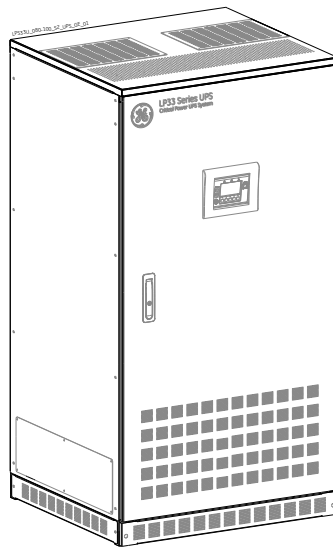


GE
Critical Power



User Manual

Uninterruptible Power Supply

LP33 Series 80 & 100

80 & 100 kVA / 208-120Vac UL / S2

GE Consumer & Industrial SA

General Electric Company
CH - 6595 Riazzino (Locarno)
Switzerland

T +41 (0)91 / 850 51 51

F +41 (0)91 / 850 52 52

www.gecriticalpower.com



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The illustrations and plans describing the equipment are intended as general reference only and are not necessarily complete in every detail.

The content of this publication may be subject to modification without prior notice.

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 **LP33 Series 80 & 100** Uninterruptible Power Supply system, developed and produced to the highest standards of quality, will give you complete satisfaction.

Please read carefully the *User 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** !



START-UP AND COMMISSIONING

A GE Critical Power Field Services Engineer must perform start-up and commissioning of the UPS.

Please Contact GE Services at least two weeks prior to schedule start-up and commissioning at [1-800-637-1738](tel:1-800-637-1738), or by E-mail at pqservice@ge.com.

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Your service contact:



GE Consumer & Industrial SA
General Electric Company
CH - 6595 Riazzino (Locarno)
Switzerland
www.gecriticalpower.com



GE Energy Connections
Critical Power
3100 Technology - Suite 200
Plano, TX 75074
T: +1 800-637-1738
E: gepqsales@ge.com
[www.geindustrial.com/products/
critical-power](http://www.geindustrial.com/products/critical-power)



GE Energy Connections
Critical Power
601 Shiloh Road
Plano, TX 75074
24/7 T: +1 800-637-1738
24/7 F: +1 866-765-3595
E: pqservice@ge.com

Preface

Congratulations on your choice of a *LP33 Series 80 & 100* Uninterruptible Power Supply (UPS).

It will help eliminate load disturbances due to unexpected power problem.

This *User Manual* describes the function of the UPS module, the purpose and location of the switches, the meaning of the system events related to the front panel indication, and provides procedures for starting and stopping the equipment.

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.

WARNING !

LP33 Series 80 & 100 is a product that needs to be installed by a licensed and knowledgeable contractor.

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 your *Service Center* before you proceed.

This document shall not be copied or reproduced without the permission of *GE*.

Some of the information contained in this manual may be changed without notice to reflect technical improvements.

Safety instructions

Read the safety instructions contained on the following pages carefully before the installation of the UPS, options and battery system.

Pay attention to the rectangular boxes included in the text:

They contain important information and warning concerning electrical connections and personnel safety.

Parallel version secured with RPA

RPA

Redundant Parallel
Architecture

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

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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 **User Manual** before 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 Center** 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 !

LP33 Series 80 & 100 is a FCC Class A-UPS Product.

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, unauthorized alterations or improper use of the delivered UPS.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions for UPS **LP33 Series 80 & 100** that should be followed during installation and maintenance of the UPS and battery.

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 the integrity of the UPS equipment carefully.
If you notice visible damage, do not install or start the UPS.
Contact the nearest *Service Center* immediately.
- **WARNING! RISK OF ELECTRICAL SHOCK:**
Do not remove 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.
- UPS's and battery system require a 12 months periodic maintenance to operate reliably and safely. This should be performed by qualified service personnel.
The UPS contains its own energy source (battery).
- The field-wiring outlets may be electrically live, even when the UPS is disconnected from the utility.
- Dangerous voltages may be present during battery operation.
- The battery must be disconnected during maintenance or service work.
- This UPS contains potentially hazardous voltages.
- Be aware that the inverter can restart automatically after the utility voltage is restored.
- End user must follow applicable regional occupational safety codes/regulations during installation, operation and equipment maintenance. This may require additional field marking or labeling defining appropriate level of PPE (Personal Protection Equipment) to reduce the risk of Arc-flash related injuries. Contact our Technical Support for product specific information.

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.
- **WARNING! HIGH EARTH LEAKAGE CURRENT:**
Earth connection is essential before connecting to AC input!
- Switching OFF the unit does not isolate the UPS from the utility.
- 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 104°F (40°C).
- Optimal battery life is obtained if the ambient temperature does not exceed 77°F (25°C).
- 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 -13°F (-25°C) to 131°F (+55°C).
- The optimal temperature for Battery storage is 68°F (20°C) to 77°F (25°C) and shall never exceed the range -4°F (-20°C) to 104°F (40°C).
- If the unit is stored for a period exceeding 3 months, the battery 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 cells number, voltage (V), capacity (Ah).
All the battery used, shall be of the same manufacturer and date of production.
- 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.
- In case of air shipment, the cables +/- going to the battery fuses/terminals shall be disconnected and isolated.

Safety instructions when working with battery



THE BATTERY MUST BE INSTALLED AND CONNECTED TO THE UPS BY QUALIFIED SERVICE PERSONNEL.

INSTALLATION PERSONNEL MUST READ THIS ENTIRE SECTION AND REFER TO THE BATTERY MANUFACTURERS INSTALLATION MANUAL 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.

They may cause severe injury if the terminals are shorted together or to ground.

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 un-insulated *Battery Terminals*.

A qualified service person that is familiar with *Battery* systems and required precautions must install and service the *Battery*.

The installation must conform to national and local codes.

Keep unauthorized personnel away from *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 batteries, 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* so 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 conduit, 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 *Battery* or repairing *Battery Connections*, shut OFF the UPS and remove the *Battery Fuses* or open the *Battery System* disconnect.

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.

Throughout this manual the following symbols are defined:

	WARNING, if instruction is not followed injury or serious equipment damage may occur!
	CAUTION, internal parts have dangerous voltage present. Risk of electric shock!
	PE (Earth) – GND (Ground) PROTECTIVE GROUNDING TERMINAL: A terminal which must be connected to earth ground prior to making any other connection to the equipment.
	A terminal to which or from which an alternating (sine wave) current or voltage may be applied or supplied.
	A terminal to which or from which a direct current or voltage may be applied or supplied.
	This symbol indicated the word "phase".
	This symbol indicates the principal ON/OFF switch in the ON position.
	This symbol indicates the principal ON/OFF switch in the OFF position.

2 LAYOUT

2.1 LAYOUT LP33 SERIES 80 & 100

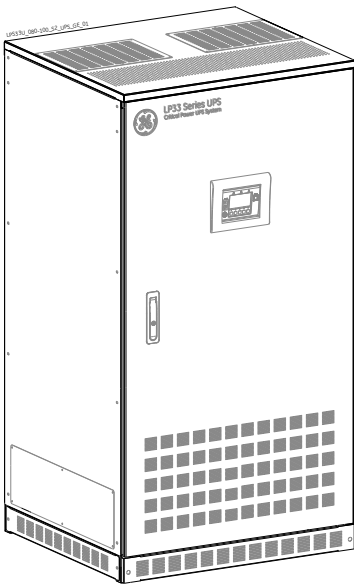


Fig. 2.1-1 General view

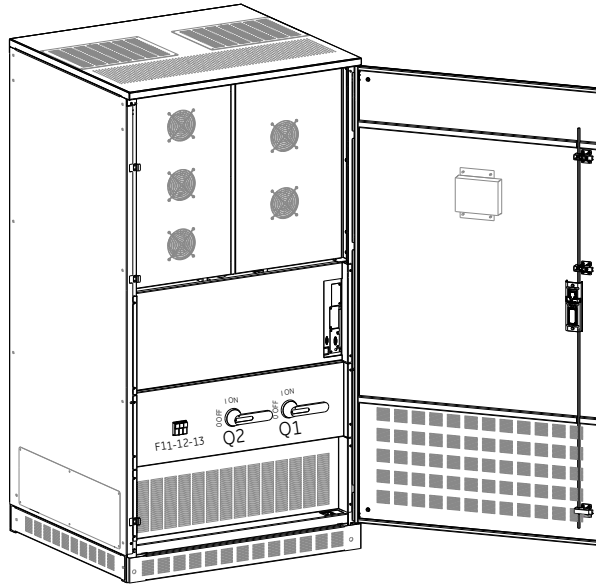


Fig. 2.1-2 General view With front door open

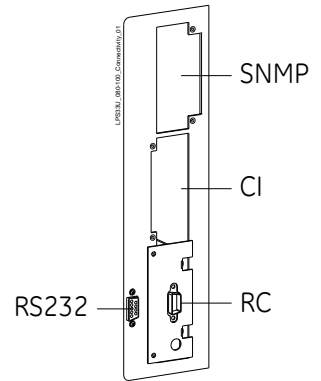


Fig. 2.1-3 Connectivity Rack



Fig. 2.1-4 Control panel

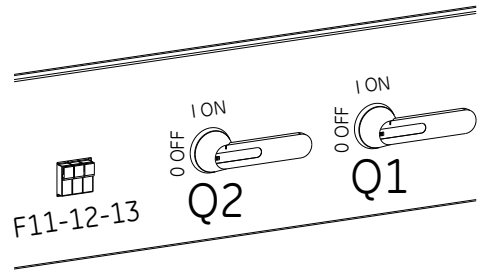


Fig. 2.1-5 Q1 & Q2 switches and F11-12-13 fuses

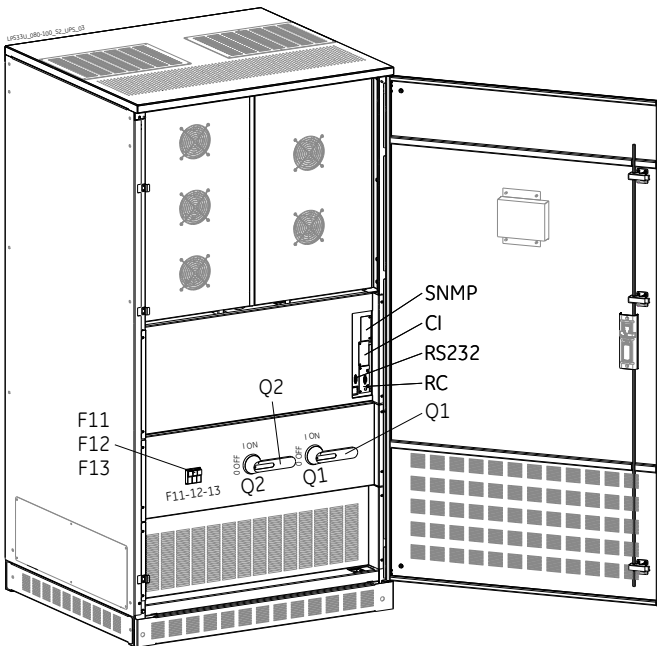


Fig. 2.1-6 General view with open door



- CI** Customer Interface Board (optional)
- F11** Power Supply Fuses (6-1/4A 600Vac Class CC)
- F12** Attention: only for Service purposes.
- F13** Don't open during UPS operation!
- Q1** UPS output switch
- Q2** Manual bypass switch
- RC** Relay card
- SNMP** 3-ph SNMP/WEB plug-in adapter (option)
- RS232** Serial port RS232

3 INTRODUCTION

3.1 GENERAL DESCRIPTION

The **LP33 Series 80 & 100 Uninterruptible Power Supply** (UPS) provides the energy supply for critical loads which need a reliable, continuous, and free from 'voltage disturbances and frequency fluctuations' supply.

In case the *utility 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 utility recovers.

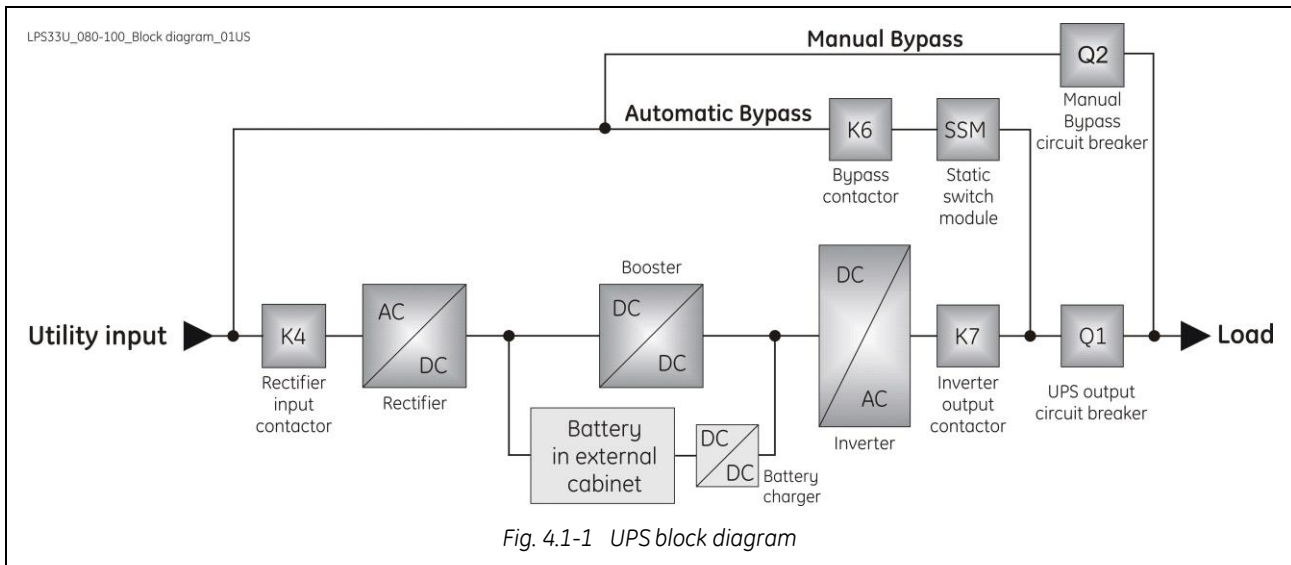
	<p>LP33 Series 80 & 100 is a truly <i>VFI</i> double conversion Uninterruptible Power Supply (UPS), equipped with <i>automatic bypass</i>, where the load is normally supplied by the inverter.</p>
	<p>LP33 Series 80 & 100 can be configured, if chosen, for the ECO Mode permitting the maximum energy saving.</p>

The main typical performances of the **LP33 Series 80 & 100** 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 <10%.**
- **Automatic bypass and manual bypass to improve reliability and maintenance.**
- **Microprocessor controlled supervision.**
- **Dual AC inputs (option).**
- **ECO Mode operation.**
- **Compact designed for commercial applications.**
- **Low level acoustic sound, 68 dB (A).**
- **Multi-language graphical LCD screen.**
- **Total battery management: SBM (Superior Battery Management)**
- **High battery capacity extendable in several battery cabinet configurations.**
- **Wide rectifier input voltage tolerance: 177 - 229Vac (Line-Line).**
- **Wide rectifier input frequency tolerance: +/-10% (54 - 66 for 60Hz).**
- **RPA (Redundant Parallel Architecture) up to 4 units.**
- **Compliance with UL standard 1778 and CSA C22.2.**

4 DESCRIPTION

4.1 BLOCK DIAGRAM AND MAIN ELEMENTS DESCRIPTION



The Uninterruptible Power Supply System **LP33 Series 80 & 100** 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 graphical LCD screen, displaying the operation modes, the measurements and the events / alarms.

Rectifier

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

Inverter

The **inverter** converts the DC voltage into a three-phase AC-voltage 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 Mode**.

If **ECO Mode** is enabled, the *Static Switch Module (SSM)* will transfer **load** from **utility** to **inverter** in case the utility power anomaly.

Back-Feed Protection

All **LP33 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 incorrect operation of 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 charged by the **battery-charger**, supplies the DC energy to **inverter** in the event of **mains** failure.

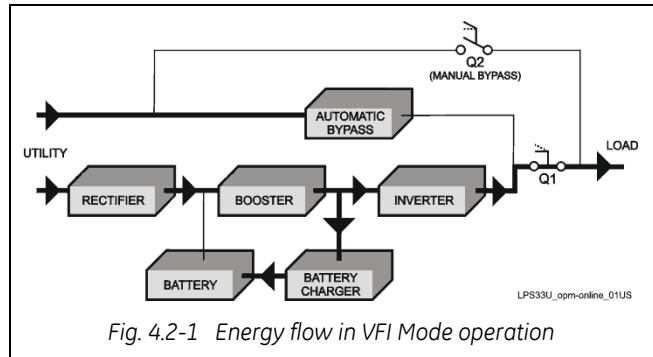
4.2 OPERATION MODES

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.



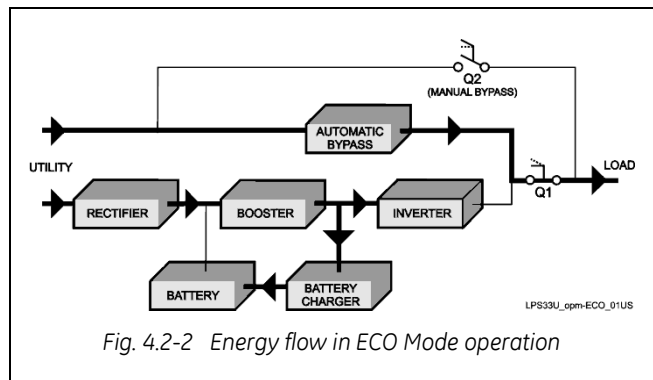
The **inverter** converts the DC voltage in a new AC sine wave voltage with constant amplitude and frequency independently from the input **mains** power.

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 7.1.3).

RPA

Redundant Parallel Architecture

In case of parallel system

ECO Mode cannot be enabled for RPA Parallel System.

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

Automatic bypass operation

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

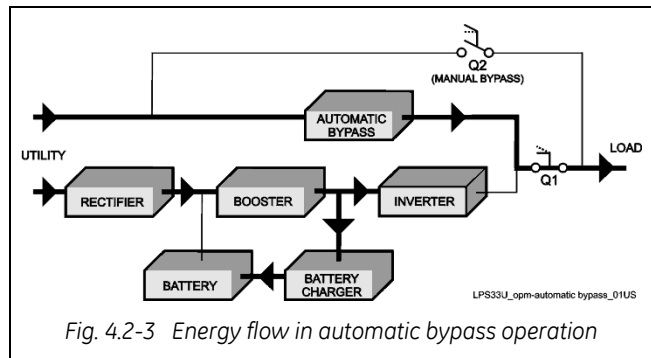


Fig. 4.2-3 Energy flow in automatic bypass operation

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

RPA

Redundant Parallel Architecture

In case of parallel system

Each unit has its own bypass.

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

The units are continuously exchanging information before taking such decision.

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

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

Mains recovery operation

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

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

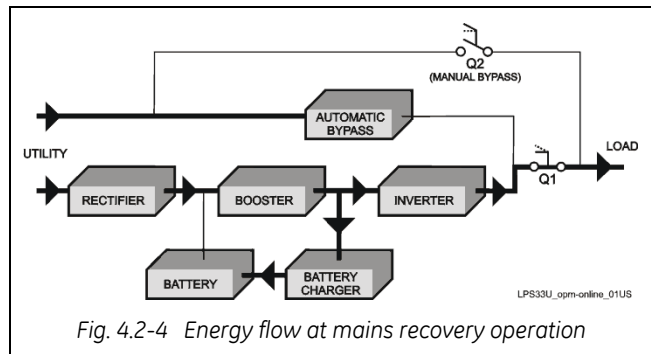


Fig. 4.2-4 Energy flow at mains recovery operation

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

RPA

Redundant Parallel Architecture

In case of parallel system

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

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

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

Manual bypass operation

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

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

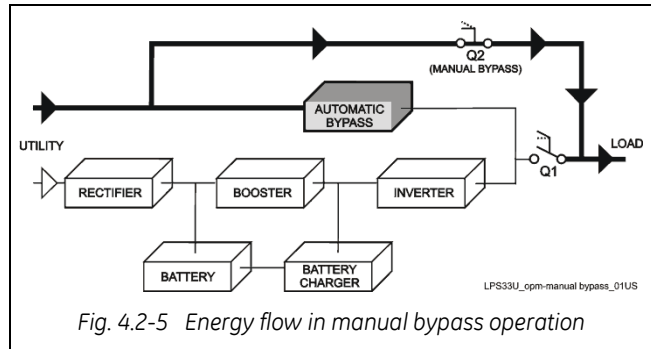


Fig. 4.2-5 Energy flow in manual bypass operation

Mains failure operation

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

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

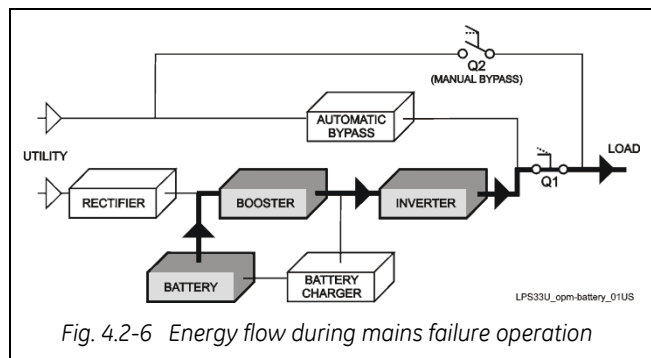


Fig. 4.2-6 Energy flow during mains failure operation

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 shut-down procedures when the indicated time expired (normally 3 minutes).

RPA

Redundant Parallel
Architecture

In case of parallel system

With parallel system for power capacity:

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

With redundant parallel system:

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

RPA

Redundant Parallel Architecture

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 **LP33 Series 80 & 100** 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.

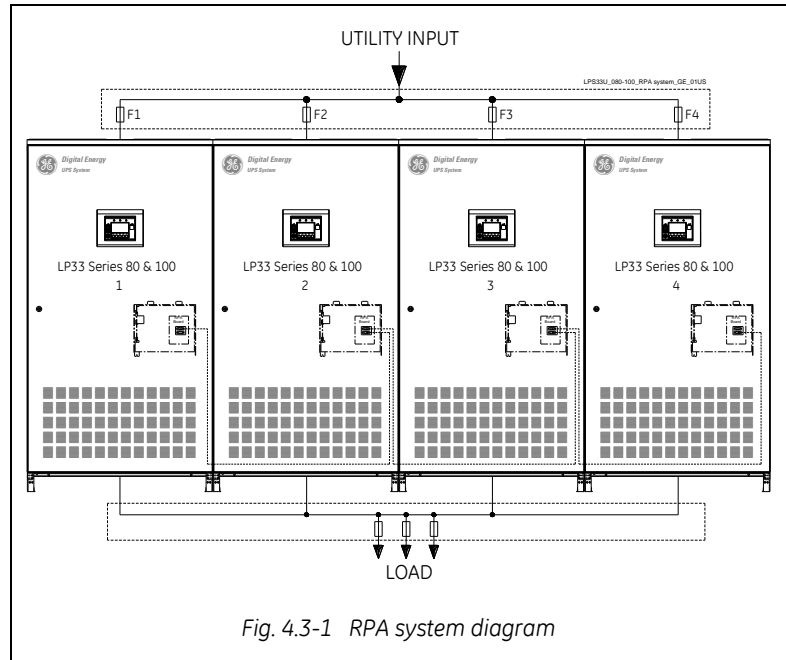


Fig. 4.3-1 RPA system diagram

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 synchronization of the parallel system

All the units are identical without master and slave relationship.

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

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

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

Control bus of the parallel system

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

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



NOTE !

The parallel system excludes more rectifiers connected on common battery. 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

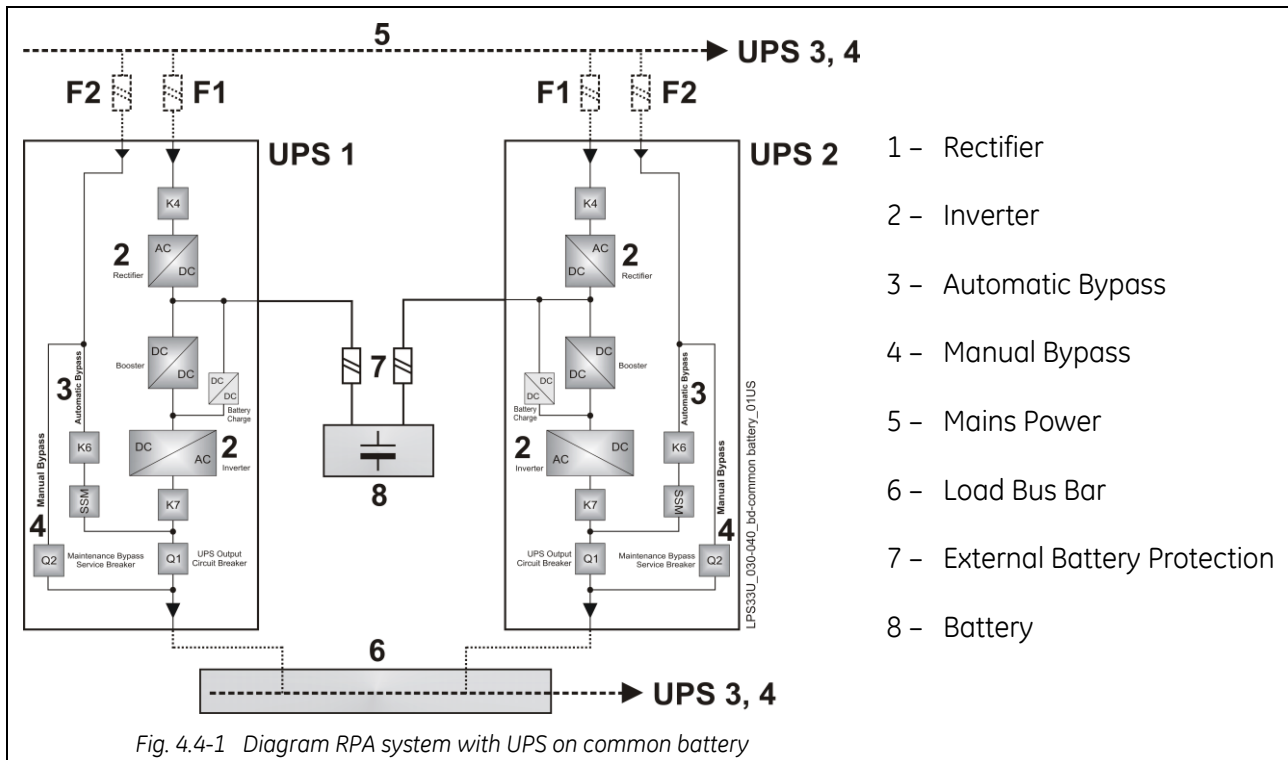


NOTE !

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.

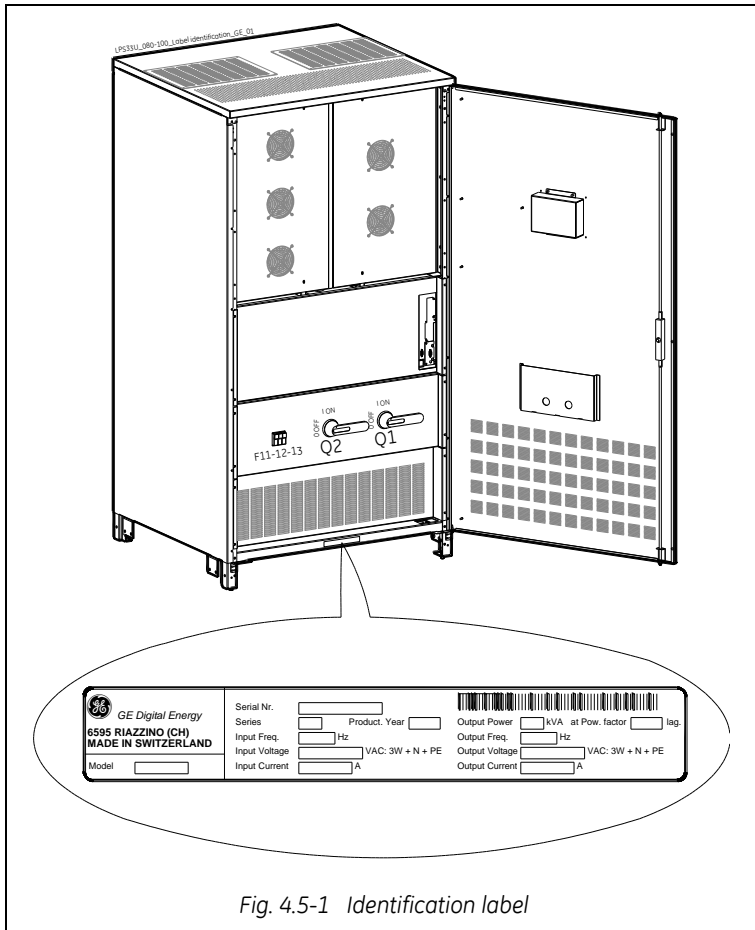
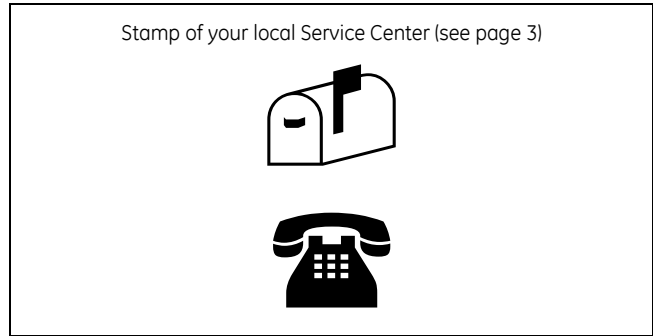


Pay attention to the following recommendations:

- The units delivered for this functioning mode need a special parameter setting, so they must be prepared in advance before the installation.
- The installation must be performed only with the UPS system completely shut down.
- The AC *Rectifiers* input power (5) must be the same, with clockwise phase rotation for each unit.
- Each *Rectifier* must be set for the same floating DC voltage and the same *Battery* current limitation.
- It is mandatory to install the fuses / MCB (7) on each line connecting the *Rectifiers* to the common *Battery* for maintenance / safety reasons (see Section 4.7.2).
- In case a unit must be powered down for maintenance, switch-OFF the concerned unit before opening the DC fuses / MCB on the *Battery* line (7).
- 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.
- 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 Center**.



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 authorized agents, warrants that the standard products will be free of defects in materials and workmanship for a period as per contract specifications.

	<p>NOTE !</p> <p>This warranty does not cover failures of the product which result from incorrect installation, misuse, alterations by persons other than authorized agents, or abnormal working conditions.</p>
--	---

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).



PACKING MATERIAL RECYCLING

GE, in compliance with environment protection, uses only environmentally friendly material.

UPS packing materials must be recycled in compliance with all applicable regulations.



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.

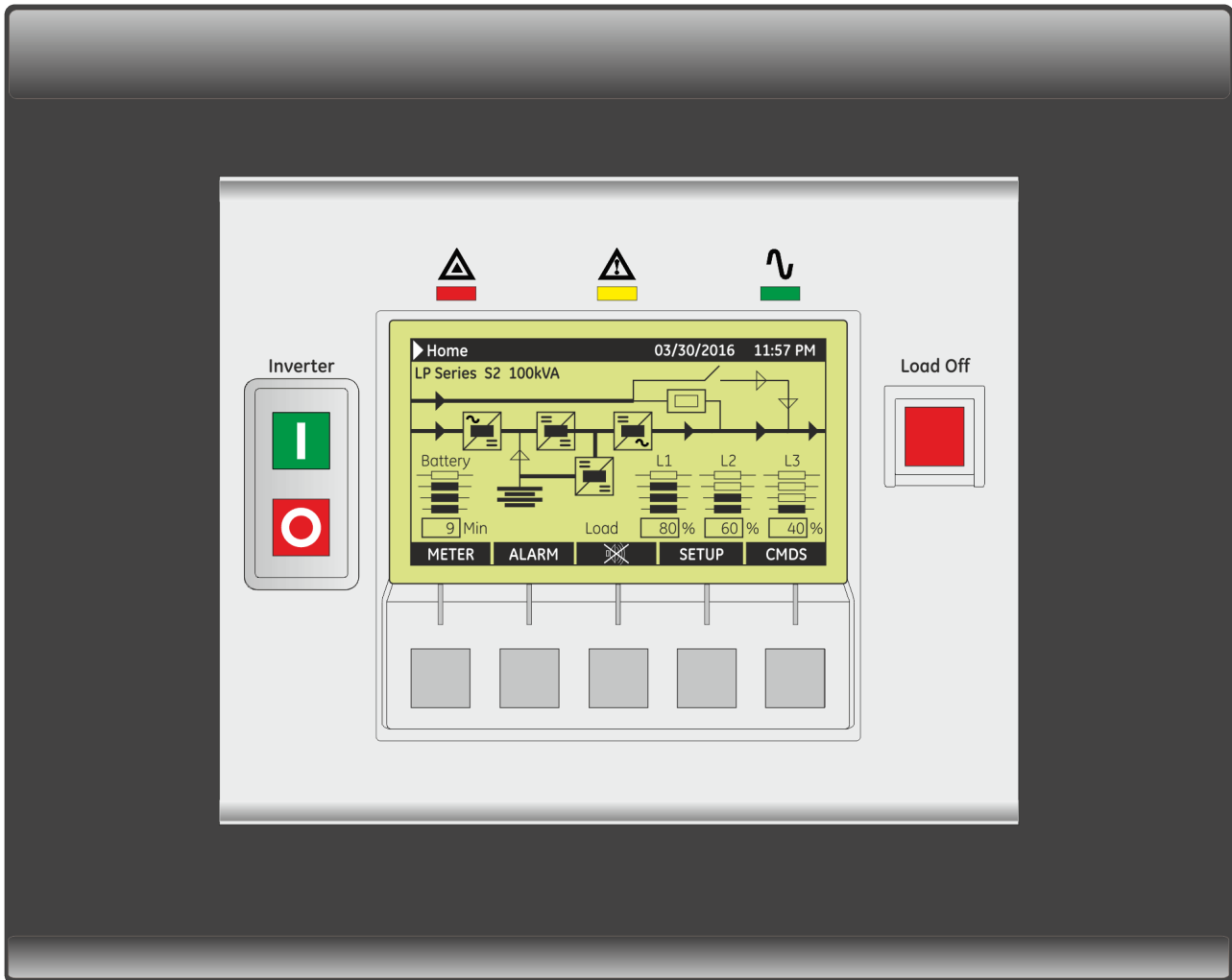


WARNING !

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

5 SYSTEM HANDLING

5.1 CONTROL PANEL



LCD_LP33UL_080-100_S2_Front_GE_01US

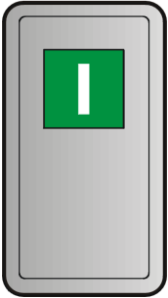
Fig. 5.1-1 Control panel

The *control panel*, positioned on the UPS front-top, 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.*

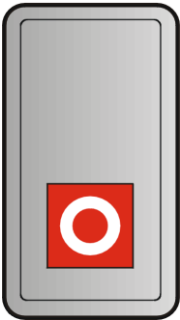
5.2 TABLE OF FUNCTIONS AND INDICATIONS ON CONTROL PANEL

Inverter



Key to switch the Inverter ON (I)

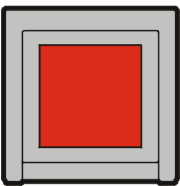
Inverter



Key for Inverter shut-down (O)

Press key to transfers the *Load to Utility*.
 Keep pressed for 5 seconds to shut-down the *Inverter*.
 This key is also used as the *EPO (Emergency Power Off)* reset.

Load Off



Key "Load Off"

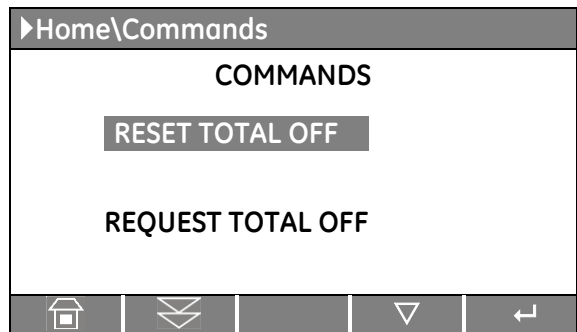
The key "*Load Off*" is protected by a transparent cover.
 By pressing it, you immediately separate the *UPS* from the *Load*.

It is possible to activate the command "*Load Off*" using the following screen:
COMMANDS / REQUEST TOTAL OFF. See Section 6.5.

Attention: "*Load Off*" cannot disconnect the *UPS* from the *Load* with *Q2* closed.

To reset "Load Off"

Restore the command "*Load Off*"
 by entering the screen:
COMMANDS / RESET TOTAL OFF



RPA

Redundant Parallel Architecture

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

	<p>NOTE!</p> <p>Special care must be taken in using this command, in order to avoid accidental <i>load</i> disconnection.</p>
--	--



LED Stop Operation (red color)

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

- The *battery* is fully discharged and the *load* cannot be transferred on *utility*.
- Over temperature or overload condition (>105%) and the *load* cannot be transferred on *utility*.



LED Alarm (yellow color)

It blinks when one or more alarm is activated. The internal *buzzer* is *ON*.

The *LED Alarm* remains lit (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 color)

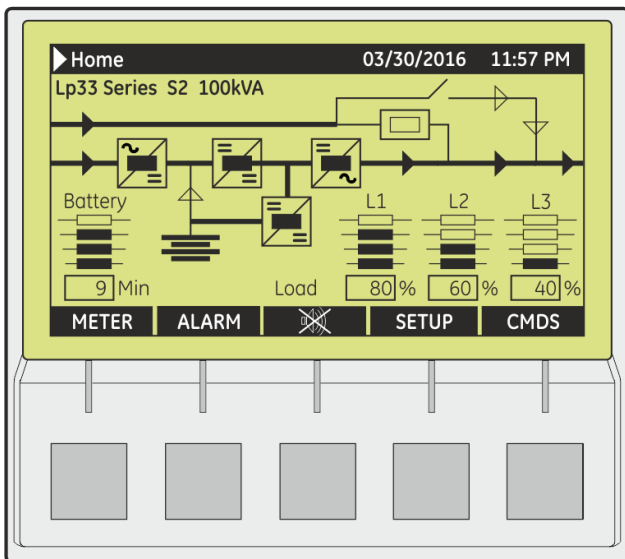
When lit, indicates that the *UPS* is functioning correctly and the *load* is system protected (*Load* supplied either from *inverter* or from *Automatic Bypass* in case of *ECO Mode* functionality).

When blinking, indicates that a regular maintenance service is needed (*SERVICE REQUIRED*).

May be reset by a service technician only.

See *Section 9 – 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*.

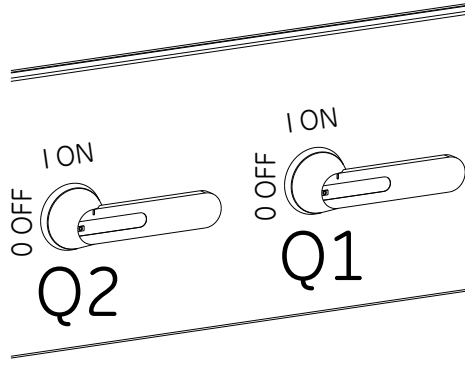


User LCD Interface

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*.


5.3 SWITCHES



Q1 - UPS output switch
Q2 - Manual bypass switch

NOTE !
Do not switch ON Q1 and Q2, while Inverter is ON.

Fig. 5.3-1 Q1 and Q2 switches



NOTE !
Mains failure of long duration or low Battery voltage will cause the automatic shut-down of the UPS, thus preventing damage to the Battery.

6 LCD SCREEN

6.1 HOME SCREEN

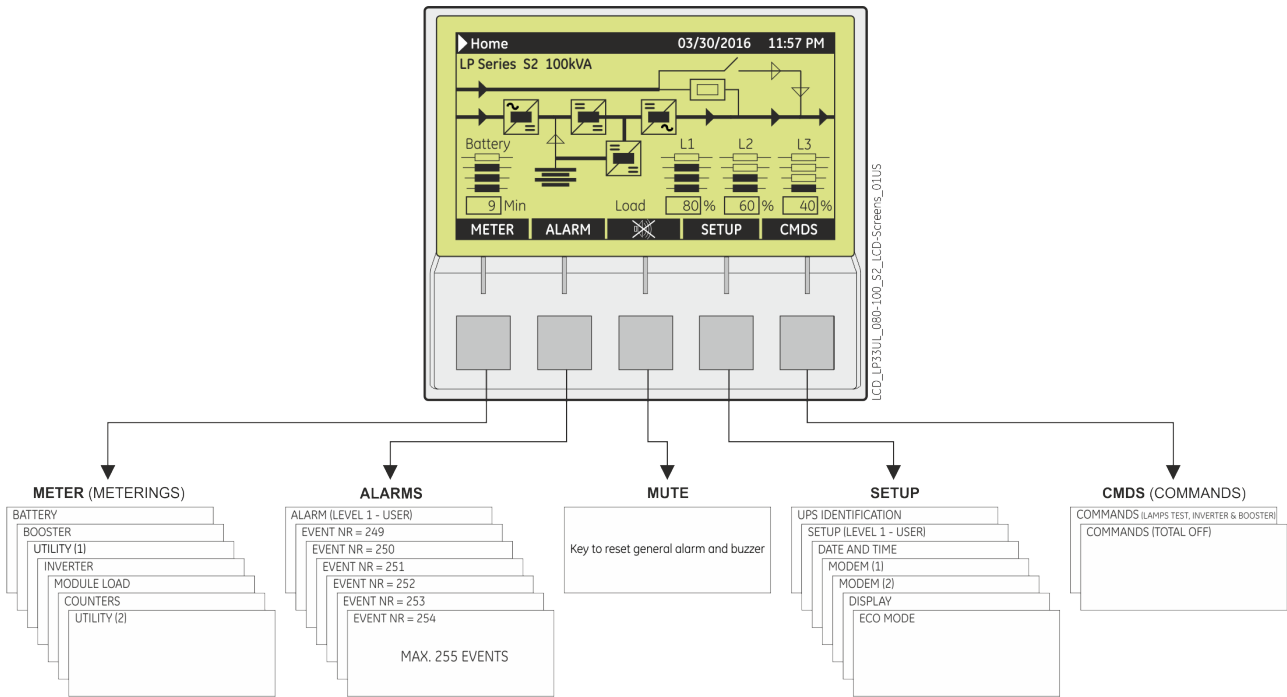


Fig. 6.1-1 LCD display

The keys perform the following functions:

METER	METERING	View electric parameters values and statistics of use. See <i>Section 6.2</i> .
ALARM	ALARMS	Shows in chronological order, all the events occurred (alarms, messages, commands, handling, etc.). See <i>Section 6.3</i> .
	MUTE	Key to reset general alarm and buzzer.
SETUP	SETUP	Allows the user to customize some UPS functions to specific requirements and to view UPS identification data. See <i>Section 6.4</i> .
CMDS	COMMANDS	Allows the user to execute UPS operation commands. See <i>Section 6.5</i> .

The LCD screen, after 5 minutes of inactivity, shuts down the backlight.
To reactivate it, press any key.

If the keypad remains inactive for 5 minutes or longer, during the viewing of a screen such as *MEASURES*, *ALARMS*, *SETUP* or *COMMANDS*, 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 "METER" (1st button) and "ALARM" (2nd button) together automatically sets the LCD communication language for "ENGLISH".

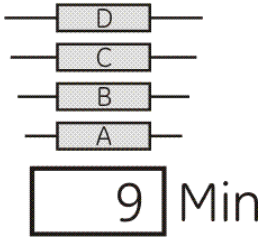
LP33 Series S2 100KVA

UPS Model

UPS series number

UPS nominal rating (kVA)

Battery

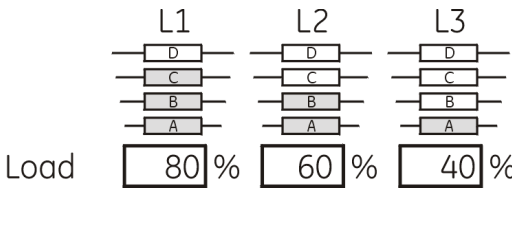


Battery level LED

All LED light indicate a battery autonomy of 100%.

- LED A Fixed: indicates battery autonomy between 6% and 25%.
Blinking: indicates battery autonomy $\leq 5\%$.
- LED A, B Indicate battery autonomy between 26% and 50%.
- LED A, B, C Indicate 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 $\leq 25\%$.

- LED A Indicates a load level between 26% and 50%.
- LED A, B Indicate a load level between 51% and 75%.
- LED A, B, C Indicate a load level between 76% and 100%.
- LED A, B, C, D Indicate a load level between 101% and 124%.
- LED D blinking Indicates a load level $\geq 125\%$.

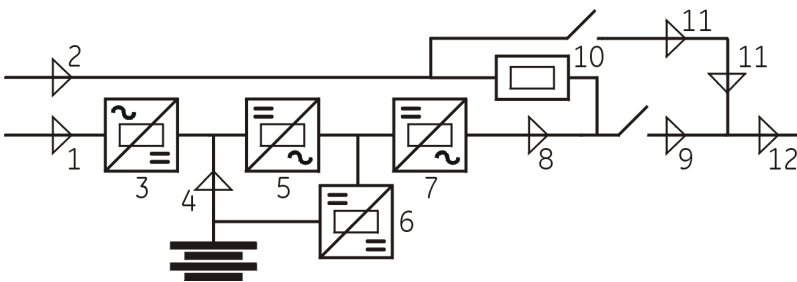


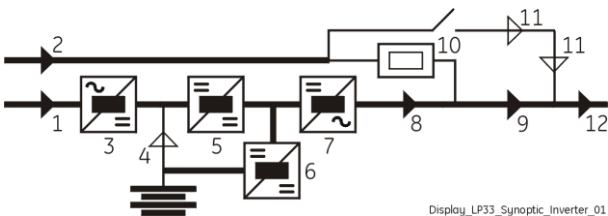
Fig. 6.1-2 LEDs on synoptic diagram

LEDs on synoptic diagram

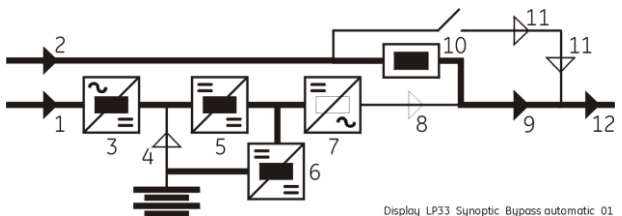
- LED 1 Utility rectifier OK
- LED 2 Utility bypass OK
- LED 3 Rectifier ON
- LED 4 Discharging battery
- LED 5 Booster ON
- LED 6 Charge battery ON
- LED 7 Inverter available
- LED 8 Inverter ON
- LED 9 Q1 closed
- LED 10 Automatic bypass ON
- LED 11 Manual bypass Q2 ON
- LED 12 Load on UPS

Examples of typical scenarios in the synoptic diagram:

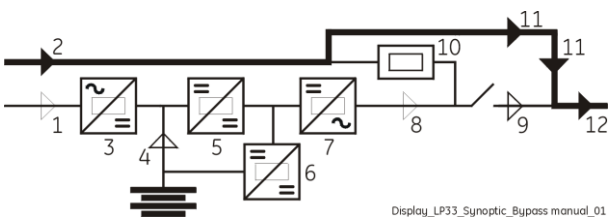
Load supplied by Inverter



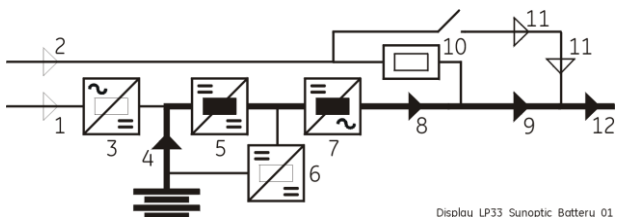
Load supplied by Automatic Bypass



Load supplied by Manual Bypass Q2



Load supplied by Battery






6.2 METERING

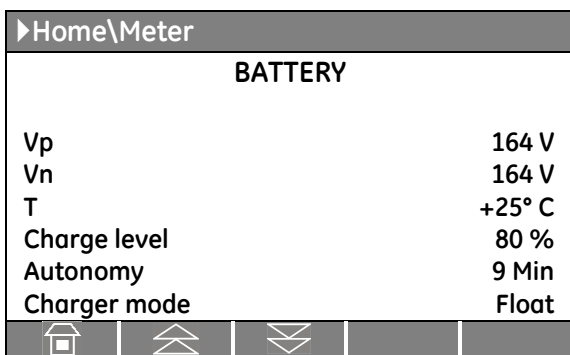
The *METERING mode* is entered any time the “**METER**” key is pressed.

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.



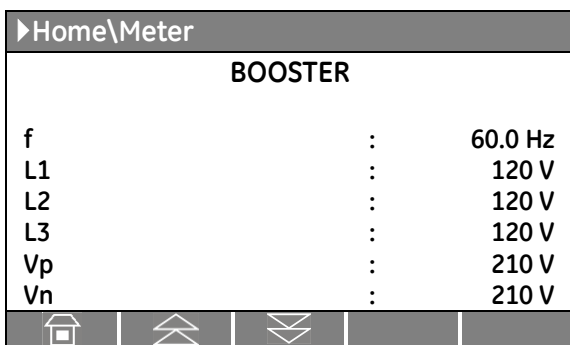
Battery data screen

- Vp** Voltage of positive (+) battery string.
- Vn** Voltage of negative (-) battery string.
- T** The temperature of the battery (“SENSOR DISABLE” indicates sensor disabled).
- Charge level** The battery charge level.
- Autonomy** The estimated backup time with the present load.

Charger mode The functionality of *SBM (Superior Battery Management)* can help to reduce the battery recharging time, and improve the lifetime of the battery. Beside the indication of the battery voltage on the display, a letter shows, according to the table below, the operational status of *SBM*:

Abbreviation	Status of charger	Charger voltage	Description
Off	OFF	0Vdc	Battery open circuit voltage
Top	ON	Boost (176Vdc)	Boost charge with new Battery
Float	ON	Floating (164Vdc)	Battery charged
Low	ON	Floating (164Vdc)	Normal charge
Boost	ON	Boost (176Vdc)	Boost charge
Equalize	ON	Boost (179Vdc)	Battery equalization

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



Booster data screen

- f** The input frequency of the rectifier.
- L1**
- L2** Input line voltage L1, L2 and L3 phases.
- L3**
- Vp** Voltage of positive (+) booster string.
- Vn** Voltage of negative (-) booster string.

Home\Meter	
UTILITY	
f	60 Hz
L1	120 V
L2	120 V
L3	120 V
BYPASS FREE	

Bypass utility data screen

- f The frequency of the utility.
- L1
- L2 3-phase utility voltage PHASE /NEUTRAL.
- L3
- Bypass** Bypass status: FREE / LOCKED.

Home\Meter	
INVERTER	
f	60 Hz
L1	120 V
L2	120 V
L3	120 V
T	OK
SYNCHRONIZED	

Inverter data screen

- f The output frequency of the *Inverter*.
 - L1
 - L2 3-phase output voltage PHASE/NEUTRAL.
 - L3
 - T The temperature of the inverter bridge (OK / MAX).
- The synchronization status of the inverter with respect to utility (Synchronized / Not Synchronized).

Home\Meter				
MODULE LOAD				
L1	:	120 V	139.0 A	50 %
L2	:	120 V	139.0 A	50 %
L3	:	120 V	139.0 A	50 %
LOAD ON INVERTER				

Module load screen

- ... V Output voltage PHASE/NEUTRAL for each phase.
 - ... A The output current as RMS values (RPA: value for each UPS).
 - ... % The output load as percentage (RPA: value for each UPS).
- The source of the power supplied to the load.

Home\Meter	
COUNTERS	
Bypass utility failure	: 53
Rectifier utility failure	: 35
Overloads	: 15
InvOperTime [h]	: 2135
UPSOperTime [h]	: 3125

Statistics screen

- The total number of minor utility faults (bypass utility out of tolerance faults).
- The total number of times a gap of utility in the rectifier has been reordered.
- The total number of detected output overloads.
- The total operating time for the *Inverter* (in hours).
- The total operating time for the UPS (in hours).

Home\Meter			
UTILITY			
NUMBER OF FAST TRANSIENTS			
<2ms	>2ms	>5ms	>10ms
25	20	7	5
ECO MODE RATE = 70 %			

ECO Mode statistic screen







- This screen is enabled only for a single UPS, not for an *RPA Parallel System*.
- The number of fast transients occurred on the bypass utility in the last seven days.
- The statistic evaluation in % (100= good; 0= bad) of the utility, for the *ECO* mode operation.

6.3 ALARMS

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

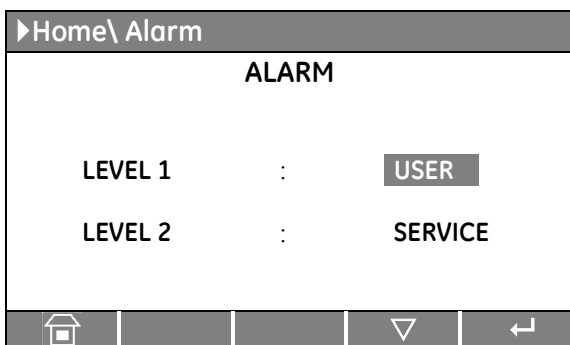
The *LCD* will display a series of screens corresponding to the last **255 events**, two events per screen (LEVEL 1 USER).

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 6.3.1 - EVENTS (Alarms and Messages)**.



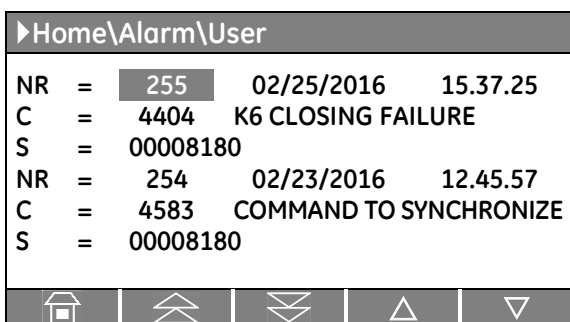
Alarms screen

LEVEL 1 USER

Chronologically view 2 events per screenshot.

LEVEL 2 SERVICE

Chronologically view 5 events per screenshot with service related info.



Screen of user alarms

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 (information reserved for the connectivity and the diagnostic).

6.3.1 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 signaled 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*).

6.3.2 Alarms list

Code	Alarm	Meaning
4000	SETUP VALUES LOST	Parameters are lost and have been replaced with default values.
4001	REGULATION BOARD FAILURE	Voltage supply +/-15Vdc has been detected out of tolerance on the P2 - Mainboard or the programmable circuits are defective.
4100	RECTIFIER FUSES FAILURE	The trip indicator mounted on rectifier input fuses indicates a blown fuse. The rectifier is turned OFF (K4 open) and the load will be supplied by the battery.
4102	K4 CLOSING FAILURE	K4 not closed despite a closing command being done. The rectifier is switched OFF.
4103	K4 OPENING FAILURE	K4 not open despite an opening command being done. The rectifier is switched OFF.
4110	RECTIFIER UTILITY OUT OF TOLERANCE	Rectifier input utility 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 DC-Voltage. Causes Inverter shut-down. 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.
4130	TURN ON RECT. OR SHUTDOWN UPS	Rectifier and inverter are OFF. The DC power supply is discharging the battery slowly. Rectifier must be restarted or battery must be disconnected in order to avoid damages.
4140	RECTIFIER CONTROL FAILURE	Rectifier voltage hasn't reached the set value. Probably fault on regulation loop. The DC capacitors are not equally charged (more of 50Vdc of difference). The rectifier is switched OFF.

Code	Alarm	Meaning
4301	INVERTER FUSES FAILURE	Inverter output fuses blown. Signaled by electronic detector. Inverter can be started manually after replacement of fuses.
4304	K7 CLOSING FAILURE	K7 not closed despite a closing command being done. Signaled by auxiliary contact. The load will be supplied by utility.
4305	K7 OPENING FAILURE	K7 not open despite an opening command being done. Signaled by auxiliary contact. The load will be supplied by utility.
4312	INV. VOLTAGE OUT OF TOLERANCE	Inverter output voltage is out of the tolerances defined in respective parameter ($\pm 10\%$). Inverter is switched OFF.
4320	ISMAX DETECTION	Detection of inverter bridge (Is) current limitation cause inverter OFF and possible automatic restart. After 3 times inverter switches OFF for persistent Is max detection in time. Inverter switch OFF, and it can be restarted manually.
4340	INVERTER CONTROL FAILURE	The slave oscillator is not synchronized with the master, thus causing the shut-down of it's inverter.
4347	OSCILLATOR FAILURE	Auto calibration of the Inverters free run frequency was not possible. The oscillator frequency of this unit is out of tolerance.
4402	RECTIFIER CANNOT BE TURNED ON	The rectifier cannot be turned on because the DC link voltage has not reached the requested value.
4404	K6 CLOSING FAILURE	K6 not closed despite a closing command being done. Signaled by auxiliary contact. The load cannot be supplied by electronic bypass.
4405	K6 OPENING FAILURE	K6 not open despite an opening command being done. Signaled by auxiliary contact.
4410	BYPASS UTILITY OUT OF TOLERANCE	The utility bypass voltage is out of the tolerances ($\pm 10\%$). K6 opens, synchronization with utility is inhibited and transfer to utility is blocked.
4520	NO INVERTER POWER	The load supplied by utility is over 100%. The load remains blocked on utility as long as alarm overload is active.
4530	LOAD LOCKED ON UTILITY	Load is locked on utility because 3 transfers on utility 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).
4531	LOAD ON UTILITY BY ERROR DETECTOR	Load is transferred to utility because the error detector detected a disturbance on the output voltage.
4563	EMERGENCY OFF ACTIVATED	Alarm after detection of an Emergency OFF from an external safety device connected on Customer Interface. Consequently K4, K6 and K7 open and shut down inverter, booster and rectifier.
4570	OVERLOAD	The UPS-System is in an overload condition $>105\%$ on inverter, or $>150\%$ on utility. A sequence of "stop operation" starts. Time out depending on load quantity.

Code	Alarm	Meaning
4571	OVERLOAD: LOAD ON UTILITY	With utility bypass supply available and load >115%, the load is transferred on utility. Load will be transferred again automatically on inverter when load will be <100%.
4581	INVERTER AND UTILITY NOT SYNCHRONIZED	The voltages of utility and inverter are not synchronized, which causes the opening of K6.
4697	BATTERY OVERTEMPERATURE	The battery temperature exceeds the value inserted in parameter. Disabled with parameter (service only).
4698	BATTERY POWER INSUFFICIENT	In case of utility failure, with the actual load, the autonomy time would result below "stop operation" time (default 3 minutes).
4700	DC LOW	Battery voltage is at the lowest limit. Shut-down of inverter until the battery voltage reaches the value in respective parameter.
4900	LOAD LOCKED ON INVERTER	The load is locked on Inverter following 3 load transfers within 30 seconds. After time out of the value in respective parameter (default 30 seconds), bypass will be free.
4955	OVERTEMPERATURE	An over temperature condition has been detected on inverter. Elapsed "stop operation" time, inverter shut-down. With utility available, load is transferred on utility.
4998	LOAD OFF DUE TO EXTENDED OVERLOAD	Load OFF after time-out of "stop operation" for overload on inverter (time depending on the % of overload).
4999	LOAD OFF DUE TO LOW BATT. OR TEMP.	Load OFF after time-out of "stop operation" with missing utility due to battery low voltage or over temperature condition.

6.3.3 Messages list

Code	Message	Meaning
4111	RECTIFIER UTILITY OK	Rectifier input utility is again within the acceptable tolerance (voltage, frequency and phase).
4114	UPS SHUTDOWN (LOW BATTERY VOLTAGE)	The UPS is in Load OFF status, resulting in Battery supply for the power supply. Should the Battery voltage decrease to a value below of the one set in a parameter, then power supply will shut-down to avoid damage to the Battery
4119	BATTERY TEST STARTED	Start of manual or automatic battery test. Rectifier output voltage is decreased to the value defined by respective parameter.
4120	BATTERY TEST STOPPED	End battery test. End of manual or automatic battery test. Rectifier output voltage is restored to floating voltage.
4141	ISMAX DETECTION RECTIFIER	Detection of persistent booster (Is) current limitation.
4161	RECTIFIER ON	Rectifier received the command to switch ON.
4162	RECTIFIER OFF	Rectifier received the command to switch OFF for: input utility out of tolerance / EPO / DC-Voltage max.
4163	GENERATOR ON	Customer Interface (X1 / 11, 22) received a Gen set ON signaling. Operating mode dependent on setting of respective parameters.
4164	GENERATOR OFF	Customer Interface (X1 / 11, 22) received a Gen set OFF signaling. Function bypass enabled dependent on setting of respective parameter.
4302	INVERTER CANNOT BE TURNED ON	Inverter cannot be switched on because one of the following conditions are still present: <ul style="list-style-type: none"> - <i>Over temperature</i> - <i>Low battery voltage</i> - <i>Inverter fuses</i> - <i>Overload</i> - <i>K7 opening failure</i> - <i>High battery voltage</i> - <i>DC low</i> - <i>EPO (Emergency Power Off)</i>
4303	INVERTER CANNOT BE TURNED OFF	Inverter cannot be switched OFF, because the load cannot be transferred on utility (voltage out of tolerance, not synchronizing, bypass blocked).
4361	INVERTER ON	The command to start the inverter has been activated on the control panel.
4362	INVERTER OFF	The command to switch OFF the inverter has been done by the control panel or automatically for alarm detection.
4411	BYPASS UTILITY OK	Bypass input utility is again within the admitted tolerance (Voltage, frequency and phase).
4500	COMMAND LOAD OFF	Disconnection of the load by opening K4, K6 and K7 for: EPO / Load Off / Overload / Stop operation.
4521	NO BYPASS POWER	With the load supplied by electronic bypass, a utility failure or K6 opening occurred.
4534	MULTIPLE LOAD TRANSFER	2 transfers inverter-utility have been detected in a short time, defined by respective parameter (default 30 seconds).

Code	Message	Meaning
4535	BYPASS LOCKED	Transfer on utility not enabled due to settings of respective parameters. Contactor K6 is open.
4536	BYPASS FREE	Settings of respective parameters enable bypass transfer on utility. Contactor K6 can be closed.
4561	LOAD OFF	Key Load Off behind the front door has been pressed, with the output circuit breaker Q1 closed.
4562	DETOUR ON	The auxiliary contact indicates that manual bypass Q2 has been closed.
4564	DETOUR OFF	The auxiliary contact indicates that manual bypass Q2 has been opened.
4567	COMMAND LOAD ON UTILITY	The control unit received a command to transfer the load on utility.
4568	COMMAND LOAD ON INVERTER	The control unit received a command to transfer the load on inverter.
4572	NO MORE OVERLOAD	End of the overload condition previously detected with alarm 4570.
4580	INVERTER AND UTILITY SYNCHRONIZED	The voltages of inverter and utility bypass are synchronized.
4582	COMMAND NOT TO SYNCHRONIZE	Command not to synchronize with utility has been done for: utility bypass out of tolerance (alarm 4410) or setting respective parameters.
4583	COMMAND TO SYNCHRONIZE	Command to synchronize with utility has been done for: utility BP OK (4410) or setting respective parameters.
4600	COMMAND UPS ON	The <i>ECO Mode</i> function has been disabled or the programmed time is expired. The UPS returns to <i>VFI</i> mode supplying the load normally by inverter.
4601	COMMAND UPS STANDBY	The function <i>ECO Mode</i> is enabled, and according to the time program the UPS will run in <i>ECO Mode</i> , supplying the load normally by utility.
4602	Q1 OPEN	The auxiliary contact indicates that the output switch Q1 has been opened.
4603	Q1 CLOSED	The auxiliary contact indicates that the output switch Q1 has been closed.
4699	BATTERY TEST IMPOSSIBLE	Not possible to start battery test (it is postponed) for: <ul style="list-style-type: none"> - <i>No utility rectifier or bypass</i> - <i>Battery not fully charged</i> - <i>Load is below 10% or above 80%</i>
4763	REMOTE CONTROL ON	Inverter can be started or shut-down by remote control. Commands source can be chosen depending on the value of respective parameter (password required): 0 = <i>Only local panel</i> 1 = <i>Only Remote Control</i> 2 = <i>Both</i>
4764	REMOTE CONTROL OFF	Inverter can be started or shut-down by remote control. Commands source can be chosen depending on the value of respective parameter (password required): 0 = <i>Only local panel</i> 1 = <i>Only Remote Control</i> 2 = <i>Both</i>

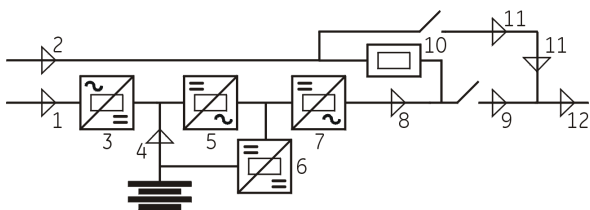
6.3.4 Event report LP33 Series 80 & 100

In case of failure or malfunction, before calling the nearest **Service Center** 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 Center** we suggest you make a copy of this page, fill it in with the requested data, and send it by fax.

Unit No: _____ Series No: UPS rating:
 Customer: Place:
 Date: / / 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.

Remark: exact data and time are very important

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:





6.4 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.

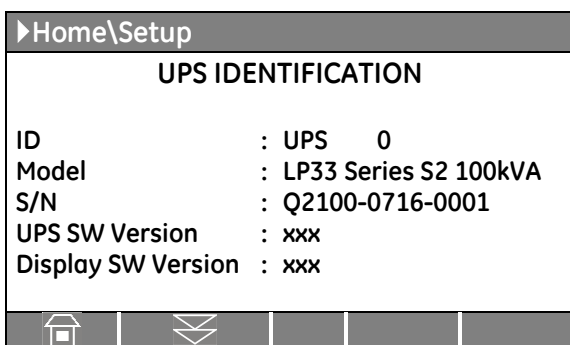
In this mode the keys perform the following functions:

-  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:

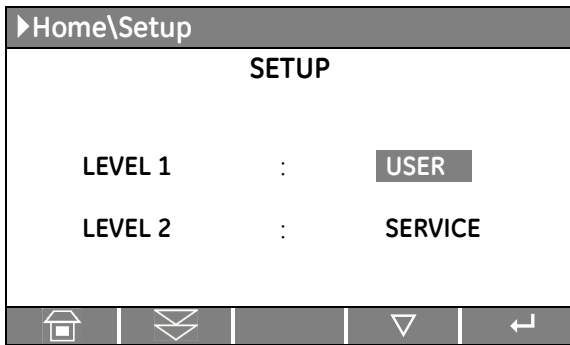
-  Allows to exit a selected screen without making any modification.
-  Scrolls backward to the previous line.
-  Scrolls forward to the next line.
-  Allows to access a value to be set or modified.
-  Select, on the same line, the following value or letter to set or modify.
-  Set or modify the selected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

- 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

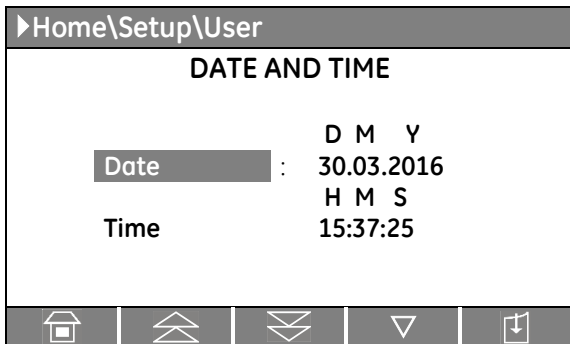
LEVEL 1 USER

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

LEVEL 2 SERVICE

Service only allowed.

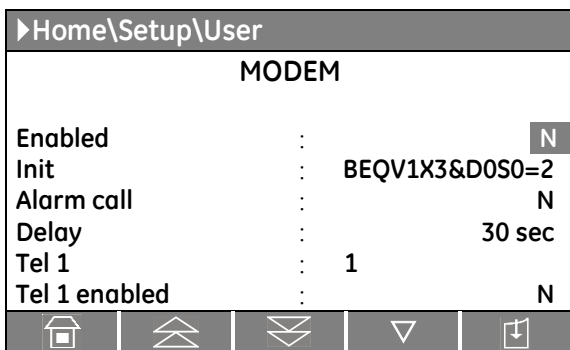
At this level the parameters access is protected by a code.



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 J27 or J3 on *Customer Interface* (option).

Init

This parameter presents the modem initialization 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 signaling 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.

Home\Setup\User

MODEM

Tel 2 : 2

Tel 2 enabled : N

Tel 3 : 3

Tel 3 enabled : N

Tel 4 : 4

Tel 4 enabled : N

Tel 4 It records the *fourth dial-out number*.

Tel 4 enabled This parameter *Y/N* specifies if the *fourth telephone number* 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.

Home\Setup\User

DISPLAY

UPS name : LP Series

Language : ENGLISH

Contrast

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).

Home\Setup\User

ECO MODE

Enabled : N

DAY OF WEEK

d1	d2	d3	d4	d5	d6	d7
24	24	12	12	12	12	12

HOURS / DAY

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 to 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* programming: i.e. **d2 - Sunday** 00:00 to 23:58).

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

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.

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

Example 3:

ECO Mode during the night and week-end.

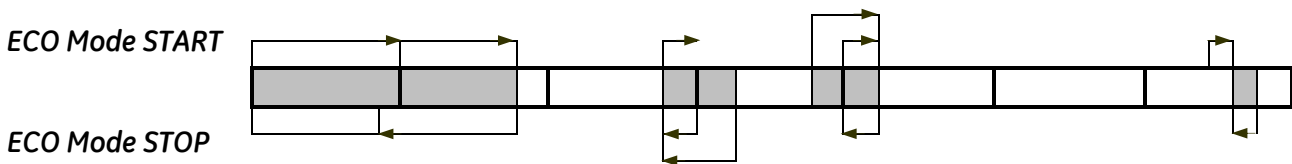
If the *ECO Mode* must be enabled all nights (**d3 - Monday to d7 - Friday**) between 18:00 in the evening and 06:00 of the following morning and during all Saturday (**d1**) and Sunday (**d2**), the corresponding parameters are:

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

Example 4:

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

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



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

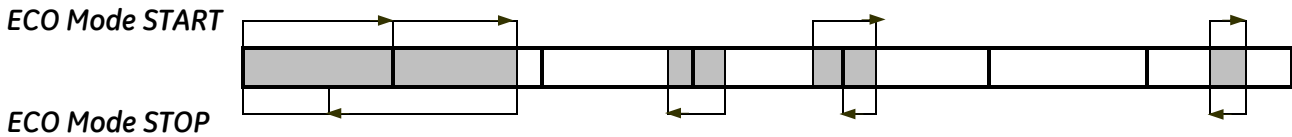
The arrows indicate the conditions given by the *ECO Mode START* and *ECO Mode STOP* times introduced with the parameters.

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.

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



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


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


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

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

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

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

	<p>NOTE !</p> <p>To avoid undesired <i>ECO Mode</i> operation, verify:</p> <ul style="list-style-type: none"> • Date and Time (first page of parameter). • <i>ECO mode</i> screen how many hours of <i>ECO Mode</i> operation have been selected for each day of the week.
---	---





	<p>NOTE !</p> <p>The <i>ECO Mode</i> will become active only if the Load is supplied from the Inverter.</p>
---	--

6.5 COMMANDS

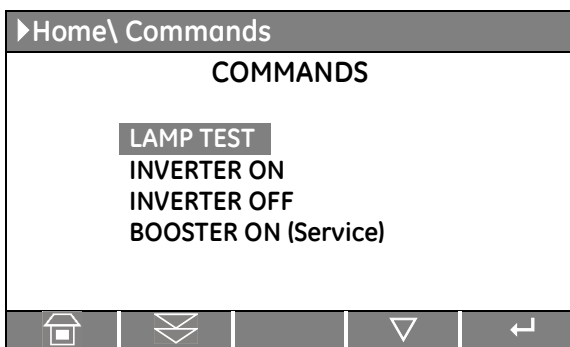
The *COMMANDS mode* is entered any time the “**CMDS**” key is pressed.

This 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

Signaling *LEDs* test and *buzzer* test (all LED should be lit and blinking and the acoustical alarm should be activated).

INVERTER ON

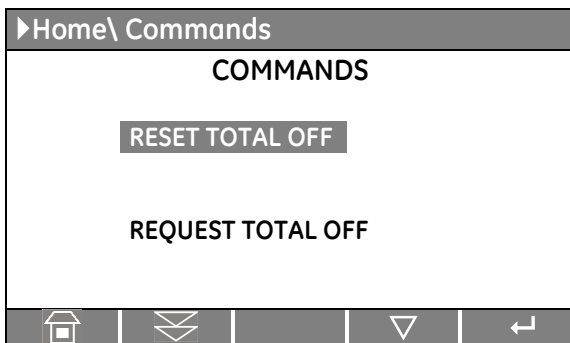
Command to switch the inverter.

INVERTER OFF

Command to shut-down the inverter.

BOOSTER ON (Service)

Service only allowed.



Commands screen 2

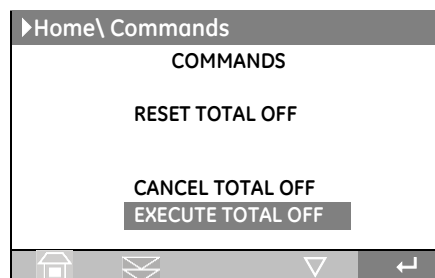
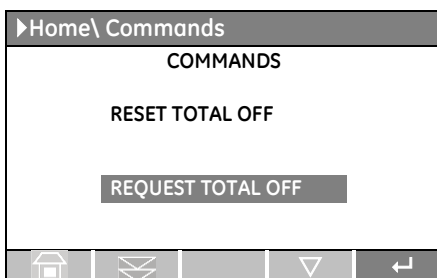
RESET TOTAL OFF

Restore of the command “*Load Off*”.

REQUEST TOTAL OFF

Command “*Load Off*”.

Screen sequence to execute the command “*Load Off*”:



As the command procedure of “*Load Off*” is finished the “REQUEST TOTAL OFF” screen appears again.

7 OPERATION



START-UP AND COMMISSIONING

A GE CRITICAL POWER FIELD SERVICES ENGINEER must perform start-up and commissioning of the UPS. Please Contact GE Services at least two weeks prior to schedule start-up and commissioning at [1-800-637-1738](tel:1-800-637-1738), or by E-mail at pgservice@ge.com.



This symbol refers to the operations of a Parallel System.



WARNING !

Verify that the input/output connections have been performed by qualified personnel before connecting Utility input voltage and verify that the equipment is correctly grounded.

Open only the front door, do not remove any panels.

Now you can initiate the start-up procedure of the UPS system. There is no need for specific knowledge if you follow carefully the step-by-step instructions given below. However we recommend that at least the initial procedure should be performed by an instructed person.

Check after every step for correct reaction of the UPS (LEDs on the panel), and correct voltage and current measurements, before you proceed to the next step.

If you encounter any problems during the following procedures, you should not continue, but contact *GE Services*.

Find on the following pages the descriptions of the various procedures of start-up and shut-down for single and parallel UPS's, divided into the following principal chapters:

7.1 PROCEDURES FOR SINGLE *LP33 Series 80 & 100*

7.2 PROCEDURES FOR *LP33 Series 80 & 100* PARALLEL SYSTEM

7.1 PROCEDURES FOR SINGLE LP33 SERIES 80 & 100

7.1.1 Start-up of the LP33 Series 80 & 100

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 *utility input protection* is removed;
- All the *panels* removed to allow the UPS connection have been correctly reinstalled;
- The UPS switches **Q1** and **Q2** are **OFF (Pos. 0)**;
- The **"Battery Breaker"** of the *battery cabinet* is **OFF**.

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

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

NOTE !

The UPS can be started-up using the *Battery Supply* in case the *Input Utility* should be unavailable.

To avoid an incidental *Battery* discharge, it is recommended to proceed to the UPS start-up having the *Input Utility* available.

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. 0)** and the **"Battery Breaker"** in the *Battery Cabinet (option)* is **OFF (Pos. 0)**.

Q1 *UPS output switch*

Q2 *Manual bypass switch*

LEDs on synoptic diagram

LED 1 <i>Utility rectifier OK</i>	LED 7 <i>Inverter available</i>
LED 2 <i>Utility bypass OK</i>	LED 8 <i>Inverter ON</i>
LED 3 <i>Rectifier ON</i>	LED 9 <i>Q1 closed</i>
LED 4 <i>Discharging battery</i>	LED 10 <i>Automatic bypass ON</i>
LED 5 <i>Booster ON</i>	LED 11 <i>Manual bypass Q2 ON</i>
LED 6 <i>Charge battery ON</i>	LED 12 <i>Load on UPS</i>

Key
Inverter ON

Key
Inverter OFF

Key
Load Off

LED
Stop Operation

LED
Alarm

LED
Operation

Continue ►

1. Switch ON (Pos. II) the utility voltage from the input distribution panel.

The UPS performs a *SELFTTEST*.

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 Center*.

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


LED 1 (*utility rectifier OK*) and LED 2 (*utility bypass OK*) must be lit.

Press "MUTE" key to reset *acoustical alarm*. LED Alarm remains lit.





Overall test results	
Test1 OK	Test7 OK
Test2 OK	Test8 OK
Test3 OK	Test9 OK
Test4 OK	Test10 OK
Test5 OK	Test11 OK
Test6 OK	

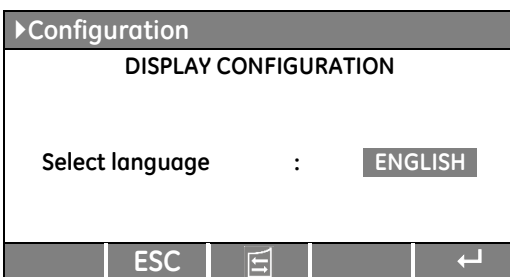
During the first commissioning *LP33 Series 80 & 100* requests a set-up of the UPS configuration parameters presented in the following screens.

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

	<p>WARNING !</p> <p>The setup of the UPS configuration parameters must be done only by a GE CRITICAL POWER FIELD SERVICES ENGINEER. The setup of mistaken values could compromise the integrity and reliability of the UPS.</p>
---	---

In this mode the keys perform the following functions:

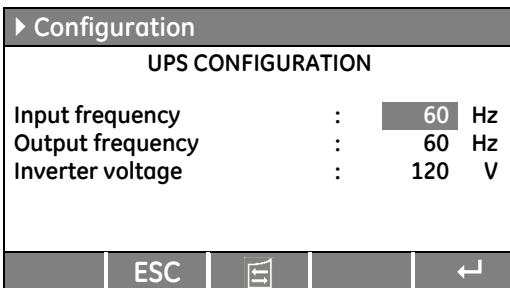
-  Confirm the selection made and select the next parameter.
-  Re-establish default value.
-  Modify or insert the selected value.
-  Save the configuration of set parameters.



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 (*60Hz).

Output frequency

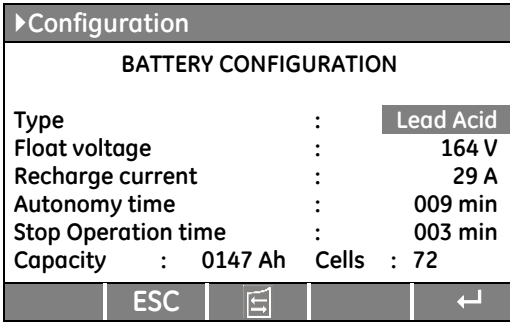
Inverter output frequency value (*60Hz).

Inverter voltage

Output voltage PHASE/NEUTRAL of the inverter (120V).

* Configuration of the frequency to 50Hz requires the intervention of an *Authorized Service Engineer*.

Continue ►



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).

Float voltage = Number of battery cells x battery float voltage per cell.

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

Lead - Acid (VRLA): 2.27Vdc for cell 72 cells x 2.27Vdc = **164Vdc**

Recharge current

Maximum battery recharge current is 40A.

Stop Operation time

Residual battery autonomy time before UPS forced shut-down. Standard set 3 minutes.

Settable from 1 minute to autonomy time in minutes (see tables).


Capacity

Ah capacity of the battery.

Cells

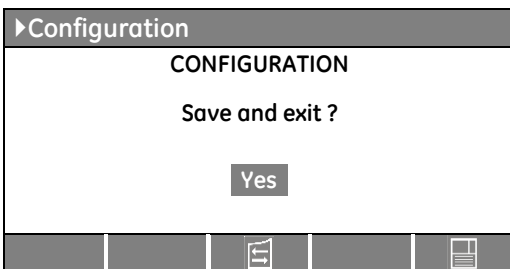
Number of cells of the battery (insert the value of single battery string).

Lead - Acid (VRLA): 72 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.

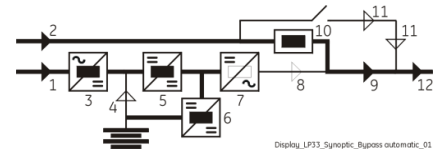
Any additional modification of setup parameters can be done only by a GE SERVICE PERSON as it requires an access code.

Continue ►

2. Close the output switch Q1 (Pos. I).

The load is supplied by the utility 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 **210Vdc**.

Home\Meter	
BOOSTER	
f	: 60.0 Hz
L1	: 120 V
L2	: 120 V
L3	: 120 V
Vp	: 210 V
Vn	: 210 V

3. Switch ON (Pos. I) the "Battery Breaker" of the battery cabinet.

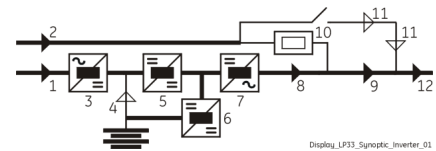
	<p>DANGER !</p> <p>Before performing this operation, check the right DC polarities on both side of the switch/fuse holder!</p>
--	---

4. Insert the inverter by pressing "Inverter ON" (I) key.

Some seconds later the load will be transferred on inverter.

LED Alarm turns OFF and the LED Operation must be lit.

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



5. Load supply.

Your LP33 Series 80 & 100 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.

LP33 Series 80 & 100 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 6.4 SETUP / ECO MODE).

END OF PROCEDURE

	<p>NOTE !</p> <p>Even if the UPS is delivered with the battery fully charged, they could be partially discharged during transportation or storage.</p> <p>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 utility failure.</p>
--	---

7.1.2 UPS shut-down with load transfer on manual bypass Q2

The purpose of this procedure is to supply the *load* directly by *utility* 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 authorized *Service Center*.



NOTE !

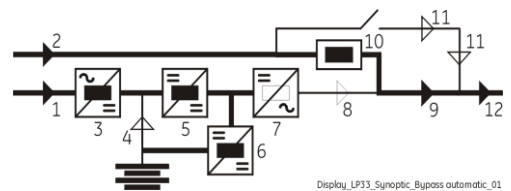
This procedure must not be performed if the UPS is used as *frequency converter*.

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

Load is transferred to *utility* by *automatic bypass*.

LED Alarm is lit and the LED Operation is Off.

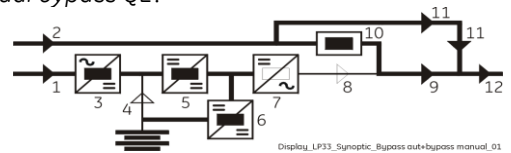
The *synoptic diagram* must display the status "**LOAD SUPPLIED BY AUTOMATIC BYPASS**".



2. **Close the manual bypass switch Q2 (Pos. I).**

Load is now supplied parallel through *automatic bypass* and *manual bypass Q2*.

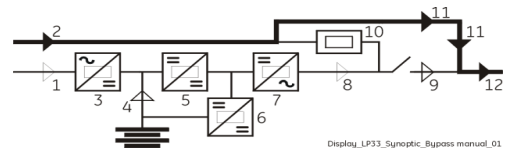
The *synoptic diagram* must display the status "**LOAD SUPPLIED BY AUTOMATIC BYPASS AND MANUAL BYPASS Q2**".



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 "Load Off" key.**

5. **Switch OFF the "Battery Breaker" from battery cabinet.**

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 **7Vac** (about 30 seconds).

Home\Meter		
INVERTER		
f	:	60.0 Hz
L1	:	7 V
L2	:	7 V
L3	:	7 V
T	:	OK
SYNCHRONIZED		

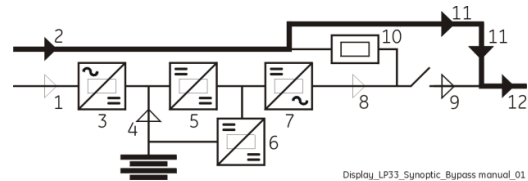
Before proceeding to step 7, check on the display panel that the *DC link voltage* (both polarities) **Vp** and **Vn** has reached the max. voltage of **5Vdc** (about 30 seconds).

Home\Meter		
BOOSTER		
f	:	60.0 Hz
L1	:	120 V
L2	:	120 V
L3	:	120 V
Vp	:	5 V
Vn	:	5 V


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

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 *utility* through the **MANUAL BYPASS Q2**.



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 a minimum of 5 minutes.

Wait until capacitors are completely discharged before starting the UPS again.

The UPS cabinet contains parts electrically live.

Apart from the front door, do not open any other part of the UPS.




NOTE !

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

7.1.3 From Manual Bypass Q2 to normal function VFI

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

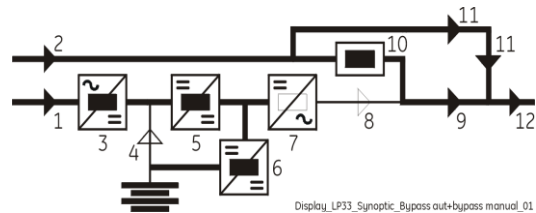
- The *inverter* is switched OFF;
- The *manual bypass switch Q2* is closed (Pos. I);
- The *output switch Q1* is open (Pos. 0);
- The “*Battery Breaker*” of the *battery cabinet* is OFF.
- *LED Alarm* blinks.

	<p>NOTE !</p> <p>This procedure must not be performed if the UPS is used as <i>frequency converter</i>.</p>
---	--

1. Close the output switch Q1 (Pos. I).

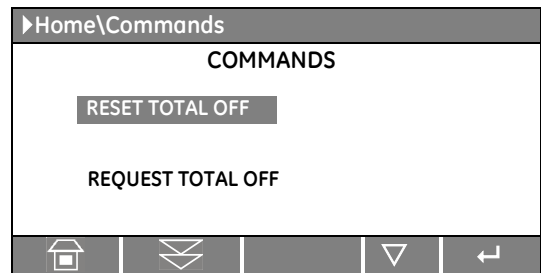
Load is now supplied parallel through *automatic bypass* and *manual bypass Q2*.

The *synoptic diagram* must display the status “**LOAD SUPPLIED BY AUTOMATIC BYPASS AND MANUAL BYPASS Q2**”.



2. Switch ON the “Battery Breaker” in battery cabinet.

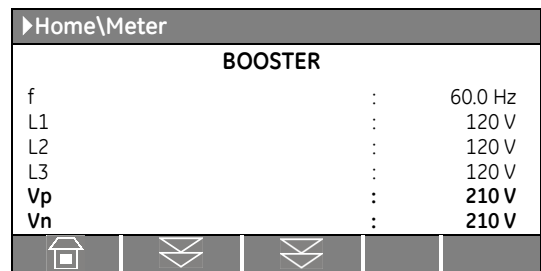
- 3.** Only in case it has been previously activated, restore the command “**Load Off**” by entering the screen:
COMMANDS/RESET TOTAL OFF



4. Open the manual bypass switch Q2 (Pos. 0).

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

Verify, selecting the screen *METERING/BOOSTER/Vp* and *Vn*, that the *booster voltage* has reached about **210Vdc**.

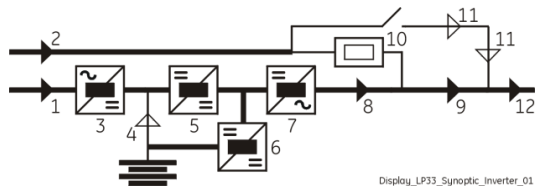


5. Insert the inverter by pressing “Inverter ON” (I) key.

Some seconds later the *load* will be transferred on *inverter*.

LED Alarm turns OFF and the *LED Operation* must be lit.

The *synoptic diagram* must display the status “**LOAD SUPPLIED BY INVERTER**”.



END OF PROCEDURE

7.1.4 Complete UPS shut-down

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 "Load Off" key.
2. Open the output switch Q1 (Pos. 0).
3. Switch OFF the "Battery Breaker" in the battery cabinet.
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 **7Vac** (about 30 seconds).

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

Home\Meter	
INVERTER	
f	: 60.0 Hz
L1	: 7 V
L2	: 7 V
L3	: 7 V
T	: OK
SYNCHRONIZED	

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 **5Vdc** (about 30 seconds).

Home\Meter	
BOOSTER	
f	: 60.0 Hz
L1	: 120 V
L2	: 120 V
L3	: 120 V
Vp	: 5 V
Vn	: 5 V

5. Disconnect the inverter by pressing "Inverter OFF" (O) key and hold until the LED inverter (7) turns OFF.
6. Switch OFF the utility 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 a minimum of 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.

7.1.5 Restore to normal operation after "Load Off"

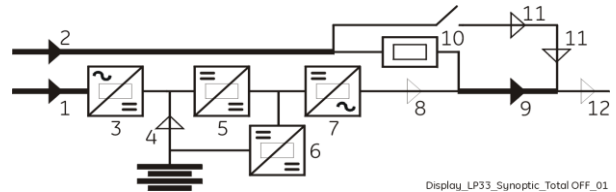


NOTE !

Make sure the UPS is in the status of the activation of "Load Off", i. e. Q1 closed, Q2 open and the "Battery Breaker" in the battery cabinet is ON.

View of the *synoptic diagram* after pressing the "Load Off" key:

- All Contactors are open.
- *Booster, Inverter and Static-Switch* shut-down.



1. Reset "Load Off".

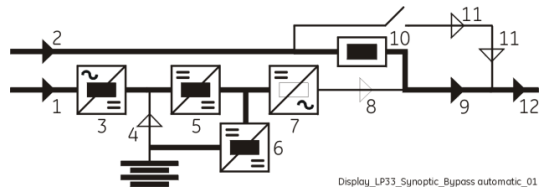
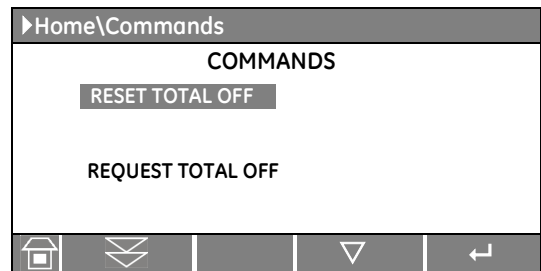
Restore the command "Load Off" by entering the screen: *COMMANDS / RESET TOTAL OFF*

LED Alarm is lit.

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

The *booster* starts automatically.

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

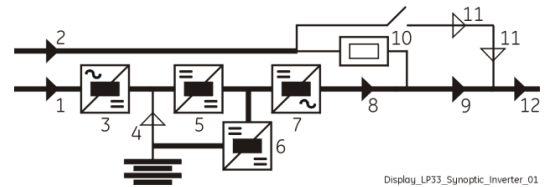


2. Insert the inverter by pressing "Inverter ON" (I) key.

Some seconds later the *load* will be transferred on *inverter*.

LED Alarm turns OFF and the LED Operation must be lit.

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



END OF PROCEDURE

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

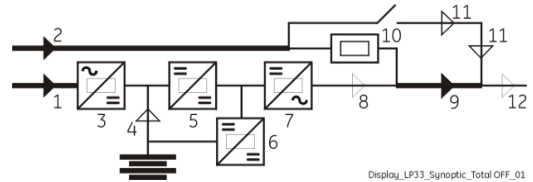


NOTE !

Make sure the UPS is in the status of the activation of "EPO - Emergency Power Off", i. e. Q1 closed, Q2 open and the "Battery Breaker" in the battery cabinet is ON.

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

- All Contactors are open.
- *Booster, Inverter and Static-Switch* shut-down.



1. Reset the "EPO" key.

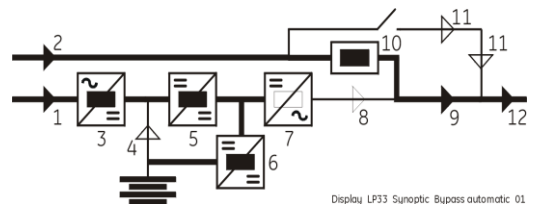
Press *MUTE* key to reset *Alarm and Acoustical alarm*.
LED Alarm remains lit.

2. Reset the UPS by pressing "Inverter OFF" (O) key.

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

The *booster* starts automatically.

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

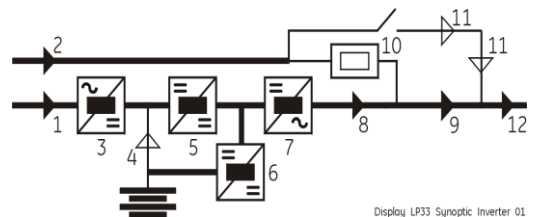


3. Insert the inverter by pressing "Inverter ON" (I) key.

Some seconds later the *load* will be transferred on *inverter*.

LED Alarm turns OFF and the *LED Operation* must be lit.

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



END OF PROCEDURE

RPA

Redundant Parallel Architecture

7.2 PROCEDURES FOR LP33 SERIES 50 & 60 PARALLEL SYSTEM

7.2.1 LP33 Series 80 & 100 Parallel System start-up

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 *utility input* protection is removed;
- All the *panels* removed to allow the UPS connection have been correctly reinstalled;
- The UPS switches *Q1* and *Q2* are OFF (Pos. 0);
- The "*Battery Breaker*" in the *battery cabinet* is OFF.

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

This procedure presupposes that the *Load* is not yet supplied by the *UPS Parallel System*.

NOTE !

The *UPS Parallel System* can be started-up using the *Battery Supply* in case the *Input Utility* should be unavailable.

To avoid an incidental *Battery* discharge, it is recommended to proceed to the *UPS Parallel System* start-up having the *Input Utility* available.

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 "**Battery Breaker**" in the *Battery Cabinet (option)* is OFF.

Q1 UPS output switch

Q2 Manual bypass switch

LEDs on synoptic diagram

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

Key
Inverter ON

Key
Inverter OFF

Key
Load Off

LED
Stop Operation

LED
Alarm

LED
Operation

Continue ►

1. Switch ON (Pos. I) the utility 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 Center*.

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


LED 1 (*utility rectifier OK*) and LED 2 (*utility bypass OK*) must be lit.

Press "MUTE" key to reset *acoustical alarm*. LED Alarm remains lit.





Overall test results	
Test1 OK	Test7 OK
Test2 OK	Test8 OK
Test3 OK	Test9 OK
Test4 OK	Test10 OK
Test5 OK	Test11 OK
Test6 OK	

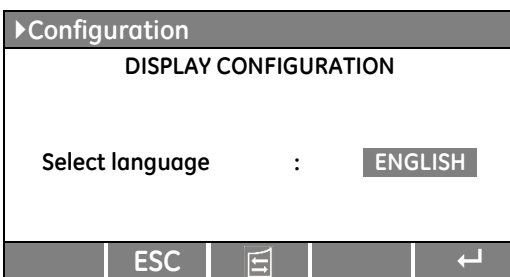
During the first commissioning *LP33 Series 80 & 100* requests a set-up of the UPS configuration parameters presented in the following screens.

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

	<p>WARNING !</p> <p>The setup of the UPS configuration parameters must be done only by a GE CRITICAL POWER FIELD SERVICES ENGINEER.</p> <p>The setup of mistaken values could compromise the integrity and reliability of the UPS.</p>
---	---

In this mode the keys perform the following functions:

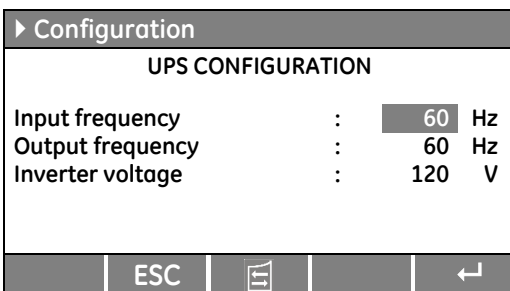
-  Confirm the selection made and select the next parameter.
-  Re-establish default value.
-  Modify or insert the selected value.
-  Save the configuration of set parameters.



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 (*60Hz).

Output frequency

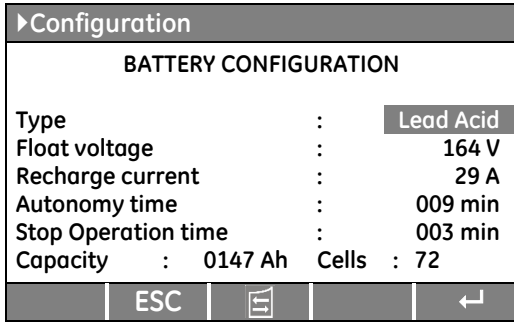
Inverter output frequency value (*60Hz).

Inverter voltage

Output voltage PHASE/NEUTRAL of the inverter (120V).

* Configuration of the frequency to 50Hz requires the intervention of an *Authorized Service Engineer*.

Continue ►



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).

Float voltage = Number of battery cells x battery float voltage per cell.

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

Lead - Acid (VRLA): 2.27Vdc for cell 72 cells x 2.27Vdc = **164Vdc**

Recharge current

Maximum battery recharge current is 40A.

Stop Operation time

Residual battery autonomy time before UPS forced shut-down. Standard set 3 minutes.

Settable from 1 minute to autonomy time in minutes (see tables).


Capacity

Ah capacity of the battery.

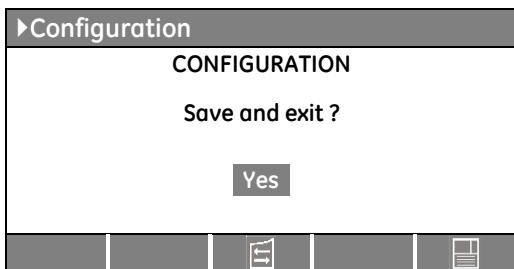
Cells

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

Lead - Acid (VRLA): 72 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.

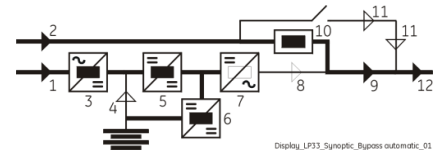
Any additional modification of setup parameters can be done only by a GE SERVICE PERSON as it requires an access code.

Continue ►

2. 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 utility through all *automatic bypasses*.

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



Home\Meter	
BOOSTER	
f	: 60.0 Hz
L1	: 120 V
L2	: 120 V
L3	: 120 V
Vp	: 210 V
Vn	: 210 V

Verify on all UPS units, selecting the screen *METERING/BOOSTER/Vp* and *Vn*, that the booster voltage has reached about **210Vdc**.

3. Switch ON the "Battery Breaker" in all battery cabinets.

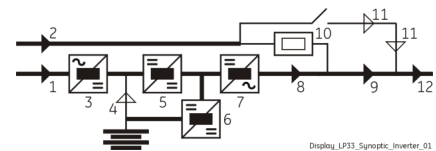
	<p>DANGER !</p> <p>Before to perform this operation, check the right DC polarities on both side of the switch/fuse holder!</p>
--	---

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 turns OFF and the *LED Operation* must be lit.

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



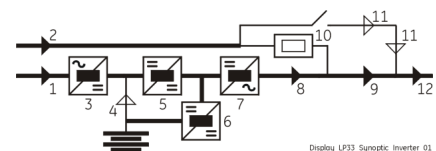
5. Insert the inverter by pressing "Inverter ON" (I) key on all other UPS units.

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

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 turns 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.

LP33 Series 80 & 100 Parallel System is now running, supplying power to the output. Insert the *loads* one by one to the output of the *LP33 Series 80 & 100 Parallel System*. Check the output current value of *L1, L2* and *L3* and check for correct load balance.

END OF PROCEDURE

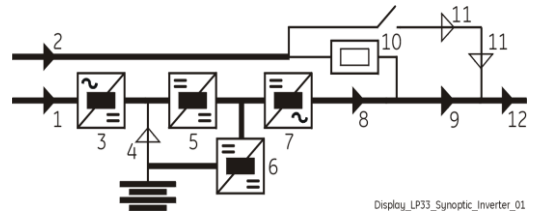
	<p>NOTE !</p> <p>Even if the UPS is delivered with the <i>battery</i> fully charged, they could be partially discharged during transportation or storage. It is recommended to recharge the battery during at least 10 hours in order to provide the complete <i>battery</i> energy stored to the load in the event of <i>utility failure</i>.</p>
--	---

7.2.2 Parallel UPS shut-down with load transfer on manual bypass Q2

The purpose of this procedure is to supply the *load* directly by *utility* 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 authorized *Service Center*.

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

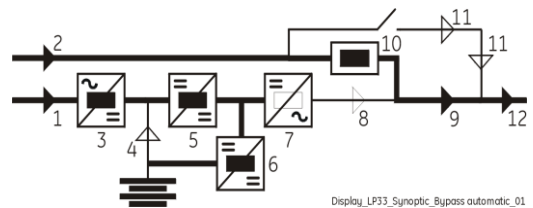


1. **Disconnect the inverter by pressing "Inverter OFF" (O) key and hold until the LED Inverter (7) turns OFF on all UPS units.**

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

LEDs Alarm are lit and the LEDs Operation are Off.

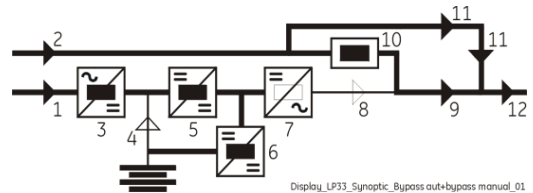
The *synoptic diagram*, on all UPS units, must display the status "**LOAD SUPPLIED BY AUTOMATIC BYPASS**".



2. **Close the manual bypass switch Q2 (Pos. I) on all UPS units.**

Load is now supplied from *utility* in parallel from *automatic bypass* and *manual bypass Q2* of all UPS units.

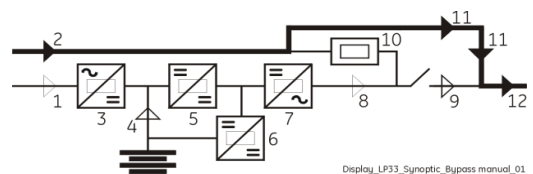
The *synoptic diagram*, on all UPS units, must display the status "**LOAD SUPPLIED BY AUTOMATIC BYPASS AND MANUAL BYPASS Q2**".



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 "Load Off" key on all UPS units.**

5. **Switch OFF the "Battery Breaker" on each battery cabinet.**

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 **7Vac** (about 30 seconds).

Home\Meter		
INVERTER		
f	:	60.0 Hz
L1	:	7 V
L2	:	7 V
L3	:	7 V
T	:	OK
SYNCHRONIZED		

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 **5Vdc** (about 30 seconds).

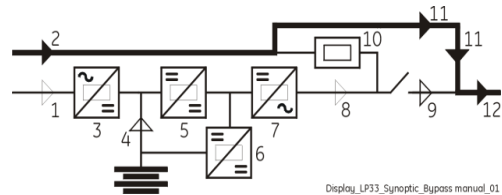
The *acoustical alarm* is activated, press “MUTE” key (from Home screen) to reset it.

Home\Meter		
BOOSTER		
f	:	60.0 Hz
L1	:	120 V
L2	:	120 V
L3	:	120 V
Vp	:	5 V
Vn	:	5 V


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 utility through all **MANUAL BYPASS Q2**.

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



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 a minimum of 5 minutes.

Wait until capacitors are completely discharged before starting the UPS again.

The UPS cabinet contains parts electrically live.

Apart from the front door, do not open any other part of the UPS.



NOTE !

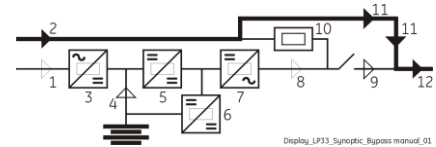
With separate utility inputs, it's possible to disconnect utility rectifier.

7.2.3 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 “*Battery Breaker*” from all *battery cabinets* is OFF (Pos. 0).
- *LED Alarm* blinks.

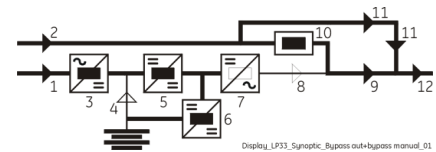
The *synoptic diagram*, on all UPS units, must display the status “**LOAD SUPPLIED BY MANUAL BYPASS Q2**”.



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

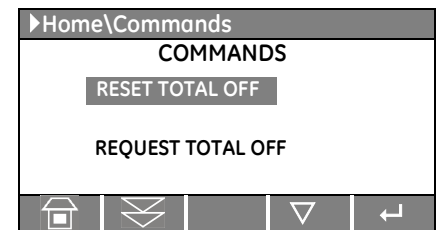
When the last Q1 will be closed the output will be from *utility* in parallel from *automatic bypass* and *manual bypass Q2* of all UPS units.

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



2. Switch ON the “Battery Breaker” in all battery cabinets.

- 3.** Only in case it has been previously activated, restore the command “*Load 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 *utility* through the *automatic bypass*.

Verify on all UPS units, selecting the screen *METERING/BOOSTER/Vp* and *Vn*, that the *booster voltage* has reached about **210Vdc**.

Home\Meter
BOOSTER

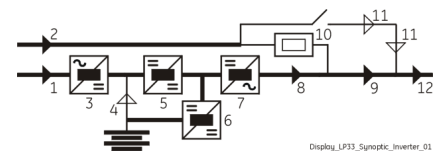
f	:	60.0 Hz
L1	:	120 V
L2	:	120 V
L3	:	120 V
Vp	:	210 V
Vn	:	210 V

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 turns OFF and the *LED Operation* must be lit.

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



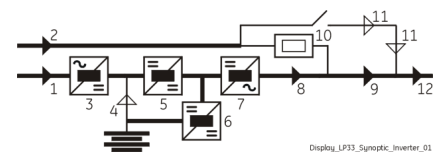
6. Insert the inverter by pressing “Inverter ON” (I) key on all other UPS units.

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

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 turns 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

7.2.4 Separate (shut-down) 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 *utility* 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 *utility*).

Load supplied from *inverter(s)* of the other Unit(s) of the *Parallel System*.

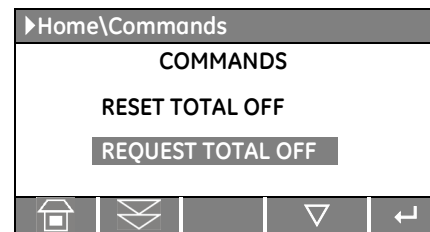
2. **Open the output switch Q1 only on this unit.**

LED Alarms is lit and the LED Operation is Off.

3. **Perform the command "Load Off" only on this unit.**

Perform the command "Load Off" by entering the screen (see Section 6.5):

COMMANDS / REQUEST TOTAL OFF

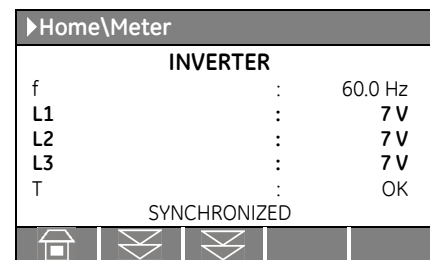


4. **Switch OFF the "Battery Breaker" only from battery cabinet belongs to this unit.**

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

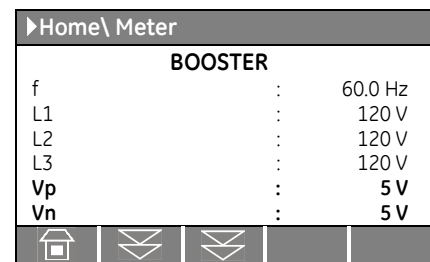
Remark:

Command *INVERTER ON* will be enabled only when the inverter voltage of each phase decreases below **7Vac** (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 **5Vdc** (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 utility power, only on this unit, at the AC input distribution panel.**

END OF PROCEDURE




WARNING !

In case the unit should be disconnected and removed from the operating system, the operation **MUST BE PERFORMED BY QUALIFIED PERSONS**.

If an intermediate unit must be disconnected from a parallel system pay attention do not open the control bus: keep the plugs **J3** and **J4** connected to the board "P16 - Connector adapter RPA" (See Chapter 3.9.5 of *Installation Guide*).

For any further intervention contact nearest *Service Center*.

7.2.5 Reconnect a UPS unit to a Parallel System

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

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 (Pos. I) the utility 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 Center*.

Overall test results	
Test1 OK	Test7 OK
Test2 OK	Test8 OK
Test3 OK	Test9 OK
Test4 OK	Test10 OK
Test5 OK	Test11 OK
Test6 OK	

2. 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 **210Vdc**.

Home\Meter	
BOOSTER	
f	: 60.0 Hz
L1	: 120 V
L2	: 120 V
L3	: 120 V
Vp	: 210 V
Vn	: 210 V

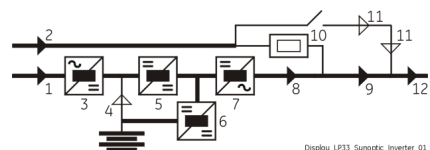
3. Switch ON the “Battery Breaker” in the battery cabinet on this UPS unit.

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

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

LED Alarm turns 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

7.2.6 Complete Parallel System shut-down

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 "Load Off" key on anyone of the parallel units.
2. Open the output switch Q1 (Pos. 0) on all UPS units.
3. Switch OFF the "Battery Breaker" in the battery cabinets of all the units.
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 **7Vac** (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 **5Vdc** (about 30 seconds).

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

Home\Meter		
INVERTER		
f	:	60.0 Hz
L1	:	7 V
L2	:	7 V
L3	:	7 V
T	:	OK
SYNCHRONIZED		

Home\Meter		
BOOSTER		
f	:	60.0 Hz
L1	:	120 V
L2	:	120 V
L3	:	120 V
Vp	:	5 V
Vn	:	5 V

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 utility power, on all UPS units, 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 a minimum of 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.

7.2.7 Restore to normal operation after "Load Off"

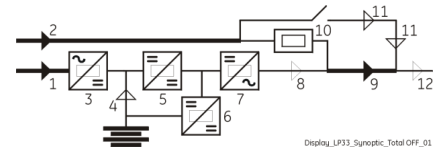


NOTE !

Make sure the all units of the *Parallel System* to be status of the activation of "Load Off", i. e. Q1 closed, Q2 open and the "Battery Breakers" in the *Battery Cabinets* are ON.

View of the *synoptic diagram*, on all UPS units, after pressing the "Load Off" key.

- All *Contactors* are open.
- *Booster, Inverter and Static-Switch* shut-down.



1. Reset "Load Off" of the Parallel System.

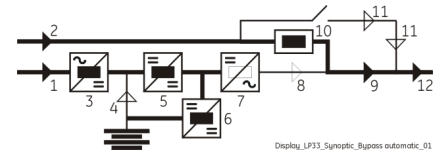
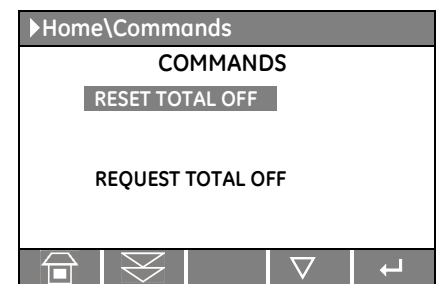
Restore the command "Load Off", on anyone of the parallel units, by entering the screen:

COMMANDS / RESET TOTAL OFF

LED Alarm is lit.

The load is supplied by the *utility* through the *automatic bypass*.
The *booster* starts automatically.

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

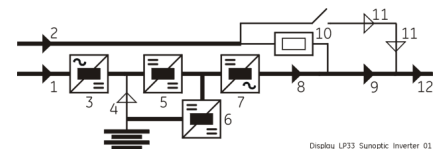


2. Insert the inverter by pressing "Inverter ON" (I) key on first UPS unit.

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

LED Alarm turns OFF and the LED Operation must be lit.

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



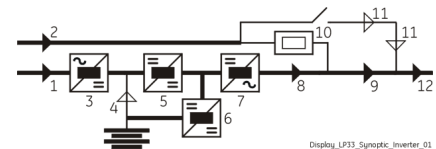
3. Insert the inverter by pressing "Inverter ON" (I) key on all other UPS units.

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

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 turns 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

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

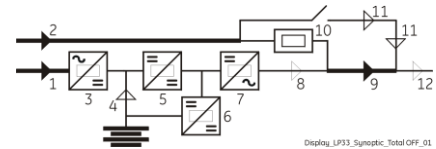


NOTE !

Make sure the all units of the *Parallel System* to be status of the activation of "EPO - Emergency Power Off", i. e. Q1 closed, Q2 open and the "Battery Breaker" of the *Battery Cabinet* are ON (Pos.I).

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* shut-down.



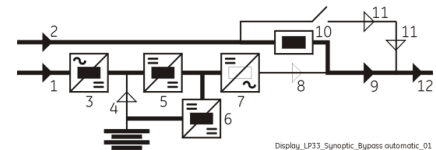
1. Reset the push-button "EPO".

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 *utility* through the *automatic bypass*.
The *booster* starts automatically.

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

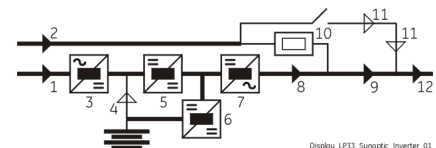


3. Insert the inverter by pressing "Inverter ON" (I) key on first UPS unit.

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

LED Alarm turns OFF and the *LED Operation* must be lit.

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



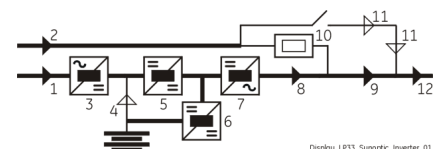
4. Insert the inverter by pressing "Inverter ON" (I) key on all other UPS units.

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

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 turns OFF and the *LED Operation* must be lit.

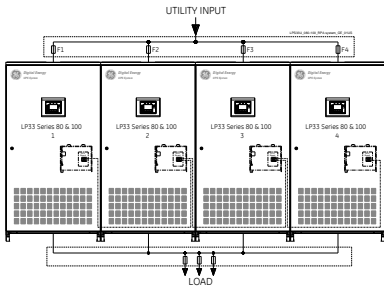
The *Synoptic diagram*, on all UPS units, must display the status
"LOAD SUPPLIED BY INVERTER".



END OF PROCEDURE

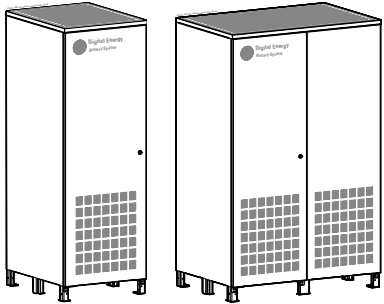
8 OPTIONS

8.1 OPTIONS GENERAL VIEW



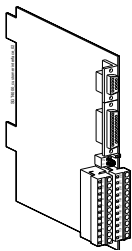
RPA kit Redundant Parallel Architecture

Allows extending 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.



Additional battery cabinets

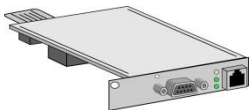
For battery with extended backup time.



Customer Interface

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

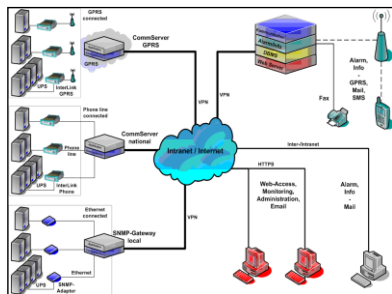
- Serial port RS232.
- 6 programmable output channels.
- 2 programmable input channels, of which one for *GEN-ON*.
- *EPO* (Emergency Power Off).



3-ph SNMP/WEB plug-in adapter

The "3-ph SNMP/WEB plug-in adapter" is an Interface to the *Ethernet Network*, and provides UPS information via the standard *SNMP* protocol (*Simple Network Management 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 shut-down of the server, when needed.



GE iUPS Guard

GE iUPS Guard 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.

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 *iUPS Guard* is not only a remote monitoring & diagnostics (RM&D) system but, the core of the integrated service offering *Power Diagnostics*.

GE Data Protection

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 shut-down.

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

9 MAINTENANCE



WARNING !

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

9.1 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 Center** organization.

9.2 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.

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



NOTE !

Never ignore a **SERVICE REQUIRED** alarm!

Failure to perform mandatory preventative maintenance on components documented in the UPS product manual may result in thermal damage to the equipment, its surroundings, and an increased risk of personnel injury.

Refer to *Section 9.3 to 9.6* for this important detail.

9.3 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.

9.4 OTHER COMPONENTS WITH LIMITED LIFETIME

We recommend the replacement of components such as AC and DC *Capacitors* every **50,000 hours**.


9.5 UPS ROOM CONDITIONS AND TEMPERATURE

The UPS room and the *Battery Room* have to be maintained clean and free from dust.

A high temperature of the UPS room and of the *Battery Room* affect the lifetime of several components inside the equipment.

The *Battery* is very sensitive to room temperatures above **77°F** (25°C).

9.6 BATTERY MAINTENANCE

	<p>NOTE !</p> <p>Perform mandatory battery maintenance per battery's manufacturer product manual. This includes electrical and thermal measurements, inspection, cleaning, replacement and re-torque of connections.</p> <p>Failure to perform proper maintenance on the battery, per the battery manufacturer's recommendation, including scheduled battery replacement, may result in thermal damage to the equipment and an increased risk of personnel injury.</p> <p>GE declines any responsibility for any damage to the system and the surrounding caused by battery when the battery maintenance program is provided by other than GE itself and GE authorized partners.</p>
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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 **LP33 Series 15** 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 utility 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 Center** 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 **Service Center**.

	<p>NOTE !</p> <p>Ask to your local <i>Service Center</i> to submit the form of <i>Preventive Maintenance Contract</i> suitable for your specific needs.</p>
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