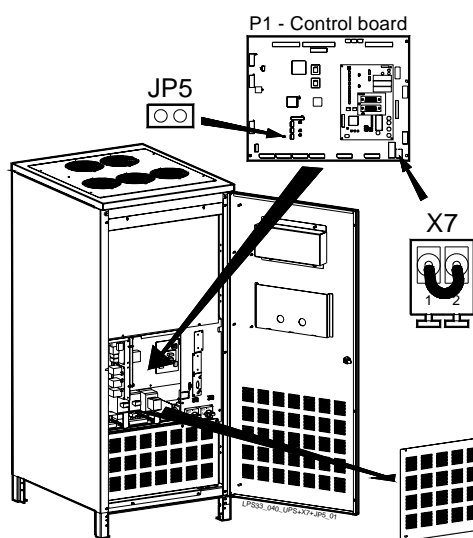


Fig. 10.2.1-3 PCB P1 - Control board



NOTE !

To enable this function, remove jumper **JP3** on the *Customer Interface* and the cable on the terminal **X2 / 1, 2** (see Fig. 10.2.1-2).

Verify if the cable on the terminal **X7 / 1, 2** and jumper **JP5** on the **P1 - Control board** are OFF (see Fig. 10.2.1-3).



In a parallel system a separate NC (Normally Closed) contact must be connected individually to each unit.

When activated, this switch causes the immediate shutdown of *booster, battery-charger, inverter*; and the *contactors K4, K6 and K7*.



NOTE !

This procedure could imply a load shutdown.

When the **EPO** has been activated, the system must be restored as following:

- Press the push-button **EPO** (contact on X2/1, 2 is closed again).
- Perform the command **INVERTER OFF** entering the screen:
MENU/COMMAND MENU/INVERTER OFF.
- Start the inverter entering the screen:
MENU/COMMAND MENU/INVERTER ON.

COMMAND MENU
INVERTER ON
INVERTER OFF *

COMMAND MENU
INVERTER ON *
INVERTER OFF

11 MAINTENANCE



WARNING !

All maintenance and service works must be performed by **QUALIFIED SERVICE PERSON**.

11.1 GENERAL MAINTENANCE

A UPS system, like other electrical equipment, needs periodic preventive maintenance.

A regular maintenance check of your installation guarantees higher reliability of your safe power supply.

Preventive maintenance work on the UPS can be done only by trained Service technicians.

We therefore recommend you sign a Maintenance and Service contract with the local **Service Centre** organisation.

11.2 COOLING FAN MAINTENANCE

The expected operational life of the cooling fans is approximately **40'000 hours** of continuous operation.

A high ambient temperature will shorten this operational life.

11.3 OTHER COMPONENTS WITH LIMITED LIFETIME

We recommend the replacement of components such as *Filter Capacitors* and *Lithium Battery* for the backup of data on the control boards of the units every **50'000 hours**.

11.4 BATTERY MAINTENANCE

The service life of the battery is from **3 to 6 years**, depending on the operating temperature and on the number of discharge cycles.

The UPS **LP 33 Series** offers the possibility of *SBM (Superior Battery Management)*.

The function *SBM* can be activated through a service Parameter.

The functionality of *SBM* reduces the Battery recharging time together with improved lifetime of the Battery.

As a healthy battery is essential to the performance of the UPS, an automatic or manual battery test can be performed regularly to ensure failsafe operation, in order to check if the battery can provide the expected backup time in case of mains failure.

We recommend the battery test be performed at least every **1 month**, especially if the battery is not sufficiently discharged during normal operation.

Since the parameter enabling the *battery test* protected by *user password*, please contact your **Service Centre** for more information.

Please consider that, if you did a full battery test to verify the full runtime of the battery, the charger needs at least **8 hours** to recharge the battery up to **90%** of its capacity.

To guarantee that the battery is fully charged, the UPS system should be in operation for at least **12 hours every 3 months**.

When the condition of the battery is critical, the warning signal will be activated (general alarm, buzzer and alarm message "*4118 - Battery fault*").

In this case the battery must be replaced as soon as possible.

Please contact your **Centre Service**.

11.5 SERVICE REQUIRED

LP 33 60 kVA
APPLICATION ON UPS
= 53%
SERVICE REQUIRED

If this lamp lights up during the normal operation (service parameter with password), the performances of the UPS remain the same, but that means the unit has not been serviced for the last **20'000 hours** by a qualified *GE Service Engineer*.

Some components of the UPS which need periodic maintenance, if not replaced, could cause a reliability reduction of the supply system.

We highly recommend that you contact your **Service Centre** for preventive maintenance work.



NOTE !

Ask to your local *Service Centre* to submit the form of *Preventive Maintenance Contract* suitable for your specific needs.

12 NOTES

12.1 NOTES FORM

It is recommended to note in this section **Notes**, with date and short description all the operations performed on the UPS, as: maintenance, components replacement, abnormal situations, etc. .

[illegible]

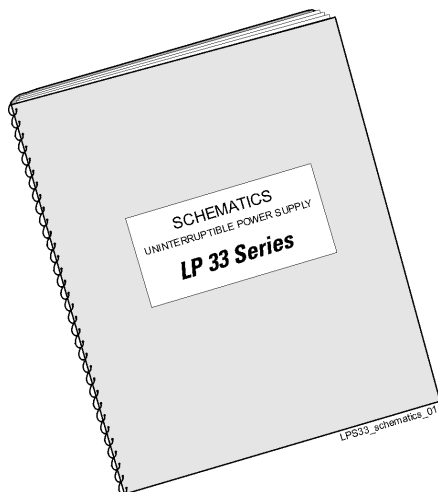
13 ANNEX

13.1 TECHNICAL DATA SHEET



Can be found in the final section and are listings of the technical data of the UPS.

13.2 SCHEMATICS



These are included in the last section and include the UPS functional drawings.