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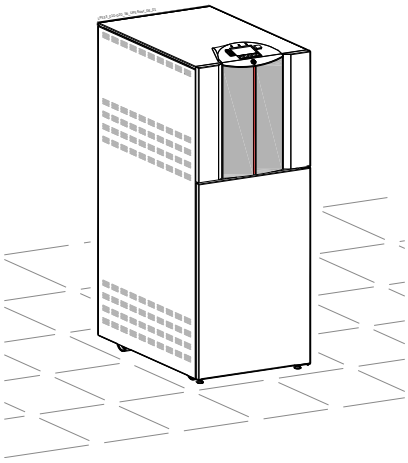

User Manual

Uninterruptible Power Supply

LP33 Series 10 & 20

10 & 20 kVA / 400Vac CE / S6

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Dear Customer,

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

We trust that the use of the ***LP33 Series 10 & 20*** 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 Digital Energy*** !

GE Consumer & Industrial SA
General Electric Company
CH – 6595 Riazzino (Locarno)
Switzerland

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1 SAFETY RULES

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

Please read carefully this ***User Manual*** before installing or operating the UPS.
We recommend that this manual be kept next to the UPS for future references.

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

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

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

THE ONLY CONDITION

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

NOTE !

LP33 Series 10 & 20 **is a Category C2 UPS Product (Class A - according to IEC 62040).**

In a domestic environment, this product may cause radio interference, in which case, the user may be required to take additional measures.

ATTENTION !

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

GE Digital Energy **refuses any responsibility in case of non-observance, unauthorised alterations or improper use of the delivered UPS.**

1.1 IMPORTANT SAFETY RULES

GENERAL

- Move the UPS in an upright position in its original package to the final destination room.
- To lift the cabinets, use a forklift or lifting belts with spreader bars.
- Check for sufficient floor and elevator loading capacity.
- Check carefully the integrity of the UPS equipment.
  In case you note some visible damage, do not put the UPS under voltage, but contact the nearest *Service Centre*.
- WARNING: RISK OF ELECTRICAL SHOCK.
  Apart the front hinged lockable doors, do not remove any covers, there are no user serviceable parts inside.
- After switching off takes min. 5 minutes for the DC capacitors to discharge because a lethally high voltage remains at the terminals of the electrolytic capacitors.
- All maintenance and service work should be performed by qualified service personnel.
- The outlet-bars may be electrically live, even when the UPS is disconnected from the mains.
- Dangerous voltages may be present during battery operation.
- The battery protections must be removed before any maintenance or service work.
- Be aware that the inverter can restart automatically after the utility voltage is restored.
- End user must follow applicable regional occupational safety codes/regulations during installation, operation and equipment maintenance.
  This may require additional field marking or labelling 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.
- High earth leakage current: Earth connection essential before connecting to AC input.
- Switching OFF the unit does not isolate the UPS from the mains.
- Do not install the UPS in an excessively humid environment or near water.
- Avoid spilling liquids on or dropping any foreign object into the UPS.
- The unit must be placed in a sufficiently ventilated area; the ambient temperature should not exceed 40°C (104°F).
- Optimal battery life is obtained if the ambient temperature does not exceed 25°C (77°F).
- It is important that air can move freely around and through the unit.
- Do not block the air vents.
- Avoid locations in direct sunlight or near heat sources.

STORAGE

- Store the UPS in a dry location; storage temperature must be within -25°C (-13°F) to +55°C (131°F).
- The optimal temperature for Battery storage is 20°C (68°F) to 25°C (77°F) and shall never exceed the range -20°C (-4°F) to 40°C (104°F).
- If the unit is stored for a period exceeding 3 months, the batteries must be recharged periodically (time depending on storage temperature).

BATTERY

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

WARNING !

The UPS contains hazardous voltages.

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

RPA
Redundant Parallel Architecture

Parallel version secured with RPA

When included in the text, this symbol refers to operation needed only for Parallel System.

Safety instructions when working with battery

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

INSTALLATION PERSONNEL MUST READ THIS ENTIRE SECTION BEFORE HANDLING THE UPS AND BATTERY.

DANGER!

Full voltage and current are always present at the battery terminals.
The battery used in this system can provide dangerous voltages, extremely high currents and a risk of electric shock.
If the terminals are shorted together or to ground they may cause severe injury.
You must be extremely careful to avoid electric shock and burns caused by contacting battery terminals or shorting terminals during battery installation.
Do not touch uninsulated battery terminals.

A qualified service person, who is familiar with battery systems and required precautions, must install and service the battery.
The installation must conform to national and local codes.
Keep unauthorised personnel away from the battery.

The qualified service person must take these precautions:

1 Wear protective clothing, such as rubber gloves and boots and protective eye wear
Batteries contain caustic acids and toxic materials and can rupture or leak if mistreated.
Remove rings and metal wristwatches or other metal objects and jewellery.
Do not carry metal objects in your pockets where the objects can fall into the battery cabinet.

2 Tools must have insulated handles and must be insulated so that they will not short battery terminals.
Do not allow a tool to short between individual or separate battery terminals or to the cabinet or rack.
Do not lay tools or metal parts on top of the battery, and do not lay them where they could fall onto the battery or into the cabinet.

3 Install the battery as shown on the drawing provided with the battery.
When connecting cables, never allow a cable to short across a battery's terminals, the string of battery, or to the cabinet or rack.

4 Align the cables on the battery terminals so that the cable lug will not contact any part of the cabinet or rack, even if the battery is moved.
Keep the cable away from any sharp metal edges.

5 Install the battery cables in such a way that the UPS or battery cabinet doors cannot pinch them.

6 Do not connect the battery terminal to Ground.
If any battery terminal is inadvertently grounded, remove the source of the ground.
Contacting any part of a grounded battery can cause a risk of electric shock.

7 To reduce the risk of fire or electric shock, install the battery in a temperature and humidity controlled indoor area, free of contaminants.

8 Battery system chassis ground (earth) must be connected to the UPS chassis ground (earth).
If you use conduits, this ground conductor must be routed in the same conduit as the battery conductors.

9 Where conductors may be exposed to physical damage, protect the conductors in accordance with all applicable codes.

10 If you are replacing the battery or repairing battery connections, shut OFF the UPS and remove the battery fuses.

1.2 SAFETY SYMBOLS AND WARNINGS

Safety warnings

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

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

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

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

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

Safety symbols

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

Please remind the meaning of each symbol.

	**CAUTION** **Related to all the potentially hazardous situations which may result in injury.**
	**DANGER OF PARTS ELECTRICALLY LIVE** **Related to all the situation with potentially hazardous voltage.**
	**DANGER OF EXPLOSION** **Used to indicate conditions where exploding parts can cause serious injury.**
	**DANGER OF CRUSHING** **Used when moving the equipment due to the heavy weight.**
	**DANGER OF OVERHUNG LOAD** **Used when the equipment is lifted by a crane.**
	**DANGER OF HOT SURFACE** **Used to indicate conditions of elevated temperature on some parts.**
	**DO NOT TOUCH** **Risk of parts with hazardous voltages or parts in movement.**

2 LAYOUT

2.1 LAYOUT LP33 SERIES 10 & 20

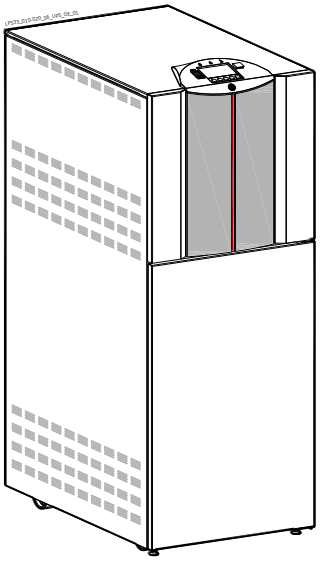


Fig. 2.1-1 General view

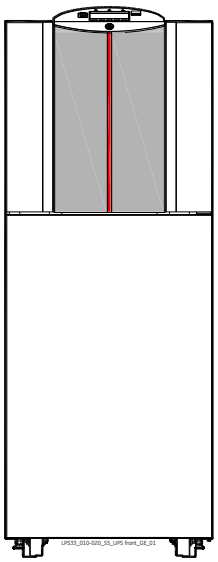


Fig. 2.1-2 Front view

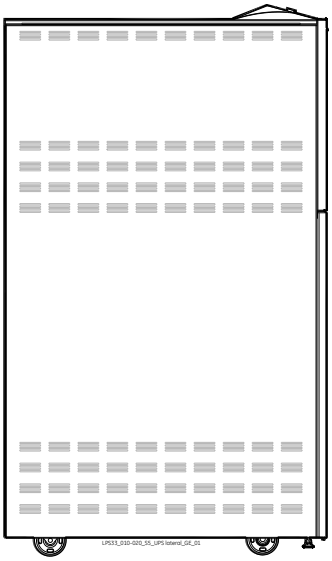


Fig. 2.1-3 Side view

Fig. 2.1-4 Control panel

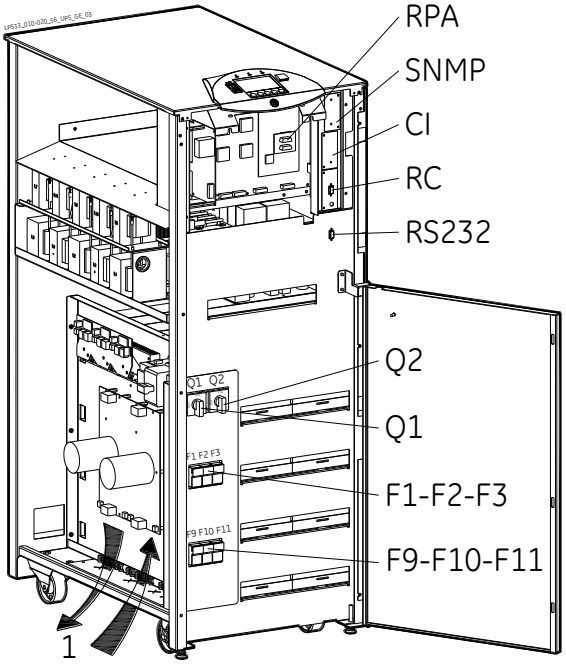


Fig. 2.1-5 General view without protection panels

1	Input Mains and Output Load
CI	Costumer Interface Board (option)
F1-F2-F3	Rectifier input fuses
F9-F10-F11	Battery fuses
Q1	UPS Output switch
Q2	Manual Bypass switch
RC	Relay card
RPA	RPA board (option)
RS232	Serial Port RS232
SNMP	3-ph SNMP/WEB plug-in adapter (option)

3 INTRODUCTION

3.1 GENERAL DESCRIPTION

The ***LP33 Series 10 & 20 Uninterruptible Power Supply*** (UPS) provides the energy supply for critical loads which need a reliable, continuous free from voltage disturbances and frequency fluctuations supply.

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

LP33 Series 10 & 20 is a truly *VFI* double conversion ***Uninterruptible Power Supply*** (UPS), equipped with *automatic bypass*, where the ***load*** is normally supplied by the ***inverter***.

LP33 Series 10 & 20 can be configured, if chosen, for the ***ECO Mode*** permitting the maximum energy saving.

The main typical performances of the ***LP33 Series 10 & 20*** system are the following:

- ***VFI (Voltage Frequency Independent) double conversion technology to provide an excellent quality power supply.***
- ***Input power factor 1.***
- ***Input current THD <8%.***
- ***Automatic bypass and manual bypass to improve reliability and maintenance.***
- ***Microprocessor controlled supervision.***
- ***Dual AC inputs (Option).***
- ***ECO Mode operation.***
- ***Compact and agreeable design expressly conceived for "Office environment".***
- ***Low level acoustic sound, to avoid noise to the persons operating in the same environment.***
- ***Multi-language LCD screen.***
- ***Total battery management: SBM (Superior Battery Management)***
- ***High battery capacity, 25 minutes (10 kVA) and 10 minutes (20 kVA), with battery mounted inside the UPS cabinet.***
- ***Wide rectifier input voltage tolerance: 323 ÷ 460Vac (phase - phase).***
- ***Wide rectifier input frequency tolerance: +/-10% (45 ÷ 55 for 50Hz and 54 ÷ 66 for 60Hz).***
- ***RPA (Redundant Parallel Architecture) up to 4 units.***
- ***GE Connectivity.***
- ***Compliance with European standard IEC 62040.***

4 DESCRIPTION

4.1 PRINCIPAL DIAGRAM AND MAIN ELEMENTS DESCRIPTION

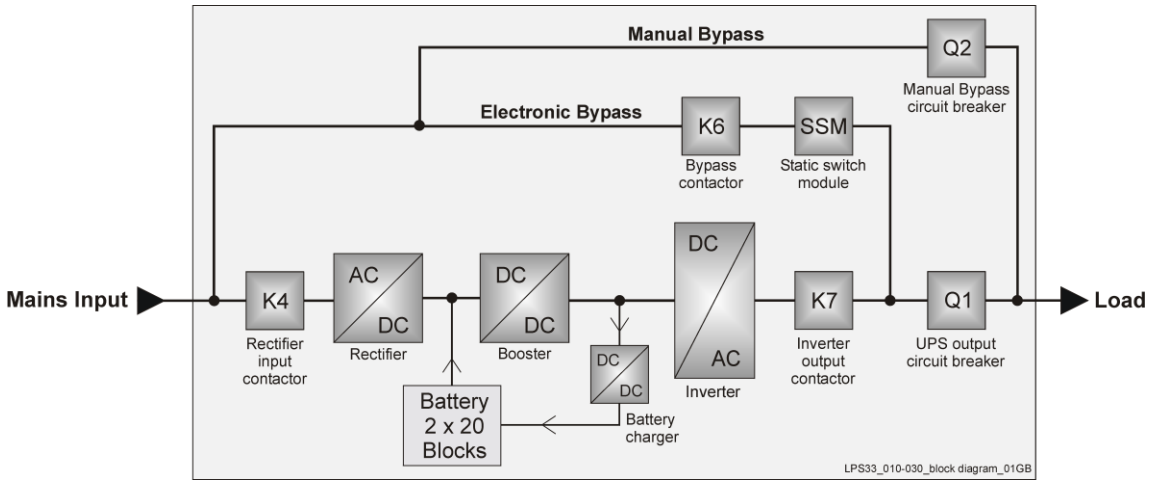


Fig. 4.1-1 Block Diagram LP33 Series 10 & 20

The Uninterruptible Power Supply System ***LP33 Series 10 & 20*** 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 *Control Panel* consisting of an *LCD screen*, displaying the operation modes, the measurements and the events / alarms.

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

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

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

Back-Feed Protection
All *LP33 Series 10 & 20* UPS's are equipped with an automatic system for the protection against voltage back feeding towards Utility, through the Bypass (Applied Standard IEC 62040-1).
This protection works automatically by opening *contactor K6* (in series with the thyristors of the static switch) and eventually *K7*, and acts in case of internal defects of the system, or due to wrong manipulations on the *maintenance bypass Q2*.

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

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

4.2 OPERATION MODES

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

VFI (Voltage Frequency Independent) mode operation

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

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

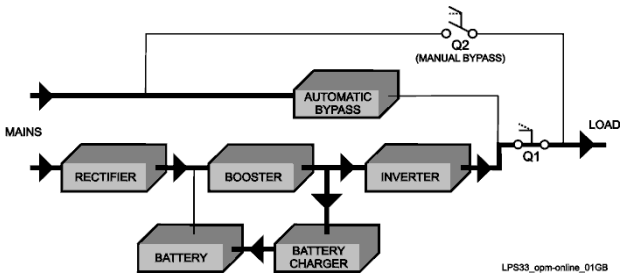


Fig. 4.2-1 Energy flow in VFI Mode operation

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.

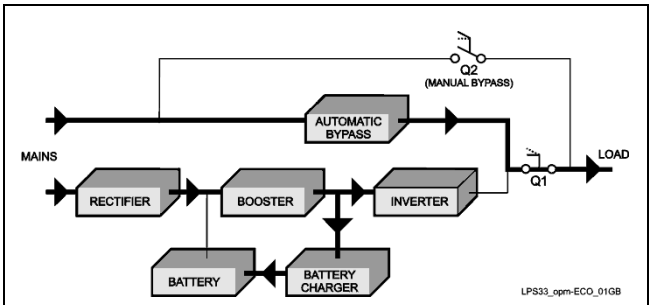


Fig. 4.2-2 Energy flow in ECO Mode operation

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

The selection between the two operation modes "***VFI Mode*** and ***ECO Mode***", or switching between operation modes at required time, can be done through the UPS ***control panel*** (see *Section 7.4 / ECO Mode)*.

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 i***nverter*** 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.

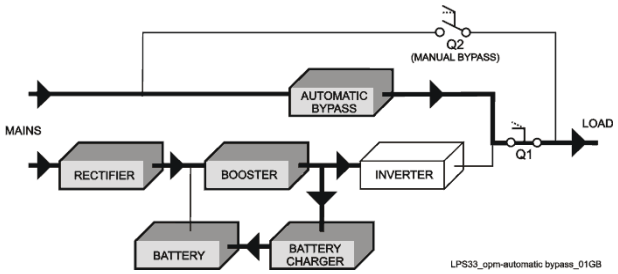


Fig. 4.2-3 Energy flow in automatic bypass operation

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.

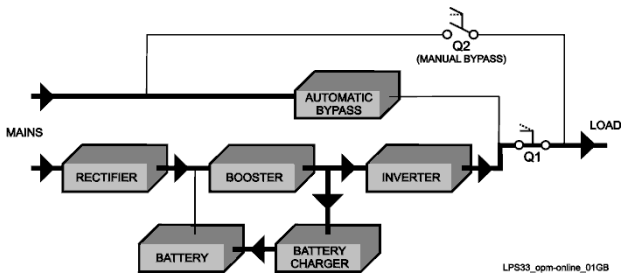


Fig. 4.2-4 Energy flow at mains recovery operation

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 retransfered to ***inverter*** (if selected *VFI Mode*).

RPA
Redundant Parallel Architecture

In case of Parallel System

When the AC input power recovers, ***the rectifiers will start-up sequentially*** *according to their number in the Parallel System* ***in order to avoid an initial inrush current***.
The ***inverters will start-up automatically****, but only when the battery has recharged enough for a* ***minimum runtime*** *with the present load.*
When *enough inverters to supply the load have been restarted,* ***the load will be transferred from the automatic bypass back to the inverter bus-bars***.

Manual bypass operation

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

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

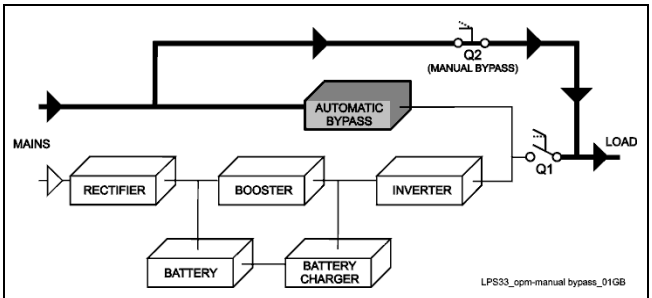


Fig. 4.2-5 Energy flow in manual bypass operation

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

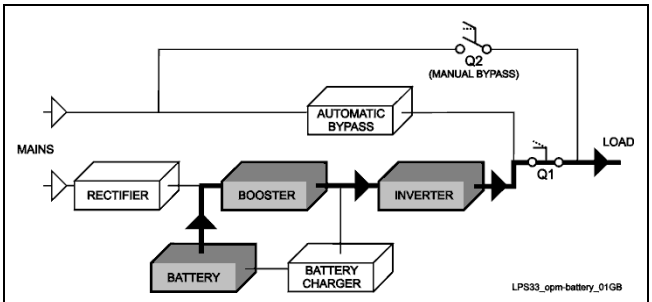


Fig. 4.2-6 Energy flow during mains failure operation

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 10 & 20* 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.

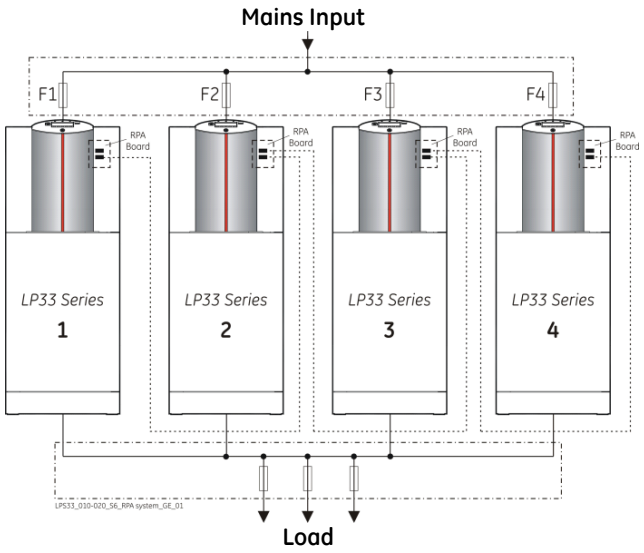


Fig. 4.3-1 RPA system diagram

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 synchronisation of the Parallel System

All the units are identical without master and slaves.
One unit is arbitrarily selected as the reference (the first unit connected on power bus) being this unit the first synchronised with the mains voltage, and all the other units synchronise with the first one.
In case the reference unit fails or it is excluded from the parallel power bus any other unit will take over the reference role.
The AC input power source of all the bypasses must be the same for all the units of the Parallel System excluding any phase shift between them.

Control bus of the Parallel System

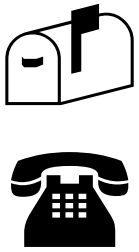
A high-speed serial bus, guarantees communication, synchronization and load sharing between the UPS modules.
Each module controls it's own function, while the Master (each unit can be Master) controls and commands the status of the system.

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

4.4 SERVICE AND TECHNICAL SUPPORT

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

Stamp of your local Service Centre (see page 3)



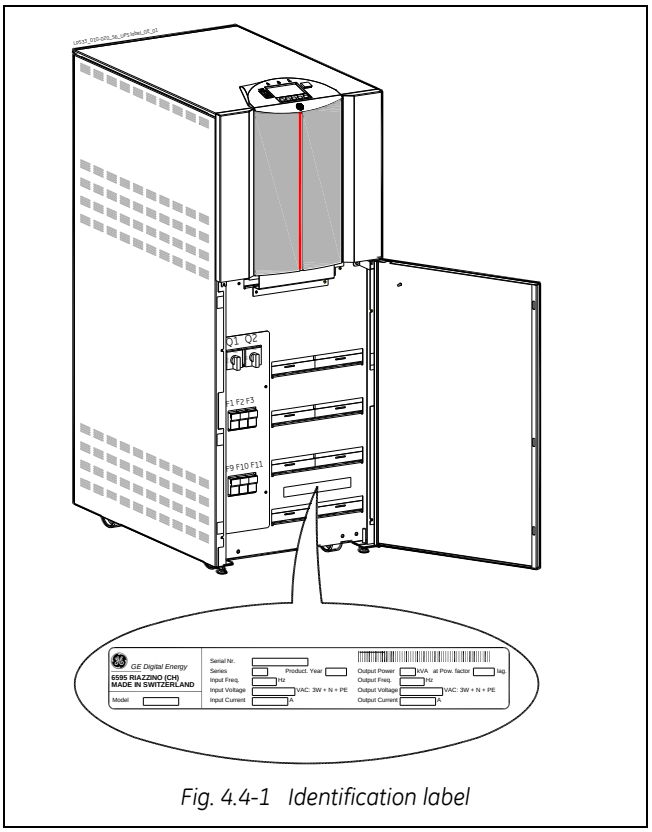


Fig. 4.4-1 Identification label

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.

4.5 WARRANTY

GE Digital Energy, operating through its authorised agents, warrants that the standard products will be free of defects in materials and workmanship for a period as per contract specifications.

NOTE !

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

4.6 RECYCLING AT THE END OF SERVICE LIFE

NOTE !

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

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

RECYCLING AT THE END OF SERVICE LIFE !

***GE Digital Energy*, 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.**

BATTERY DISPOSAL

This product contains a battery that cannot be disposed of as unsorted municipal waste in the European Union.

See the product documentation for specific battery information.

The battery is marked with this symbol, which may include lettering to indicate cadmium (Cd), lead (Pb), or mercury (Hg).

For proper recycling return the battery to your supplier or to a designated collection point.

For more information see: www.weeerohsinfo.com

5 INSTALLATION

5.1 TRANSPORT

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

The UPS must be moved in **upright position**.
Do not tilt cabinets **more than +/- 10°** during handling.

Move the UPS in its **original package** to the final destination room.
Do not stack other package on top: they could damage the upper side of the cabinet.

	NOTE ! **When moving the UPS, pay attention to:**	

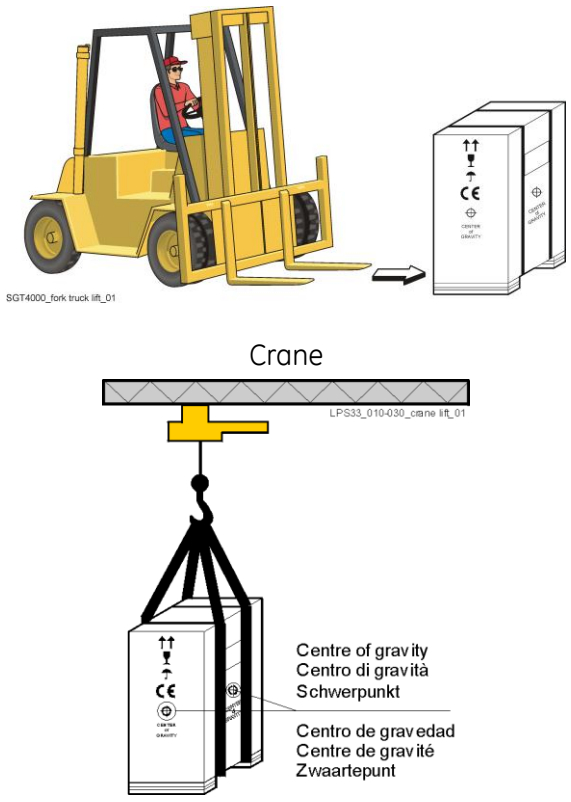


Fig. 5.1-1 Moving the unpacked UPS

Forklift

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

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

NOTE !

Check for sufficient floor and elevator loading capacity.

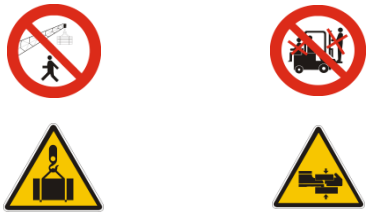
Transport UPS only in upright position.

Do not stack other package on top of the UPS.

Crane

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

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

	WARNING ! **When loading / downloading and when moving the UPS, it is forbidden:** **When loading / downloading and when moving the UPS, pay attention to:**	

5.1.1 Dimensions and weights

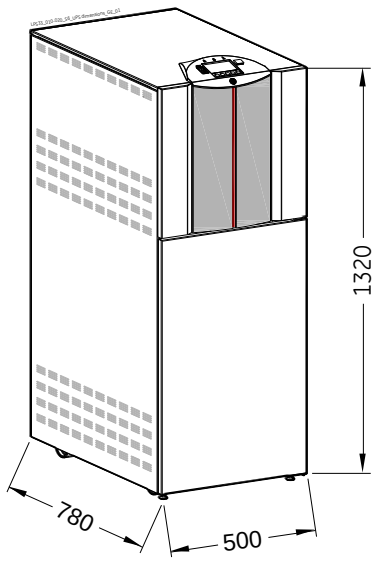


Fig. 5.1.1-1 Dimensions LP33 Series 10

LP33 Series 10	
UPS dimensions (W x D x H):	500 x 780 x 1320 mm 19.69 x 30.71 x 51.97 "
Weight UPS without battery:	140 kg / 309 lbs
Floor loading UPS without battery:	359 kg/m^2
Weight UPS with battery 7Ah / 14Ah:	270 (7Ah) / 370 (14Ah) kg 596 (7Ah) / 816 (14Ah) lbs
Floor loading UPS with battery 7Ah / 14Ah:	693 (7Ah) / 949 (14Ah) kg/m^2
Weight UPS without battery and standard shipping:	170 kg / 375 lbs
Weight UPS with battery 7Ah / 14Ah and standard shipping:	300 (7Ah) / 400 (14Ah) kg 662 (7Ah) / 882 (14Ah) lbs

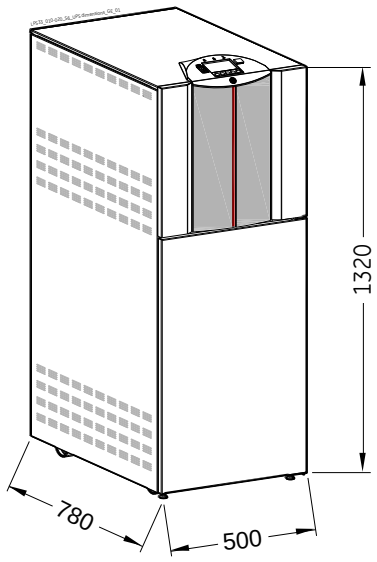


Fig. 5.1.1-2 Dimensions LP33 Series 20

LP33 Series 20	
UPS dimensions (W x D x H):	500 x 780 x 1320 mm 19.69 x 30.71 x 51.97 "
Weight UPS without battery:	150 kg / 331 lbs
Floor loading UPS without battery:	385 kg/m^2
Weight UPS with battery 14Ah:	375 kg / 827 lbs
Floor loading UPS with battery 14Ah:	962 kg/m^2
Weight UPS without battery and standard shipping:	180 kg / 397 lbs
Weight UPS with battery 14Ah and standard shipping:	405 kg / 894 lbs

NOTE !

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

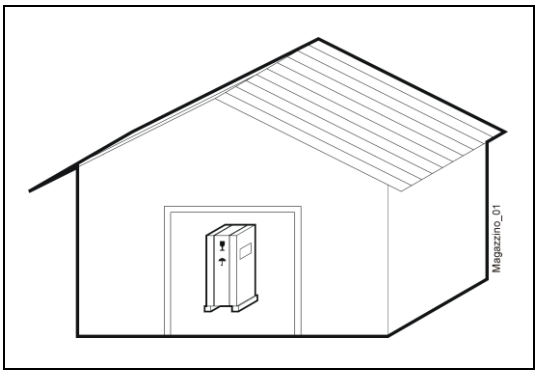
5.2 DELIVERY

When delivered, check carefully the **package integrity** and the **physical conditions of the UPS equipment**.
In case of any damage sustained during transport, immediately inform the carrier and contact your local ***Service Centre.***
A **detailed report** of the damage is necessary for any insurance claim.

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

5.3 STORAGE

5.3.1 Storage of the UPS



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

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

We recommend to store the UPS in its original package in a dry, dust-free room, away from chemical substances, and with a temperature range not exceeding **-25°C** (-13°F) to **55°C** (131°F).
In case the battery is included please refer to *Section 5.3.2*.

Some important functions of the UPS, such as the customized functions, are defined by parameters stored in a ***RAM memory***. A small backup *Battery* located on the Control Unit board supplies the RAM.
If the storage time of the UPS exceeds **1 year**, these functions **should be verified** by an authorized *Service Centre* before putting the UPS into operation.

	NOTE ! **In case of storage of the UPS pay attention to:**	

5.3.2 Storage of the battery

When the delivery includes a maintenance free *Battery*, keep in mind that they are subject to self-discharge and therefore you must recharge the *Battery*.
The storage time without *Battery* recharge depends on the temperature of the storage site.
The optimal temperature for *Battery* storage is **20°C** (68°F) to **25°C** (77°F) and shall never exceed the range **-20°C** (-4°F) to **40°C** (104°F).

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

6 months with storage temperature 20°C (68°F)
3 months with storage temperature 30°C (86°F)
2 months with storage temperature 35°C (95°F)

	NOTE ! **In case of *battery* storage pay attention to:**	

5.4 PLACE OF INSTALLATION

WARNING !

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

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

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

Verify for **sufficient floor load capacity** (see *Section 5.1.1)*.

We strongly advice that the ambient temperature should not exceed **20°** to **25°C / 68°** to **77°F** (max. 40°C / 104°F). See *Section 5.5*.

NOTE !

Insufficient space on both sides of the UPS in respect to the wall can cause a dangerous increase of the internal operating temperature.

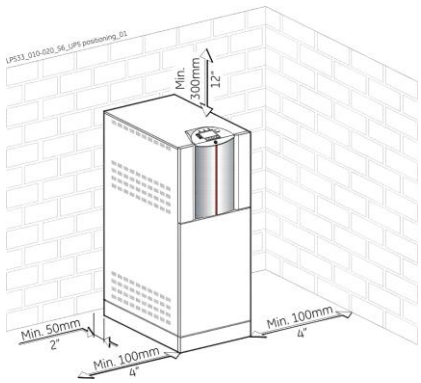


Fig. 5.4-1 LP33 Series 10 & 20 positioning

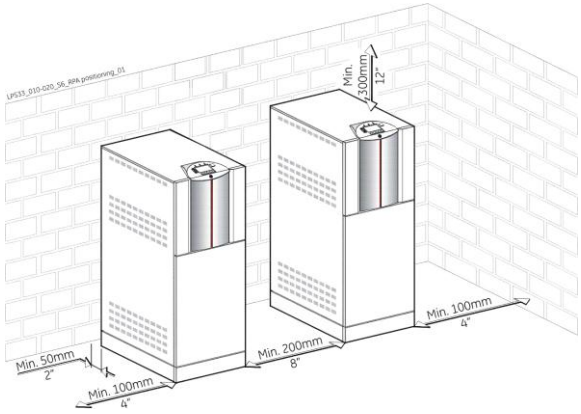


Fig. 5.4-2 RPA Parallel System positioning

***LP33 Series 10 & 20* positioning**

For easier access in case of maintenance operation and for a free circulation around the cabinet, we recommend to maintain the following minimum distances:

Right & left side:	**100 mm**	(4")
Rear side:	**50 mm**	(2")
Top of the UPS:	**300 mm**	(12")

RPA
Redundant Parallel Architecture

Right & left side:	**200 mm**	(8")
Rear side:	**50 mm**	(2")
Top of the UPS:	**300 mm**	(12")

NOTE !

Both lateral sides of the UPS MUST BE ACCESSIBLE at any time for repair or maintenance.

NOTE !

Operating temperature is very important for *valve regulated battery* (maintenance free).
Operation at temperatures higher than 20°C (68°F) will reduce life expectancy.
Respect the prescription VDE 0510, those of the battery supplier and other local standards.
The installation and cabling of the battery must be done by qualified people.

5.5 VENTILATION AND COOLING

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

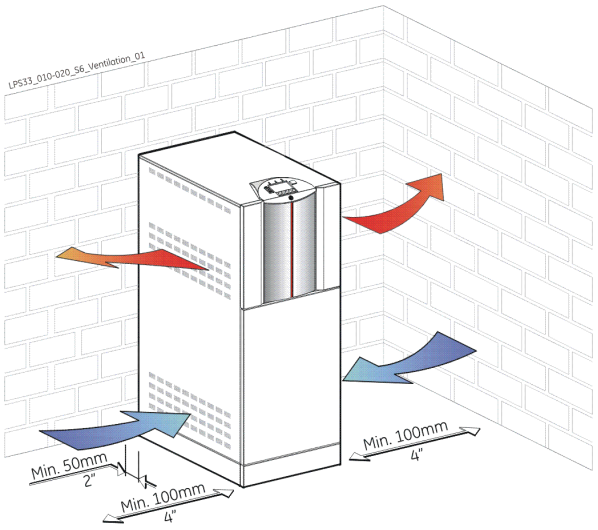


Fig. 5.5-1 Airflow through the LP33 Series 10 & 20

Airflow through the UPS

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

NOTE !

Insufficient distances on both sides of the UPS could increase the temperature inside the UPS.

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

Heat evacuation from UPS room

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

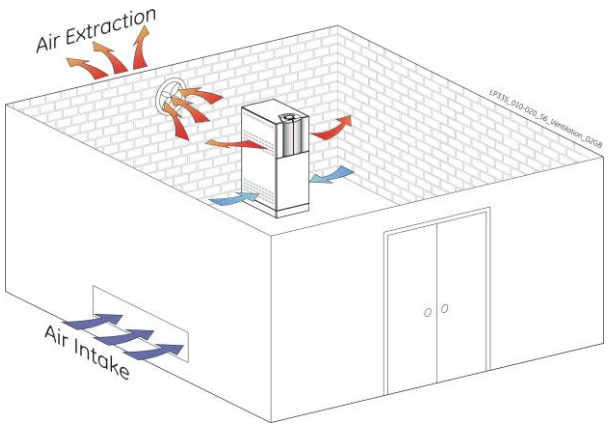


Fig. 5.5-2 Heat evacuation from UPS room

Air volume and losses of the UPS

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

UPS model	Air volume		Losses	
	VFI Mode	*ECO Mode*	*VFI Mode*	*ECO Mode*
LP33 Series 10	235 m³/h	45 m³/h	0.78 kW	0.15 kW
LP33 Series 20	430 m³/h	70 m³/h	1.47 kW	0.23 kW

5.6 UNPACKING

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

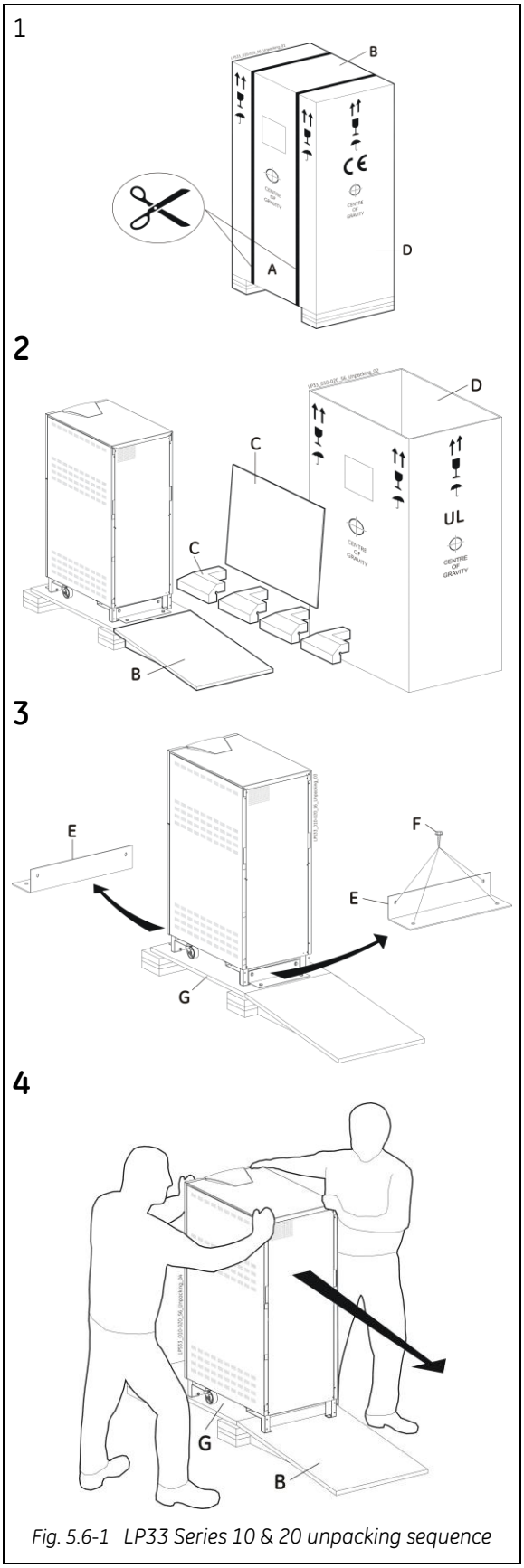


Fig. 5.6-1 LP33 Series 10 & 20 unpacking sequence

Procedure for the unpacking of the UPS:

- Make sure to have sufficient space around the UPS before you start unpacking.
- Cut the two straps "***A***" fixing the carton box.
- Remove the wooden top cover "***B***", which will be used as a ramp and position it as shown in the picture.
- Remove the protection "***C***" outside the cabinet and the accessories bag.
- Remove the carton box "***D***".
- Remove the 2 angle irons "***E***", which are fixing the UPS to the wooden base "***G***" by unscrewing bolts "***F***".
- Push now the UPS towards the ramp "***B***" and let it slide down the ramp.
  This has to done with the utmost care!

NOTE !

Be aware of the heavy weight of the UPS, in particular if already equipped with Batteries.

White colour = without any anomaly
Red colour = anomaly evidence

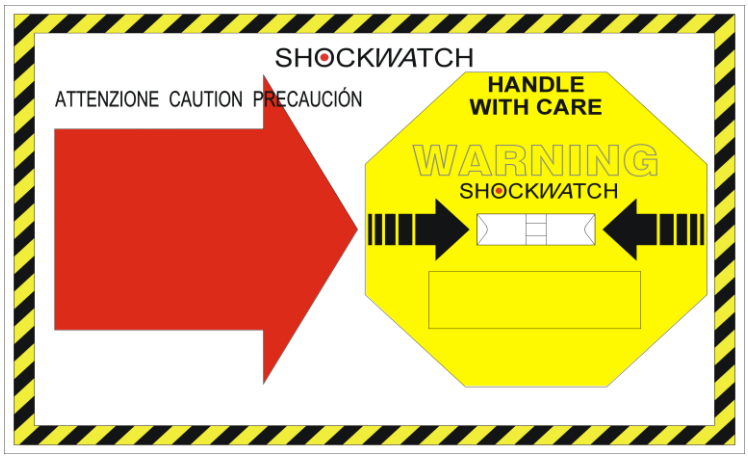


Fig. 5.6-2 ShockWatch device

The package of the *LP33 Series 10 & 20* is equipped with *ShockWatch* (indicator for shock), and *TiltWatch* (indicator for overthrow) on the outside.

These devices indicate an eventual shock or overthrow during transport.

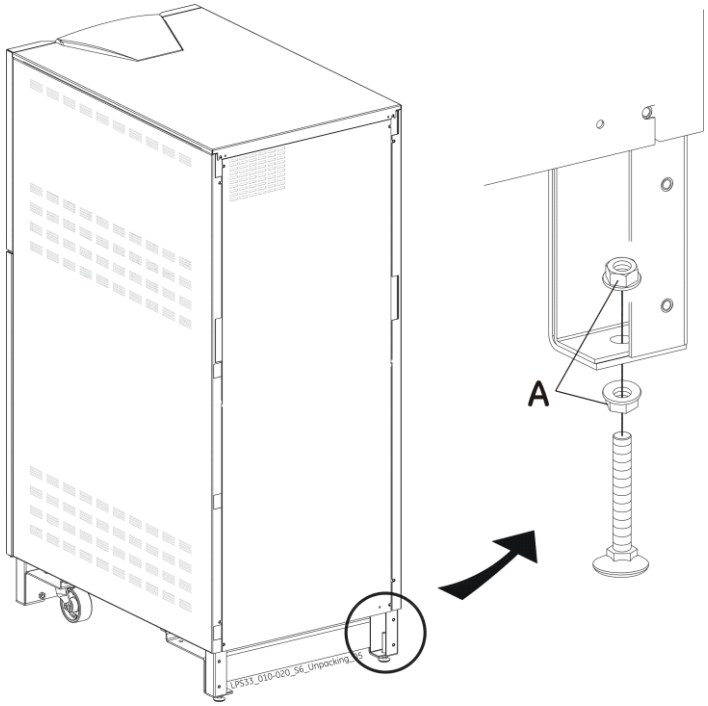
Fig. 5.6-3 TiltWatch device

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

Included in the delivery you can find the following parts:

- An accessories bag.
- Control Bus cables (only for RPA system).
- 2 bolts to support the UPS cabinet (see *Fig. 5.6-4)*.
- CD-ROM connectivity.

Bolts to block and support the *LP33 Series 10 & 20*



Make use of the 2 bolts, as shown in the picture, in case you desire to block the UPS on it's position.

The bolts can be used either on the front or the rear of the UPS.

The height can be adjusted with the 2 enclosed nuts "***A***", taking care however, that the weight of the UPS remains on the wheels.

The UPS can also be screwed directly to the floor on each leg.

Fig. 5.6-4 Bolts to block the LP33 Series 10 & 20 on it's position

NOTA !

The wheels are designed only for limited movements on the installation site.

NOTE !

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

In case of any damage sustained during the transport, immediately inform the shipping agent!

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

PACKING MATERIAL RECYCLING

***GE Digital Energy*, in compliance with environment protection, use only environmentally friendly material.**

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

5.7 ELECTRICAL WIRING

WARNING !

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

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

NOTE !

The UPS is designed for TN System.
The input neutral shall be grounded at source and shall never be disconnected.

4 pole breaker shall not be used at the UPS input (see also IEC 60634, IEC 61140, IEC 61557).

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

Exceptions are only allowed to suit local prescriptions.

For correct rating of fuses and cable sections for input mains, output load and battery, see data indicated in sections *5.7.2* and *5.7.3*.

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

Protection of the UPS mains input, must be exclusively with 3 pole breakers.
The UPS needs the connection of the Neutral to the input, to guarantee the function in TN mode.

Caution when using **four-pole circuit breakers** as protection to the load of the UPS.
A potential problem exists for situations with non-linear loads: **the neutral current could be greater than the phase currents**.

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

The three-phase Mains power supply must be symmetrical with respect to earth, due to the existence of voltage surge protection devices inside the UPS.

The connection of the Battery to the UPS must be protected with fuses or similar devices according to technical specifications and in accordance with local standards.

NOTE !

In case of non-observance of the required minimum distances on both UPS sides (see *Section 5.4)* it is recommended to provide an additional length of the input/output cables so that the UPS can be moved for maintenance purpose.

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

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

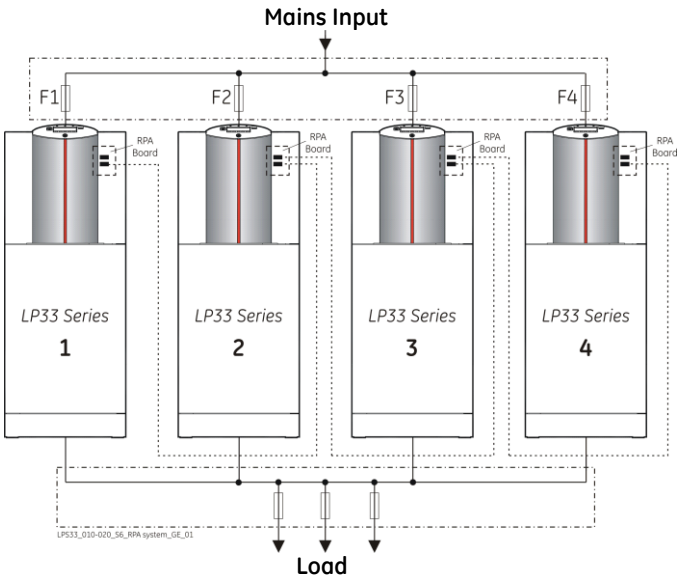


Fig. 5.7-1 RPA Parallel System

RPA
Redundant Parallel Architecture

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

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

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

NOTE !

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

5.7.1 Fuse discrimination (co-ordination of breakers tripping)

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

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

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

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

5.7.2 Fuse ratings

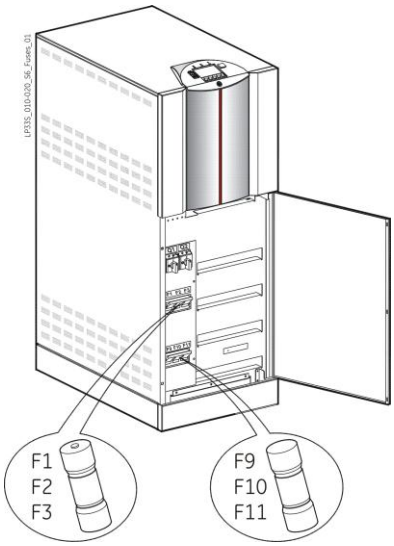


Fig. 5.7.2-1 Mains input and battery fuses

***LP33 Series 10 & 20* fuses**

The UPS is equipped with "***Rectifier input fuses - F1, F2, F3***" and "***Battery* fuses - *F9, F10, F11***".

In case of replacement the same type and the same rating must be used (see table below).

UPS model	Fuses type URD 660/690V F1 - F2 - F3	Fuses type gG-gL 660/690V F9 - F10 - F11
LP33 Series 10	20A (14 x 51)	25A (14 x 51)
LP33 Series 20	40A (14 x 51)	50A (14 x 51)

Required protective devices

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

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

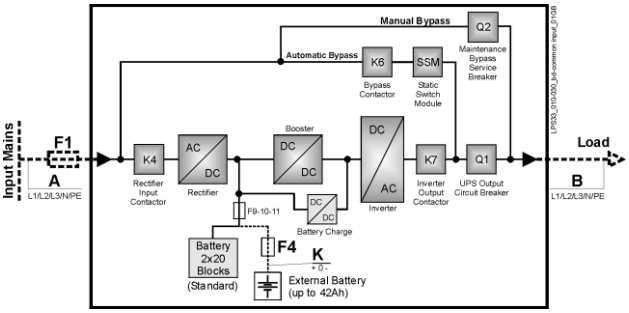


Fig. 5.7.2-2 Common input mains

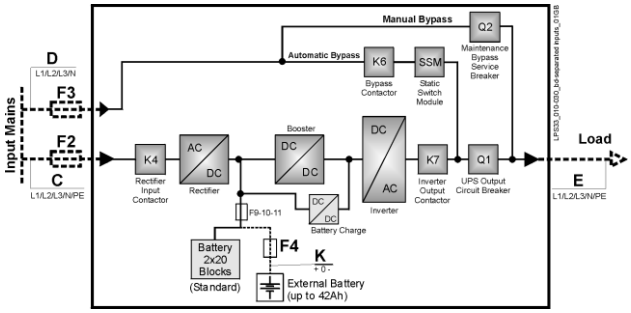


Fig. 5.7.2-3- Separated input mains (option)

UPS model	Fuses (gL) or Circuit Breakers rating for AC input 3x380/220V, 3x400/230V, 3x415/240V			
	F1	**F2**	**F3**	**F4** (external battery)
LP33 Series 10	3 x 25A	3 x 25A	3 x 20A	3 x 25A
LP33 Series 20	3 x 50A	3 x 50A	3 x 35A	3 x 50A

5.7.3 Input / output cable ratings

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

NOTE !

The values given in the tables below do correspond to European Standards (EN) and, in brackets, for Swiss standards.

In any case the local standards must be respected.

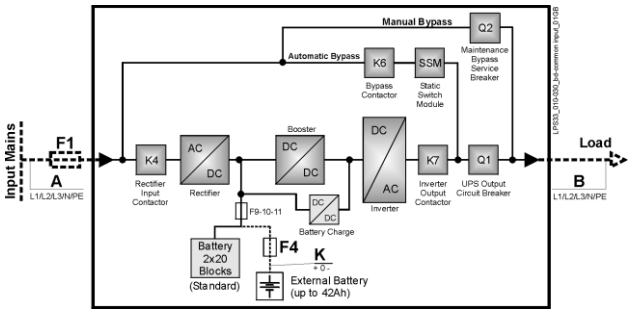


Fig. 5.7.3-1 Common input mains

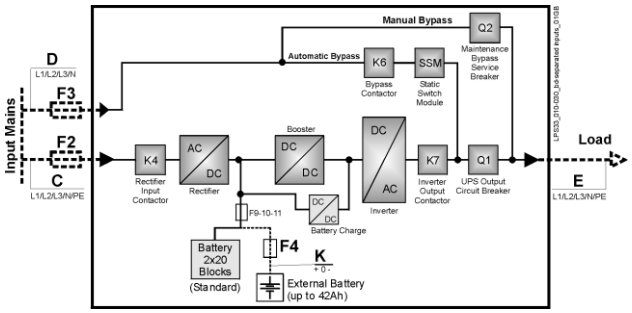


Fig. 5.7.3-2 Separate input mains (option)

UPS model	Recommended sizing for the lines A, B, C, D, E (mm^2) According to European Standards EN and Swiss standard (in brackets)				
	A and B	C	D	E	K
LP33 Series 10	5 x 4 (5 x 6)	5 x 4 (5 x 6)	4 x 2.5 (4 x 4)	5 x 2.5 (5 x 4)	4 x 4 (4 x 6)
LP33 Series 20	5 x 10 (5 x 16)	5 x 10 (5 x 16)	4 x 6 (4 x 10)	5 x 6 (5 x 10)	4 x 10 (4 x 16)

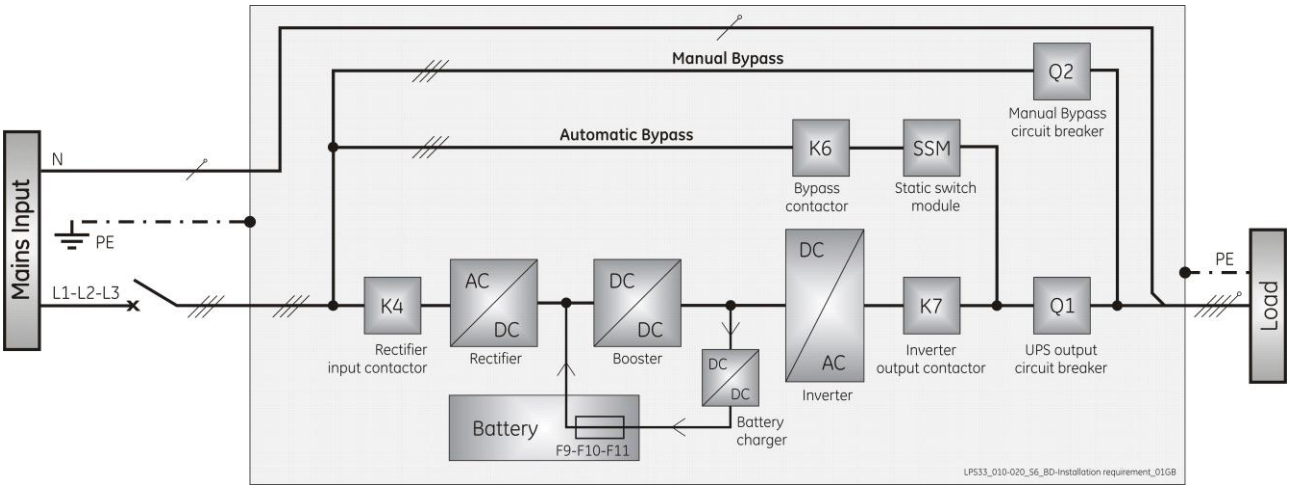
NOTE !

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

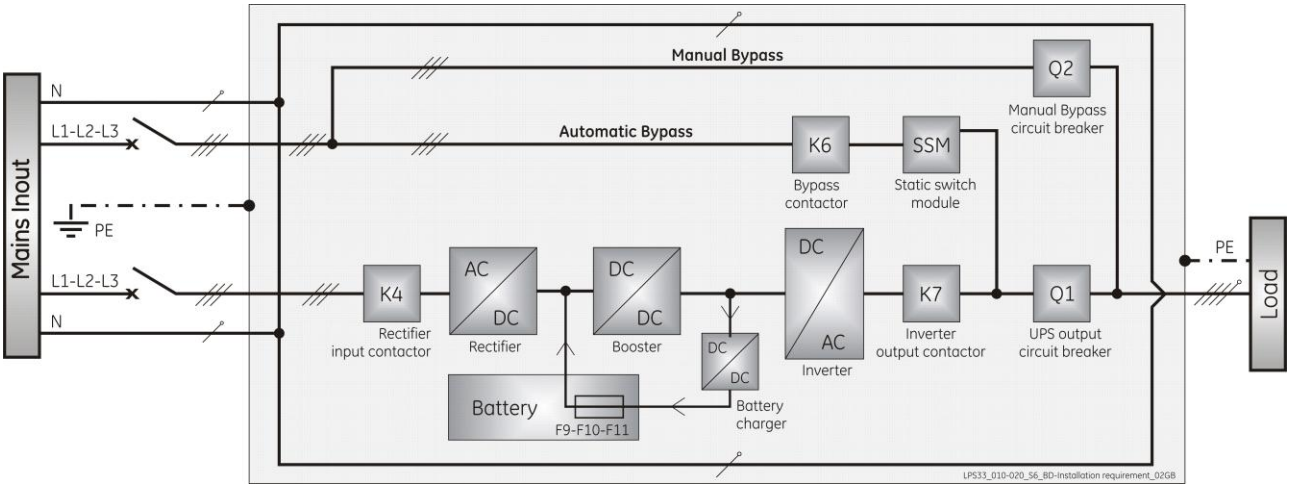
5.7.4 Installation requirements

Typical examples for the connection of the *LP33 Series 10 & 20.*

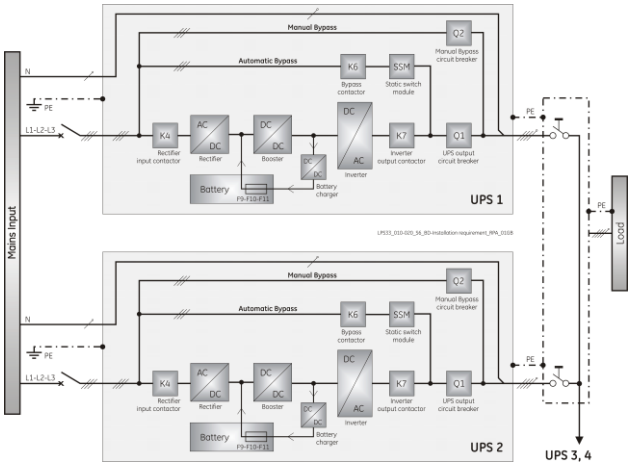
Single UPS with common input for rectifier & bypass



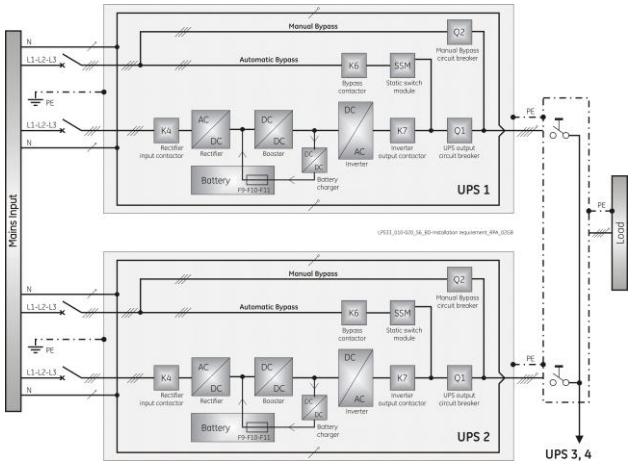
Single UPS with separate input for rectifier & bypass (option)



UPS Parallel System with common input rectifier & bypass



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



5.8 ELECTRICAL CONNECTION

WARNING !

The connections to and from the UPS must be executed by QUALIFIED PERSONNEL ONLY. Refer to the "*Safety prescriptions - Installation*" described on *Chapter 1*.

In case of UPS equipped with options or customized parts not covered by this manual, please consult the appropriate technical documentation before proceeding with electrical connections.

5.8.1 Power connection with common input mains

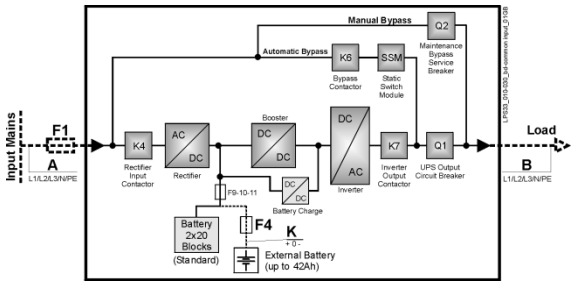


Fig. 5.8.1-1 Common input mains

Common input mains

The UPS delivered in standard version has ***common input mains***.
Only one input line *(F1)* supplies both *rectifier* and *bypass* input terminals.

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

Access to the AC terminals

1 - Open the front door "***A***" of the cabinet.
2 - Remove the front panel "***B***" loosening the screw "***D***".
3 - Remove the left side panel "***C***" loosening the screws "***E***".
4 - Cut an opening into rubber "***F***" to allow cable passage.

NOTE !

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

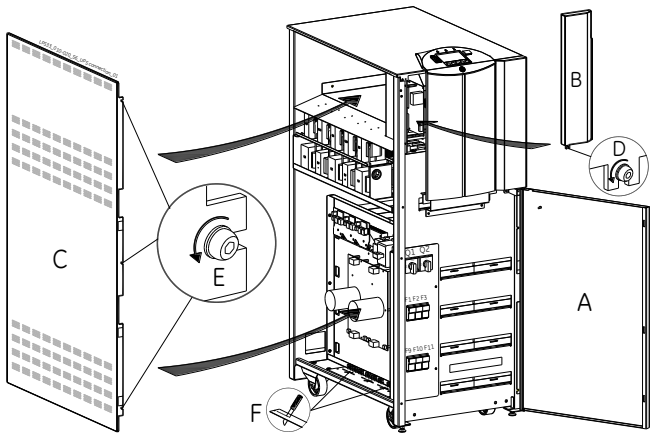


Fig. 5.8.1-2 Power IN / OUT connections

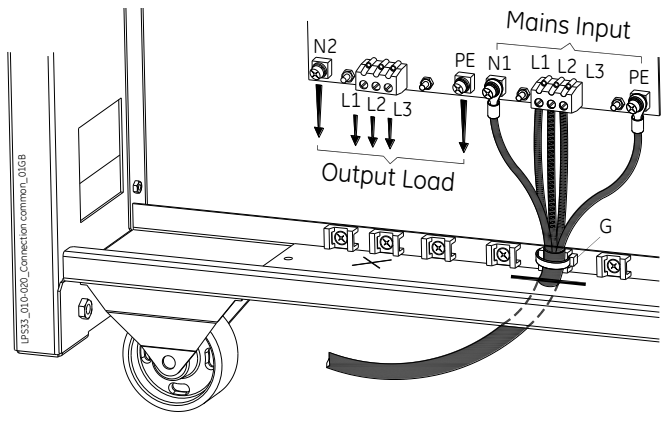


Fig. 5.8.1-3 Common input mains connection

Input mains connection

L1 = Phase L1 rectifier + bypass
L2 = Phase L2 rectifier + bypass
L3 = Phase L3 rectifier + bypass
N1 = Neutral mains
PE = Earth mains

Output load connection

L1 = Phase L1 load
L2 = Phase L2 load
L3 = Phase L3 load
N2 = Neutral load
PE = Earth load

NOTE !

Input/output terminals must be tightened with a proper screwdriver applying torsion force 1,2 / 1,4 Nm.
Clamp the input/output cables with the included cable-ties "*G*".

5.8.2 Power connection with separate input mains (option)

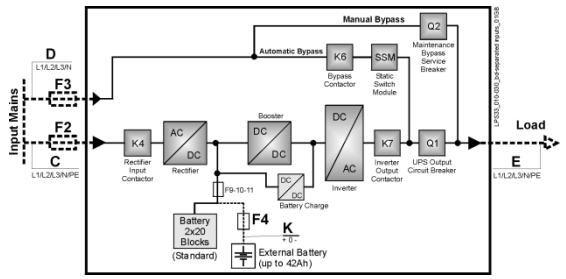


Fig. 5.8.2-1 Separate input mains (option)

Separate input mains

On request, the UPS can be delivered for ***separate input mains***.
Two independent lines *(F2* and *F3)* supply separately the *rectifier* and the *bypass* inputs

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

Access to the AC terminals

1 - Open the front door "***A***" of the cabinet.
2 - Remove the front panel "***B***" loosening the screw "***D***".
3 - Remove the left side panel "***C***" loosening the screws "***G***".
4 - Cut an opening into rubber "***F***" to allow cable passage.

NOTE !
Neutral of *rectifier* input and neutral of *bypass* input must be coming from the same input bar.
Inside the UPS, neutrals *N1* and *N* are connected together.

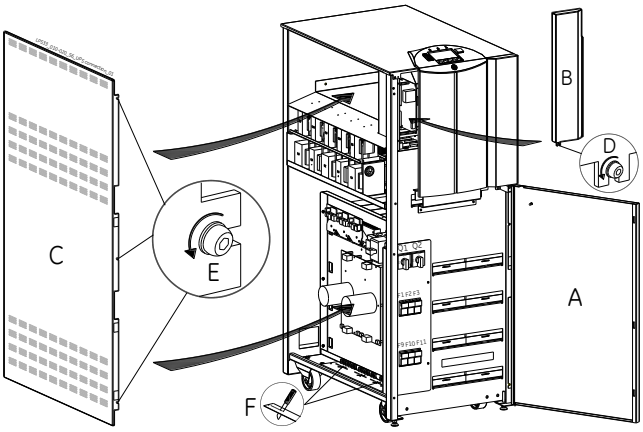


Fig. 5.8.2-2 Power IN / OUT connections

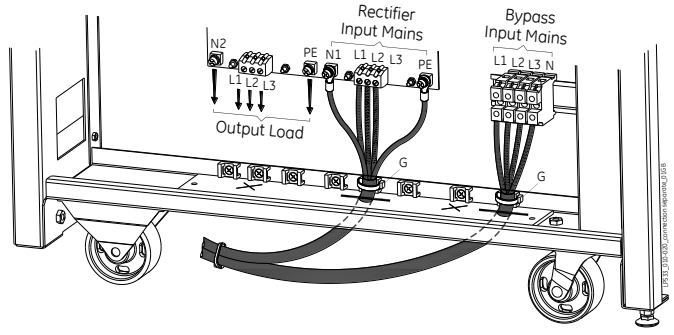


Fig. 5.8.2-3 Separated input mains

NOTE !
Input/output terminals must be tightened with a proper screwdriver applying torsion force 1,2 / 1,4 Nm.

Clamp the input/output cables with the included cable-ties "*G*".

Rectifier input mains connection

L1 = Phase L1 rectifier
L2 = Phase L2 rectifier
L3 = Phase L3 rectifier
N1 = Neutral mains
PE = Earth mains

Bypass input mains connection

L1 = Phase L1 bypass
L2 = Phase L2 bypass
L3 = Phase L3 bypass
N = Neutral mains

Output load connection

L1 = Phase L1 load
L2 = Phase L2 load
L3 = Phase L2 load
N2 = Neutral load
PE = Earth load

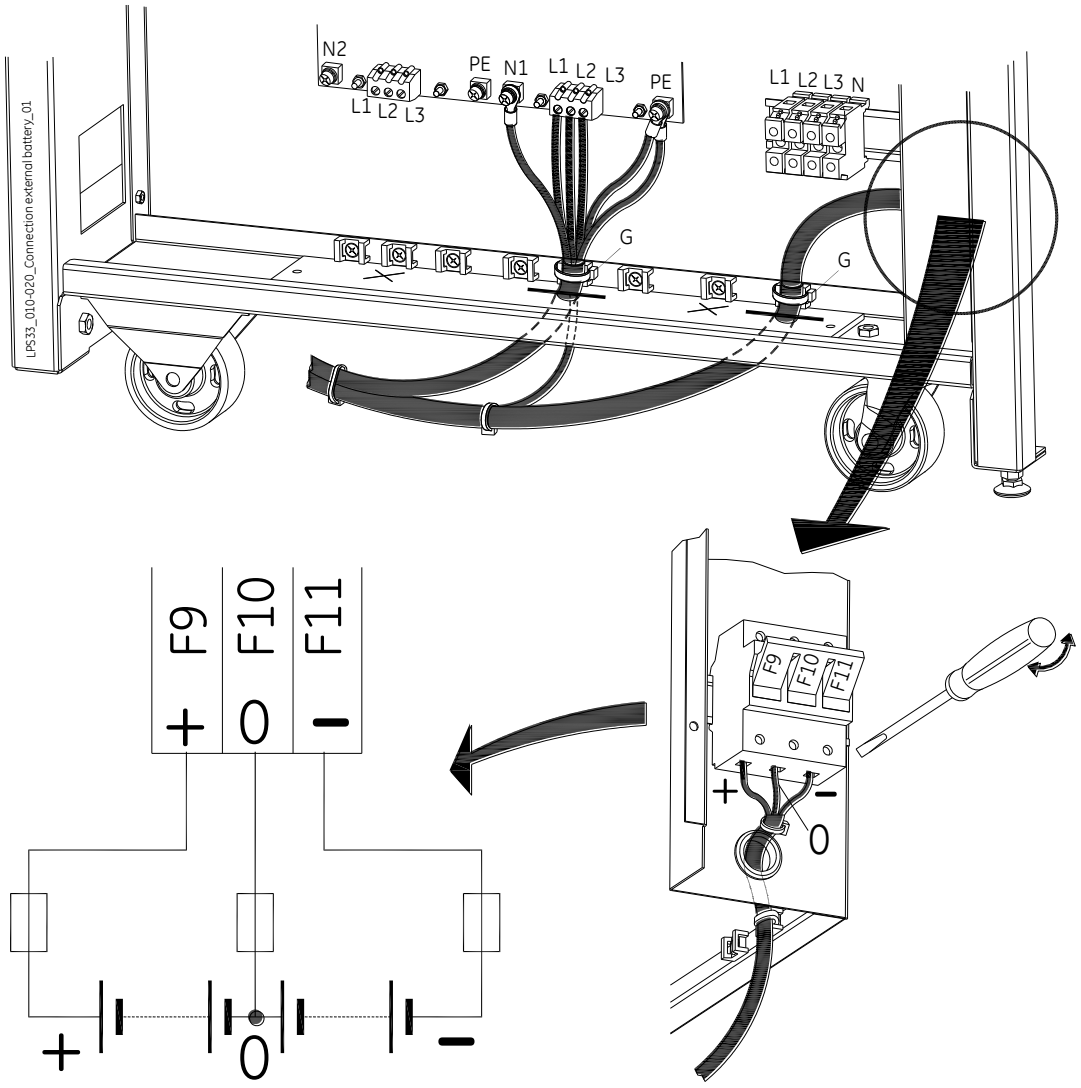
NOTE !
For UPS correct operation, the input mains phase rotation must be clock-wise.

5.8.3 External battery connection

Before proceeding to an external battery connection, follow the ***Safety rules*** concerning the battery. Make sure that the UPS is not powered, and remove the external battery protections and the ***"Battery fuses - F9, F10, F11"*** at the front of the UPS cabinet.

WARNING !

Before closing the "*Battery* fuses - *F9, F10, F11*", verify for correct polarity of the battery connection.



F9 (+) = Positive pole **F10 (0)** = Central point of battery blocks **F11 (-)** = Negative pole

Fig. 5.8.3-1 External battery connection to UPS

NOTE ! **Clamp the input/output cables with the included cable-ties "*G*".**

RPA
Redundant Parallel Architecture

5.8.4 RPA system - Control bus connection

WARNING !

This operation must be performed by trained personnel before the initial start-up (ensure that the UPS installation is COMPLETELY POWERED DOWN).

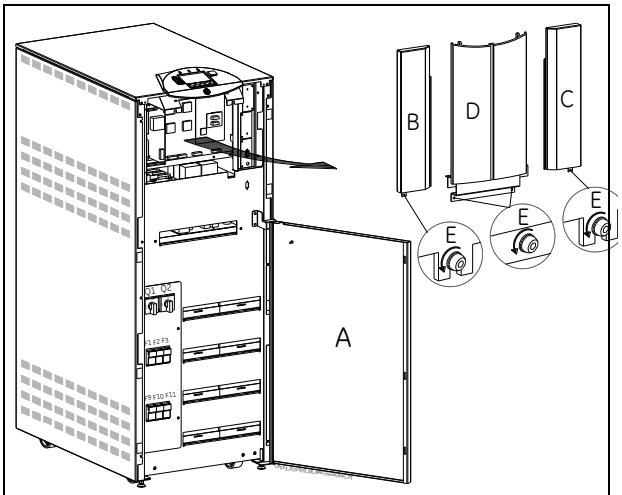


Fig. 5.8.4-1 Access to the RPA board

Access to the RPA board

1 - Open the front door "***A***" of the cabinet.

2 - Remove the protection covers "***B, C, D***" loosening the screws "***E***".

NOTE !

When fixing again the protection covers, make sure that the screws "*E*" are as tight as possible since they serve also as earth connection.

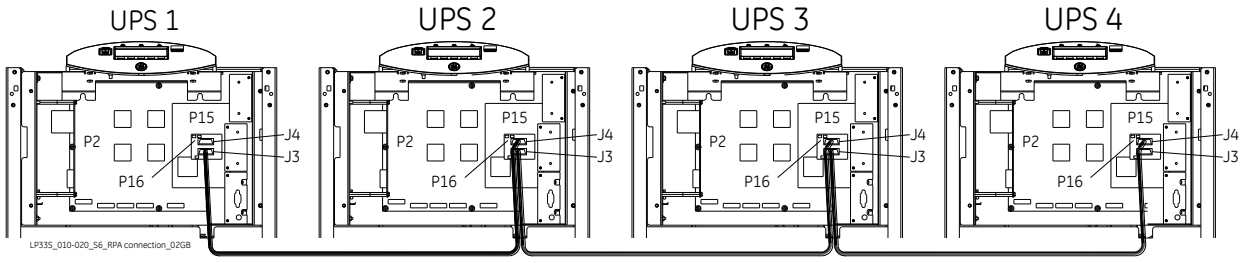


Fig. 5.8.4-2 Bus connection RPA Parallel System

Bus connection RPA Parallel System

Connect the control bus cable between the parallel units as indicated in the diagram *Fig. 5.8.4-2*. Provide that the connectors ***J3*** and ***J4*** are properly fixed with the included screws.

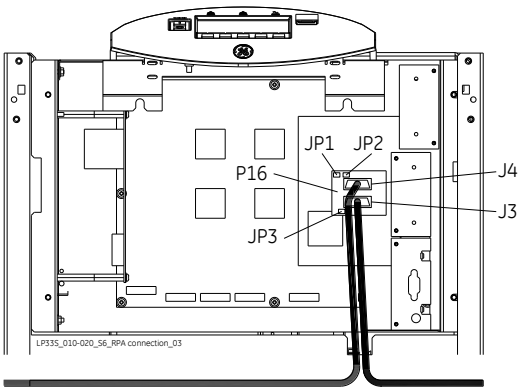


Fig. 5.8.4-3 Connection to Board P16

NOTE !

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

Do not insert or remove *J3* and *J4* from the board *"P16 - Connector adapter RPA"* when the *Parallel System* is operating.

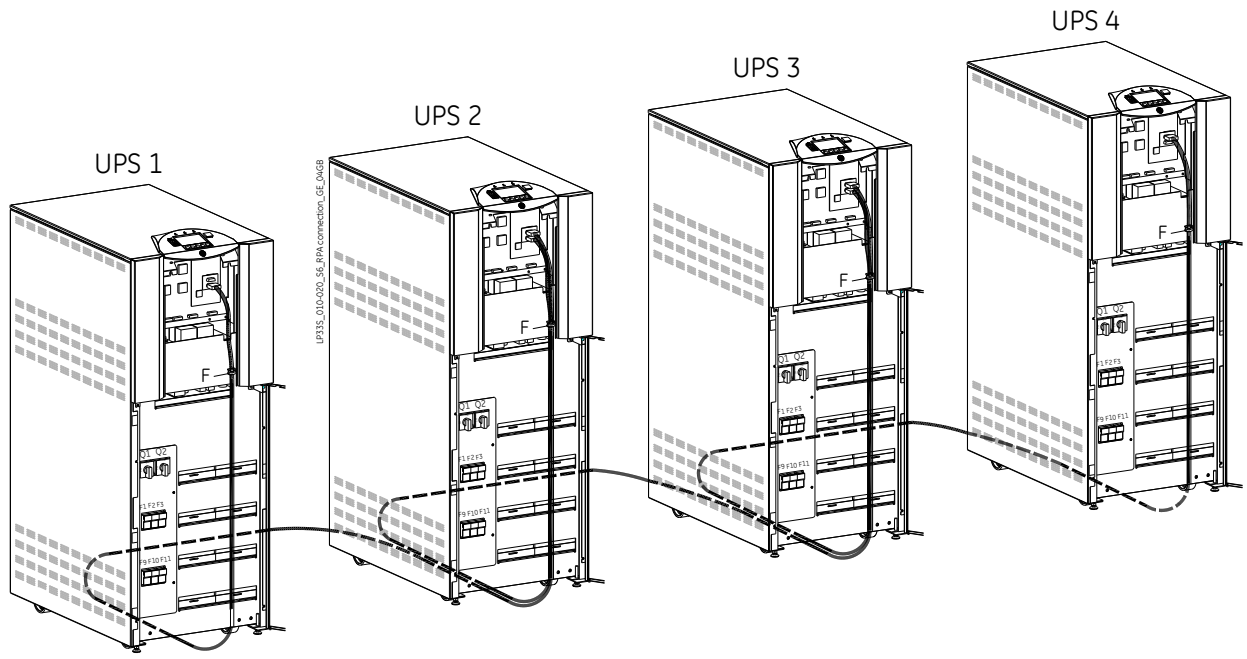


Fig. 5.8.4-4 Control bus location RPA Parallel System

Control bus location RPA Parallel System

Place the cables and connect them as indicated in the diagram *Fig. 5.8.4-4* following these procedures:

- Fix the *control bus cables* with the appropriate tie-wrap "***F***".
- Place the cables between the parallel units in separated protected conduit to avoid they could be accidentally interrupted.
- Put in place the front screens "***B, C*** and ***D***" *(Fig. 5.8.4-1)* paying attention to not damaging the control bus cables.

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

A unit number from ***1*** to ***4*** is displayed on the ***control panel***.
This number is also marked inside and outside the packaging.

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

NOTE !

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

5.9 UPS FUNCTIONING AS FREQUENCY CONVERTER

When the UPS ***LP33 Series 10 & 20*** is delivered as frequency converter (different output frequency with respect to the input frequency), **the *automatic bypass* and *manual bypass* functions are disabled**.

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

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

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

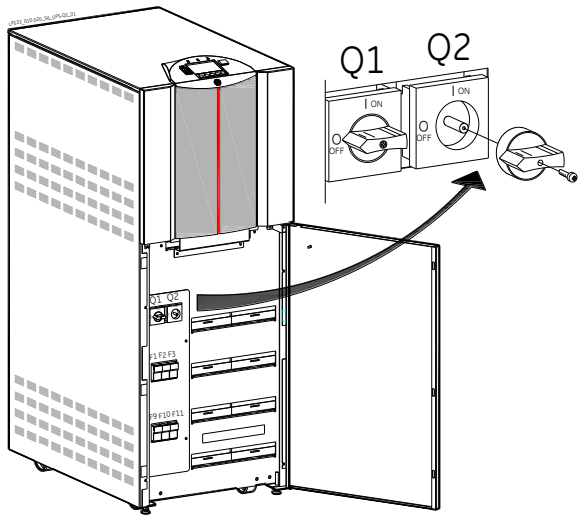


Fig. 5.9-1 Switch Q2 – Manual Bypass

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

- *Automatic bypass disabled* by setting of dedicated parameter (access protected by password reserved to service engineer).
- The handle of the switch *Q2 - manual bypass* is removed to avoid accidental wrong manipulations.
- *Mains bypass* disabled by removing the fuse *F3* fitted on the board *P1 – Power Supply*.

WARNING !

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

Notices for installation:

- For UPS with *common AC input* follows the standard procedure described in *Section 5.8.1*.

Notices for start-up procedures:

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

Notices for shut-down procedures:

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

NOTE !

The inverter can be turned off only by pressing the *"Total Off" key*.

6 SYSTEM HANDLING

6.1 CONTROL PANEL

Fig. 6.1-1 Control panel

The *Control Panel*, positioned on the UPS front-top, acts as the UPS user interface and comprises of the following elements:

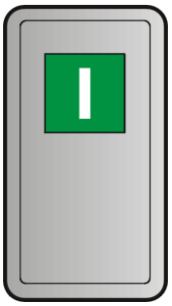
- *Back lit Graphic Display (LCD) with the following characteristics:*
  - *Multilanguage communication interface:*
    English, German, Italian, Spanish, French, Finnish, Polish, Portuguese, Czech, Slovakian, Chinese, Swedish, Russian and Dutch.
  - *Synoptic diagram indicating UPS status.*

- *Command keys and parameters setting.*

- *UPS status control LED.*

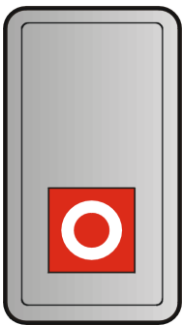
6.2 TABLE OF FUNCTIONS AND INDICATIONS ON CONTROL PANEL

Inverter



Key to switch the Inverter ON (I)

Inverter



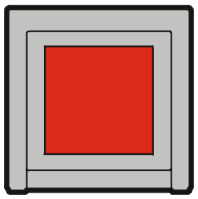
Key for Inverter shut-down (O)

Press key to transfers the *Load to Mains*.

Keep pressed for 5 seconds to shut-down the *Inverter*.

This key is also used as the *EPO (Emergency Power Off)* reset.

Total Off



Key "Total Off"

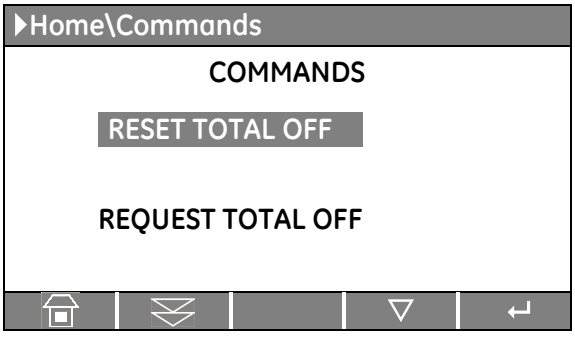
The key *"Total Off"* is protected by a transparent cover.
By pressing it, you immediately separate the *UPS* from the *Load*.

It is possible to activate the command *"Total Off"* using the following screen: *COMMANDS* / ***REQUEST TOTAL OFF***. See *Section 7.5*.

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

To reset *"Total Off"*

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



RPA
Redundant Parallel Architecture

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

NOTE !
Special care must be taken in using this command, in order to avoid accidental *load* disconnection.

LED Stop Operation (red colour)

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

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

LED Alarm (yellow colour)

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

The *LED* remains lighted (with the alarm condition still present) and the buzzer stops when the key *"MUTE"* is pressed.

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

LED Operation (green colour)

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

When blinking, indicates that a regular maintenance service is needed *(SERVICE REQUIRED)*.
May be reset by a service technician only.
See *Section 11 – Maintenance – Service check*.

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

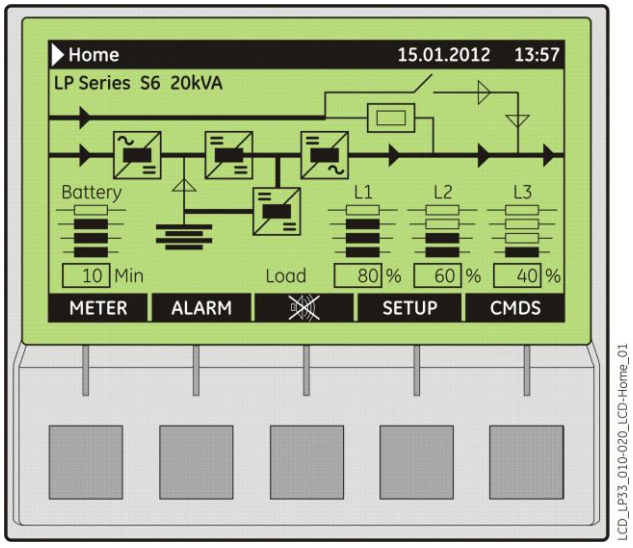


Fig. 6.2-1 User LCD Interface - Home screen

User LCD Interface

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

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

6.3 COMMAND SWITCHES AND FUSES

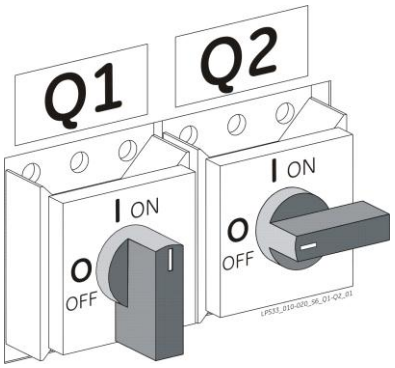


Fig. 6.3-1 Q1 and Q2 switches

Q1 - UPS output switch

Q2 - Manual bypass switch

NOTE !

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

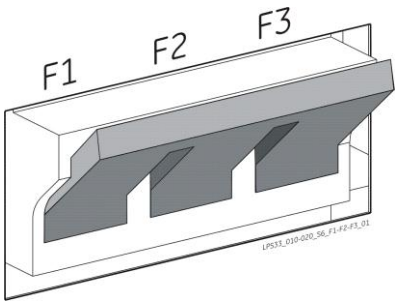


Fig. 6.3-2 Rectifier input fuses

Rectifier input fuses

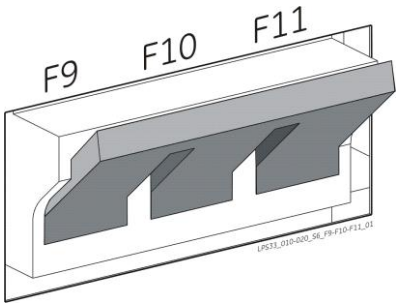


Fig. 6.3-3 Battery fuses

Battery fuses

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.

7 LCD SCREEN

7.1 HOME SCREEN

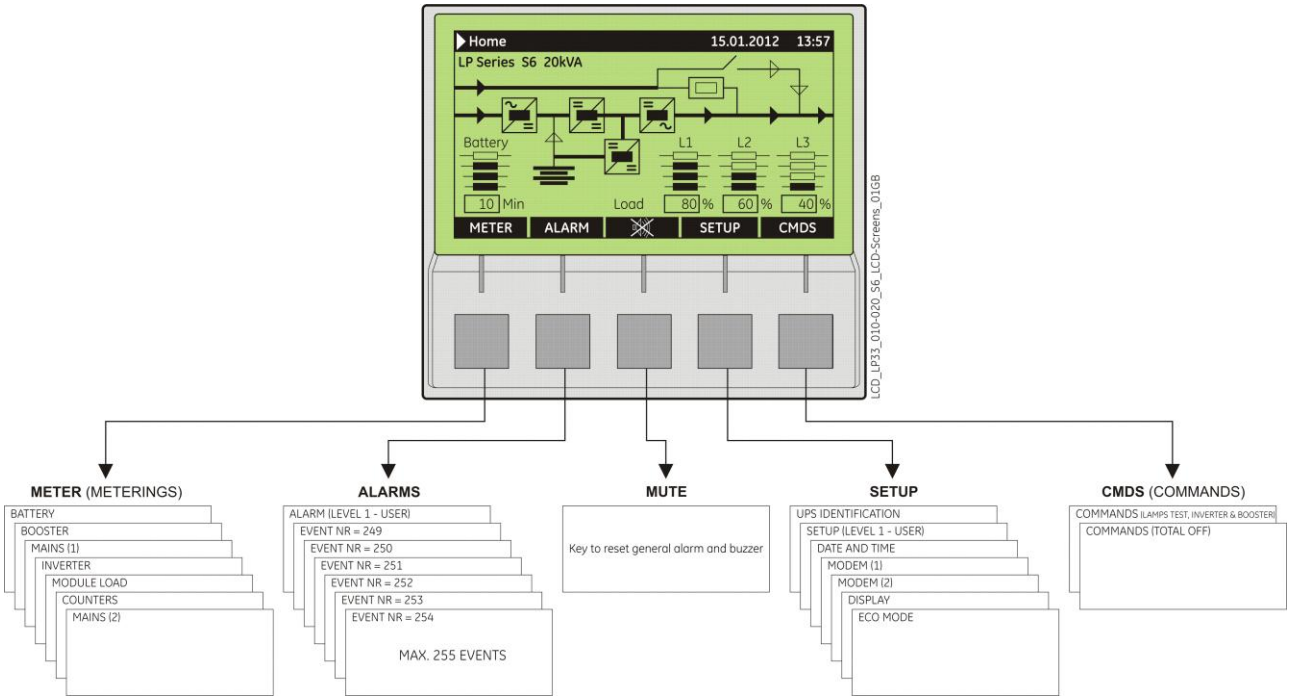


Fig. 7.1-1 LCD display

The keys perform the following functions:

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

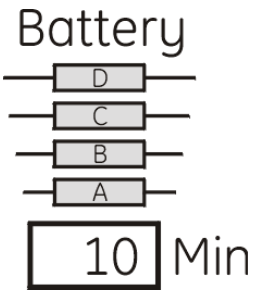
The *LCD screen*, after 5 minutes of inactivity, shuts down the backlight.
To reactivate it, it is sufficient to press any keys.

If the keypad remains inactive for 5 minutes or longer, during the viewing of a screen such as *MEASURES*, *ALARMS*, *SETUP* or *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 *"MEASURES"* and *"ALARMS"* together automatically sets the *LCD* communication for "ENGLISH".

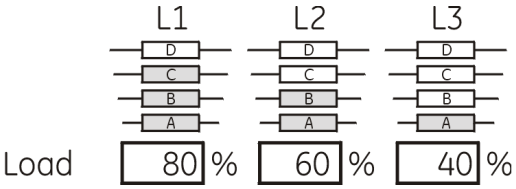
LP Series S6 20kVA | UPS Model | UPS series number | UPS nominal rating (kVA)



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 ≤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 ≤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 ≥125%.

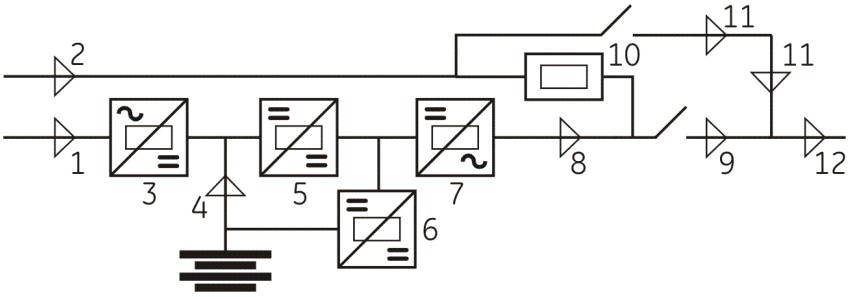


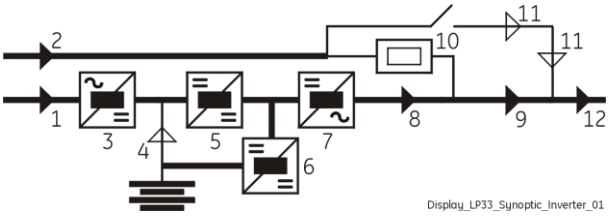
Fig. 7.1-2 LEDs on synoptic diagram

LEDs on synoptic diagram

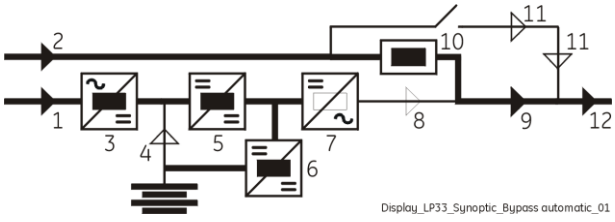
LED 1	Mains rectifier OK
LED 2	Mains bypass OK
LED 3	Rectifier ON
LED 4	Discharging battery
LED 5	Booster ON
LED 6	Charge battery ON
LED 7	Inverter available
LED 8	Inverter ON
LED 9	Q1 closed
LED 10	Automatic bypass ON
LED 11	Manual bypass Q2 ON
LED 12	Load on UPS

Examples of typical scenarios in the synoptic diagram:

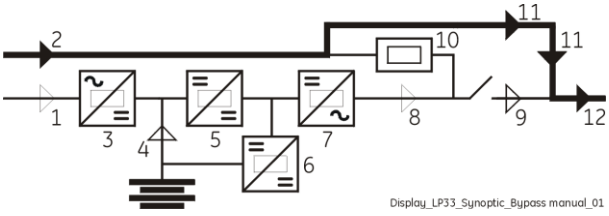
Load supplied by inverter



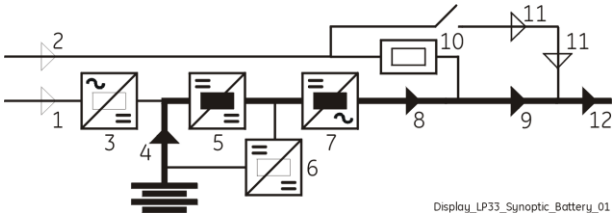
Load supplied by automatic bypass



Load supplied by manual bypass Q2



Load supplied by battery



7.2 METERING

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

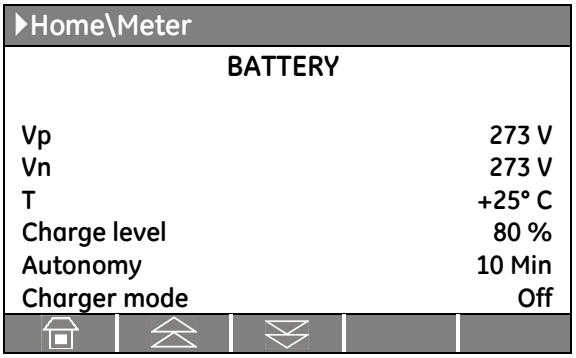
In this mode the keys perform the following functions:

Return to HOME screen.

Scrolls backward to the previous screen.

Scrolls forward to the next screen.

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



Battery data screen

Vp Voltage of positive (+) battery string.

Vn Voltage of negative (-) battery string.

T The temperature of the battery ("SENSOR DISABLE" indicates sensor disabled).

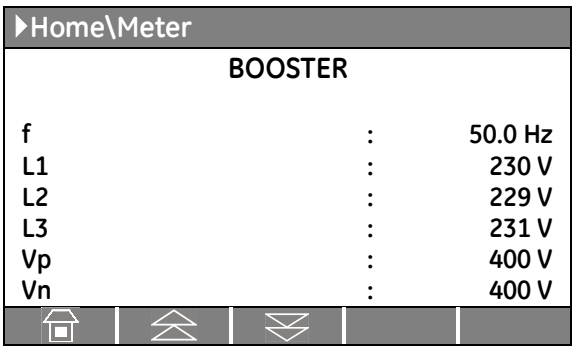
Charge level The battery charge level.

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	240Vdc	Battery open circuit voltage
Top	ON	Boost (294Vdc)	Boost charge with new Battery
Float	ON	Floating (273Vdc)	Battery charged
Low	ON	Floating (273Vdc)	Normal charge
Boost	ON	Boost (294Vdc)	Boost charge
Equalize	ON	Boost (294Vdc)	Battery equalization

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



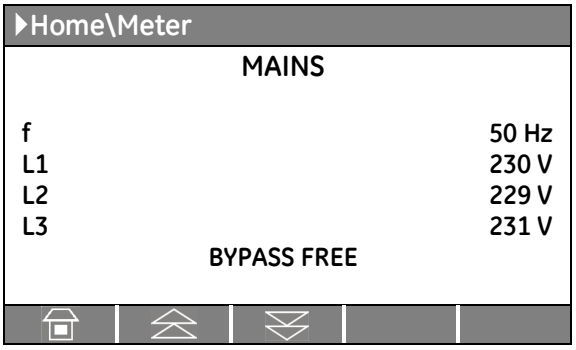
Booster data screen

f The input frequency of the rectifier.

L1
L2
L3 3-phase mains voltage PHASE /NEUTRAL.

Vp Voltage of positive (+) booster string.

Vn Voltage of negative (-) booster string.

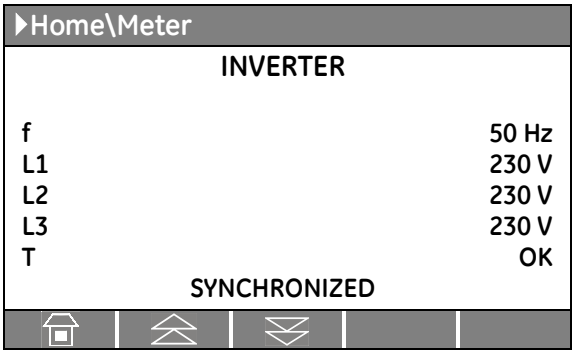


Bypass mains data screen

f The frequency of the mains.

L1
L2
L3 3-phase mains voltage PHASE /NEUTRAL.

Bypass Bypass status: FREE / LOCKED.



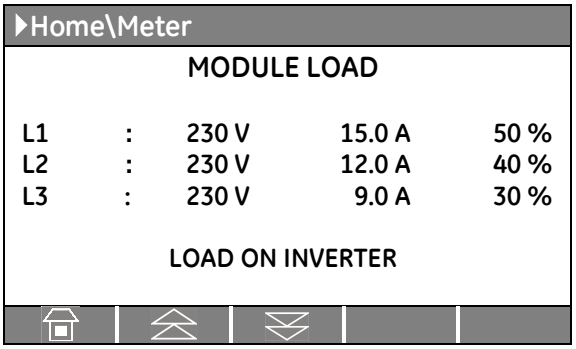
Inverter data screen

f The output frequency of the *Inverter*.

L1
L2
L3 3-phase output voltage PHASE/NEUTRAL.

T The temperature of the inverter bridge (OK / MAX).

The synchronization status of the inverter with respect to mains (Synchronized / Not Synchronized).



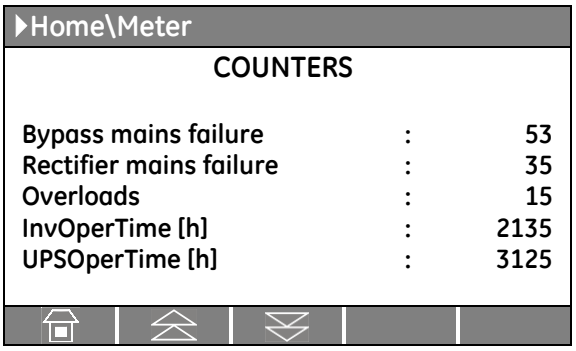
Module load screen

... 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.



Statistics screen

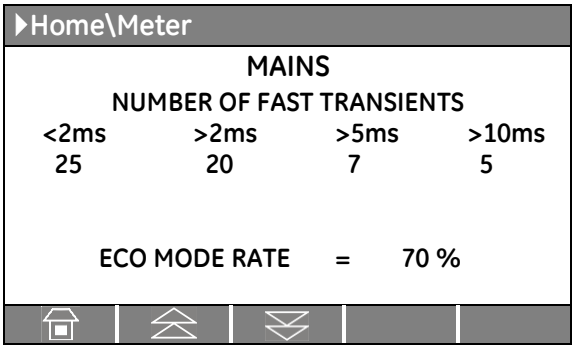
The total number of minor mains faults (bypass mains out of tolerance faults).

The total number of times a gap of mains 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).



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 on the last seven days.

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

7.3 ALARMS

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

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

In this mode the keys perform the following functions:

Return to HOME screen.

Scrolls backward to the previous screen.

Scrolls forward to the next screen.

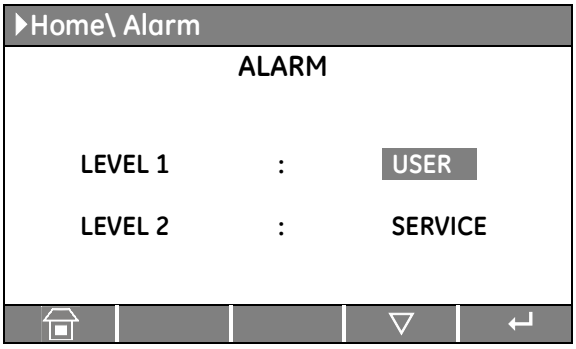
Move forward to the following event.

Move back to the following previous event.

Confirm the selection made.

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

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



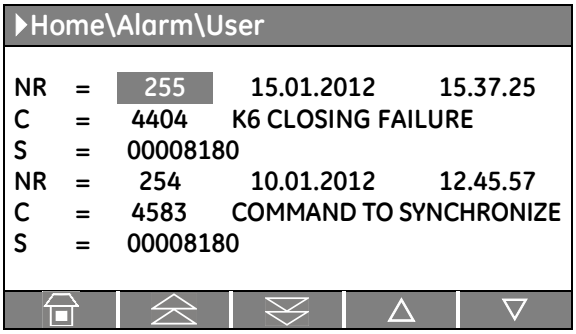
Alarms screen

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.

7.3.1 Events (alarms and messages)

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

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

7.3.2 Alarms list

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 MAINS OUT OF TOLERANCE	Rectifier input mains has been detected out of tolerance (voltage, frequency or phase).
4115	LOW BATTERY VOLTAGE	The battery has been discharged and reached "stop operation" time-out (default 3 minutes), the inverter will be shut down. It restarts automatically only when the battery has recovered energy to ensure min. a "stop operation" time to the actual load.
4116	HIGH BATTERY VOLTAGE	Dangerous high UDC-Voltage. Causes Inverter 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. Signalled by electronic detector. Inverter can be started manually after replacement of fuses.
4304	K7 CLOSING FAILURE	K7 not closed despite a closing command being done. Signalled by auxiliary contact. The load will be supplied by mains.
4305	K7 OPENING FAILURE	K7 not open despite an opening command being done. Signalled by auxiliary contact. The load will be supplied by mains.
4312	INV. VOLTAGE OUT OF TOLERANCE	Inverter output voltage is out of the tolerances defined in respective parameter (±10%). Inverter is switched OFF.
4320	ISMAX DETECTION	Detection of inverter bridge (Is) current limitation cause inverter OFF and automatic restart (message 320). After 3 times inverter switches OFF for persistent Is max detection in time. Inverter switch OFF, and it can be restarted manually.
4340	INVERTER CONTROL FAILURE	The slave oscillator is not synchronised with the master, thus causing the shut-down of it's inverter.
4347	OSCILLATOR FAILURE	Auto calibration of the Inverters freerun frequency was not possible. The oscillator frequency of this unit is out of tolerance.
4402	RECTIFIER CANNOT BE TURNED ON	The rectifier cannot be turned on because the DC link voltage has not reached the requested value.
4404	K6 CLOSING FAILURE	K6 not closed despite a closing command being done. Signalled by auxiliary contact. The load cannot be supplied by electronic bypass.
4405	K6 OPENING FAILURE	K6 not open despite an opening command being done. Signalled by auxiliary contact.
4410	BYPASS MAINS OUT OF TOLERANCE	The mains bypass voltage is out of the tolerances (±10%). K6 opens, synchronisation with mains is inhibited and transfer to mains is blocked.
4520	NO INVERTER POWER	The load supplied by utility is over 100%. The load remains blocked on utility as long as alarm overload is active.
4530	LOAD LOCKED ON MAINS	Load is locked on mains because 3 transfers on mains have been detected in a short time (default 30 seconds). Transfer will be free again after a time defined by respective parameter (default 30 seconds).
4531	LOAD ON MAINS BY ERROR DETECTOR	Load is transferred to mains because the error detector detected a disturbance on the output voltage.
4563	EMERGENCY OFF ACTIVATED	Alarm after detection of an Emergency Off from an external safety device connected on Customer Interface. Consequently K4, K6 and K7 open and shut down inverter, booster and rectifier.
4570	OVERLOAD	The UPS-System is in an overload condition >105% on inverter, or >150% on mains. A sequence of "stop operation" starts. Time out depending on load quantity.

Code	*Alarm*	*Meaning*
4571	OVERLOAD: LOAD ON MAINS	With mains bypass supply available and load >115%, the load is transferred on mains. Load will be transferred again automatically on inverter when load will be <100%.
4581	INVERTER AND MAINS NOT SYNCHRONIZED	The voltages of mains and inverter are not synchronised, which causes the opening of K6.
4697	BATTERY OVERTEMPERATURE	The battery temperature exceeds the value inserted in parameter. Disabled with parameter (service only).
4698	BATTERY POWER INSUFFICIENT	In case of utility failure, with the actual load, the autonomy time would result below “stop operation” time (default 3 minutes).
4700	DC LOW	Battery voltage is at the lowest limit. 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 overtemperature condition has been detected on inverter. Elapsed “stop operation” time, inverter shut-down. With mains available, load is transferred on mains.
4998	LOAD OFF DUE TO EXTENDED OVERLOAD	Load Off after time-out of “stop operation” for overload on inverter (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 mains due to battery low voltage or overtemperature condition.

7.3.3 Messages list

Code	Message	Meaning
4111	RECTIFIER MAINS OK	Rectifier input mains is again within the admitted 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 mains out of tolerance / EPO / UDC max.
4163	GENERATOR ON	Customer Interface (X1 / 11, 22) received a Gen set ON signalling. Operating mode dependent on setting of respective parameters.
4164	GENERATOR OFF	Customer Interface (X1 / 11, 22) received a Gen set OFF signalling. Function bypass enabled dependent on setting of respective parameter.
4302	INVERTER CANNOT BE TURNED ON	Inverter cannot be switched on because one of the following conditions are still present: - *Overtemperature* - *Low battery voltage* - *Inverter fuses* - *Overload* - *K7 opening failure* - *High battery voltage* - *DC low* - *EPO (Emergency Power Off)*
4303	INVERTER CANNOT BE TURNED OFF	Inverter cannot be switched OFF, because the load cannot be transferred on mains (voltage out of tolerance, not synchronising, bypass blocked).
4361	INVERTER ON	The command to start the inverter has been activated on the control panel.
4362	INVERTER OFF	The command to switch OFF the inverter has been done by the control panel or automatically for alarm detection.
4411	BYPASS MAINS OK	Bypass input mains is again within the admitted tolerance (voltage, frequency and phase).
4500	COMMAND TOTAL OFF	Disconnection of the load by opening K4, K6 and K7 for: EPO / Total Off / Overload / Stop operation.
4521	NO BYPASS POWER	With the load supplied by electronic bypass, a mains failure or K6 opening occurred.
4534	MULTIPLE LOAD TRANSFER	2 transfers inverter-mains have been detected in a short time, defined by respective parameter (default 30 seconds).

Code	Message	Meaning
4535	BYPASS LOCKED	Transfer on mains not enabled due to settings of respective parameters. Contactor K6 is open.
4536	BYPASS FREE	Settings of respective parameters enable bypass transfer on mains. Contactor K6 can be closed.
4561	TOTAL OFF	Key Total Off behind the front door has been pressed, with the output circuit breaker Q1 closed.
4562	DETOUR ON	The auxiliary contact indicates that manual bypass Q2 has been closed.
4564	DETOUR OFF	The auxiliary contact indicates that manual bypass Q2 has been opened.
4567	COMMAND LOAD ON MAINS	The control unit received a command to transfer the load on mains.
4568	COMMAND LOAD ON INVERTER	The control unit received a command to transfer the load on inverter.
4572	NO MORE OVERLOAD	End of the overload condition previously detected with alarm 4570.
4580	INVERTER AND MAINS SYNCHRONIZED	The voltages of inverter and mains bypass are synchronised.
4582	COMMAND NOT TO SYNCHRONIZE	Command not to synchronise with mains has been done for: mains bypass out of tolerance (4410) or setting respective parameters.
4583	COMMAND TO SYNCHRONIZE	Command to synchronise with mains has been done for: mains BP OK (4410) or setting respective parameters.
4600	COMMAND UPS ON	The *ECO Mode* function has been disabled or the programmed time is expired. The UPS returns to *VFI* mode supplying the load normally by inverter.
4601	COMMAND UPS STANDBY	The function *ECO Mode* is enabled, and according to the time program the UPS will run in *ECO Mode*, supplying the load normally by mains.
4602	Q1 OPEN	The auxiliary contact indicates that the output switch Q1 has been opened.
4603	Q1 CLOSED	The auxiliary contact indicates that the output switch Q1 has been closed.
4699	BATTERY TEST IMPOSSIBLE	Not possible to start battery test (it is postponed) for: - *No mains rectifier or bypass* - *Battery not fully charged* - *Load is below 10% or above 80%*
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 = *Only local panel* 1 = *Only Remote Control* 2 = *Both*
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 = *Only local panel* 1 = *Only Remote Control* 2 = *Both*

7.3.4 Event report LP33 Series 10 & 20

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

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

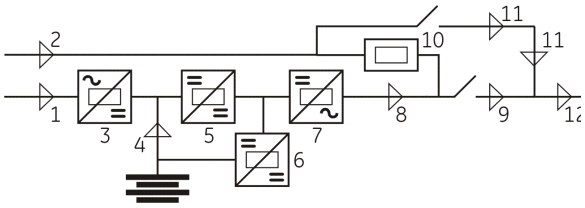
Unit No: _ _ _ _ _ - _ _ _ _ _ - _ _ _ _ _ **Series No**: ..... **UPS rating**: ..... kVA

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

Description of repair actions taken:

.....

.....

.....

Actual situation:

.....

.....

.....

Remarks:

.....

.....

.....

.....

2. On the LCD panel, enter the "*ALARM" 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				

7.4 SETUP

The *SETUP mode* is entered any time the "***SETUP***" key is pressed.

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

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

In this mode the keys perform the following functions:

Return to HOME screen.

Scrolls backward to the previous screen.

Scrolls forward to the next screen.

Confirm selected choice of USER / SERVICE level.

Description of the keys to set or modify the parameters:

Allows to exit a selected screen without making any modification.

Scrolls backward to the previous line.

Scrolls forward to the next line.

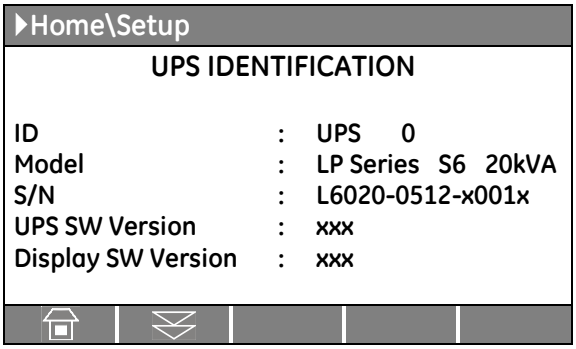
Allows to access a value to be set or modified.

Select, on the same line, the following value or letter to set or modify.

Set or modify the selected value.

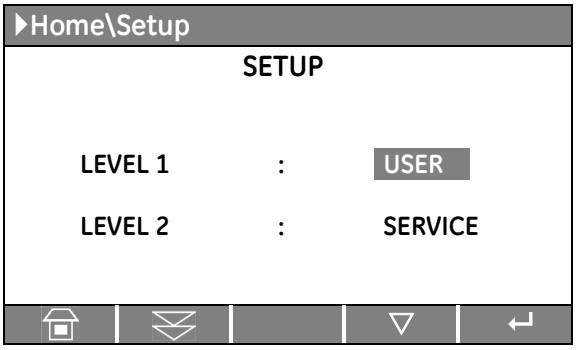
Save the set or modified value and return to the selected screen.

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



UPS identification screen

ID	Number of UPS in the RPA Parallel System (0 for single unit).
Model	UPS model, series number and power range
S/N	The UPS serial number.
UPS SW	The UPS software version.
Display SW	The LCD display software version.



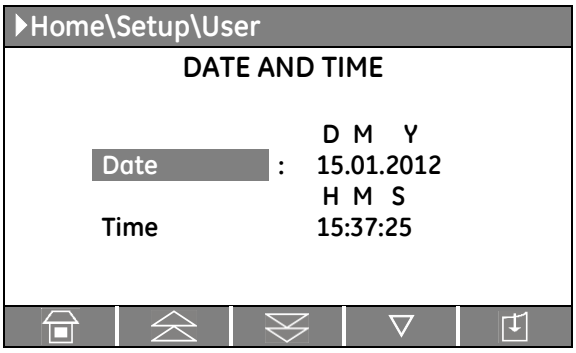
Setup screen

LEVEL 1 USER

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

LEVEL 2 SERVICE

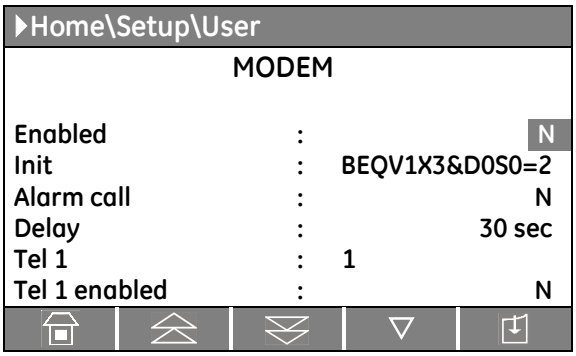
Service only allowed.
At this level the parameters access is protected by a code.



Date and time screen

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

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



Modem screen 1

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

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

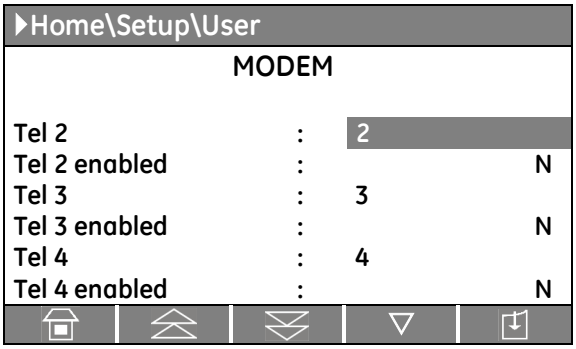
When editing this parameter the UPS considers that a blank character terminates the string.
If no blank character is found then all 40 characters are used.

Alarm call
This *Y/N* parameter controls the automatic events signalling through modem.
If this parameter is set to *Y (Yes)* the UPS itself will call the remote location when a new event occurs

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

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

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



Modem screen 2

Tel 2 It records the *second dial-out number*.

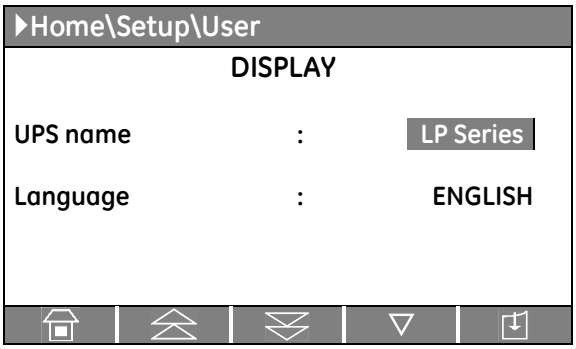
Tel 2 enabled This parameter *Y/N* specifies if the *second telephone number* will be used for dial-out.

Tel 3 It records the *third dial-out number*.

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

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

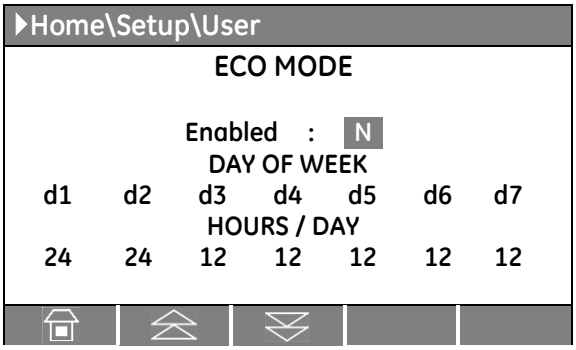
Tel 4 enabled This parameter *Y/N* specifies if the *fourth telephone number* will be used for dial-out.



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.*



ECO MODE screen

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

Enabled
This parameter (values *Y/N*) enables or disables the operation in *ECO Mode*.
If the value is *Y* and the current time is in the interval for the current day, the *ECO Mode* is active.
The activation / deactivation of *ECO Mode* is indicated each time in the event list.

In order to check the *inverter* function, at least *1 minute* of *VFI* mode must be programmed during the week (the *Y/N* parameter is automatically disabled if this condition is not satisfied).
In case this minimum time in *VFI mode* is not respected, the *ECO Mode* will be disabled.
If the value is *N*, the UPS is normally operating in *VFI / double conversion mode* at all times.

DAY OF WEEK (d1 ÷ d7): Enabling time in function of weekdays
For the weekdays from ***d1*** to ***d7*** *(Saturday to Friday)* the edit mode (edit day) allows to define time intervals when the UPS is operating in *ECO Mode*.
The hour is given in 24-hour format.

These intervals are defined by:

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

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

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

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

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

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

Example 1 For continuous ***ECO Mode*** set the ***ECO Mode START* times to 00:00** and the ***ECO Mode STOP* times to 23:59** for all weekdays, but almost **1 day must have 1 minute of *VFI*** 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 ÷ 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:

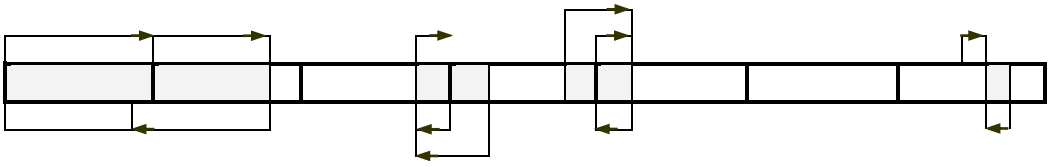
Weekday	*d1 - Saturday*	*d2 - Sunday*	*d3 - Monday*	*d4 - Tuesday*	*d5 - Wednesday*	*d6 - Thursday*	*d7 - Friday*
ECO Mode START	00:00	00:00	18:00	18:00	18:00	18:00	18:00
ECO Mode STOP	23:59	23:59	06:00	06:00	06:00	06:00	06:00

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

ECO Mode START

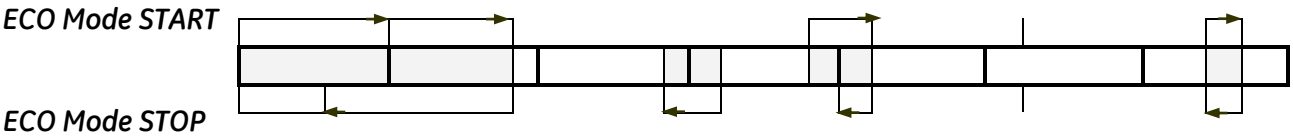
ECO Mode STOP



In dark colour are displayed the times with *ECO Mode* operation.
The arrows indicate the conditions given by the *ECO Mode START* and *ECO Mode STOP* times introduced with the parameters.
Note that on day ***d6 - Thursday*** the interval has length 0 (zero), therefore the *ECO Mode* is not enabled on this day.

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

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.

NOTE !

To avoid undesired *ECO Mode* operation, verify:

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

NOTE !

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

7.5 COMMANDS

The *COMMANDS mode* is entered any time the "**COMMANDS**" key is pressed.

Allows the user to execute UPS operation commands.

In this mode the keys perform the following functions:

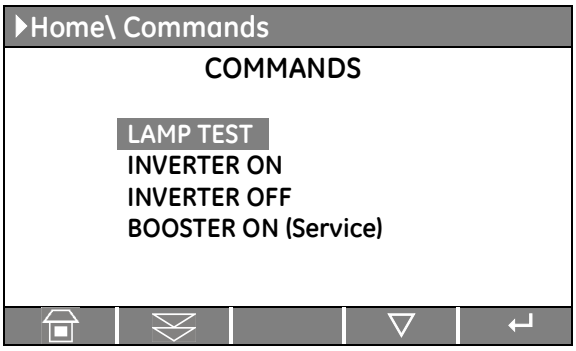
Return to HOME screen.

Scrolls forward to the next screen.

Scrolls forward to the next line.

Confirm the selection made.

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



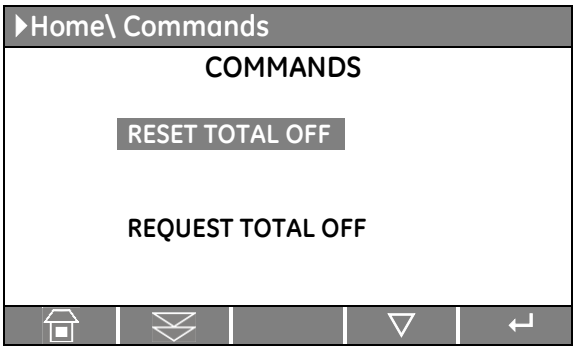
Commands screen 1

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

INVERTER ON
Command to switch the inverter.

INVERTER OFF
Command to shut-down the inverter.

BOOSTER ON (Service)
Service only allowed.

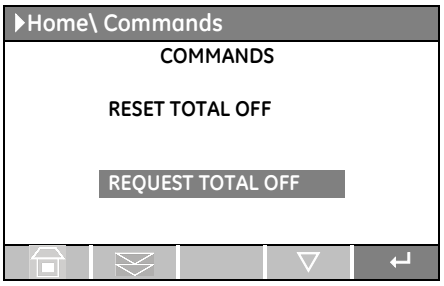


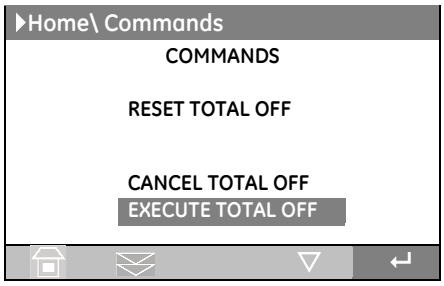
Commands screen 2

RESET TOTAL OFF
Restore of the command *"Total Off"*.

REQUEST TOTAL OFF
Command *"Total Off"*.

Screen sequence to execute the command *"Total Off"*:





As the command procedure of *"Total Off"* is finished the "REQUEST TOTAL OFF" screen appears again.

8 OPERATION

8.1 PROCEDURES FOR SINGLE LP33 SERIES 10 & 20

8.1.1 Start-up of the LP33 Series 10 & 20

WARNING !

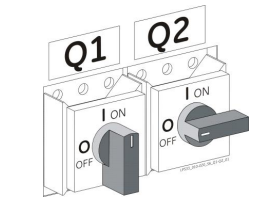
Before proceeding to turn on the UPS system, ensure that the AC and DC external isolators are OFF, and prevent their inadverted operation.

Ensure that the output load distribution can be powered and all the output isolators are open.

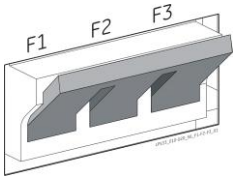
This procedure must be performed for the first start-up following the installation, with the UPS completely switched Off and not powered.

Open the front door and make sure that:

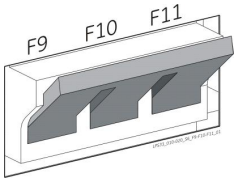
- All the ***connections*** to the input/output terminals of the UPS have been made correctly.
- The ***safety screens*** are fixed in their position.
- The switches ***Q1*** and ***Q2*** **are open (Pos. O)** and the "***Rectifier input fuses - F1, F2, F3***" and "***Battery fuses - F9, F10, F11***" **are removed**.



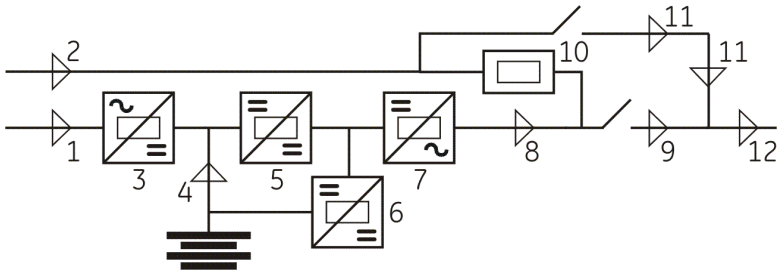
Q1 *Output UPS switch*
Q2 *Manual bypass switch*



Input fuses rectifier

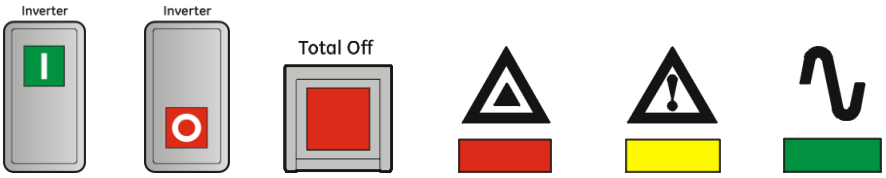


Battery fuses



LEDs on synoptic diagram

LED 1	*Mains rectifier OK*	*LED 7*	*Inverter available*
LED 2	*Mains 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* | *v Total Off* | *LED Stop Operation* | *LED Alarm* | *LED Operation*

1. ***Insert the rectifier "Rectifier input fuses - F1, F2, F3".***

2. ***Switch-ON the mains voltage from the input distribution (both rectifier and bypass if separated).***

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

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

   LED 1 (mains rectifier OK) and *LED 2 (mains bypass OK)* must be lit.
   Press *"MUTE"* key to reset *acoustical alarm*. *LED Alarm* remains lit.

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**		

Continue ▶

During the first commissioning *LP33 Series 10 & 20* requests a set-up of the UPS configuration parameters presented in the following screens.

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

WARNING !

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

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

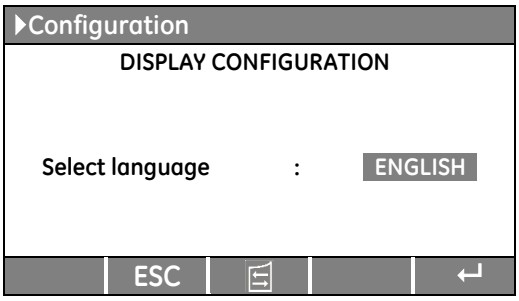
In this mode the keys perform the following functions:

Confirm the selection made and select the next parameter.

Re-establish default value.

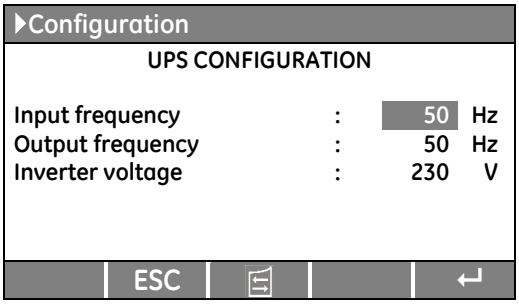
Modify or insert the selected value.

Save the configuration of set parameters.



DISPLAY CONFIGURATION screen

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



UPS CONFIGURATION screen

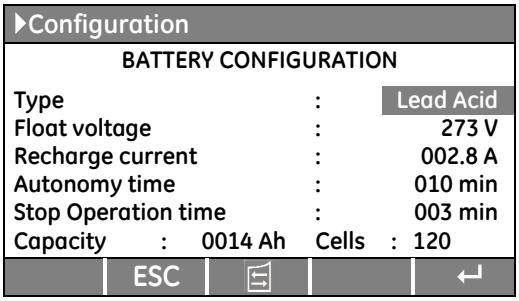
Input frequency
Input frequency value (*50Hz).

Output frequency
Inverter output frequency value (*50Hz).

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

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

Continue ▶



BATTERY CONFIGURATION 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 120 cells x 2.27Vdc = **273Vdc**

Recharge current

Maximum battery recharge current.
Default setting value: 1.4A (10 kVA) 2.8A (20 kVA)

Autonomy time

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

Autonomy times for lead acid batteries (VRLA)						
2 x 120 cells	Autonomy at full load at PF=0.8			U floating = 273Vdc (2.27Vdc - cell)		
UPS Model	Battery with expected trickle life 5 years					
	7Ah	14Ah	21Ah	28Ah	35Ah	42Ah
LP33 Series 10	10	25	45	60	80	100
LP33 Series 20	-	10	20	28	37	45

Autonomy time for battery supplied by GE UPS manufacturer.

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

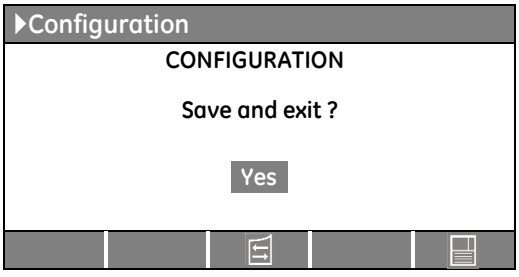
Ah capacity of the battery.

Cells

Number of cells of the battery (insert the value of single battery string).
Lead - Acid (VRLA): 120 cells.

NOTE !

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



CONFIGURATION screen

Screen to save the configuration of set parameters.

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

Continue ▶

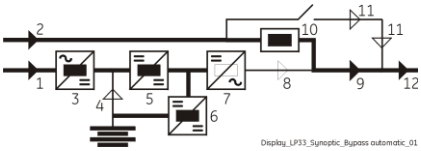
3. *Insert the "Battery fuses - F9, F10, F11" and eventual external fuses in case of external battery.*

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

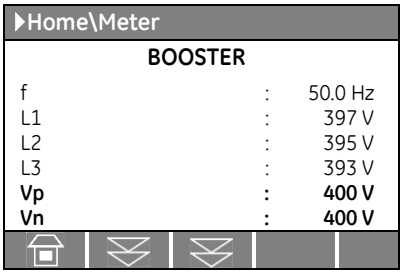
4. *Close the output switch Q1 (Pos. I).*

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

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



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

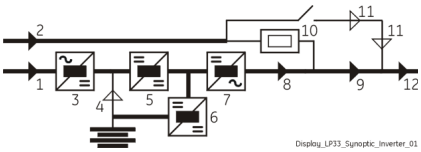


5. *Insert the inverter by pressing "Inverter ON" (I) key.*

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***".



6. *Load supply.*

Your *LP33 Series 10 & 20* 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.

7. *Operation mode selection.*

LP33 Series 10 & 20 is delivered normally selected for permanent *VFI* operation.

ECO mode can be enabled and the *ECO Mode START* time & *ECO Mode STOP* time can be programmed for each day of the week (see *Section 7.4 SETUP / ECO MODE).*

END OF PROCEDURE

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

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

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

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

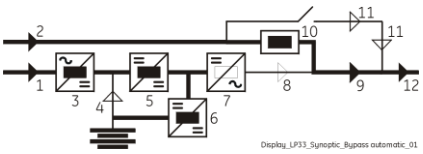
	**NOTE !** **This procedure must not be performed if the UPS is used as *frequency converter*.**

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

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

   LED Alarm is lit and the *LED Operation* is Off.

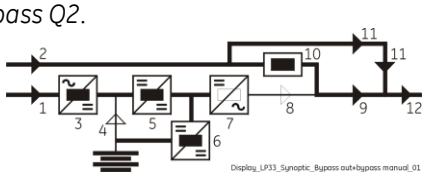
   The *synoptic diagram* must display the status "***LOAD SUPPLIED BY AUTOMATIC BYPASS***".



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

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

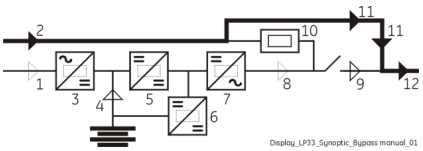
   The *synoptic diagram* must display the status "***LOAD SUPPLIED BY AUTOMATIC BYPASS AND MANUAL BYPASS Q2***".



3. ***Open the output switch Q1 (Pos. 0).***

   The *load* is now supplied only through the *manual bypass Q2*.

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



4. ***Press "Total Off" key.***

5. ***Remove the "Rectifier input fuses - F1, F2, F3" and the "Battery fuses - F9, F10, F11" (remove the external battery fuses in case of external battery).***

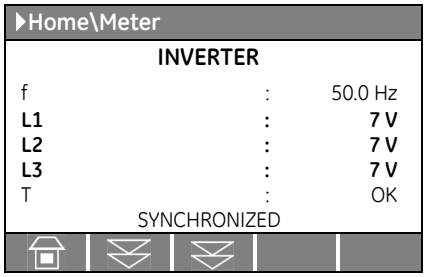
   The *acoustical alarm* is activated, press *"MUTE"* key to reset it.

Continue ►

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

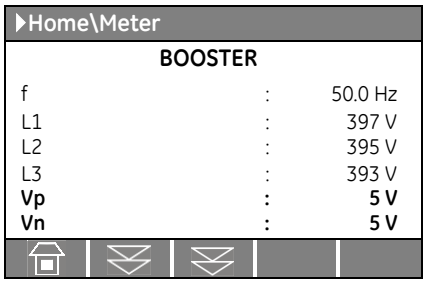
Remark:

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



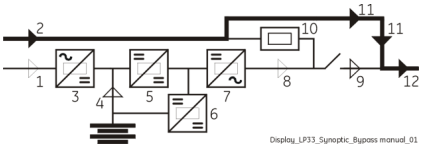
Before proceeding to step ***7***, check on the display panel that the *DC link voltage* (both polarities) ***Vp*** and ***Vn*** has reached the max. voltage of ***5Vdc*** (about 30 seconds).

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



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

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



END OF PROCEDURE

WARNING !

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

In case the procedure described on step *"6 - Discharge DC link capacitors"* cannot be completely performed, the DC capacitors could be charged with dangerous voltage for min. 5 minutes.

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

NOTE !

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

8.1.3 From Manual Bypass Q2 to normal function VFI

This procedure presupposes that the *load* is powered by the *manual bypass Q2* switch, and:

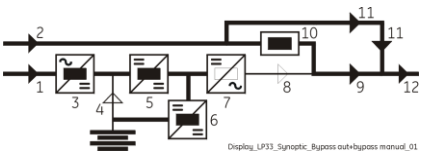
- The *inverter* is switched OFF;
- The *manual bypass* switch *Q2* is closed (Pos. I);
- The output switch *Q1* is open (Pos. 0);
- The *"Rectifier input fuses - F1, F2, F3"* and *"Battery* fuses - *F9, F10, F11"* are removed;
- *LED Alarm* blinks.

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

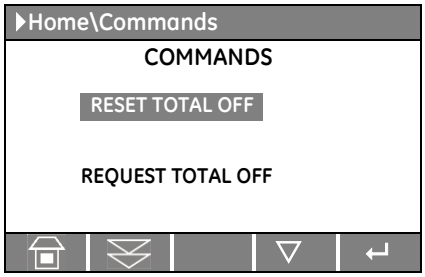
1. ***Insert the "Rectifier input fuses - F1, F2, F3" and the "Battery* fuses - *F9, F10, F11" (insert the external battery fuses in case of external battery).***

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

   Load is now supplied parallel through *automatic bypass* and *manual bypass Q2*.
   The *synoptic diagram* must display the status *"**LOAD SUPPLIED BY AUTOMATIC BYPASS AND MANUAL BYPASS Q2**"*.



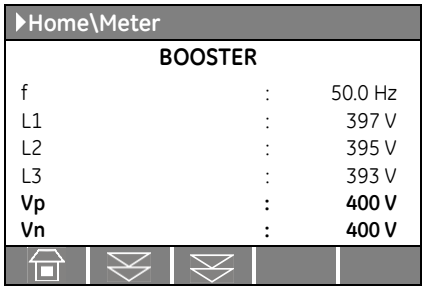
3. Only in case it has been previously activated, restore the command ***"Total Off"*** by entering the screen:
   *COMMANDS/**RESET TOTAL OFF***



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

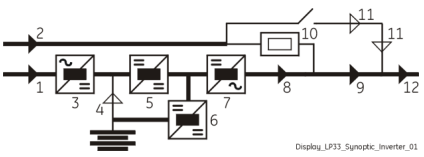
   The *load* is supplied by the mains through the *automatic bypass*.

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



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

8.1.4 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 "Total Off" key.***

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

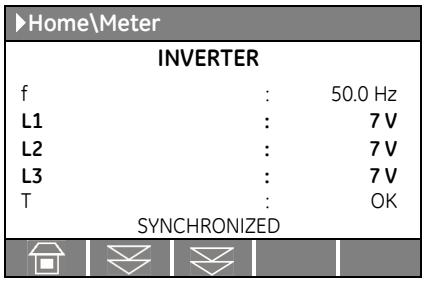
3. ***Remove the "Rectifier input fuses - F1, F2, F3" and the "Battery fuses - F9, F10, F11" (remove the external battery fuses in case of external battery).***
   The *acoustical alarm* is activated, press *"MUTE"* key to reset it.

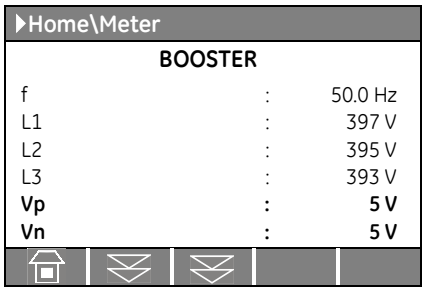
4. ***In order to discharge the DC link capacitors, insert the inverter by pressing "Inverter ON" (I) key.***

   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.

   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).





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

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

END OF PROCEDURE

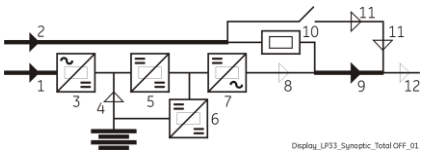
	**WARNING !** **If the above procedure is not completely performed, it could cause serious damages to the UPS.** **In case the procedure described on step "4 - *Discharge DC link capacitors*" cannot be completely performed, the DC capacitors could be charged with dangerous voltage for min. 5 minutes.** **The UPS cabinet contains parts electrically live.** **Apart from the front door, do not open any other part of the UPS.**

8.1.5 Restore to normal operation after "Total Off"

	**NOTE !** **Make sure the UPS to be status of the activation of "*Total Off*", i. e. *Q1* closed, *Q2* open and the "*Rectifier input fuses - F1, F2, F3*" and "*Battery* fuses - *F9, F10, F11*" connected.**

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

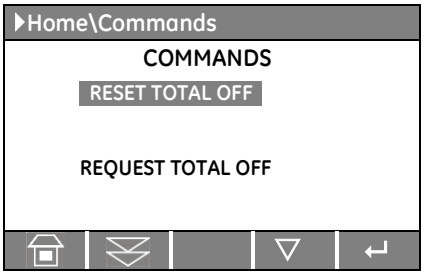
- **All *Contactors* are open.**
- ***Booster*, *Inverter* and *Static-Switch* shut-down.**



1. ***Reset "Total Off".***

   Restore the command "*Total Off*" by entering the screen:

   COMMANDS / ***RESET TOTAL OFF***

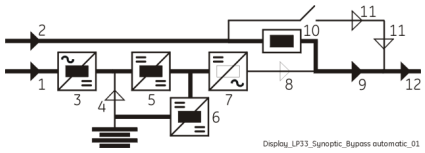


   LED Alarm is lit.

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

   The *booster* starts automatically.

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

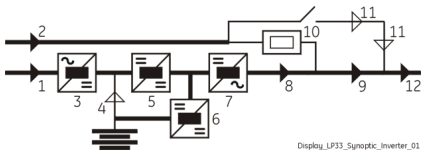


2. ***Insert the inverter by pressing "Inverter ON" (I) key.***

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

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

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

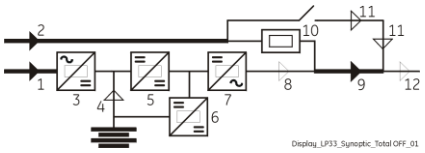


END OF PROCEDURE

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

	**NOTE !** **Make sure the UPS to be status of the activation of *"EPO - Emergency Power Off"*, i. e. *Q1* closed, *Q2* open and the *"Rectifier input fuses - F1, F2, F3"* and *"Battery* fuses - *F9, F10, F11"* connected.**

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.

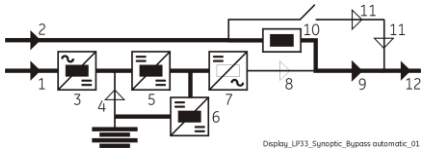
Press *MUTE* key to reset *Alarm and Acoustical alarm*.
LED Alarm remains lit.

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

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

The *booster* starts automatically.

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

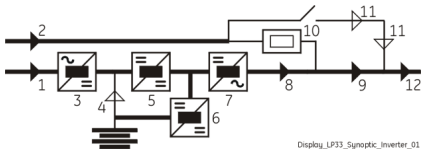


3. Insert the inverter by pressing "Inverter ON" (I) key.

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

LED Alarm 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

8.2 PROCEDURES FOR LP33 SERIES 10 & 20 PARALLEL SYSTEM

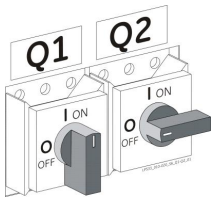
8.2.1 LP33 Series 10 & 20 Parallel System start-up

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

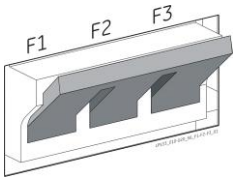
This procedure must be performed for the first start-up following the installation, with the *UPS Parallel System* completely switched Off and not powered.

Open the front door on all UPS units and make sure that:

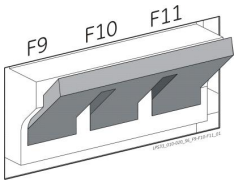
- All the ***connections*** to the input/output terminals of the UPS have been made correctly.
- The ***safety screens*** are fixed in their position.
- The switches ***Q1*** and ***Q2*** **are open (Pos. O)** and the "***Rectifier input fuses - F1, F2, F3***" and "***Battery fuses - F9, F10, F11***" **are removed**.



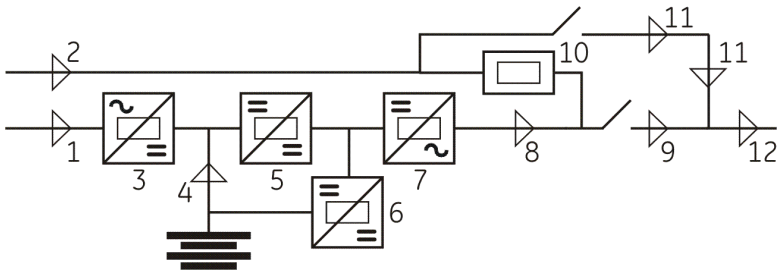
Q1 *Output UPS switch*
Q2 *Manual bypass switch*



Input fuses rectifier

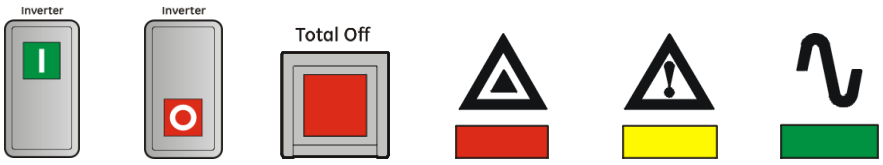


Battery fuses



LEDs on synoptic diagram

LED 1	*Mains rectifier OK*	*LED 7*	*Inverter available*
LED 2	*Mains 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* *v Total Off* *LED Stop Operation* *LED Alarm* *LED Operation*

1. ***Insert the "Rectifier input fuses - F1, F2, F3" on all UPS units.***

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

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

   At this stage the electronic power supply is switched ON and the buzzer sounds.
   LED 1 (mains rectifier OK) and *LED 2 (mains bypass OK)* must be lit.
   Press *"MUTE"* key to reset *acoustical alarm*. *LED Alarm* remains lit.

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**		

Continue ▶

During the first commissioning *LP33 Series 10 & 20* requests a set-up of the UPS configuration parameters presented in the following screens.

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

WARNING !

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

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

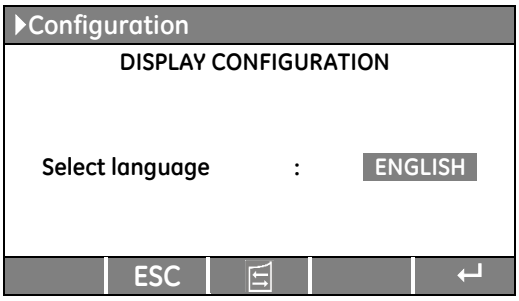
In this mode the keys perform the following functions:

Confirm the selection made and select the next parameter.

Re-establish default value.

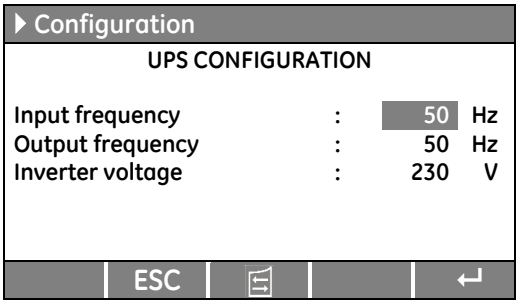
Modify or insert the selected value.

Save the configuration of set parameters.



DISPLAY CONFIGURATION screen

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



UPS CONFIGURATION screen

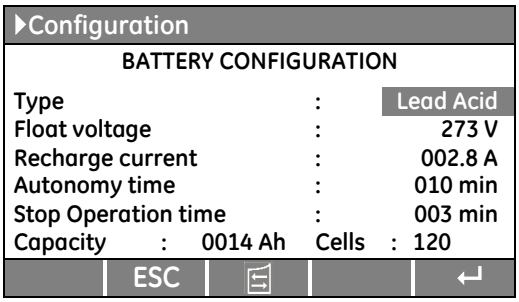
Input frequency
Input frequency value (*50Hz).

Output frequency
Inverter output frequency value (*50Hz).

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

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

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 120 cells x 2.27Vdc = **273Vdc**

Recharge current
Maximum battery recharge current.
Default setting value: 1.4A (10 kVA) 2.8A (20 kVA)

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

Autonomy times for lead acid batteries (VRLA)						
2 x 120 cells	Autonomy at full load at PF=0.8			U floating = 273Vdc (2.27Vdc - cell)		
UPS Model	Battery with expected trickle life 5 years					
	7Ah	14Ah	21Ah	28Ah	35Ah	42Ah
LP33 Series 10	10	25	45	60	80	100
LP33 Series 20	-	10	20	28	37	45

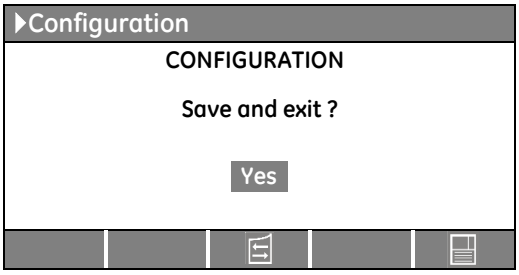
Autonomy time for battery supplied by GE UPS manufacturer.

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): 120 cells.

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



CONFIGURATION screen

Screen to save the configuration of set parameters.

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

Continue ▶

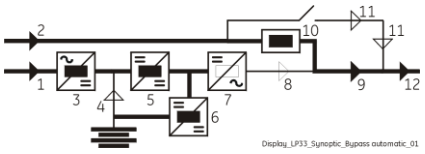
3. ***Insert the "Battery fuses - F9, F10, F11" and eventual external fuses in case of external battery on all UPS units.***

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

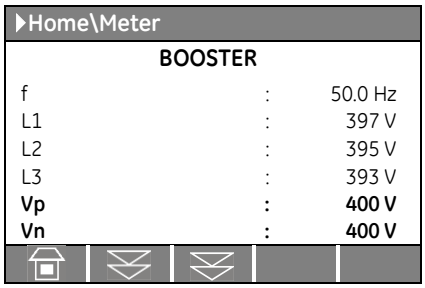
4. ***Close the output switch Q1 (Pos. I) on all UPS units.***

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

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



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

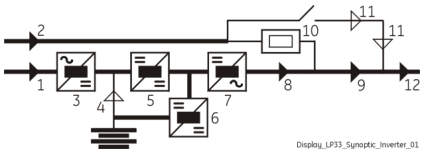


5. ***Insert the inverter by pressing "Inverter ON" (I) key on first UPS unit.***

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

LED Alarm turns Off and the *LED Operation* must be is lit.

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



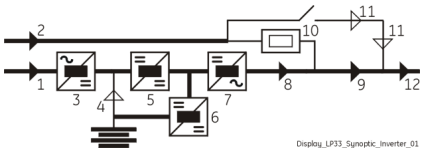
6. ***Insert the inverter by pressing "Inverter ON" (I) key on all other UPS units.***

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

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

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

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



7. ***Load supply.***

LP33 Series 10 & 20 Parallel System is now running, supplying power to the output.
Insert the *loads* one by one to the output of the *LP33 Series 10 & 20 Parallel System*.
Check the output current value of *L1*, *L2* and *L3* and check for correct load balance.

END OF PROCEDURE

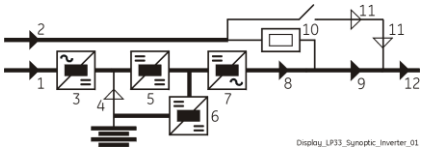
> **NOTE !**
>
> **Even if the UPS is delivered with the *battery* fully charged, they could be partially discharged during transportation or storage.**
>
> **It is recommended to recharge the battery during at least 10 hours in order to provide the complete *battery* energy stored to the load in the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

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

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

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

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

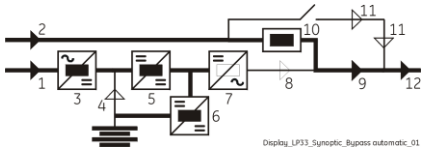


1. ***Disconnect the inverter by pressing "Inverter OFF" (O) key and hold until the LED Inverter (7) turns OFF on all UPS units.***

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

   LEDs Alarm are lit and the *LEDs Operation* are Off.

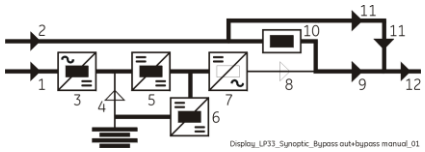
   The *synoptic diagram*, on all UPS units, must display the status "***LOAD SUPPLIED BY AUTOMATIC BYPASS***".



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

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

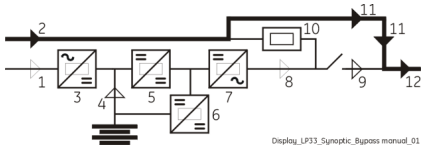
   The *synoptic diagram*, on all UPS units, must display the status "***LOAD SUPPLIED BY AUTOMATIC BYPASS AND MANUAL BYPASS Q2***".



3. ***Open the output switch Q1 (Pos. 0) on all UPS units.***

   The *load* is now supplied only through the *manual bypass Q2*.

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



4. ***Press "Total Off" key on all UPS units.***

5. ***Remove the "Rectifier input fuses - F1, F2, F3" and the "Battery fuses - F9, F10, F11" (remove the external battery fuses in case of external battery) on all UPS units.***

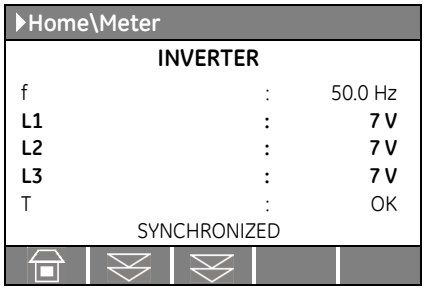
   The *acoustical alarm* is activated, press *"MUTE"* key to reset it.

Continue ►

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

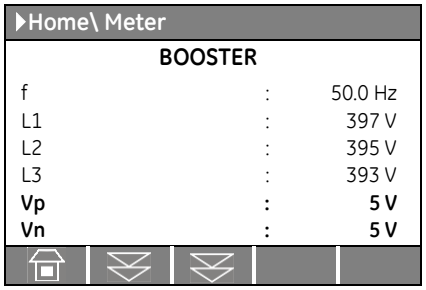
Remark:

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



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).

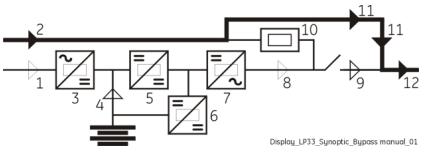
The *acoustical alarm* is activated, press *"MUTE"* key (from Home screen) to reset it.



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

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

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



END OF PROCEDURE

WARNING !

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

In case the procedure described on step *"6 - Discharge DC link capacitors"* cannot be completely performed, the DC capacitors could be charged with dangerous voltage for min. 5 minutes.

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

NOTE !

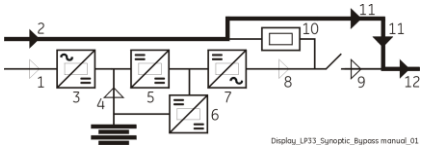
With separate mains inputs, it's possible to disconnect mains rectifier.

8.2.3 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 *"Rectifier input fuses - F1, F2, F3"* and *"Battery* fuses - *F9, F10, F11"* are removed.
- *LED Alarm* blinks.

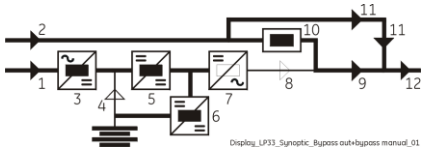
The *synoptic diagram*, on all UPS units, must display the status *"**LOAD SUPPLIED BY MANUAL BYPASS Q2**"*.



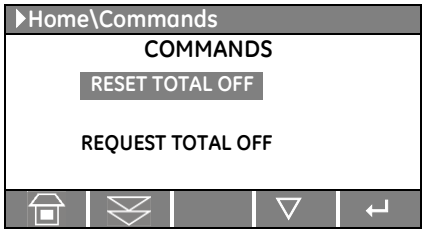
1. ***Insert the "Rectifier input fuses - F1, F2, F3" and the "Battery* fuses - *F9, F10, F11" (and eventual external battery fuses) on all UPS units.***

2. ***Close the output switch (Pos. I) on all UPS units.***
   When the last *Q1* will be closed the output will be from *mains* in parallel from *automatic bypass* and *manual bypass Q2* of all UPS units.

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

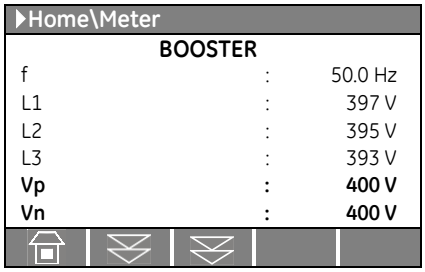


3. Only in case it has been previously activated, restore the command *"Total Off"* **on any one of the units** by entering the screen: *COMMANDS/**RESET TOTAL OFF***



4. ***Open the manual bypass switch Q2 (Pos. 0) on all UPS units.***
   The *load* is supplied by the mains through the *automatic bypass*.

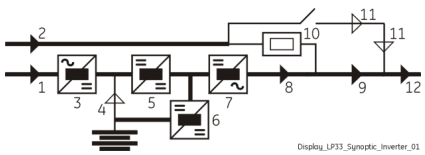
   Verify on all UPS units, selecting the screen *METERING/BOOSTER/**Vp*** and ***Vn***, that the booster voltage has reached about ***400Vdc***.



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 is lit.

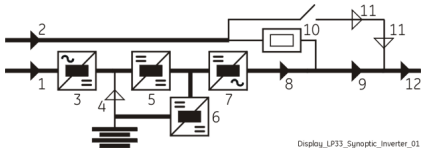
   The *synoptic diagram*, on first UPS unit, must display the status *"**LOAD SUPPLIED BY INVERTER**"*.



6. ***Insert the inverter by pressing "Inverter ON" (I) key on all other UPS units.***
   Do not start the next *inverter* until the sequence of the previous one ends.
   As soon as the output power of the *inverters* is sufficient to supply the *load*, the output of the units with running *inverter* will transfer to *inverter*.

   LED Alarm 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

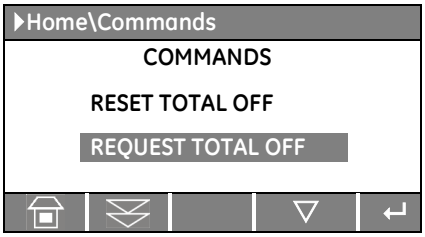
8.2.4 Separate a UPS unit from the Parallel System (System Redundancy)

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

1. ***Disconnect the inverter, only on this unit, by pressing "Inverter OFF" (O) key and hold until the LED Inverter (7) turns OFF.***
   With *redundant system*, pressing the key OFF the *inverter* shuts down and it will stay OFF.
   If by pressing the key *"O"* the *load* is transferred to the *mains* and the *inverter* remains operating, it means the system is not redundant.
   In this case is not possible to switch-OFF one unit without transferring the *load* on *mains*.
   Load supplied from *inverter(s)* of the other Unit(s) of the *Parallel System*.

2. ***Open the output switch Q1 only on this unit.***
   LED Alarms is lit and the *LED Operation* is Off.

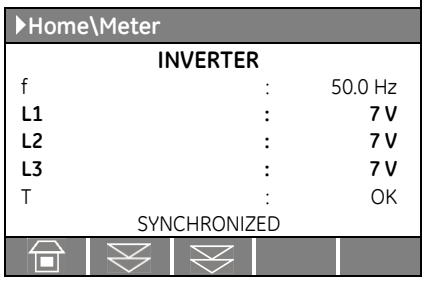
3. ***Perform the command "Total Off" only on this unit.***
   Perform the command *"Total Off"* by entering the screen (see *Section 7.5)*:
   COMMANDS / **REQUEST TOTAL OFF**



4. ***Remove the "Rectifier input fuses - F1, F2, F3" and the "Battery fuses - F9, F10, F11" (remove the external battery fuses in case of external battery) only on this unit.***

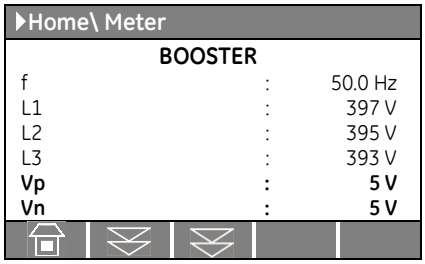
5. ***In order to discharge the DC link capacitors, insert the inverter by pressing "Inverter ON" (I) key only on this unit.***

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

END OF PROCEDURE

WARNING !
In case the unit should be disconnected and removed from the operating system, the operation MUST BE PERFORMED BY QUALIFIED PERSONS.
If an intermediate unit must be disconnected from a Parallel System pay attention do not open the control bus: keep the plugs *J3* and *J4* connected to the board *"P16 - Connector adapter RPA"* (see *Section 5.8.4).*
For any further intervention contact nearest *Service Centre*.

8.2.5 Reconnect a UPS unit to a Parallel System

WARNING !

Before connecting hazardous voltages, make sure that:

- **The connection to the electrical system has been performed by qualified personnel;**
- **The *equipment frame* has been correctly grounded to the *main earth*;**
- **Make sure that *mains input* protection is removed;**
- **All the *panels* removed to allow the UPS connection have been correctly reinstalled;**
- **The UPS switches *Q1* and *Q2* are open (Pos. 0);**
- **The *"Rectifier input fuses - F1, F2, F3"* and *"Battery* fuses - *F9, F10, F11"* is removed.**

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

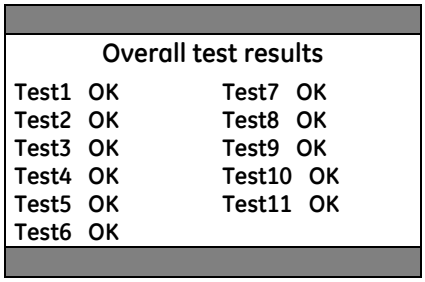
This unit must be completely switched OFF and not powered.

1. ***Insert the "Rectifier input fuses - F1, F2, F3" on this UPS unit.***

2. ***Switch-ON the mains voltage from the input distribution (both rectifier and bypass if separated) on this UPS unit.***

   The UPS performs a *SELFTEST*.

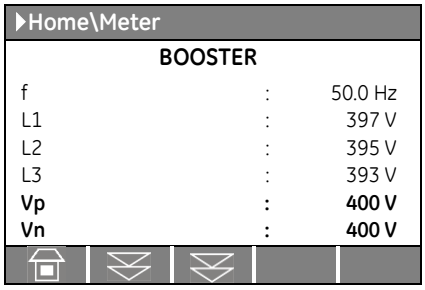
   A successful termination of the tests will be indicated with Overall test results *"OK"*.
   Commissioning cannot be continued should one or more tests result to be negative.
   Please contact in this case your *Service Centre*.



3. ***Insert the "Battery* fuses - *F9, F10, F11" (insert the external battery fuses in case of external battery) on this UPS unit.***

4. ***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 ***400Vdc***.

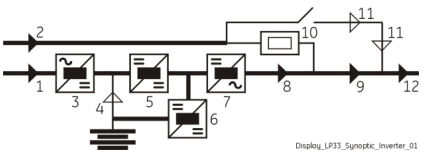


5. ***Insert the inverter by pressing "Inverter ON" (I) key on this UPS unit.***

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

   LED Alarm 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

8.2.6 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 "Total Off" key on anyone of the parallel units.***

2. ***Open the output switch Q1 (Pos. 0) on all UPS units***.

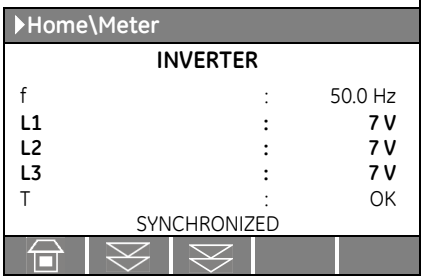
3. ***Remove the "Rectifier input fuses - F1, F2, F3" and the "Battery* fuses - *F9, F10, F11"* (remove the *external battery fuses* in case of *external battery*) on all UPS units.**

   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.***

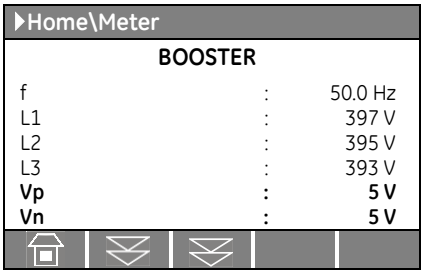
   Remark:

   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.



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

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

END OF PROCEDURE

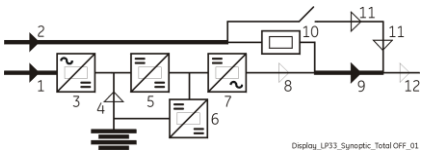
	WARNING ! **If the above procedure is not completely performed, it could cause serious damages to the UPS.** **In case the procedure described on step "4 - *Discharge DC link capacitors*" cannot be completely performed, the DC capacitors could be charged with dangerous voltage for a min. 5 minutes.** **The UPS cabinet contains parts electrically live.** **Apart from the front door, do not open any other part of the UPS.**

8.2.7 Restore to normal operation after "Total Off"

NOTE !

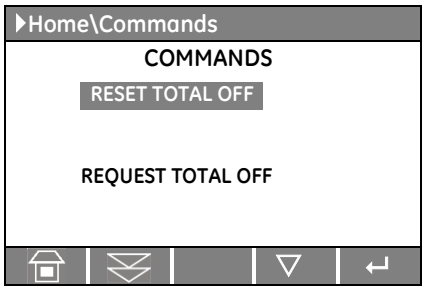
Make sure the all units of the Parallel System to be status of the activation of "*Total Off*", i. e. Q1 closed, Q2 open and the "*Rectifier input fuses - F1, F2, F3*" and "*Battery fuses - F9, F10, F11*" connected.

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



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

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

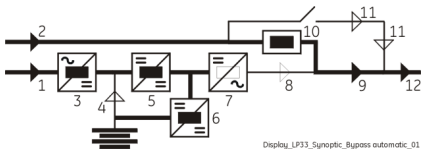


Restore the command *"Total Off"*, on anyone of the parallel units, by entering the screen:

COMMANDS / **RESET TOTAL OFF**

LED Alarm is lit.

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

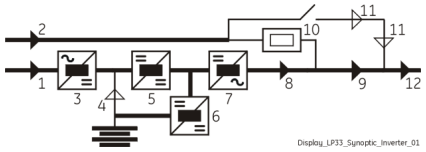


The *synoptic diagram*, on all UPS units, must display the status "***LOAD SUPPLIED BY AUTOMATIC BYPASS***".

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

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

LED Alarm turns Off and the *LED Operation* must be is lit.



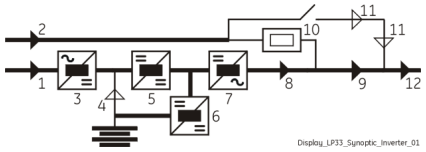
The *synoptic diagram*, on first UPS unit, must display the status "***LOAD SUPPLIED BY INVERTER***".

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

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

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

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



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

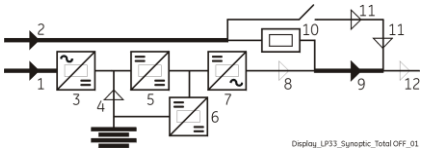
END OF PROCEDURE

8.2.8 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 "*Rectifier input fuses - F1, F2, F3*" and "*Battery* fuses - *F9, F10, F11*" connected.**

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

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



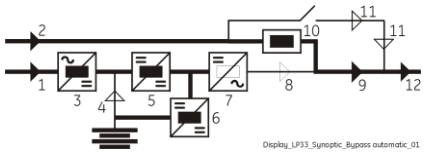
1. Reset the* push-button *"EPO".

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

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

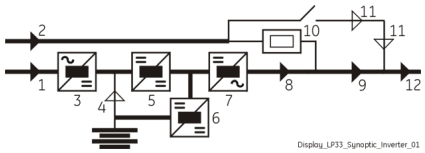


3. Insert the inverter by pressing "Inverter ON" (I) key on first UPS unit.

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

LED Alarm turns Off and the *LED Operation* must be is lit.

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



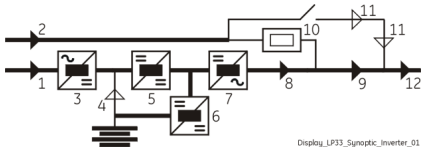
4. Insert the inverter by pressing "Inverter ON" (I) key on all other UPS units.

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

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

LED Alarm 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

9 CUSTOMER INTERFACE

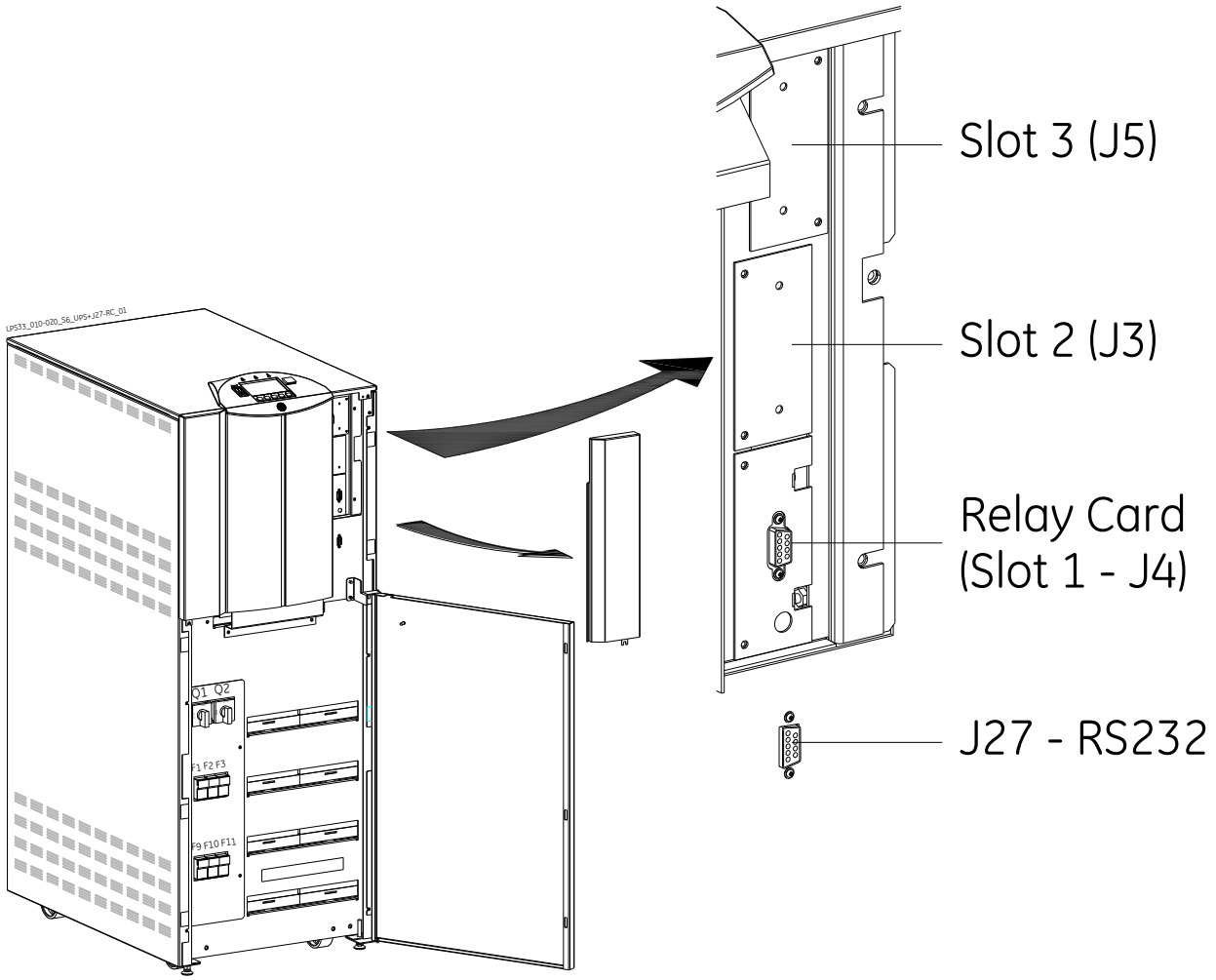


Fig. 9-1 Slot connectivity

LP33 Series 10 & 20 is supplied by a standard ***Serial Port J27 - RS232*** (see *Section 9.1*) and a ***Relay Card*** (see *Section 9.2*).

List of possible connectivity configurations on LP33 Series 10 & 20			
Slot 1 – J4	**Slot 2 – J3**	**Slot 3 – J5**	**Slot 1 – J4 + Slot 2 – J3**
Relay Card (standard)			
Relay Card (standard)	Advanced SNMP Card (Option)		
Relay Card (standard)	Advanced SNMP Card (Option)	Advanced SNMP Card (Option)	
			Customer Interface board (Option)
		Advanced SNMP Card (Option)	Customer Interface board (Option)

9.1 SERIAL PORT J27 - RS232

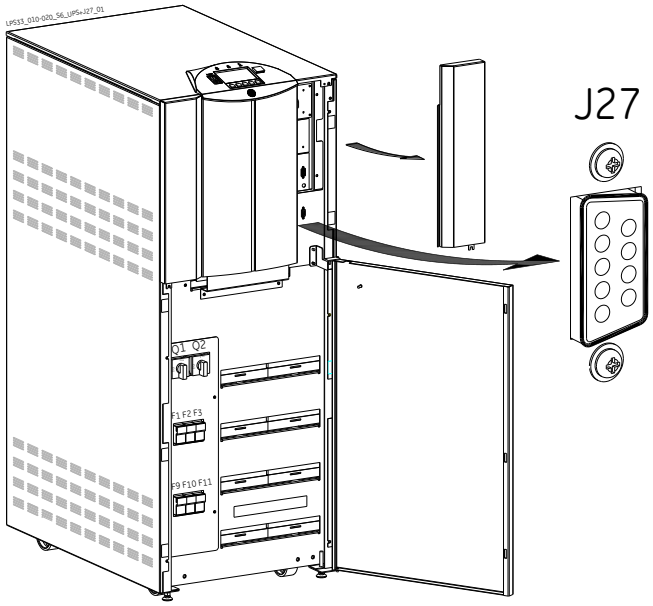


Fig. 9.1-1 Serial Port J27 – RS232

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

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

RPA
Redundant Parallel Architecture

The serial port *J27 - RS232* is enabled on all the units of the Parallel System.

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

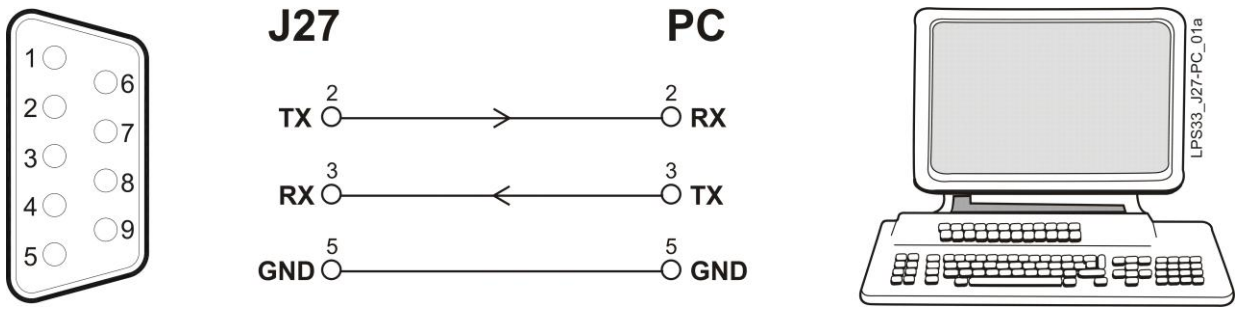


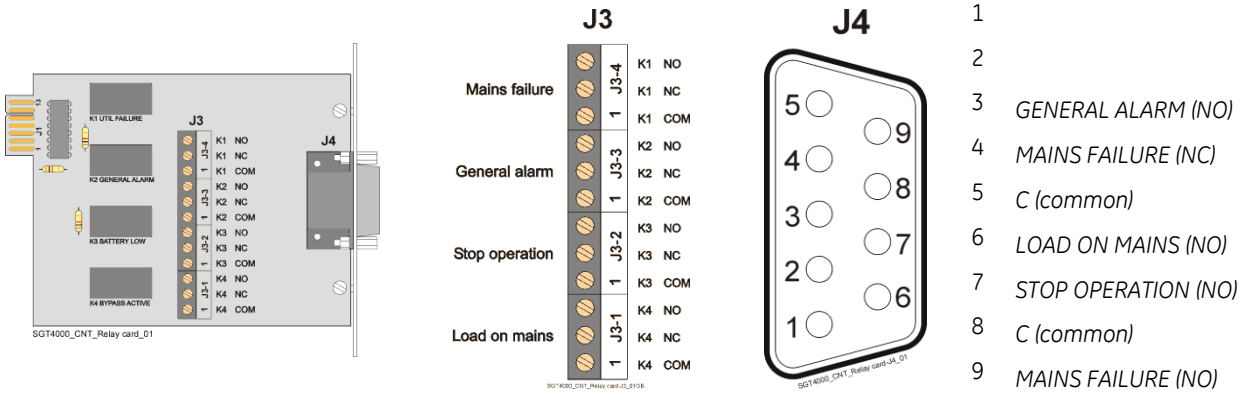
Fig. 9.1-2 Serial port J27 - RS232 connection to PC

9.2 RELAY CARD

WARNING !

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

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



NO = Normally Open **C** = Common **NC** = Normally Closed

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

Fig. 9.2-1 Relay Card

Output signals on voltage-free contacts

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

0 - NO SIGNAL
1 - BUZZER
2 - GENERAL ALARM (NO)
3 - LOAD ON MAINS
4 - STOP OPERATION
5 - LOAD ON INVERTER
6 - MAINS FAILURE
7 - DC OVERVOLTAGE
8 - LOW BATTERY
9 - OVERLOAD
10 - OVERTEMPERATURE
11 - INVERTER-BYPASS NOT SYNCHRONY
12 - BYPASS LOCKED
13 - BYPASS MAINS FAILURE
14 - RECTIFIER MAINS FAILURE
15 - BATTERY DISCHARGE
16 - MANUAL BYPASS ON
17 - RECTIFIER ON
18 - INVERTER ON
19 - BOOST CHARGE
20 - BATTERY EARTH FAULT
21 - BATTERY FAULT
22 - RELAY INPUT 1
23 - RELAY INPUT 2
24 - RELAY OUTPUT ON
25 - RELAY OUTPUT OFF
26 - EMERGENCY OFF (EPO)
27 - ECO MODE ON
28 - GENERAL ALARM (NC)

NOTE !

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

9.3 EPO (EMERGENCY POWER OFF)

WARNING !

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

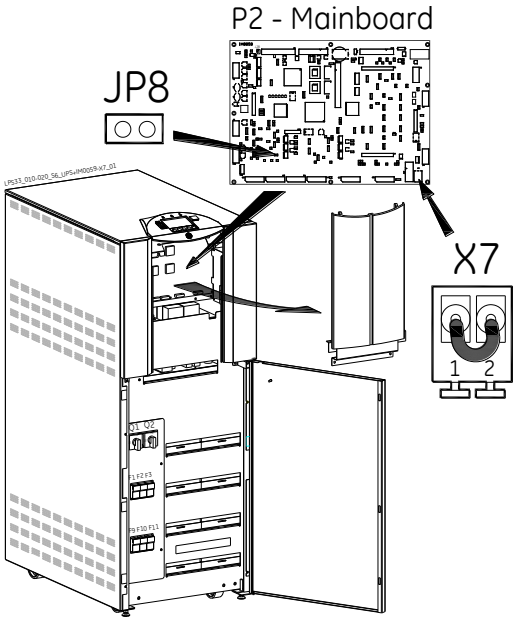


Fig. 9.3-1 Terminals X7 - EPO

An external Emergency switch (*NC* - Normally Closed voltage-free contact) can be connected on terminals ***X7 / 1, 2*** of the "***P2 – Mainboard***".

NOTE !

To enable this function, remove jumper *JP8* on the *"P2 – Mainboard"*, when the cables have been already connected on *X7 / 1, 2*.

RPA Redundant Parallel Architecture

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

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

NOTE !

This procedure could imply a load shut-down.

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

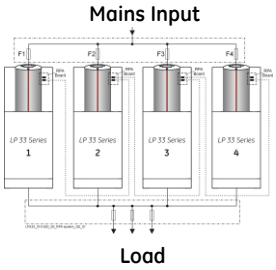
- Press the push-button ***EPO*** (contact on *X7 / 1, 2* is closed again).
- Press the key "***O***" (*Inverter OFF* – see *Section 6.2*) on the *control panel*.
- Press the key "***I***" (*Inverter ON* – see *Section 6.2*) on the *control panel*.

RPA Redundant Parallel Architecture

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

10 OPTIONS

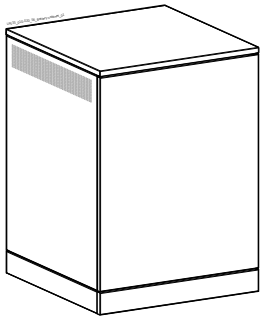
10.1 OPTIONS GENERAL VIEW



RPA kit

Redundant Parallel Architecture

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



Battery Extension Packs

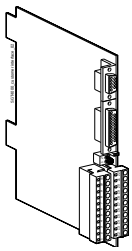
Extended run-time versions are equipped with additional batteries housed in the UPS itself, to increase the back-up time of the UPS when the *mains* fails.

Additional battery cabinets

Depending on model the battery extensions can be housed in additional cabinets with the same design of the UPS cabinet, delivered with the necessary protection and connection material.
For extended run-time versions and additional cabinets see enclosed *Data Sheets*.

Additional battery charge

For battery with extended backup time (max. 8.4A).

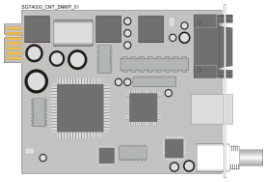


Customer Interface board

The *Customer Interface board* 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 "*GENERATOR ON*".
- *EPO* (Emergency Power Off).

See *Section 10.2.1*.

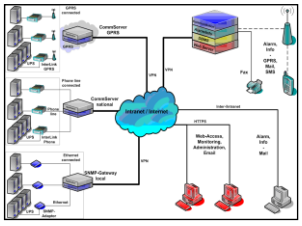


Advanced SNMP Card (Simple Network Management Protocol)

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

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

GE Power Diagnostics



GE Power Diagnostics is an anytime, anywhere concept in UPS status monitoring and alarm notification that has been successfully implemented in numerous of installations supporting up to multi-hundred UPS.
Based on the leading *Intelligent Remote Information System IRIS* all GE UPS types as well as 3rd party UPS are supported.
Accessing the latest site information via Web and being alerted by Email, SMS or Fax, it enables the user to make timely decisions in case of changing critical conditions.
With comprehensive data collection and analysis *IRIS* is not only a remote monitoring & diagnostics (RM&D) system but, the core of the integrated service offering *GE Power Diagnostics*.

GE Data Protection

GE Data Protection

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.

10.2 OPTIONS ASSEMBLY AND CONNECTION

WARNING !

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

Make sure that the UPS installation is completely powered down.

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

10.2.1 Customer Interface board

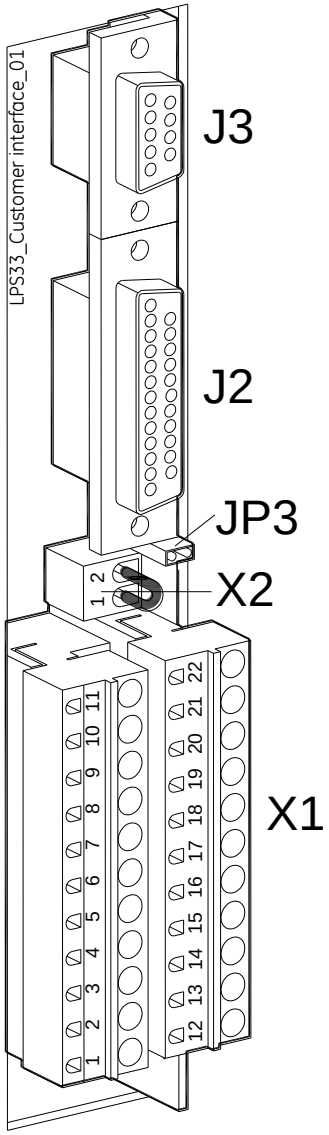


Fig. 10.2.1-1 Customer Interface

C = Common
NO = Normally Open
NC = Normally Closed

J3 serial port - RS232 (sub - D - female 9 pin)	
Total remote management of the system using software *GE Power Diagnostics*, *GE Data Protection* or *GE Service Software* for system protection and management of the UPS systems.	**Pin 2**: TX (out) **Pin 3**: RX (in) **Pin 5**: GND

J2 connector (sub – D female 25p) – Output signals on voltage-free contacts			
J2 / 1, 2, 3	NO, C, NC	MAINS FAILURE	(def. Parameter RL=1)
J2 / 4, 5, 6	NO, C, NC	LOAD ON INVERTER	(def. Parameter RL=3)
J2 / 7, 8, 9	NO, C, NC	STOP OPERATION	(def. Parameter RL=5)
J2 / 14, 15, 16	NO, C, NC	LOAD ON MAINS	(def. Parameter RL=2)
J2 / 17, 18, 19	NO, C, NC	GENERAL ALARM (NO)	(def. Parameter RL=4)
J2 / 20, 21, 22	NO, C, NC	BUZZER (acoustic alarm)	(def. Parameter RL=6)

Signals on terminals *X1* and on connector *J2* are in parallel and therefore not separated galvanically from each other.
The programmable signals on *X1* and *J2* will be disabled with *Q1* open, with the exception of the signals for:
16 – MANUAL BYPASS ON ***25 – RELAY OUTPUT OFF***
24 – RELAY OUTPUT ON ***26 – EMERGENCY OFF (EPO)***

X1 terminal block – Output signals on voltage-free contacts			
X1 / 1, 2, 3	NO, C, NC	MAINS FAILURE	(def. Parameter RL=1)
X1 / 4, 5, 6	NO, C, NC	LOAD ON INVERTER	(def. Parameter RL=3)
X1 / 7, 8, 9	NO, C, NC	STOP OPERATION	(def. Parameter RL=5)
X1 / 12, 13, 14	NO, C, NC	LOAD ON MAINS	(def. Parameter RL=2)
X1 / 15, 16, 17	NO, C, NC	GENERAL ALARM (NO)	(def. Parameter RL=4)
X1 / 18, 19, 20	NO, C, NC	BUZZER (acoustic alarm)	(def. Parameter RL=6)

X2 terminal block – EPO connection (Emergency Power Off)		
X2 / 1, 2 (or **J2 / 12, 25**)	NC	EPO (Emergency Power Off)

To enable this function, remove jumper *JP3* on the *"Customer Interface"* and the cable on the terminal *X2 / 1, 2*.
(See *Fig. 10.2.1-1*).
Verify if the cable on the terminal *X7 / 1, 2* and jumper *JP8* on the control board *"P2 – Mainboard"* are OFF (see *Fig. 10.2.1-3*).

Programmable functions on input contacts			
X1/10, 21	or	**J2/10, 23**	User Input 1 (default = Not used)
X1/11, 22	or	**J2/11, 24**	User Input 2 (default = GENERATOR ON)

Output signals on voltage-free contacts
On terminals ***X1*** or ***J2*** connector **6** of the following ***28 signals*** can be selected from the display (access only with password): *SETUP / SETUP /* ***LEVEL 2: SERVICE***.

0 - NO SIGNAL
1 - BUZZER
2 - GENERAL ALARM (NO)
3 - LOAD ON MAINS
4 - STOP OPERATION
5 - LOAD ON INVERTER
6 - MAINS FAILURE
7 - DC OVERVOLTAGE
8 - LOW BATTERY
9 - OVERLOAD
10 - OVERTEMPERATURE
11 - INVERTER-MAINS NOT SYNCHRONY
12 - BYPASS LOCKED
13 - BYPASS MAINS FAILURE
14 - RECTIFIER MAINS FAILURE
15 - BATTERY DISCHARGE
16 - MANUAL BYPASS ON
17 - RECTIFIER ON
18 - INVERTER ON
19 - BATTERY BOOSTCHARGE
20 - BATTERY EARTH FAULT
21 - BATTERY FAULT
22 - RELAY INPUT 1
23 - RELAY INPUT 2
24 - RELAY OUTPUT ON
25 - RELAY OUTPUT OFF
26 - EPO (EMERGENCY POWER OFF)
27 - ECO MODE ON
28 - GENERAL ALARM (NC)

Programmable functions on input contacts (X1 - J2)
Some UPS functions can be activated by parameters (access with password only) when an external NO contact is closed on:

NO FUNCTION
INVERTER OFF
PRINT ALL
INVERTER ON
GENERATOR ON
STATUS RELAY

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

Gen Set signalling

If an emergency generator set supplies the UPS in case of utility failure and the generator is particularly unstable in frequency, it should be suitable to install the signal *"GENERATOR ON"* on terminals ***X1 / 11, 22*** (NO - Normally Open voltage-free contact) or on connector ***J2 / 11, 24*** (see *Fig. 10.2.1-1 / X1* and *J2*).
Since the Parameter for of the reading of the Generator function is password protected, call the nearest *Service Centre* for it's activation.

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

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

It is advised to contact your *Service Centre* for further details.

RPA
Redundant Parallel Architecture

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

EPO (Emergency Power Off)

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

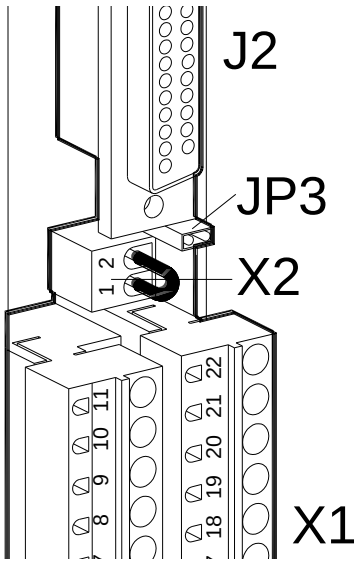


Fig. 10.2.1-2 Customer Interface board

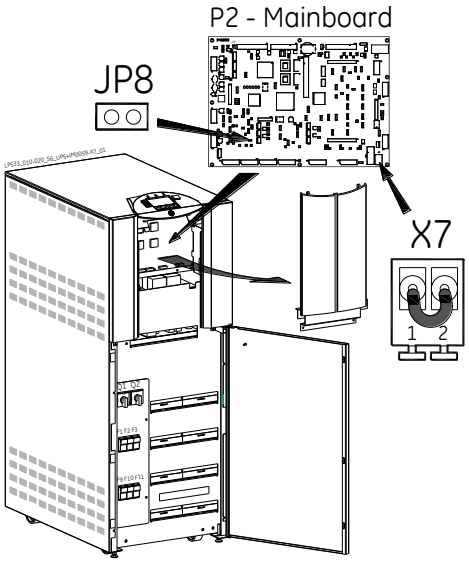


Fig. 10.2.1-3 P2 – Mainboard

NOTE !

To enable this function, remove jumper *JP3* on the *"Customer Interface"* and the cable on the terminal *X2 / 1, 2* (see *Fig. 10.2.1-2*).
Verify if the cable on the terminal *X7 / 1, 2* and jumper *JP8* on the control board *"P2 – Mainboard"* are OFF (see *Fig. 10.2.1-3*).

RPA Redundant Parallel Architecture

In a Parallel System a separate NC (Normally Closed) *contact must be connected individually to each unit.*

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

NOTE !

This procedure could imply a load shut-down.

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

- Press the push-button ***EPO*** (contact on *X2 / 1, 2* is closed again).
- Press the key *"**O**"* (*Inverter OFF* – see *Section 6.2*) on the *Control Panel*.
- Press the key *"**I**"* (*Inverter ON* – see *Section 6.2*) on the *Control Panel*.

RPA Redundant Parallel Architecture

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

10.2.2 Optional battery cabinet connection

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

Before connecting the UPS with an optional battery cabinet, follow the safety rules concerning the battery.
Make sure that the UPS is not powered, the *"Battery* fuses - *F9, F10, F11"* at the front of the cabinet and all the battery fuses "***Fbatt1, 2, 3, 4, 5, 6***" of the battery cabinet are removed.

The battery cabinet can be located on the right or left side of the UPS with a minimum distance of 100 mm (see *Fig. 10.2.2-1).*

⚠	**NOTE !** **Before closing the "*Battery* fuses - *F9, F10, F11*", verify for correct polarity of the battery connection.** **Check for sufficient floor loading capacity (see Technical Data Sheet).** **When an additional battery cabinet is connected, no batteries must be installed inside the UPS cabinet.**

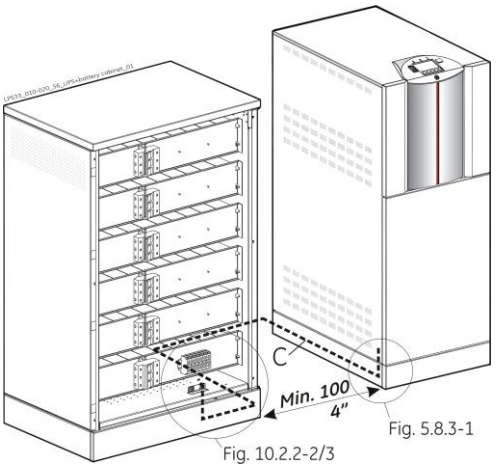


Fig. 10.2.2-1 UPS with optional battery cabinet

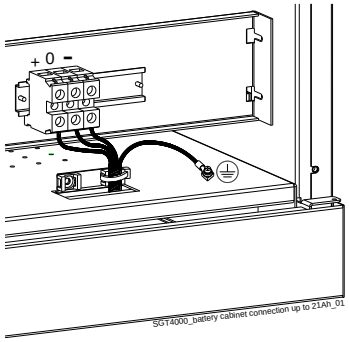


Fig. 10.2.2-2 Battery terminals up to 21Ah

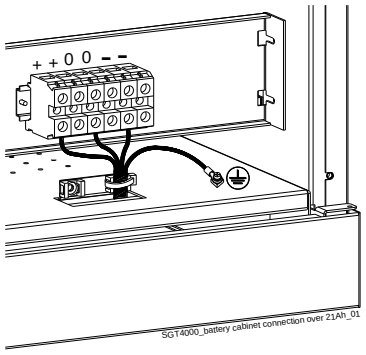


Fig. 10.2.2-3 Battery terminals over 21Ah

The cable "***C***", standard length 5 meters, must be routed and connected as shown in the above figures.

External battery fuses **Type gG-gL 660/690V (14 x 21)**
3 x 25A (each rack)

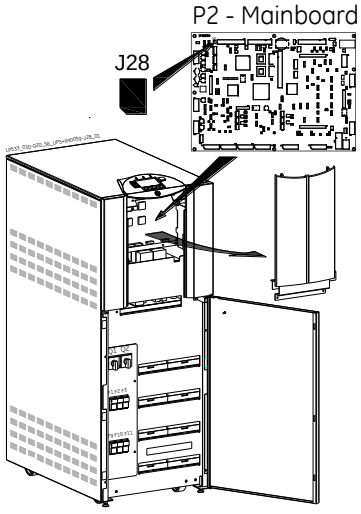


Fig. 10.2.2-4 PCB P2 - Mainboard

Connect the Battery temperature probe ***J28*** to the ***P2 - Mainboard***.
This probe compensates the battery charging current in function of the ambient temperature of the battery

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

Once the connection between the two cabinets is achieved, install the side panel of the UPS, insert the fuses "***Fbatt1, 2, 3, 4, 5, 6***" on all the racks of the battery cabinet, whereas the "***Battery* fuses - *F9, F10, F11***" at the front of the UPS must not be inserted until the start-up operation of the UPS.

11 MAINTENANCE

WARNING !

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

11.1 GENERAL MAINTENANCE

A UPS system, like other electrical equipment, needs periodic preventive maintenance.
A regular maintenance check of your installation guarantees higher reliability of your safe power supply.

GE Digital Energy recommends to perform the first service within **12 months** from the commissioning date or within **18 months** from delivery date.
Subsequent services to perform every **12 months**.

Preventive maintenance work on the UPS can be done only by trained *SERVICE TECHNICIANS*.

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

11.2 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 Digital Energy*** trained technician.

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

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

11.3 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.

11.4 OTHER COMPONENTS WITH LIMITED LIFETIME

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

11.5 BATTERY MAINTENANCE

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

The UPS ***LP33 Series 10 & 20*** offers the possibility of *SBM (Superior Battery Management)*.
The function *SBM* can be activated through a service Parameter.
The functionality of *SBM* reduces the Battery recharging time together with improved lifetime of the Battery.

As a healthy battery is essential to the performance of the UPS, an automatic or manual battery test can be performed regularly to ensure failsafe operation, in order to check if the battery can provide the expected backup time in case of mains failure.
We recommend the battery test be performed at least every **1 month**, especially if the battery is not sufficiently discharged during normal operation.
Since the parameter enabling the *battery test* protected by *user password*, please contact your ***Service Centre*** for more information.

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

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

When the condition of the battery is critical, the warning signal will be activated (general alarm, buzzer and alarm message *"4118 - BATTERY FAULT"*).
In this case the battery must be replaced as soon as possible.
Please contact your ***Centre Service***.

11.6 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).

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

12 NOTES

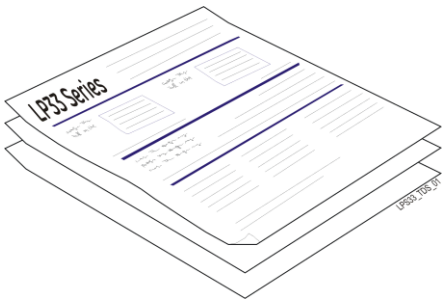
12.1 NOTES FORM

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

Date	*Description*	*Done by*

13 ANNEX

13.1 TECHNICAL DATA SHEET



Technical Data Sheet

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

13.2 UPS SCHEMATIC DIAGRAMS

UPS Schematic Diagrams

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

13.3 CD-ROM

CD-Rom

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