Operating Manual
Uninterruptible Power supply

Digital Energy™
LP 33 Series
60 – 80 – 100 – 120 kVA
400 Vac CE / Series 2

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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!
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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 60 - 80 - 100 - 120 kVA is a Category C2 UPS Product (Class A), according to IEC 62040).

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

ATTENTION !

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.

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:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="WARNING" /></td>
<td>Referred to procedures or operations which could cause damages to the persons or to the system, when not correctly operated.</td>
</tr>
<tr>
<td><img src="image" alt="NOTE" /></td>
<td>Warns the user about important operations or procedures described in this manual.</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="CAUTION" /></td>
<td>Related to all the potentially hazardous situations which may result in injury.</td>
</tr>
<tr>
<td><img src="image" alt="DANGER OF PARTS ELECTRICALLY LIVE" /></td>
<td>Related to all the situation with potentially hazardous voltage.</td>
</tr>
<tr>
<td><img src="image" alt="DANGER OF EXPLOSION" /></td>
<td>Used to indicate conditions where exploding parts can cause serious injury.</td>
</tr>
<tr>
<td><img src="image" alt="DANGER OF CRUSHING" /></td>
<td>Used when moving the equipment due to the heavy weight.</td>
</tr>
<tr>
<td><img src="image" alt="DANGER OF OVERHUNG LOAD" /></td>
<td>Used when the equipment is lifted by a crane.</td>
</tr>
<tr>
<td><img src="image" alt="DANGER OF HOT SURFACE" /></td>
<td>Used to indicate conditions of elevated temperature on some parts.</td>
</tr>
<tr>
<td><img src="image" alt="DO NOT TOUCH" /></td>
<td>Risk of parts with hazardous voltages or parts in movement.</td>
</tr>
</tbody>
</table>
2 LAYOUT

2.1 LAYOUT LP 33 Series 60 - 80 kVA

Fig. 2.1-1 General view

Fig. 2.1-2 General view with open door

Fig. 2.1-3 General view without protection panels

Fig. 2.1-4 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
2.2 LAYOUT LP 33 Series 100 - 120 kVA

Fig. 2.2-1 General view

Fig. 2.2-2 General view with open door

Fig. 2.2-3 General view without protection panels

Fig. 2.2-4 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
3 INTRODUCTION

3.1 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**:  
  - Active IGBT Rectifier: <9%
  - Active IGBT Rectifier - Clean Input Module: <4.5% (<3.5% at 75% load)
- **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**: 323 ÷ 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 IEC 62040**.
4 DESCRIPTION

4.1 PRINCIPAL DIAGRAM AND MAIN ELEMENTS DESCRIPTION

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 – Active IGBT Rectifier**
The Active IGBT Rectifier converts the 3-phase mains voltage into a controlled and regulated DC-voltage, supplying the inverter and to charge the battery through the battery-charger. Thanks to modulation strategy applied to IGBT bridge, the rectifier provides clean input power in terms of low THDi and unity power factor. For this purpose the UPS’s are offered in two configurations depending on the required harmonic content (THDi):

- **Active IGBT Rectifier**
- **Active IGBT Rectifier - Clean Input Module**

Both configurations provide clean input current at full and partial loads, avoiding thus possible interference with other upstream equipment.

**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.
4.2 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 7.4 – ECO Mode).

---

**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.

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 retransfered to inverter (if selected VFI Mode).

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).

---

**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.
4.3 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.

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 it’s 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.
4.4 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. 4.4-1), 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.

![Diagram RPA system with UPS on common battery](image)

**Fig. 4.4-1** Diagram RPA system with UPS on common battery

1 – Rectifier
2 – Inverter
3 – Automatic Bypass
4 – Manual Bypass
5 – Mains Power
6 – Load Bus Bar
7 – External Battery Fuse
8 – Battery

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 5.7.2).
- 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 9.1).
- 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.
4.5 SERVICE AND TECHNICAL SUPPORT

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

The requested data permitting to identify your UPS are marked on the identification label fixed on the front of the cabinet, behind the lower front door.

For fast and efficient Technical Support solutions, please mention the data marked on the identification label.

4.6 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.
4.7 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).

RECYCLING AT THE END OF SERVICE LIFE
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!
5 INSTALLATION

5.1 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 +/- 10°** 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.

---

**NOTE !**

When moving the UPS, pay attention to:

- **FRAGILE**
- **SENSITIVE**
- **TO DAMPNESS**
- **TO HEAT**
- **SENSITIVE**
- **TO FROST**

---

**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.

---

**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.

---

**WARNING !**

When loading / downloading and when moving the UPS, it is forbidden:

- **WARNING !**
  When loading / downloading and when moving the UPS, pay attention to:
5.1.1 Dimensions and weights

**LP 33 Series 60 - 80 kVA**

<table>
<thead>
<tr>
<th>Dimensions (W x D x H)</th>
<th>600mm x 745mm x 1815mm</th>
<th>23.63” x 29.34” x 71.46”</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPS standard weight</td>
<td>60 kVA 275 Kg / 607 lbs</td>
<td>80 kVA 300 Kg / 662 lbs</td>
</tr>
<tr>
<td>UPS floor loading</td>
<td>60 kVA 633 Kg/m²</td>
<td>80 kVA 690 Kg/m²</td>
</tr>
<tr>
<td>UPS standard shipping</td>
<td>60 kVA 295 Kg / 651 lbs</td>
<td>80 kVA 320 Kg / 706 lbs</td>
</tr>
</tbody>
</table>

**LP 33 Series 100 - 120 kVA**

<table>
<thead>
<tr>
<th>Dimensions (W x D x H)</th>
<th>720mm x 745mm x 1815mm</th>
<th>28.35” x 29.34” x 71.46”</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPS standard weight</td>
<td>100 kVA 370 Kg / 794 lbs</td>
<td>120 kVA 375 Kg / 827 lbs</td>
</tr>
<tr>
<td>UPS floor loading</td>
<td>100 kVA 709 Kg/m²</td>
<td>120 kVA 719 Kg/m²</td>
</tr>
<tr>
<td>UPS standard shipping</td>
<td>100 kVA 395 Kg / 871 lbs</td>
<td>120 kVA 400 Kg / 882 lbs</td>
</tr>
</tbody>
</table>

**NOTE!**
The weight of each single piece is marked outside the package!
5.2 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!

5.3 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)**.

5.3.1 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:
5.3.2 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:

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>Storage Time (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>6</td>
</tr>
<tr>
<td>30</td>
<td>3</td>
</tr>
<tr>
<td>35</td>
<td>2</td>
</tr>
</tbody>
</table>

**NOTE!**

In case of battery storage pay attention to:

- FRAGILE
- SENSITIVE TO DAMPNESS
- SENSITIVE TO HEAT
- SENSITIVE TO FROST

---

**OPM_LPS_33E_60K_M12_2GB_V010.doc Operating Manual**

LP 33 Series 60-80-100-120 kVA / S2
5.4 PLACE OF INSTALLATION

**WARNING !**
UPS installation and connection must be performed by QUALIFIED SERVICE PERSONNEL only.

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 5.1.1).
We strongly advice that the ambient temperature should not exceed **20° ÷ 25°C / 68° ÷ 77°F** (max. 35°C / 95°F). See Section 5.5.

Positioning of the UPS LP 33 Series 60 – 80 - 100 - 120 kVA

The rear panel of the UPS may be mounted flush to a wall or other structure.
Clearance around the front of the unit should be sufficient to enable free passage of personnel with the doors fully open, and to allow sufficient airflow to the door vents.
To guarantee proper cooling air exhaust, the recommended minimum clearance between ceiling and top of the UPS is **400mm (16")**.
A single-phase power outlet (230 Vac) should be provided near the UPS for connection of power tools, test equipment or connectivity devices. This outlet must be grounded.

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 performed by QUALIFIED SERVICE PERSONNEL only.
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.
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.
5.5 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:

<table>
<thead>
<tr>
<th>UPS model</th>
<th>Air volume</th>
<th>Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VFI Mode</td>
<td>ECO Mode</td>
</tr>
<tr>
<td>LP 33 Series 60 kVA</td>
<td>1010 m³/h</td>
<td>170 m³/h</td>
</tr>
<tr>
<td>LP 33 Series 80 kVA</td>
<td>1450 m³/h</td>
<td>190 m³/h</td>
</tr>
<tr>
<td>LP 33 Series 100 kVA</td>
<td>1815 m³/h</td>
<td>290 m³/h</td>
</tr>
<tr>
<td>LP 33 Series 120 kVA</td>
<td>2175 m³/h</td>
<td>350 m³/h</td>
</tr>
</tbody>
</table>
5.6 UNPACKING

Move the equipment in its 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 “D” by unscrewing bolts “E”.

Included in the delivery you can find the following parts:
- An accessories bag
- Control Bus cables (only for RPA Parallel System)
- CD-ROM connectivity
White colour = without any anomaly
Red colour = anomaly evidence

The package of the LP 33 Series is equipped with ShockWatch (indicator for shock), and TiltWatch (indicator for overthrow) on the outside. These devices indicate an eventual shock or overthrow during transport.

Whenever these devices show a possible anomaly, the UPS shall not be commissioned before consulting a “Service Centre”.

NOTE!
A damaged UPS must never be installed or connected to mains or battery! 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.
5.7  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 5.7.2 and 5.7.3.

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.

![Mains Input](image)

**NOTE !**
In case of non observance of the required minimum distances on both UPS sides (see Section 5.4) 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.

The delivery and installation of fuses and input / output connections of the UPS are at the customer's expense, unless agreed otherwise.
5.7.1 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.
5.7.2 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.

---

**Common input Rectifier & Bypass**

**Separate input Rectifier & Bypass** (optional)

---

![Common input Rectifier & Bypass](image1)

![Separate input Rectifier & Bypass (optional)](image2)

---

<table>
<thead>
<tr>
<th>UPS model</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F4 (external battery)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LP 33 Series 60 kVA</strong></td>
<td>3 x 100 A</td>
<td>3 x 100 A</td>
<td>3 x 100 A</td>
<td>3 x 125 A</td>
</tr>
<tr>
<td><strong>LP 33 Series 80 kVA</strong></td>
<td>3 x 125 A</td>
<td>3 x 125 A</td>
<td>3 x 125 A</td>
<td>3 x 160 A</td>
</tr>
<tr>
<td><strong>LP 33 Series 100 kVA</strong></td>
<td>3 x 160 A</td>
<td>3 x 160 A</td>
<td>3 x 160 A</td>
<td>3 x 200 A</td>
</tr>
<tr>
<td><strong>LP 33 Series 120 kVA</strong></td>
<td>3 x 200 A</td>
<td>3 x 200 A</td>
<td>3 x 200 A</td>
<td>3 x 250 A</td>
</tr>
</tbody>
</table>
5.7.3 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

![Common input mains](image1)

### Separate input Rectifier & Bypass (optional)

![Separate input mains (optional)](image2)

<table>
<thead>
<tr>
<th>UPS model</th>
<th>Cable sections A, B, C, D, E and K recommended by EN - European Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A / B / C</td>
</tr>
<tr>
<td><strong>LP 33 Series 60 kVA</strong></td>
<td>4 x 25 + 16 mm²</td>
</tr>
<tr>
<td><strong>LP 33 Series 80 kVA</strong></td>
<td>4 x 35 + 25 mm²</td>
</tr>
<tr>
<td><strong>LP 33 Series 100 kVA</strong></td>
<td>4 x 50 + 25 mm²</td>
</tr>
<tr>
<td><strong>LP 33 Series 120 kVA</strong></td>
<td>4 x 70 + 35 mm²</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UPS model</th>
<th>Cable sections recommended in Switzerland</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A / B / C</td>
</tr>
<tr>
<td><strong>LP 33 Series 60 kVA</strong></td>
<td>4 x 35 + 25 mm²</td>
</tr>
<tr>
<td><strong>LP 33 Series 80 kVA</strong></td>
<td>4 x 50 + 25 mm²</td>
</tr>
<tr>
<td><strong>LP 33 Series 100 kVA</strong></td>
<td>4 x 70 + 35 mm²</td>
</tr>
<tr>
<td><strong>LP 33 Series 120 kVA</strong></td>
<td>4 x 95 + 50 mm²</td>
</tr>
</tbody>
</table>

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

Typical examples for the connection of the LP 33 Series 60 – 80 - 100 – 120 kVA.

**Single UPS with common input for rectifier & bypass**

![Diagram of Single UPS with common input for rectifier & bypass](image1)

**Single UPS with separate input for rectifier & bypass (option)**

![Diagram of Single UPS with separate input for rectifier & bypass](image2)

**UPS Parallel System with common input rectifier & bypass**

![Diagram of UPS Parallel System with common input rectifier & bypass](image3)

**UPS Parallel System with separate input for rectifier & bypass (option)**

![Diagram of UPS Parallel System with separate input for rectifier & bypass](image4)
5.8 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.

Carefully read the following recommendations before proceeding:
- Ensure that the AC and DC external isolators are Off, and prevent their inadverted operation.
- Do not close any external isolators prior to the commissioning of the equipment.
- The input/output cables must be put in order and fixed, taking care to avoid risk of short-circuit between different poles.
- The earthing and neutral connection of the electrical system must be in accordance with local regulations.
- In case of additional cabinets containing batteries, filters, input/ output transformers, etc, the earth must be connected to the UPS main earth.
- Once the power cables have been connected, re-install the internal safety shields and close the cabinets by re-installing all external panels.

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.
**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**.

**Separate input mains (option)**

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.
5.8.1 LP 33 Series 60 kVA - Power connection with common input mains

**X1 Mains 1**

*Mains input connection*

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

**X3 Load**

*Load output connection*

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

**NOTE !**

Max. rating X1 – X3 – X4 terminals: 50mm².
Input/output terminals must be tightened with a proper screwdriver applying torsion force 2.5 Nm.

**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.
5.8.2  LP 33 Series 80 kVA - Power connection with common input mains

**Fig. 5.8.2-1  Terminals for common input mains**

- **X1 Mains 1 - Mains input connection**
  - **L1-1** = Rectifier + Bypass Phase L1
  - **L2-1** = Rectifier + Bypass Phase L2
  - **L3-1** = Rectifier + Bypass Phase L3
  - **N1** = Mains Neutral
  - **PE** = Main Ground

- **X3 Load - Load output connection**
  - **L1** = Load Phase L1
  - **L2** = Load Phase L2
  - **L3** = Load Phase L3
  - **N2** = Load Neutral
  - **PE** = Load Ground

**NOTE !**

Max. rating X1 – X3 - X4 terminals: 70mm². Input/output terminals must be tightened with a proper screwdriver applying torsion force 3 Nm.

**Fig. 5.8.2-2  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.
5.8.3  LP 33 Series 100 - 120 kVA - Power connection with common input mains

**NOTE !**

Max. rating X1 – X3 - X4 terminals: 150mm².

*Input/output terminals must be tightened with a proper screwdriver applying torsion force 10 Nm.*

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

*Torque wrench at 22Nm.*

**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.
5.8.4  LP 33 Series - 60 kVA - Power connection with separate input mains (option)

**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. 5.8.4-1  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 = Neutral of Rectifier Mains
- 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 = Neutral of Bypass Mains

**X3 Load**
Load output connection

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

**NOTE!**
Max. rating X1 – X2 – X3 – X4 terminals: 50mm².
Input/output terminals must be tightened with a proper screwdriver applying torsion force 2.5 Nm.

**Fig. 5.8.4-2  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.
5.8.5   **LP 33 Series 80 kVA - Power connection with separate input mains (option)**

**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.

![Diagram showing terminals for separated input mains](image)

**Fig. 5.8.5-1   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** = Neutral of Rectifier Mains
- **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** = Neutral of Bypass Mains

**X3 Load**
**Load output connection**

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

**NOTE !**
Max. rating **X1 -X2 - X3 -X4 terminals**: 70mm².

Input/output terminals must be tightened with a proper screwdriver applying torsion force 3 Nm.

**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

![Diagram showing external battery connection](image)

**Fig. 5.8.5-2   External battery connection**

**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.
5.8.6 LP 33 Series 100 - 120 kVA - Power connection with separate input mains (option)

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.

---

**X1 Mains 1**
**Rectifier input mains connection**

- L1-1 = Rectifier Phase L1
- L2-1 = Rectifier Phase L2
- L3-1 = Rectifier Phase L3
- N1 = Neutral of Rectifier Mains
- 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 = Neutral of Bypass Mains

**X3 Load**
**Load output connection**

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

---

**NOTE!**
Max. rating X1 – X2 - X3 - X4 terminals: 150mm². Input/output terminals must be tightened with a proper screwdriver applying torsion force 10 Nm.
Main ground (PE) cables must be connected to bus-bar with M8 bolts. Torque wrench at 22Nm.

---

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

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.
**Bus connection RPA Parallel System**

Connect the control bus cable between the parallel units as indicated in the diagram Fig. 5.8.7-3.

![Diagram](image)

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

![Diagram](image)

**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.
Control bus location RPA Parallel System

Place the cables and connect them as indicated in the diagram Fig. 5.8.7-5/6 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 1 to 4 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.
5.9 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 5.8.1.

**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.
6 SYSTEM HANDLING

6.1 CONTROL PANEL

The control panel, positioned on the UPS front door, acts as the UPS user interface and comprises of the following elements:

- **Back lit Graphic Display (LCD) with the following characteristics:**
  - Multilanguage communication interface: English, German, Italian, Spanish, French, Finnish, Polish, Portuguese, Czech, Slovakian, Chinese, Swedish, Russian and Dutch.
  - Synoptic diagram indicating UPS status.

- **Command keys and parameters setting.**

- **UPS status control LED.**
6.2 TABLE OF FUNCTIONS AND INDICATIONS ON CONTROL PANEL

Key to switch the Inverter ON (I)

Key for Inverter shutdown (O)
Press key to transfers the Load to Mains.
Keep pressed for 5 seconds to shutdown the Inverter.
This key is also used as the EPO (Emergency Power Off) reset.

Key “Total Off”
The key “Total Off” is protected by a transparent cover.
By pressing it, you immediately separate the UPS from the Load.
It is possible to activate the command “Total Off” using the following screen:
COMMANDS / REQUEST TOTAL OFF. See Section 7.5.
Attention: “TOTAL Off” cannot disconnect the UPS from the Load with Q2 closed.

To reset “Total Off”
Restore the command “Total Off” by entering the screen:
COMMANDS / RESET TOTAL OFF

RPA
For Parallel System: if “Total Off” is pressed on one unit connected to the parallel bus (switch Q1 closed), all the units are separated from the load.
The “Total Off” reset must be done only on one unit connected to the parallel bus (switch Q1 closed).

NOTE!
Special care must be taken in using this command, in order to avoid accidental load disconnection.
LED Stop Operation (red colour)

It warns about the imminent inverter stop (default parameter = 3 min.) and the consequent load shutdown as result of:

- The battery is fully discharged and the load cannot be transferred on mains.
- Overtemperature or overload condition (>125%) and the load cannot be transferred on mains.

LED Alarm (yellow colour)

It blinks when one or more alarm is activated. The internal buzzer is ON. The LED remains lighted (with the alarm condition still present) and the buzzer stops when the key “MUTE” is pressed.

LED Alarm is lit when the load is not protected by UPS or in case Q1 is open.

LED Operation (green colour)

When lit, indicates that the UPS is functioning correctly and the load is system protected (Load supplied either from inverter or from Automatic Bypass in case of ECO Mode functionality).

When blinking, indicates that a regular maintenance service is needed (SERVICE REQUIRED). May be reset by a service technician only.

See Section 11 – Maintenance – Service check.

The LED is OFF when the output switch Q1 is open, indicating that the Inverter is in service mode, not supplying the load.

User LCD Interface

The user interface consists of a Back lit Graphic Display (LCD) having:

- Synoptic diagram indicating UPS status.
- UPS operating, AC and DC metering information.
- History of events (alarms and messages).
- Functionality can be programmed to meet customer needs by changing parameters.
- Operation commands of the UPS.
6.3 COMMAND 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

7.1 HOME SCREEN

The keys perform the following functions:

- **METER**: View electric parameters values and statistics of use. See Section 7.2.
- **ALARM**: Shows in chronological order, all the events occurred (alarms, messages, commands, handling, etc.). See Section 7.3.
- **MUTE**: Key to reset general alarm and buzzer.
- **SETUP**: Allows the user to customize some UPS functions to specific requirements and to view UPS identification data. See Section 7.4.
- **CMDS**: Allows the user to execute UPS operation commands. See Section 7.5.

The LCD screen, after 5 minutes of inactivity, shuts down the backlight. To reactivate it, it is sufficient to press any keys.

If the keypad remains inactive for 5 minutes or longer, during the viewing of a screen such as MEASURES, ALARMS, SETUP or CMDS, the LCD screen returns automatically to the main screen.

It is possible to view any key functional description by pushing the key for more than 3 seconds.

Pushing the key “MEASURES” and “ALARMS” together automatically sets the LCD communication for “ENGLISH”.

**Fig. 7.1-1 LCD display**
**Battery level LED**

All LED lights indicate a battery autonomy of 100%.

- **LED A**: Fixed: indicates a battery autonomy between 6% and 25%.
  Blinking: indicates a battery autonomy ≤5%.
- **LED A, B**: Indicates a battery autonomy between 26% and 50%.
- **LED A, B, C**: Indicates a battery autonomy between 51% and 99%.
- **Min**: Battery autonomy time in minutes estimates with actual load.

**Load level LED**

All LED Off indicate a load status at ≤25%.

- **LED A**: Indicates a load level between 26% and 50%.
- **LED A, B**: Indicates a load level between 26% and 50%.
- **LED A, B, C**: Indicates a load level between 51% and 75%.
- **LED A, B, C, D**: Indicates a load level between 76% and 100%.
- **LED D blinking**: Indicates a load level ≥125%.

**LEDs on synoptic diagram**

- **LED 1**: Mains rectifier OK
- **LED 2**: Mains bypass OK
- **LED 3**: Rectifier ON
- **LED 4**: Discharging battery
- **LED 5**: Booster ON
- **LED 6**: Charge battery ON
- **LED 7**: Inverter available
- **LED 8**: Inverter ON
- **LED 9**: Q1 closed
- **LED 10**: Automatic bypass ON
- **LED 11**: Manual Bypass Q2 ON
- **LED 12**: Load on UPS

**Examples of typical scenarios in the synoptic diagram:**

- **Load supplied by inverter**
- **Load supplied by automatic bypass**
- **Load supplied by manual bypass Q2**
- **Load supplied by battery**
7.2 METERING

The METERING mode is entered any time the "METER" key is pressed. The LCD screen will indicate a series of screenshots showing the measures of all electric parameters like AC, DC and various statistics.

In this mode the keys perform the following functions:

- Return to HOME screen.
- Scrolls backward to the previous screen.
- Scrolls forward to the next screen.

It is possible to view any key functional description by pushing the key for more than 3 seconds.

### Battery data screen

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Status of charger</th>
<th>Charger voltage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>OFF</td>
<td>240 Vdc</td>
<td>Battery open circuit voltage</td>
</tr>
<tr>
<td>Top</td>
<td>ON</td>
<td>Boost (294 Vdc)</td>
<td>Boost charge with new Battery</td>
</tr>
<tr>
<td>Float</td>
<td>ON</td>
<td>Floating (273 Vdc)</td>
<td>Battery charged</td>
</tr>
<tr>
<td>Low</td>
<td>ON</td>
<td>Floating (273 Vdc)</td>
<td>Normal charge</td>
</tr>
<tr>
<td>Boost</td>
<td>ON</td>
<td>Boost (294 Vdc)</td>
<td>Boost charge</td>
</tr>
<tr>
<td>Equalize</td>
<td>ON</td>
<td>Boost (294 Vdc)</td>
<td>Battery equalization</td>
</tr>
</tbody>
</table>

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

### Booster data screen

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Status of charger</th>
<th>Charger voltage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>f</td>
<td></td>
<td>50.0 Hz</td>
<td>The input frequency of the rectifier.</td>
</tr>
<tr>
<td>L1</td>
<td></td>
<td>397 V</td>
<td>Input line voltage L1, L2 and L3 phases.</td>
</tr>
<tr>
<td>L2</td>
<td></td>
<td>397 V</td>
<td>Input line voltage L1, L2 and L3 phases.</td>
</tr>
<tr>
<td>L3</td>
<td></td>
<td>393 V</td>
<td>Input line voltage L1, L2 and L3 phases.</td>
</tr>
<tr>
<td>Vp</td>
<td></td>
<td>400 V</td>
<td>Voltage of positive (+) booster string.</td>
</tr>
<tr>
<td>Vn</td>
<td></td>
<td>400 V</td>
<td>Voltage of negative (-) booster string.</td>
</tr>
</tbody>
</table>
### Bypass mains data screen

- **f** 50 Hz: The frequency of the mains.
- **L1** 230 V, **L2** 229 V, **L3** 231 V: 3-phase mains voltage PHASE /NEUTRAL.
- **Bypass**: Bypass status: FREE / LOCKED.

### Inverter data screen

- **f** 50 Hz: The output frequency of the Inverter.
- **L1** 230 V, **L2** 230 V, **L3** 230 V: 3-phase output voltage PHASE/NEUTRAL.
- **T** OK: The temperature of the inverter bridge (OK / MAX).
- **SYNCHRONIZED**: The synchronization status of the inverter with respect to mains (Synchronized / Not Synchronized).

### Module load screen

- **L1**: 230 V 72.0 A 50 %
- **L2**: 230 V 58.0 A 40 %
- **L3**: 230 V 43.0 A 30 %

### Statistics screen

- **Bypass mains failure**: 53
- **Rectifier mains failure**: 35
- **Overloads**: 15
- **InvOperTime [h]**: 2135
- **UPSOperTime [h]**: 3125

**ECO Mode statistic screen**

This screen is enabled only for a single UPS, not for an RPA Parallel System.

- **NUMBER OF FAST TRANSIENTS**
  - <2ms: 25
  - >2ms: 20
  - >5ms: 7
  - >10ms: 5

- **ECO MODE RATE**: 70 %

The number of fast transients occurred on the bypass utility on the last seven days.

The statistic evaluation in % (100= good; 0= bad) of the utility, for the ECO mode operation.
7.3 ALARMS

The ALARMS mode is entered any time the “ALARM” key is pressed.

The LCD will display a series of screens corresponding to the last 255 events, two events per screen (LEVEL 1 USER).

In this mode the keys perform the following functions:

- Return to HOME screen.
- Scrolls backward to the previous screen.
- Scrolls forward to the next screen.
- Move forward to the following event.
- Move back to the following previous event.
- Confirm the selection made.

It is possible to view any key functional description by pushing the key for more than 3 seconds.

The events displayed are the standard GE events as described in the Section 7.3.1 - EVENTS (Alarms and Messages).

---

### Alarms screen

<table>
<thead>
<tr>
<th>LEVEL 1</th>
<th>USER</th>
</tr>
</thead>
<tbody>
<tr>
<td>NR 255</td>
<td>03.03.2009 15.37.25</td>
</tr>
<tr>
<td>C 4404</td>
<td>K6 CLOSING FAILURE</td>
</tr>
<tr>
<td>S 00008180</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL 2</th>
<th>SERVICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NR 254</td>
<td>01.03.2009 12.45.57</td>
</tr>
<tr>
<td>C 4583</td>
<td>COMMAND TO SYNCHRONIZE</td>
</tr>
<tr>
<td>S 00008180</td>
<td></td>
</tr>
</tbody>
</table>

---

### Screen of user alarms

<table>
<thead>
<tr>
<th>NR 255</th>
<th>03.03.2009 15.37.25</th>
</tr>
</thead>
<tbody>
<tr>
<td>C 4404</td>
<td>K6 CLOSING FAILURE</td>
</tr>
<tr>
<td>S 00008180</td>
<td></td>
</tr>
</tbody>
</table>

**NR** Number chronologically assigned to an event (Nr. 255 is the more recent, Nr. 1 is the first).
Date and exact hour of the moment when the event occurred.

**C** Number of standard GE code of the event and an explicit text describing the event in the selected languages.

**S** Status code of the UPS.
7.3.1 Events (alarms and messages)

Each of the following listed events, alarm or message, can be displayed on the LCD screen, on a PC with the software “GE Data Protection” installed or with the monitoring system “GE Power Diagnostic”.

Alarms and Messages are differently specified because the alarms are indicating an abnormal functioning of the UPS (which are additionally signalled with the LED Alarm and acoustically with the buzzer), while the messages indicate the various states of operation of the UPS (stored in the events list, but not activating the LED Alarm and the acoustical alarm).

7.3.2 Alarms list

<table>
<thead>
<tr>
<th>Code</th>
<th>Alarm</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>4000</td>
<td>SETUP VALUES LOST</td>
<td>Parameters are lost and have been replaced with default values.</td>
</tr>
<tr>
<td>4001</td>
<td>REGULATION BOARD FAILURE</td>
<td>Voltage supply +/-15 Vdc has been detected out of tolerance on the P2 - Mainboard or the programmable circuits are defective.</td>
</tr>
<tr>
<td>4100</td>
<td>RECTIFIER FUSES FAILURE</td>
<td>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.</td>
</tr>
<tr>
<td>4102</td>
<td>K4 CLOSING FAILURE</td>
<td>K4 not closed despite a closing command being done. The rectifier is switched OFF.</td>
</tr>
<tr>
<td>4103</td>
<td>K4 OPENING FAILURE</td>
<td>K4 not open despite an opening command being done. The rectifier is switched OFF.</td>
</tr>
</tbody>
</table>
| 4104 | BATTERY FUSES | Alarm due to one of the following conditions:  
- The voltage of one or both battery strings was measured less then 50V that the battery probably is not connected to the UPS (open fuses).  
- The function DC-Fuses, activated on one of the input channels of the Customer Interface, indicates open battery fuses. |
<p>| 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. |</p>
<table>
<thead>
<tr>
<th>Code</th>
<th>Alarm</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>4130</td>
<td>TURN ON RECT. OR SHUTDOWN UPS</td>
<td>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.</td>
</tr>
<tr>
<td>4140</td>
<td>RECTIFIER CONTROL FAILURE</td>
<td>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.</td>
</tr>
<tr>
<td>4301</td>
<td>INVERTER FUSES FAILURE</td>
<td>Inverter output fuses blown. Signalled by electronic detector. Inverter can be started manually after replacement of fuses.</td>
</tr>
<tr>
<td>4304</td>
<td>K7 CLOSING FAILURE</td>
<td>K7 not closed despite a closing command being done. Signalled by auxiliary contact. The load will be supplied by mains.</td>
</tr>
<tr>
<td>4305</td>
<td>K7 OPENING FAILURE</td>
<td>K7 not open despite an opening command being done. Signalled by auxiliary contact. The load will be supplied by mains.</td>
</tr>
<tr>
<td>4312</td>
<td>INV. VOLTAGE OUT OF TOLERANCE</td>
<td>Inverter output voltage is out of the tolerances defined in respective parameter (±10%). Inverter is switched OFF.</td>
</tr>
<tr>
<td>4320</td>
<td>ISMAX DETECTION</td>
<td>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.</td>
</tr>
<tr>
<td>4340</td>
<td>INVERTER CONTROL FAILURE</td>
<td>The slave oscillator is not synchronised with the master, thus causing the shutdown of it's inverter.</td>
</tr>
<tr>
<td>4347</td>
<td>OSCILLATOR FAILURE</td>
<td>Auto calibration of the Inverters freerun frequency was not possible. The oscillator frequency of this unit is out of tolerance.</td>
</tr>
<tr>
<td>4402</td>
<td>RECTIFIER CANNOT BE TURNED ON</td>
<td>The rectifier cannot be turned on because the DC link voltage has not reached the requested value.</td>
</tr>
<tr>
<td>4404</td>
<td>K6 CLOSING FAILURE</td>
<td>K6 not closed despite a closing command being done. Signalled by auxiliary contact. The load cannot be supplied by electronic bypass.</td>
</tr>
<tr>
<td>4405</td>
<td>K6 OPENING FAILURE</td>
<td>K6 not open despite an opening command being done. Signalled by auxiliary contact.</td>
</tr>
<tr>
<td>4410</td>
<td>BYPASS MAINS OUT OF TOLERANCE</td>
<td>The mains bypass voltage is out of the tolerances (±10%). K6 opens, synchronisation with mains is inhibited and transfer to mains is blocked.</td>
</tr>
<tr>
<td>4520</td>
<td>NO INVERTER POWER</td>
<td>The load supplied by utility is over 100%. The load remains blocked on utility as long as alarm overload is active.</td>
</tr>
<tr>
<td>4530</td>
<td>LOAD LOCKED ON MAINS</td>
<td>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).</td>
</tr>
<tr>
<td>Code</td>
<td>Alarm</td>
<td>Meaning</td>
</tr>
<tr>
<td>--------</td>
<td>------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>4531</td>
<td>LOAD ON MAINS BY ERROR DETECTOR</td>
<td>Load is transferred to mains because the error detector detected a disturbance on the output voltage.</td>
</tr>
<tr>
<td>4563</td>
<td>EMERGENCY OFF ACTIVATED</td>
<td>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.</td>
</tr>
<tr>
<td>4570</td>
<td>OVERLOAD</td>
<td>The UPS-System is in an overload condition &gt;125% on inverter, or &gt;150% on mains. A sequence of “stop operation” starts. Time out depending on load quantity.</td>
</tr>
<tr>
<td>4571</td>
<td>OVERLOAD: LOAD ON MAINS</td>
<td>With mains bypass supply available and load &gt;115%, the load is transferred on mains. Load will be transferred again automatically on inverter when load will be &lt;100%.</td>
</tr>
<tr>
<td>4581</td>
<td>INVERTER AND MAINS NOT SYNCHRONIZED</td>
<td>The voltages of mains and inverter are not synchronised, which causes the opening of K6.</td>
</tr>
<tr>
<td>4697</td>
<td>BATTERY OVERTEMPERATURE</td>
<td>The battery temperature exceeds the value inserted in parameter. Disabled with parameter (service only).</td>
</tr>
<tr>
<td>4698</td>
<td>BATTERY POWER INSUFFICIENT</td>
<td>In case of utility failure, with the actual load, the autonomy time would result below “stop operation” time (default 3 minutes).</td>
</tr>
<tr>
<td>4700</td>
<td>DC LOW</td>
<td>Battery voltage is at the lowest limit. Shutdown of inverter until the battery voltage reaches the value in respective parameter.</td>
</tr>
<tr>
<td>4900</td>
<td>LOAD LOCKED ON INVERTER</td>
<td>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.</td>
</tr>
<tr>
<td>4955</td>
<td>OVERTEMPERATURE</td>
<td>An overtemperature condition has been detected on inverter. Elapsed “stop operation” time, inverter shutdown. With mains available, load is transferred on mains.</td>
</tr>
<tr>
<td>4998</td>
<td>LOAD OFF DUE TO EXTENDED OVERLOAD</td>
<td>Load Off after time-out of “stop operation” for overload on inverter or bypass (time depending on the % of overload).</td>
</tr>
<tr>
<td>4999</td>
<td>LOAD OFF DUE TO LOW BATT. OR TEMP.</td>
<td>Load Off after time-out of “stop operation” with missing mains due to battery low voltage or overtemperature condition.</td>
</tr>
</tbody>
</table>
### 7.3.3 Messages list

<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>4111</td>
<td>RECTIFIER MAINS OK</td>
<td>Rectifier input mains is again within the admitted tolerance (voltage, frequency and phase).</td>
</tr>
<tr>
<td>4114</td>
<td>UPS SHUTDOWN (LOW BATTERY VOLTAGE)</td>
<td>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.</td>
</tr>
<tr>
<td>4119</td>
<td>BATTERY TEST STARTED</td>
<td>Start of manual or automatic battery test. Rectifier output voltage is decreased to the value defined by respective parameter.</td>
</tr>
<tr>
<td>4120</td>
<td>BATTERY TEST STOPPED</td>
<td>End battery test. End of manual or automatic battery test. Rectifier output voltage is restored to floating voltage.</td>
</tr>
<tr>
<td>4141</td>
<td>ISMAX DETECTION RECTIFIER</td>
<td>Detection of persistent booster Is current limitation.</td>
</tr>
<tr>
<td>4161</td>
<td>RECTIFIER ON</td>
<td>Rectifier received the command to switch ON.</td>
</tr>
<tr>
<td>4162</td>
<td>RECTIFIER OFF</td>
<td>Rectifier received the command to switch OFF for: input mains out of tolerance / EPO / UDC max.</td>
</tr>
<tr>
<td>4163</td>
<td>GENERATOR ON</td>
<td>Customer Interface (X1 / 11, 22) received a Gen set ON signalling. Operating mode dependent on setting of respective parameters.</td>
</tr>
<tr>
<td>4164</td>
<td>GENERATOR OFF</td>
<td>Customer Interface (X1 / 11, 22) received a Gen set OFF signalling. Function bypass enabled dependent on setting of respective parameter.</td>
</tr>
<tr>
<td>4302</td>
<td>INVERTER CANNOT BE TURNED ON</td>
<td>Inverter cannot be switched on because one of the following conditions are still present:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Overtemperature</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Low battery voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Inverter fuses</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Overload</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- K7 opening failure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- High battery voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- DC low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- EPO (Emergency Power Off)</td>
</tr>
<tr>
<td>4303</td>
<td>INVERTER CANNOT BE TURNED OFF</td>
<td>Inverter cannot be switched OFF, because the load cannot be transferred on mains (voltage out of tolerance, not synchronising, bypass blocked).</td>
</tr>
<tr>
<td>4361</td>
<td>INVERTER ON</td>
<td>The command to start the inverter has been activated on the control panel.</td>
</tr>
<tr>
<td>4362</td>
<td>INVERTER OFF</td>
<td>The command to switch OFF the inverter has been done by the control panel or automatically for alarm detection.</td>
</tr>
<tr>
<td>4411</td>
<td>BYPASS MAINS OK</td>
<td>Bypass input mains is again within the admitted tolerance (voltage, frequency and phase).</td>
</tr>
<tr>
<td>4500</td>
<td>COMMAND TOTAL OFF</td>
<td>Disconnection of the load by opening K4, K6 and K7 for: EPO / Total Off / Overload / Stop operation.</td>
</tr>
<tr>
<td>4521</td>
<td>NO BYPASS POWER</td>
<td>With the load supplied by electronic bypass, a mains failure or K6 opening occurred.</td>
</tr>
<tr>
<td>4534</td>
<td>MULTIPLE LOAD TRANSFER</td>
<td>2 transfers inverter-mains have been detected in a short time, defined by respective parameter (default 30 seconds).</td>
</tr>
<tr>
<td>Code</td>
<td>Message</td>
<td>Meaning</td>
</tr>
<tr>
<td>------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>4535</td>
<td>BYPASS LOCKED</td>
<td>Transfer on mains not enabled due to settings of respective parameters. Contactor K6 is open.</td>
</tr>
<tr>
<td>4536</td>
<td>BYPASS FREE</td>
<td>Settings of respective parameters enable bypass transfer on mains. Contactor K6 can be closed.</td>
</tr>
<tr>
<td>4561</td>
<td>TOTAL OFF</td>
<td>Key Total Off behind the front door has been pressed, with the output circuit breaker Q1 closed.</td>
</tr>
<tr>
<td>4562</td>
<td>DETOUR ON</td>
<td>The auxiliary contact indicates that manual bypass Q2 has been closed.</td>
</tr>
<tr>
<td>4564</td>
<td>DETOUR OFF</td>
<td>The auxiliary contact indicates that manual bypass Q2 has been opened.</td>
</tr>
<tr>
<td>4567</td>
<td>COMMAND LOAD ON MAINS</td>
<td>The control unit received a command to transfer the load on mains.</td>
</tr>
<tr>
<td>4568</td>
<td>COMMAND LOAD ON INVERTER</td>
<td>The control unit received a command to transfer the load on inverter.</td>
</tr>
<tr>
<td>4572</td>
<td>NO MORE OVERLOAD</td>
<td>End of the overload condition previously detected with alarm 4570.</td>
</tr>
<tr>
<td>4580</td>
<td>INVERTER AND MAINS SYNCHRONIZED</td>
<td>The voltages of inverter and mains bypass are synchronised.</td>
</tr>
<tr>
<td>4582</td>
<td>COMMAND NOT TO SYNCHRONIZE</td>
<td>Command not to synchronise with mains has been done for: mains bypass out of tolerance (4410) or setting respective parameters.</td>
</tr>
<tr>
<td>4583</td>
<td>COMMAND TO SYNCHRONIZE</td>
<td>Command to synchronise with mains has been done for: mains BP OK (4410) or setting respective parameters.</td>
</tr>
<tr>
<td>4600</td>
<td>COMMAND UPS ON</td>
<td>The ECO Mode function has been disabled or the programmed time is expired. The UPS returns to VFI mode supplying the load normally by inverter.</td>
</tr>
<tr>
<td>4601</td>
<td>COMMAND UPS STANDBY</td>
<td>The function ECO Mode is enabled, and according to the time program the UPS will run in ECO Mode, supplying the load normally by mains.</td>
</tr>
<tr>
<td>4602</td>
<td>Q1 OPEN</td>
<td>The auxiliary contact indicates that the output switch Q1 has been opened.</td>
</tr>
<tr>
<td>4603</td>
<td>Q1 CLOSED</td>
<td>The auxiliary contact indicates that the output switch Q1 has been closed.</td>
</tr>
<tr>
<td>4699</td>
<td>BATTERY TEST IMPOSSIBLE</td>
<td>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%</td>
</tr>
<tr>
<td>4763</td>
<td>REMOTE CONTROL ON</td>
<td>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 Remote Control 2 = Both</td>
</tr>
<tr>
<td>4764</td>
<td>REMOTE CONTROL OFF</td>
<td>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 Remote Control 2 = Both</td>
</tr>
</tbody>
</table>
7.3.4 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.

Unit No: __________ - __________ - __________
Customer: ..................................................................
Date: __________ / __________ / __________

Series No: ............
UPS rating: ............ kVA
Place: ..................................................................
Sent by: ..................................................................

1. Record the exact UPS status on the panel when the failure appeared.

   LED 1  □ ON  □ OFF
   LED 2  □ ON  □ OFF
   LED 3  □ ON  □ OFF
   LED 4  □ ON  □ OFF
   LED 5  □ ON  □ OFF
   LED 6  □ ON  □ OFF
   LED 7  □ ON  □ OFF
   LED 8  □ ON  □ OFF
   LED 9  □ ON  □ OFF
   LED 10 □ ON  □ OFF
   LED 11 □ ON  □ OFF
   LED 12 □ ON  □ OFF
   LOAD ........................................................ %
   BATTERY .............................................. minutes

2. On the LCD panel, enter the Alarms Mode and record the alarms/messages in the list below indicating at least 5 events before the failure time.

   Event No. Event Code UPS Status Date Time h. m. s
   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 actions taken:

Actual situation:

Remarks:
7.4 SETUP

The SETUP mode is entered any time the “SETUP” key is pressed.

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

The LCD will display a series of screens containing the user parameters, accessible without password protection.

In this mode the keys perform the following functions:

- Return to HOME screen.
- Scrolls backward to the previous screen.
- Scrolls forward to the next screen.
- Confirm selected choice of USER / SERVICE level.

Description of the keys to set or modify the parameters:

- Allows to exit a selected screen without making any modification.
- Scrolls backward to the previous line.
- Scrolls forward to the next line.
- Allows to access a value to be set or modified.
- Select, on the same line, the following value or letter to set or modify.
- Set or modify the selected value.
- Save the set or modified value and return to the selected screen.

It is possible to view any key functional description by pushing the key for more than 3 seconds.

### UPS identification screen

<table>
<thead>
<tr>
<th>UPS IDENTIFICATION</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>UPS 0</td>
</tr>
<tr>
<td>Model</td>
<td>LP Series S2 100kVA</td>
</tr>
<tr>
<td>S/N</td>
<td>L2100-1109-0001</td>
</tr>
<tr>
<td>UPS SW Version</td>
<td>xxx</td>
</tr>
<tr>
<td>Display SW Version</td>
<td>xxx</td>
</tr>
</tbody>
</table>

ID Number of UPS in the RPA Parallel System (0 for single unit).

Model UPS model, series number and power range.

S/N The UPS serial number.

UPS SW The UPS software version.

Display SW The LCD display software version.
Setup screen

LEVEL 1 USER
Displays a sequence of screens with parameters which can be user defined.

LEVEL 2 SERVICE
Service only allowed.
At this level the parameters access is protected by a code.

Date and time screen

Date You can adjust the date of the real time clock existing in the UPS by the means of this parameter.
The value you enter is thoroughly checked to be a correct date in the format “DD.MM.YY”.

Hour You can adjust the time of the real time clock existing in the UPS by means of this parameter.
The value you enter is thoroughly checked to be a correct time in the format “HH.MM.SS”.
The time is specified in 24-hour format.

Modem screen 1

Enabled You can enable/disable with Y/N the remote control through modem calls by using this parameter.
For modem connection, the default setting is for serial port J3 on P4 – Customer Interface.

Init This parameter presents the modem initialisation string.
It can be 40 characters long.

When editing this parameter the UPS considers that a blank character terminates the string.
If no blank character is found then all 40 characters are used.

Alarm call
This Y/N parameter 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 dialing.
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.

Tel 1
This parameter specifies a first telephone number to be used for modem dial-out.
The telephone number has a maximum 40 characters and cannot contain blanks.
If the desired number is shorter than 40 characters, the string will finish with blanks.

Tel 1 enabled
This parameter Y/N specifies if the first telephone number (Tel 1) will be used for dial-out.
Modem screen 2

Tel 2
It records the second dial-out number.
Tel 2 enabled
This parameter Y/N specifies if the second telephone number will be used for dial-out.
Tel 3
It records the third dial-out number.
Tel 3 enabled
This parameter Y/N specifies if the third telephone number will be used for dial-out.

LCD Display screen

UPS Name
The user can choose the name of the UPS model shown on the main page (max. 9 characters).
Language
This parameter allows the choice of language used to display the information.
Valid choices are: English, German, Italian, Spanish, French, Finnish, Polish, Portuguese, Czech, Slovakian, Chinese, Swedish, Russian and Dutch.
Contrast
This parameter controls the contrast of the LCD screen in ten steps (0 – 9).

ECO MODE screen

This screen is enabled only for a single UPS, not for an RPA Parallel System.

Enabled
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 / deactivation 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.

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

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

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

HOURS / DAY:
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 Mode START times to 00:00 and the ECO Mode STOP times to 23:59 for all weekdays, but almost 1 day must have 1 minute of VFI programmation: i.e d2 - Sunday 00:00 to 23:58).

<table>
<thead>
<tr>
<th>Weekday</th>
<th>d1 - Saturday</th>
<th>d2 - Sunday</th>
<th>d3 - Monday</th>
<th>d4 - Tuesday</th>
<th>d5 - Wednesday</th>
<th>d6 - Thursday</th>
<th>d7 - Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECO Mode START</td>
<td>00:00</td>
<td>00:00</td>
<td>00:00</td>
<td>00:00</td>
<td>00:00</td>
<td>00:00</td>
<td>00:00</td>
</tr>
</tbody>
</table>

**Example 2:**
ECO Mode STOP before ECO Mode START.
ECO Mode START 18:00, ECO Mode 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.

<table>
<thead>
<tr>
<th>Weekday</th>
<th>d1 - Saturday</th>
<th>d2 - Sunday</th>
<th>d3 - Monday</th>
<th>d4 - Tuesday</th>
<th>d5 - Wednesday</th>
<th>d6 - Thursday</th>
<th>d7 - Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECO Mode START</td>
<td>00:00</td>
<td>00:00</td>
<td>00:00</td>
<td>18:00</td>
<td>00:00</td>
<td>00:00</td>
<td>00:00</td>
</tr>
</tbody>
</table>

**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:

<table>
<thead>
<tr>
<th>Weekday</th>
<th>d1 - Saturday</th>
<th>d2 - Sunday</th>
<th>d3 - Monday</th>
<th>d4 - Tuesday</th>
<th>d5 - Wednesday</th>
<th>d6 - Thursday</th>
<th>d7 - Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECO Mode START</td>
<td>00:00</td>
<td>00:00</td>
<td>18:00</td>
<td>18:00</td>
<td>18:00</td>
<td>18:00</td>
<td>18:00</td>
</tr>
<tr>
<td>ECO Mode STOP</td>
<td>23:59</td>
<td>23:59</td>
<td>06:00</td>
<td>06:00</td>
<td>06:00</td>
<td>06:00</td>
<td>06:00</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Weekday</th>
<th>d1 - Saturday</th>
<th>d2 - Sunday</th>
<th>d3 - Monday</th>
<th>d4 - Tuesday</th>
<th>d5 - Wednesday</th>
<th>d6 - Thursday</th>
<th>d7 - Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECO Mode START</td>
<td>00:00</td>
<td>00:00</td>
<td>18:00</td>
<td>18:00</td>
<td>00:00</td>
<td>00:00</td>
<td>12:00</td>
</tr>
<tr>
<td>ECO Mode STOP</td>
<td>23:59</td>
<td>20:00</td>
<td>23:59</td>
<td>06:00</td>
<td>06:00</td>
<td>00:00</td>
<td>13:00</td>
</tr>
</tbody>
</table>

In dark colour are displayed the times with ECO Mode operation.
The arrows indicate the conditions given by the ECO Mode START and ECO Mode STOP times introduced with the parameters.
Note that on day d6 - Thursday 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.

<table>
<thead>
<tr>
<th>Weekday</th>
<th>d1 - Saturday</th>
<th>d2 - Sunday</th>
<th>d3 - Monday</th>
<th>d4 - Tuesday</th>
<th>d5 - Wednesday</th>
<th>d6 - Thursday</th>
<th>d7 - Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECO Mode START</td>
<td>00:00</td>
<td>00:00</td>
<td>18:00</td>
<td>18:00</td>
<td>06:00</td>
<td>09:00</td>
<td>12:00</td>
</tr>
<tr>
<td>ECO Mode STOP</td>
<td>23:59</td>
<td>20:00</td>
<td>18:00</td>
<td>06:00</td>
<td>09:00</td>
<td>13:00</td>
<td></td>
</tr>
</tbody>
</table>

The ECO Mode is active from 18:00 of weekday \(d_3\) - Monday until 06:00 of weekday \(d_4\) - Tuesday (as indicated by the ECO Mode STOP time of weekday \(d_4\) - Tuesday).

The ECO Mode STOP time of weekday \(d_3\) - Monday has no effect as it is followed by the ECO Mode STOP time of weekday \(d_4\) - 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 \(d_4\) - Tuesday until 06:00 of weekday \(d_5\) - Wednesday.

The ECO Mode START time of weekday \(d_5\) - Wednesday has no effect as it is preceded by the ECO Mode START time of weekday \(d_4\) - Tuesday.

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

NOTE!

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 will become active only if the load is supplied from the inverter.
7.5 COMMANDS

The COMMANDS mode is entered any time the “COMMANDS” key is pressed. Allows the user to execute UPS operation commands.

In this mode the keys perform the following functions:

- Return to HOME screen.
- Scrolls forward to the next screen.
- Scrolls forward to the next line.
- Confirm the selection made.

It is possible to view any key functional description by pushing the key for more than 3 seconds.

Commands screen 1

LAMP TEST
Signalling LEDs test and buzzer test (all LED should be lit and blinking and the acoustical alarm should be activated).

INVERTER ON
Command to switch the inverter.

INVERTER OFF
Command to shutdown the inverter.

BOOSTER ON (Service)
Service only allowed.

Commands screen 2

RESET TOTAL OFF
Restore of the command “Total Off”.

REQUEST TOTAL OFF
Command “Total Off”.

Screen sequence to execute the command “Total Off”: As the command procedure of “Total Off” is finished the “REQUEST TOTAL OFF” screen appears again.
8 OPERATION

8.1 PROCEDURES FOR SINGLE LP 33 Series

8.1.1 Start-up of the LP 33 Series

**WARNING !**
Before proceeding to turn on the UPS system, ensure that the AC and DC external isolators are OFF, and prevent their inadvertent operation.
Ensure that the output load distribution can be powered and all the output isolators are open.

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

Open the front door and make sure that:
- All the **connections** to the input/output terminals of the UPS have been made correctly.
- The **safety screens** are fixed in their position.
- The switches Q1 and Q2 are **open (Pos. O)** and the “**External Battery fuses**” are removed.

1. **Switch-ON the mains voltage from the input distribution (both rectifier and bypass if separated).**
   
   The UPS performs a **SELFTEST**.
   A successful termination of the tests will be indicated with Overall test results “OK”.
   Commissioning cannot be continued should one or more tests result to be negative.
   Please contact in this case your **Service Centre**.

   At this stage the electronic power supply is switched ON and the buzzer sounds.

   **LED 1 (mains rectifier OK) and LED 2 (mains bypass OK) must be lit.**
   Press “**MUTE**” key to reset acoustical alarm. **LED Alarm** remains lit.
During the first commissioning LP 33 Series requests a set up of the UPS configuration parameters presented in the following screens.

Without such configuration it is not possible to continue with the commissioning procedure.

### WARNING!

The setup of the UPS configuration parameters must be done only by QUALIFIED AND TRAINED PERSONNEL.

The setup of mistaken values could compromise the integrity and reliability of the UPS.

In this mode the keys perform the following functions:

- **Confirm the selection made and select the next parameter.**
- **Re-establish default value.**
- **Modify or insert the selected value.**
- **Save the configuration of set parameters.**

#### DISPLAY CONFIGURATION screen

Select language

This parameter allows the choice of language used to display the information.

#### UPS CONFIGURATION screen

**Input frequency**

Input frequency value (*50Hz).

**Output frequency**

Inverter output frequency value (*50Hz).

**Inverter voltage**

Output voltage PHASE/NEUTRAL of the inverter (220V/230V/240V).

*) Configuration of the frequency to 60Hz requires the intervention of a Service Centre.

Continue ➤
### BATTERY CONFIGURATION

**Type**: Lead Acid
**Float voltage**: 273 V
**Recharge current**: 015.0 A
**Autonomy time**: 010 min
**Stop Operation time**: 003 min
**Capacity**: 0066 Ah, Cells: 120

---

**Float voltage**
Voltage to maintain battery charging (insert the value of single battery string).

\[
\text{Float voltage} = \text{Number of battery cells} \times \text{battery float voltage per cell.}
\]

Typical battery float voltage per cell (ask the battery manufacturer for confirmation):

\[
\text{Lead - Acid (VRLA)}: \quad 2.27 \text{ Vdc for cell} \quad 120 \text{ cells} \times 2.27 \text{ Vdc} = 273 \text{ Vdc}
\]

**Recharge current**
Maximum battery recharge current: 15 A

**Autonomy time**
The autonomy time of the battery.
UPS autonomy on battery mode at full load condition.
This value is calculated based on the **battery type**, **capacity**, and **number of cells**.

#### Autonomy times for lead acid batteries (VRLA)

<table>
<thead>
<tr>
<th>UPS Model</th>
<th>Battery with expected trickle life 5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>33Ah</td>
</tr>
<tr>
<td>LP 33 Series 60 kVA</td>
<td>9</td>
</tr>
<tr>
<td>LP 33 Series 80 kVA</td>
<td>-</td>
</tr>
<tr>
<td>LP 33 Series 100 kVA</td>
<td>-</td>
</tr>
<tr>
<td>LP 33 Series 120 kVA</td>
<td>-</td>
</tr>
</tbody>
</table>

Autonomy time for battery supplied by GE UPS manufacturer.

**Stop Operation time**
Residual battery autonomy time before UPS forced shutdown. Standard set 3 minutes.
Settable from 1 minute to autonomy time in minutes (see tables).

**Capacity**
Ah capacity of the battery.

**Cells**
Number of cells of the battery (insert the value of single battery string).

\[
\text{Lead - Acid (VRLA)}: \quad 120 \text{ cells}
\]

---

**NOTE!**
The values indicated above, must be considered as standard values.
The actual programmed values must be the ones defined from the battery manufacturer.

---

### CONFIGURATION

**CONFIGURATION screen**

Save and exit?

- Yes

#### CONFIGURATION screen

Screen to save the configuration of set parameters.

Any additional modification of setup parameters can be done only by a GE SERVICE PERSON as it requires an access code.
2. **Insert the external battery fuses.**
   In case of GE battery cabinet: insert the fuses in their place and close fully the cover of fuse-holder by using correctly the handle.

   ![](image1)
   **DANGER !**
   Before to perform this operation, check the right DC polarities on both side of the switch/fuse holder!

3. **Close the output switch Q1 (Pos. I).**
   The load is supplied by the mains through the automatic bypass.

   The synoptic diagram must display the status "LOAD SUPPLIED BY AUTOMATIC BYPASS".

   Verify, selecting the screen METERING/BOOSTER/Vp and Vn, that the booster voltage has reached about 400 Vdc.

4. **Insert the inverter by pressing "Inverter ON" (I) key.**
   Some seconds later the load will be transferred on inverter.
   LED Alarm turn Off and the LED Operation must be lit.

   The synoptic diagram must display the status "LOAD SUPPLIED BY INVERTER".

5. **Load supply.**
   Your LP 33 Series UPS is now running in VFI mode, supplying power to the output.
   Insert the loads one by one to the output of the UPS.
   Check the output current value of L1, L2 and L3 and check for correct load balance.

6. **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 7.4 SETUP / ECO MODE).

---

**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 at least 10 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. **Disconnect the inverter by pressing “Inverter OFF” (O) key and hold until the LED Inverter (7) turns OFF.**
   - Load is transferred to mains by automatic bypass.
   - LED Alarm is lit and the LED Operation is Off.
   - The synoptic diagram must display the status “LOAD SUPPLIED BY AUTOMATIC BYPASS”.

2. **Close the manual bypass switch Q2 (Pos. I).**
   - Load is now supplied parallel through automatic bypass and manual bypass Q2.
   - The synoptic diagram must display the status “LOAD SUPPLIED BY AUTOMATIC BYPASS AND MANUAL BYPASS Q2”.

3. **Open the output switch Q1 (Pos. 0).**
   - The load is now supplied only through the manual bypass Q2.
   - The synoptic diagram must display the status “LOAD SUPPLIED BY MANUAL BYPASS Q2”.

4. **Press “Total Off” key.**

5. **Remove the external battery fuses.**
   - In case of GE battery cabinet:
     - Open fully and remove the cover of fuse-holder by using correctly the handle;
     - Remove the fuses from their place, re-install and close fully the cover of fuse-holder.
   - The acoustical alarm is activated, press “MUTE” key to reset it.

Continue ►
6. **In order to discharge the DC link capacitors, insert the inverter by pressing “Inverter ON” (I) key.**

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

   ![Home\Meter](INSERT_IMAGE)

<table>
<thead>
<tr>
<th>INVERTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>f : 50.0 Hz</td>
</tr>
<tr>
<td>L1 : 7 V</td>
</tr>
<tr>
<td>L2 : 7 V</td>
</tr>
<tr>
<td>L3 : 7 V</td>
</tr>
<tr>
<td>T : OK</td>
</tr>
<tr>
<td>SYNCHRONISED</td>
</tr>
</tbody>
</table>

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

   The *acoustical alarm* is activated, press “MUTE” key (from Home screen) to reset it.

   ![Home\Meter](INSERT_IMAGE)

<table>
<thead>
<tr>
<th>BOOSTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>f : 50.0 Hz</td>
</tr>
<tr>
<td>L1 : 397 V</td>
</tr>
<tr>
<td>L2 : 395 V</td>
</tr>
<tr>
<td>L3 : 393 V</td>
</tr>
<tr>
<td>Vp : 5 V</td>
</tr>
<tr>
<td>Vn : 5 V</td>
</tr>
</tbody>
</table>

7. **Disconnect the inverter by pressing “Inverter OFF” (O) key and hold until the LED Inverter (7) turns OFF.**

   The load is now powered directly by mains through the **MANUAL BYPASS Q2.**

   ![Diagram](INSERT_IMAGE)

   **END OF PROCEDURE**

   **WARNING !**
   If the above procedure is not completely performed, it could cause serious damages to the UPS.
   In case the procedure described on step “6 - Discharge DC link capacitors” cannot be completely performed, the DC capacitors could be charged with dangerous voltage for min.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.

   ![Warning](INSERT_IMAGE)

   **NOTE !**
   With separate mains inputs, it’s possible to disconnect mains rectifier.
8.1.3 From Manual Bypass Q2 to normal function VFI

This procedure presupposes that the load is powered by the manual bypass switch, and:
- The inverter is switched OFF;
- The manual bypass switch Q2 is closed (Pos. I);
- The output switch Q1 is open (Pos. 0);
- The external battery fuses are removed;
- LED Alarm blinks.

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

1. **Insert the external battery fuses.**
   In case of GE battery cabinet: insert the fuses in their place and close fully the cover of fuse-holder by using correctly the handle.

2. **Close the output switch Q1 (Pos. I).**
   Load is now supplied parallel through automatic bypass and manual bypass Q2.
   The synoptic diagram must display the status “LOAD SUPPLIED BY AUTOMATIC BYPASS AND MANUAL BYPASS Q2”.

3. **Only in case it has been previously activated, restore the command “Total Off” by entering the screen:**
   COMMANDS/RESET TOTAL OFF

4. **Open the manual bypass switch Q2 (Pos. 0).**
   The load is supplied by the mains through the automatic bypass.
   Verify, selecting the screen METERING/BOOSTER/Vp and Vn, that the booster voltage has reached about 400 Vdc.

5. **Insert the inverter by pressing “Inverter ON” (I) key.**
   Some seconds later the load will be transferred on inverter.
   LED Alarm turn Off and the LED Operation must be lit.
   The synoptic diagram must display the status “LOAD SUPPLIED BY INVERTER”.

END OF PROCEDURE
8.1.4 Complete UPS shutdown

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

NOTE!
Follow this procedure only in case the UPS system and the load must be completely powered-down.

1. Press “Total Off” key.

2. Open the output switch Q1 (Pos. 0).

3. Remove the external battery fuses.
   In case of GE battery cabinet:
   - Open fully and remove the cover of fuse-holder by using correctly the handle;
   - Remove the fuses from their place, re-install and close fully the cover of fuse-holder.
   The acoustical alarm is activated, press “MUTE” key to reset it.

4. In order to discharge the DC link capacitors, insert the inverter by pressing “Inverter ON” (I) key.

   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) Vp and Vn has reached the max. voltage of 5 Vdc (about 30 seconds).

5. Disconnect the inverter by pressing “Inverter OFF” (O) key and hold until the LED Inverter (7) turns OFF.

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

END OF PROCEDURE

WARNING!
If the above procedure is not completely performed, it could cause serious damages to the UPS.
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 min.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 the external battery fuses connected.

View of the synoptic diagram after pressing the "Total Off" key:
- All Contactors are open.
- Booster, Inverter and Static-Switch shutdown.

1. **Reset "Total Off"**.
   Restore the command "Total Off" by entering the screen:
   **COMMANDS / RESET TOTAL OFF**
   
   LED Alarm is lit.
   
   The load is supplied by the mains through the automatic bypass.
   
   The booster starts automatically.
   
   The synoptic diagram must display the status "LOAD SUPPLIED BY AUTOMATIC BYPASS".

2. **Insert the inverter by pressing "Inverter ON (I)" key.**
   
   Some seconds later the load will be transferred on inverter.
   
   LED Alarm turn Off and the LED Operation must be lit.
   
   The synoptic diagram must display the status "LOAD SUPPLIED BY INVERTER".

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 - Emergency Power Off”, i.e. Q1 closed, Q2 open and the external battery fuses connected.

View of the synoptic diagram after pressing the push-button “EPO - Emergency Power Off”:

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

1. **Reset the "EPO" key.**
   Press MUTE key to reset Alarm and Acoustical alarm. LED Alarm remains lit.

2. **Reset the UPS by pressing "Inverter OFF" (O) key.**
   The load is supplied by the mains through the automatic bypass.
   The booster starts automatically.
   The synoptic diagram must display the status “LOAD SUPPLIED BY AUTOMATIC BYPASS”.

3. **Insert the inverter by pressing "Inverter ON" (I) key.**
   Some seconds later the load will be transferred on inverter.
   LED Alarm turn Off and the LED Operation must be lit.
   The synoptic diagram must display the status “LOAD SUPPLIED BY INVERTER”.

**END OF PROCEDURE**
8.2 PROCEDURES FOR PARALLEL SYSTEM LP 33 Series

8.2.1 LP 33 Series Parallel System start-up

WARNING!
Before proceeding to turn on the UPS Parallel System, ensure that the AC and DC external isolators are OFF, and prevent their inadvertent operation. Ensure that the output load distribution can be powered and all the output isolators are open.

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

Open the front door on all UPS units and make sure that:
- All the connections to the input/output terminals of the UPS have been made correctly.
- The safety screens are fixed in their position.
- The switches Q1 and Q2 are open (Pos. O) and the “External Battery fuses” are removed.

1. **Switch-ON the mains voltage, on all UPS units, from the input distribution (both rectifier and bypass if separated).**

The UPS performs a SELFTEST.
A successful termination of the tests will be indicated with Overall test results “OK”.
Commissioning cannot be continued should one or more tests result to be negative.
Please contact in this case your Service Centre.

At this stage the electronic power supply is switched ON and the buzzer sounds.

LED 1 (mains rectifier OK) and LED 2 (mains bypass OK) must be lit.
Press “MUTE” key to reset acoustical alarm. LED Alarm remains lit.
During the first commissioning LP 33 Series requests a set up of the UPS configuration parameters presented in the following screens.

Without such configuration it is not possible to continue with the commissioning procedure.

**WARNING !**
The setup of the UPS configuration parameters must be done only by QUALIFIED AND TRAINED PERSONNEL.
The setup of mistaken values could compromise the integrity and reliability of the UPS.

In this mode the keys perform the following functions:

- **Confirm** the selection made and select the next parameter.
- **ESC** Re-establish default value.
- **Modify or insert** the selected value.
- **Save** the configuration of set parameters.

**DISPLAY CONFIGURATION**

*Select language* : **ENGLISH**

**UPS CONFIGURATION**

- **Input frequency**: 50 Hz
- **Output frequency**: 50 Hz
- **Inverter voltage**: 230 V

*) Configuration of the frequency to 60Hz requires the intervention of a Service Centre.

Continue ►
**BATTERY CONFIGURATION**

<table>
<thead>
<tr>
<th>Type</th>
<th>Lead Acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Float voltage</td>
<td>273 V</td>
</tr>
<tr>
<td>Recharge current</td>
<td>015.0 A</td>
</tr>
<tr>
<td>Autonomy time</td>
<td>010 min</td>
</tr>
<tr>
<td>Stop Operation time</td>
<td>003 min</td>
</tr>
<tr>
<td>Capacity</td>
<td>0066 Ah</td>
</tr>
<tr>
<td>Cells</td>
<td>120</td>
</tr>
</tbody>
</table>

**ESC**

**BATTERY CONFIGURATION screen**

- **Type**: Battery type (Lead Acid).
  - *Lead - Acid*: Sealed Battery (VRLA).

**Float voltage**

Voltage to maintain battery charging (insert the value of single battery string).

\[
\text{Float voltage} = \text{Number of battery cells} \times \text{battery float voltage per cell.}
\]

Typical battery float voltage per cell (ask the battery manufacturer for confirmation):

- **Lead - Acid (VRLA)**: 2.27 Vdc for cell
  
  \[
  120 \text{ cells} \times 2.27 \text{ Vdc} = 273 \text{ Vdc}
  \]

**Recharge current**

Maximum battery recharge current: 15 A

**Autonomy time**

The autonomy time of the battery.

UPS autonomy on battery mode at full load condition.

This value is calculated based on the battery type, capacity and number of cells.

**Autonomy times for lead acid batteries (VRLA)**

<table>
<thead>
<tr>
<th>UPS Model</th>
<th>Battery with expected trickle life 5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>33Ah</td>
</tr>
<tr>
<td>LP 33 Series 60 kVA</td>
<td>9</td>
</tr>
<tr>
<td>LP 33 Series 80 kVA</td>
<td>-</td>
</tr>
<tr>
<td>LP 33 Series 100 kVA</td>
<td>-</td>
</tr>
<tr>
<td>LP 33 Series 120 kVA</td>
<td>-</td>
</tr>
</tbody>
</table>

*Autonomy time for battery supplied by GE UPS manufacturer.*

**Stop Operation time**

Residual battery autonomy time before UPS forced shutdown. Standard set 3 minutes.
Settable from 1 minute to autonomy time in minutes (see tables).

**Capacity**

Ah capacity of the battery.

**Cells**

Number of cells of the battery (insert the value of single battery string).

- **Lead - Acid (VRLA)**: 120 cells.

**NOTE !**

The values indicated above, must be considered as standard values.
The actual programmed values must be the ones defined from the battery manufacturer.

**CONFIGURATION screen**

Screen to save the configuration of set parameters.

Any additional modification of setup parameters can be done only by a GE SERVICE PERSON as it requires an access code.
2. **Insert the external battery fuses on each unit.**
   
   In case of GE battery cabinet: insert the fuses in their place and close fully the cover of fuse-holder by using correctly the handle.

   ![DANGER!]
   
   Before to perform this operation, check the right DC polarities on both side of the switch/fuse holder!

3. **Close the output switch Q1 (Pos. I) on all UPS units.**

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

   The synoptic diagram, on all UPS units, must display the status "LOAD SUPPLIED BY AUTOMATIC BYPASS".

   ![Synoptic Diagram]

   Verify on all UPS units, selecting the screen METERING/BOOSTER/Vp and Vn, that the booster voltage has reached about **400 Vdc**.

4. **Insert the inverter by pressing “Inverter ON” (I) key on first UPS unit.**

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

   **LED Alarm** turn Off and the **LED Operation** must be lit.

   The synoptic diagram, on first UPS unit, must display the status "LOAD SUPPLIED BY INVERTER".

5. **Insert the inverter by pressing “Inverter ON” (I) key on all other UPS units.**

   Do not start the next inverter until the sequence of the previous one ends.

   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.

   **LED Alarm** turn Off and the **LED Operation** must be lit.

   The synoptic diagram, on all UPS units, must display the status "LOAD SUPPLIED BY INVERTER".

6. **Load supply.**

   **LP 33 Series Parallel System** is now running, supplying power to the output.

   Insert the loads one by one to the output of the **LP 33 Series Parallel System**.

   Check the output current value of L1, L2 and L3 and check for correct load balance.

   ![Synoptic Diagram]

**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 at least 10 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 System Parallel must be completely switched OFF for maintenance or service purpose, performed by an authorised Service Centre.

The synoptic diagram, on all UPS units, must display the status “LOAD SUPPLIED BY INVERTER”.

1. Disconnect the inverter by pressing “Inverter OFF” (O) key and hold until the LED Inverter (7) turns OFF on all UPS units.
   The output will be supplied by the mains through all automatic bypass.
   LEDs Alarm are lit and the LEDs Operation are Off.
   The synoptic diagram, on all UPS units, must display the status “LOAD SUPPLIED BY AUTOMATIC BYPASS”.

2. Close the manual bypass switch Q2 (Pos. I) on all UPS units.
   Load is now supplied from mains in parallel from automatic bypass and manual bypass Q2 of all UPS units.
   The synoptic diagram, on all UPS units, must display the status “LOAD SUPPLIED BY AUTOMATIC BYPASS AND MANUAL BYPASS Q2”.

3. Open the output switch Q1 (Pos. 0) on all UPS units.
   The load is now supplied only through the manual bypass Q2.
   The synoptic diagram, on all UPS units, must display the status “LOAD SUPPLIED BY MANUAL BYPASS Q2”.

4. Press “Total Off” key on all UPS units.

5. Remove the external battery fuses on each unit.
   In case of GE battery cabinet:
   - Open fully and remove the cover of fuse-holder by using correctly the handle;
   - Remove the fuses from their place, re-install and close fully the cover of fuse-holder.
   The acoustical alarm is activated, press “MUTE” key to reset it.

Continue ►
6. **In order to discharge the DC link capacitors, insert the inverter by pressing “Inverter ON” (I) key on all UPS units.**

**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) Vp and Vn has reached the max. voltage of 5 Vdc (about 30 seconds).

The acoustical alarm is activated, press “MUTE” key (from Home screen) to reset it.

7. **Disconnect the inverter, on all UPS units, by pressing “Inverter OFF” (O) key and hold until the LED Inverter (7) turns OFF.**

The load is now powered directly by mains through all MANUAL BYPASS Q2.

The synoptic diagram, on all UPS units, must display the status “LOAD SUPPLIED BY MANUAL BYPASS Q2”.

---

**WARNING !**

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

In case the procedure described on step “6 - Discharge DC link capacitors” cannot be completely performed, the DC capacitors could be charged with dangerous voltage for min.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.

---

**NOTE !**

With separate mains inputs, it’s possible to disconnect mains rectifier.
8.2.3 From Manual Bypass Q2 to normal function VFI

This procedure presupposes that the load is powered by all manual bypass Q2 switch of the Parallel System, and:

- The inverter is switched OFF;
- The manual bypass switch Q2 is closed (Pos. I);
- The output switch Q1 is open (Pos. 0);
- The external battery fuses are removed;
- LED Alarm blinks.

The synoptic diagram, on all UPS units, must display the status “LOAD SUPPLIED BY MANUAL BYPASS Q2”.

1. **Insert the external battery fuses on each unit.**
   - In case of GE battery cabinet: insert the fuses in their place and close fully the cover of fuse-holder by using correctly the handle.

2. **Close the output switch (Pos. I) on all UPS units.**
   - When the last Q1 will be closed the output will be from mains in parallel from automatic bypass and manual bypass Q2 of all UPS units.
   - The synoptic diagram, on all UPS units, must display the status “LOAD SUPPLIED BY AUTOMATIC BYPASS AND MANUAL BYPASS Q2”.

3. Only in case it has been previously activated, restore the command “Total Off” on any one of the units by entering the screen: COMMANDS/RESET TOTAL OFF

4. **Open the manual bypass switch Q2 (Pos. 0) on all UPS units.**
   - The load is supplied by the mains through the automatic bypass.
   - Verify on all UPS units, selecting the screen METERING/BOOSTER/Vp and Vn, that the booster voltage has reached about 400 Vdc.

5. **Insert the inverter by pressing “Inverter ON” (I) key on first UPS unit.**
   - In case of sufficient output power, the output will transfer to Inverter.
   - LED Alarm turn Off and the LED Operation must be is lit.
   - The synoptic diagram, on first UPS unit, must display the status “LOAD SUPPLIED BY INVERTER”.

6. **Insert the inverter by pressing “Inverter ON” (I) key on all other UPS units.**
   - Do not start the next inverter until the sequence of the previous one ends.
   - 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.
   - LED Alarm turn Off and the LED Operation must be lit.
   - The synoptic diagram, on all UPS units, must display the status “LOAD SUPPLIED BY INVERTER”.

END OF PROCEDURE
8.2.4 Separate a UPS unit from the Parallel System (System Redundancy)

One UPS unit of the Parallel System has to be turned Off, while the load is shared between the other units supplying the parallel bus.

1. **Disconnect the inverter, only on this unit, by pressing “Inverter OFF” (O) key and hold until the LED Inverter (7) turns OFF.**

   With redundant system, pressing the key OFF the inverter shuts down and it will stay OFF. If by pressing the key “O” the load is transferred to the mains and the inverter remains operating, it means the system is not redundant. In this case is not possible to switch-OFF one unit without transferring the load on mains. Load supplied from inverter(s) of the other Unit(s) of the Parallel System.

2. **Open the output switch Q1 only on this unit.**

   LED Alarms is lit and the LED Operation is Off.

3. **Perform the command “Total Off” only on this unit.**

   Perform the command “Total Off” by entering the screen (see Section 7.5):
   COMMANDS / REQUEST TOTAL OFF

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

   In case of GE battery cabinet:
   - Open fully and remove the cover of fuse-holder by using correctly the handle;
   - Remove the fuses from their place, re-install and close fully the cover of fuse-holder.

5. **In order to discharge the DC link capacitors, insert the inverter by pressing “Inverter ON” (I) key only on this unit.**

   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 6, check on the display panel that the DC link voltage (both polarities) Vp and Vn has reached the max. voltage of 5 Vdc (about 30 seconds).

   The acoustical alarm is activated, press “MUTE” key (from Home screen) to reset it.

6. **Disconnect the inverter, only on this unit, by pressing “Inverter OFF” (O) key and hold until the LED Inverter (7) turns OFF.**

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

   **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 “P16 - Connector adapter RPA” (see Section 5.8.4). For any further intervention contact nearest Service Centre.
8.2.5 Reconnect a UPS unit to a Parallel System

**WARNING!**
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 open (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 Parallel 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 voltage from the input distribution (both rectifier and bypass if separated) on this UPS unit.**
   
   The UPS performs a SELFTEST.
   
   A successful termination of the tests will be indicated with Overall test results “OK”. Commissioning cannot be continued should one or more tests result to be negative.
   
   Please contact in this case your Service Centre.

<table>
<thead>
<tr>
<th>Overall test results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test1 OK</td>
</tr>
<tr>
<td>Test2 OK</td>
</tr>
<tr>
<td>Test3 OK</td>
</tr>
<tr>
<td>Test4 OK</td>
</tr>
<tr>
<td>Test5 OK</td>
</tr>
<tr>
<td>Test6 OK</td>
</tr>
</tbody>
</table>

2. **Insert the external battery fuses on this unit.**
   
   In case of GE battery cabinet: insert the fuses in their place and close fully the cover of fuse-holder by using correctly the handle.

3. **Close output switch Q1 (Pos. I) on this UPS unit.**
   
   Verify on this UPS unit, selecting the screen METERING/BOOSTER/Vp and Vn, that the booster voltage has reached about 400 Vdc.

   ![Home\Meter](Home\Meter.png)

4. **Insert the inverter by pressing “Inverter ON” (I) key on this UPS unit.**
   
   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.
   
   LED Alarm turn Off and the LED Operation must be lit.
   
   The synoptic diagram, on all UPS units, must display the status “LOAD SUPPLIED BY INVERTER”.

   ![Diagram](Diagram.png)

**END OF PROCEDURE**
8.2.6 Complete Parallel System shutdown

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

**NOTE!**
Follow this procedure only in case the Parallel System and the load must be completely powered-down.

1. Press “Total Off” key on anyone of the parallel units.
2. Open the output switch Q1 (Pos. 0) on all UPS units.
3. Remove the external battery fuses on each unit:
   - In case of GE battery cabinet:
     - Open fully and remove the cover of fuse-holder by using correctly the handle;
     - Remove the fuses from their place, re-install and close fully the cover of fuse-holder.
   - The acoustical alarm is activated, press “MUTE” key to reset it.
4. In order to discharge the DC link capacitors, insert the inverter by pressing “Inverter ON” (I) key on all UPS units.

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) \( V_p \) and \( V_n \) has reached the max. voltage of 5 Vdc (about 30 seconds).

The acoustical alarm is activated, press “MUTE” key (from Home screen) to reset it.

5. Disconnect the inverter, on all UPS units, by pressing “Inverter OFF” (O) key and hold until the LED Inverter (7) turns OFF.

6. Switch OFF the mains power, on all UPS units, at the AC input distribution panel.

---

**WARNING!**
If the above procedure is not completely performed, it could cause serious damages to the UPS.
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 a min.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 the external battery fuses connected.

View of the synoptic diagram, on all UPS units, after pressing the “Total Off” key.
- All Contactors are open.
- Booster, Inverter and Static-Switch shutdown.

1. **Reset “Total Off” of the Parallel System.**

   Restore the command “Total Off”, on anyone of the parallel units, by entering the screen:
   COMMANDS / RESET TOTAL OFF

   LED Alarm is lit.

   The load is supplied by the mains through the automatic bypass.
   The booster starts automatically.
   The synoptic diagram, on all UPS units, must display the status “LOAD SUPPLIED BY AUTOMATIC BYPASS”.

2. **Insert the inverter by pressing “Inverter ON” (I) key on first UPS unit.**

   In case of sufficient output power, the output will transfer to Inverter.
   LED Alarm turn Off and the LED Operation must be lit.
   The synoptic diagram, on first UPS unit, must display the status “LOAD SUPPLIED BY INVERTER”.

3. **Insert the inverter by pressing “Inverter ON” (I) key on all other UPS units.**

   Do not start the next inverter until the sequence of the previous one ends.
   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.
   LED Alarm turn Off and the LED Operation must be lit.
   The synoptic diagram, on all UPS units, must display the status “LOAD SUPPLIED BY INVERTER”.

**END OF PROCEDURE**
8.2.8 Restore to normal operation after "EPO – Emergency Power Off"

**NOTE!**

Make sure all units of the Parallel System to be status of the activation of "EPO - Emergency Power Off", i.e. Q1 closed, Q2 open and the external battery fuses connected.

View of the synoptic diagram, on all UPS units, after pressing the push-button "EPO - Emergency Power Off":

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

1. **Reset the push-button “EPO”**.

   Press MUTE key to reset Alarm and Acoustical alarm. LED Alarm remains lit.

2. **Reset the UPS by pressing “Inverter OFF” (O) key on all UPS units**.

   The load is supplied by the mains through the automatic bypass. The booster starts automatically.
   
   The synoptic diagram must display the status “LOAD SUPPLIED BY AUTOMATIC BYPASS”.

3. **Insert the inverter by pressing “Inverter ON” (I) key on first UPS unit**.

   In case of sufficient output power, the output will transfer to Inverter.
   
   LED Alarm turn Off and the LED Operation must be is lit.
   
   The Synoptic diagram, on first UPS unit, must display the status “LOAD SUPPLIED BY INVERTER”.

4. **Insert the inverter by pressing “Inverter ON” (I) key on all other UPS units**.

   Do not start the next inverter until the sequence of the previous one ends.
   
   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.
   
   LED Alarm turn Off and the LED Operation must be lit.
   
   The Synoptic diagram, on all UPS units, must display the status “LOAD SUPPLIED BY INVERTER”.

**END OF PROCEDURE**
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**

<table>
<thead>
<tr>
<th>Slot 1 – J4</th>
<th>Slot 2 – J3</th>
<th>Slot 3 – J5</th>
<th>Slot 1 – J4 + Slot 2 – J3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay Card (standard)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relay Card (standard)</td>
<td>Advanced SNMP Card (Optional)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relay Card (standard)</td>
<td>Advanced SNMP Card (Optional)</td>
<td>Advanced SNMP Card (Optional)</td>
<td>Customer Interface (optional)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Customer Interface (optional)</td>
</tr>
</tbody>
</table>

*Fig. 9-1  Slot connectivity*
9.1 SERIAL PORT J27 - RS232

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

Total remote management of the system using software GE Power Diagnostics, GE Data Protection or GE Service Software for system protection and management of the UPS systems.

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. 9.1-3  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).

![Relay Card Diagram]

**NO** = Normally Open

**C** = Common

**NC** = Normally Closed

Voltage free contacts:
- Max.: 60Vdc or 30Vac / 0.5A
- Min. signal level: 5Vdc / 5mA

**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): *SETUP / SETUP / LEVEL 2: SERVICE*.

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

**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.

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.

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 follows:

- Press the push-button EPO (contact on X7 / 1, 2 is closed again).
- Press the key "O" (Inverter OFF – see Section 6.2) on the control panel.
- Press the key “I” (Inverter ON – see Section 6.2) on the control panel.

In case of a Parallel System press the key "O" (Inverter OFF) on the control panel of each unit connected on the parallel bus and having its output switch Q1 closed.
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.

**GE Power Diagnostics**

*GE Power Diagnostics* is an anytime, anywhere concept in UPS status monitoring and alarm notification that has been successfully implemented in numerous of installations supporting up to multi-hundred UPS.

Based on the leading *Intelligent Remote Information System IRIS* all GE UPS types as well as 3rd party UPS are supported.

Accessing the latest site information via Web and being alerted by Email, SMS or Fax, it enables the user to make timely decisions in case of changing critical conditions.

With comprehensive data collection and analysis *IRIS* is not only a remote monitoring & diagnostics (RM&D) system but, the core of the integrated service offering *GE Power Diagnostics*.

**GE Data Protection**

*GE Data Protection* software can communicate with the UPS over *RS-232, USB* or *SNMP* to receive status information and measurement values of the UPS.

In case of a critical condition (time on battery, remaining battery autonomy time or low battery) for the load, the software starts a controlled shutdown.

An enhanced alarm management system provides the possibility to start applications, send messages, and send e-mails for every upcoming or disappearing alarm.
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

Serial port J3 - RS232 (sub - D - female 9 pin)
Total remote management of the system using software GE Power Diagnostics, GE Data Protection or GE Service Software for system protection and management of the UPS systems.

Pin 2: TX (out)
Pin 3: RX (in)
Pin 5: GND

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

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

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

X2 – Terminals EPO connection (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 JP8 on the control board P2 – Mainboard 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

<table>
<thead>
<tr>
<th>Signal Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No signal</td>
</tr>
<tr>
<td>1</td>
<td>Buzzer</td>
</tr>
<tr>
<td>2</td>
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<td>3</td>
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<tr>
<td>5</td>
<td>Load on inverter</td>
</tr>
<tr>
<td>6</td>
<td>Mains failure</td>
</tr>
<tr>
<td>7</td>
<td>DC overvoltage</td>
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<tr>
<td>8</td>
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</tr>
<tr>
<td>9</td>
<td>Overload</td>
</tr>
<tr>
<td>10</td>
<td>Overtemperature</td>
</tr>
<tr>
<td>11</td>
<td>Inverter-mains not synchonry</td>
</tr>
<tr>
<td>12</td>
<td>Bypass locked</td>
</tr>
<tr>
<td>13</td>
<td>Bypass mains failure</td>
</tr>
<tr>
<td>14</td>
<td>Rectifier mains failure</td>
</tr>
<tr>
<td>15</td>
<td>Battery discharge</td>
</tr>
<tr>
<td>16</td>
<td>Manual bypass ON</td>
</tr>
<tr>
<td>17</td>
<td>Rectifier ON</td>
</tr>
<tr>
<td>18</td>
<td>Inverter ON</td>
</tr>
<tr>
<td>19</td>
<td>Battery boostcharge</td>
</tr>
<tr>
<td>20</td>
<td>Battery earth fault</td>
</tr>
<tr>
<td>21</td>
<td>Battery fault</td>
</tr>
<tr>
<td>22</td>
<td>Relay input 1</td>
</tr>
<tr>
<td>23</td>
<td>Relay input 2</td>
</tr>
<tr>
<td>24</td>
<td>Relay output ON</td>
</tr>
<tr>
<td>25</td>
<td>Relay output OFF</td>
</tr>
<tr>
<td>26</td>
<td>EPO (Emergency Power Off)</td>
</tr>
<tr>
<td>27</td>
<td>ECO Mode ON</td>
</tr>
<tr>
<td>28</td>
<td>General alarm (NC)</td>
</tr>
</tbody>
</table>

### 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:

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No function</td>
<td></td>
</tr>
<tr>
<td>Inverter OFF</td>
<td>Generator ON</td>
</tr>
<tr>
<td>Print all</td>
<td>Status relay</td>
</tr>
<tr>
<td>External bypass ON</td>
<td>External battery fuses</td>
</tr>
</tbody>
</table>

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 its 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).

![Diagram of EPO switch connection](image)

**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 follows:

- Press the push-button EPO (contact on X7 / 1, 2 is closed again).
- Press the key "O" (Inverter OFF – see Section 6.2) on the control panel.
- Press the key "I" (Inverter ON – see Section 6.2) on the control panel.

In case of a Parallel System press the key "O" (Inverter OFF) on the control panel of each unit connected on the parallel bus and having its output switch Q1 closed.
10.2.2 Optional battery cabinet 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 and the cabinet battery fuses must be open.
Check for sufficient floor loading capacity (see Technical Data Sheet).
Before closing the battery fuses verify for correct polarity of the battery connection.

The battery cabinet, with standard cables, **must be located on the left side of the UPS** (see Fig. 10.2.2-1).

![Battery cabinet connection](image)

Main ground (PE) cables must be connected to bus-bar with M8 bolts
Clamp the cables with the included cable-ties "A".

![Battery cabinet connection](image)

*Fig. 10.2.2-1  Optional battery cabinet assembly and connection*

<table>
<thead>
<tr>
<th>External battery fuses</th>
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<td><strong>LP 33 Series 60 kVA</strong></td>
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<td>3x125Agl – 550Vdc – NH00</td>
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<td><strong>LP 33 Series 80 kVA</strong></td>
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<td>3x160Agl – 550Vdc – NH00</td>
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<td><strong>LP 33 Series 100 kVA</strong></td>
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<td>3x200Agl – 440Vdc – NH1</td>
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<td><strong>LP 33 Series 120 kVA</strong></td>
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<td>3x250Agl – 440Vdc – NH1</td>
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Connect the Battery temperature probe **J28** to the **P1 – Control board**.
This probe compensates the battery charging current in function of the ambient temperature of the battery.

The cable with the connector **J28** must be laid in a separated conduit protected from the external electromagnetic fields.

![Battery cabinet connection](image)

*Fig. 10.2.2-2  PCB P1 – Control board*
11 MAINTENANCE

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
If this lamp lights up during normal operation, the unit has not been serviced for the last 20,000 hours by a GE trained technician.

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.

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**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. .

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13 ANNEX

13.1 TECHNICAL DATA SHEET

*Technical Data Sheet*

These are included in the last section and are listings of the technical data of the UPS.

13.2 UPS SCHEMATIC DIAGRAMS

*UPS Schematic Diagrams*

The UPS Schematic Diagrams are included in the CD-ROM, together with the Operating Manual.

13.3 CD-ROM

*CD-Rom*

The enclosed CD-Rom contains the complete documentation in various languages.