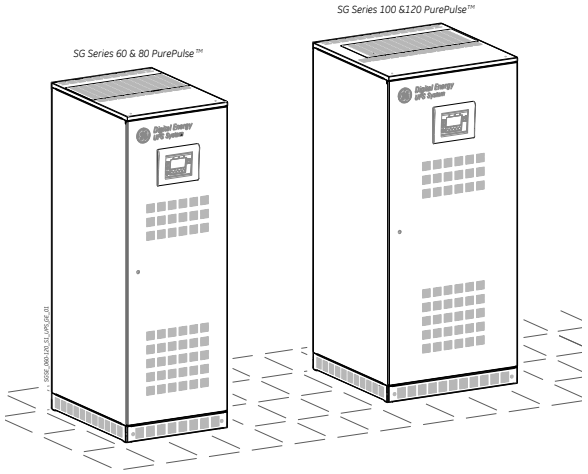
GE
Critical Power



User Manual

Uninterruptible Power Supply

SG Series 60 - 120 PurePulse™

60 – 80 - 100 - 120 kVA / 400Vac CE / S1

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imagination at work

Certified
Quality System
ISO 9001

Model:	***SG Series 60 - 120 PurePulse™ CE S1***
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Revision	Concern	Date
2.0	ECN 1825: Start-Up key & Update template	20.04.2013
3.0	ECN 1945 (EAC conformity) + ECN 2135 (Battery maintenance ECN 2316 (Input current THD) + Load Off/EPO procedures	21.03.2016

Dear Customer,

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

We trust that the use of the ***SG Series 60 - 120 PurePulse™*** Uninterruptible Power Supply system, developed and produced to the highest standards of quality, will give you complete satisfaction.

Please carefully read the *User Manual*.
It contains all the necessary information about the installation of the UPS.

Thank you for choosing ***GE*** !

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

Distributed by:

Your service contact:

Preface

Congratulations on your choice of a *SG Series 60 - 120 PurePulse*™ Uninterruptible Power Supply (UPS).
It will keep you away from any trouble due to unexpected power problems.

This manual describes how to prepare the installation site, provides weight and dimensions and procedures for moving, installing and connecting the UPS, and details of maintenance procedures suggested to preserve maximum reliability.

It explains the function of the UPS module, the purpose and location of the switches, the meaning of the system events related to the front panel indication, and provides procedures for starting and stopping the equipment.

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

WARNING!

SG Series 60 – 120 PurePulse™ is a product for restricted sales distribution to informed partners.
Installation restrictions or additional measures may be needed to prevent disturbances.

We recommend that this manual is kept next to the UPS for future references.
If any problems are encountered with the procedures contained in this manual, please contact your *Service Centre* before you proceed.

Due to technical improvements, some of the information contained in this manual may be changed without notice.

Safety instructions

Carefully read the safety instructions contained on the following page before the installation, start-up and maintenance of the UPS, options and battery.

Pay attention to the rectangular boxes included in the text:
They contain important information or warning concerning electrical connections and personnel safety.

RPA
Redundant Parallel Architecture

Parallel System secured with RPA

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

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1 SAFETY RULES

Save these instructions!

GENERAL

- Move the UPS in an upright position in its original package to the final destination room.
  To lift the cabinets, use a forklift or lifting belts with spreader bars.
- Check for sufficient floor and elevator loading capacity.
- Check the integrity of the UPS equipment carefully.
  If you notice visible damage, do not install or start the UPS.
  Contact the nearest Service Centre immediately.
- WARNING! RISK OF ELECTRICAL SHOCK:
  Do not remove covers, there are no user serviceable parts inside.
- After switching off takes 5 minutes for the DC capacitors to discharge because a lethally high voltage remains at the terminals of the electrolytic capacitors.
- -UPS's and battery system require a 12 months periodic maintenance to operate reliably and safely.
  This should be performed by qualified service personnel. The UPS contains its own energy source (battery).
- The field-wiring outlets may be electrically live, even when the UPS is disconnected from the mains.
- Dangerous voltages may be present during battery operation.
- The battery must be disconnected during maintenance or service work.
- This UPS contains potentially hazardous voltages.
- Be aware that the inverter can restart automatically after the mains 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.
- WARNING! HIGH EARTH LEAKAGE CURRENT:
  Earth connection is essential before connecting to AC input!
- Switching OFF the unit does not isolate the UPS from the 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 battery must be recharged periodically (time depending on storage temperature).

BATTERY

- The battery-voltage is dangerous for person's safety.
- When replacing the battery, use the same number, voltage (V) and capacity (Ah).
- 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.

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.

1.1 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 SG SERIES 60 & 80 PUREPULSE™

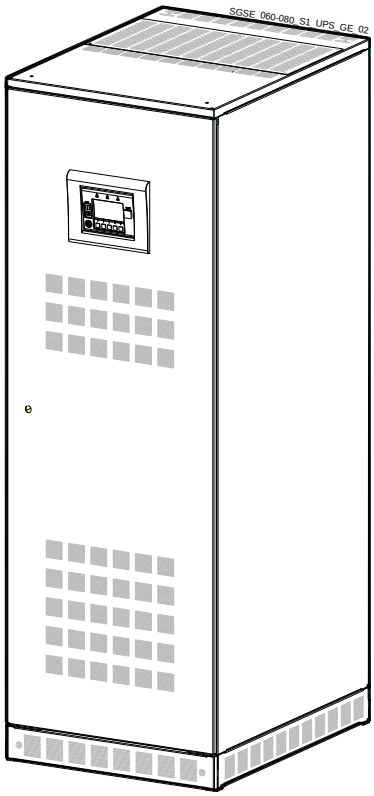

Fig. 2.1-1 General view

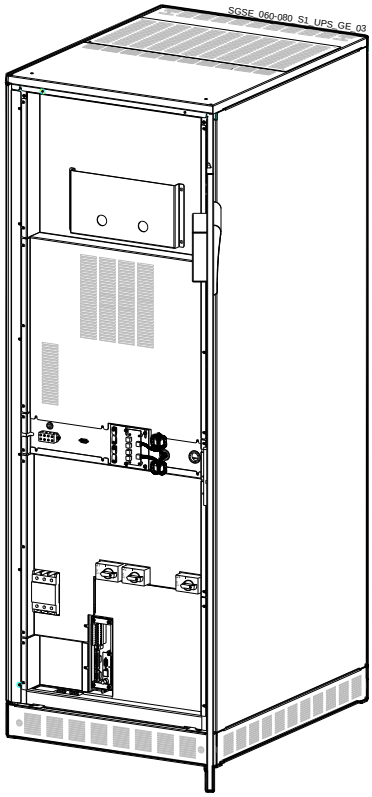

Fig. 2.1-2 General view with open doors

Fig. 2.1-4 Control panel

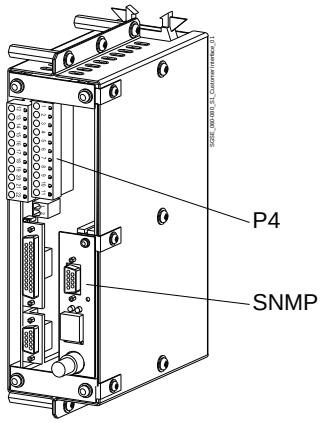

Fig. 2.1-5 Connectivity Rack

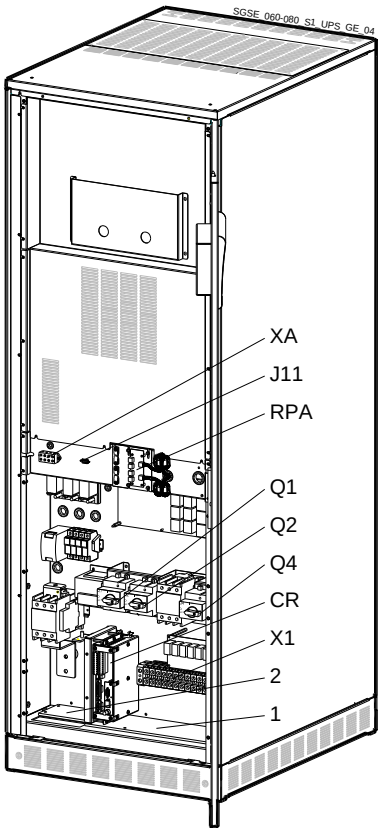

Fig. 2.1-3 General view without protection panels

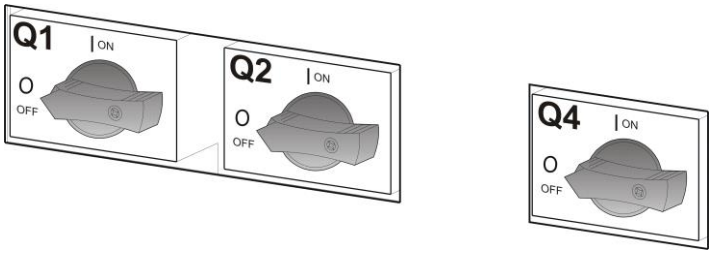

Fig. 2.1-6 Manual operated switches Q1, Q2 and Q4

1	Opening for input and output of power connection cables
2	Opening for input of the battery connection cables
CR	Connectivity Rack
J11	Serial port RS232 for IMT protocol (option)
P4	Customer Interface Board
Q1	UPS output switch
Q2	Manual Bypass switch
Q4	Input Rectifier switch
RPA	RPA board (Redundant Parallel Architecture) for Parallel System (option)
SNMP	Advanced SNMP Card (option)
X1	Terminals for Mains Input and Load Output
XA	Terminals for 24 Vdc Auxiliary Power Supply connection (option)

2.2 LAYOUT SG SERIES 60 & 80 PUREPULSE™ WITH EMC FILTER (OPTION)

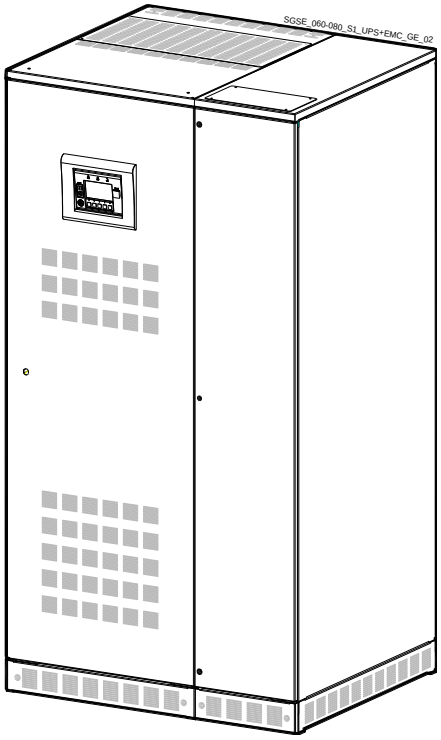

Fig. 2.2-1 General view

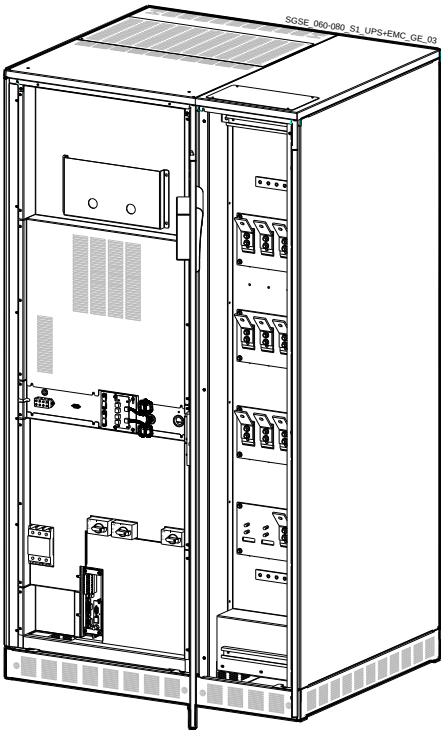

Fig. 2.2-2 General view with open doors

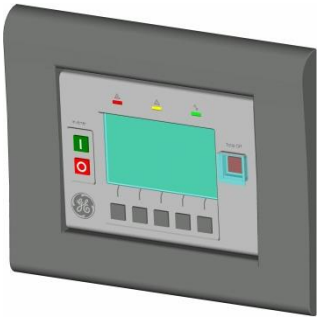

Fig. 2.2-4 Control panel

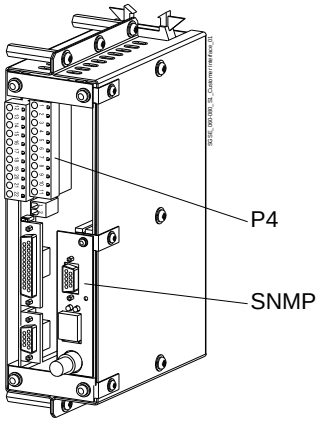

Fig. 2.2-5 Connectivity Rack

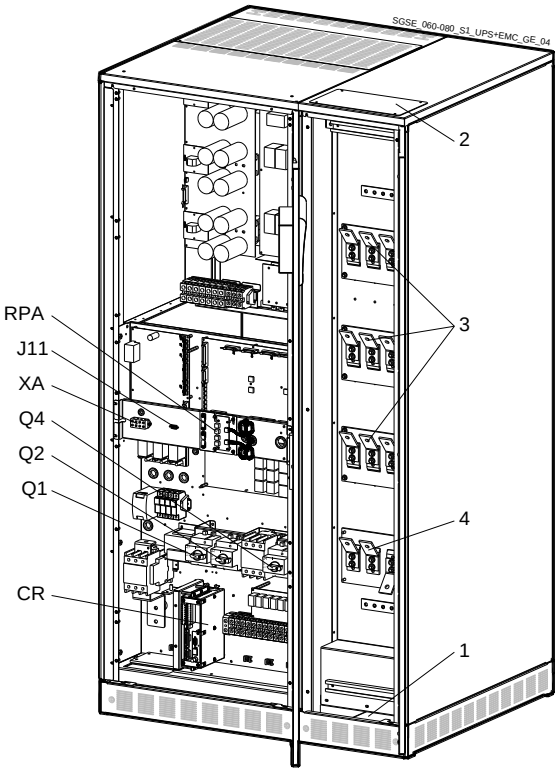

Fig. 2.2-3 General view without protection panels

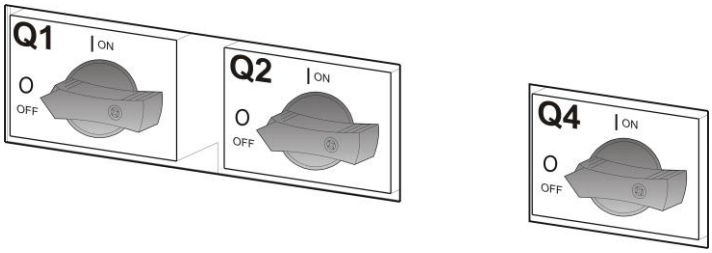

Fig. 2.2-6 Manual operated switches Q1, Q2 and Q4

1	Opening for bottom cable entry
2	Opening for top cable entry
3	Bus bars for Mains Input and Load Output
4	Bus bars for external Battery connection
CR	Connectivity Rack
J11	Serial port RS232 for IMT protocol (option)
P4	Customer Interface Board
Q1	UPS output switch
Q2	Manual Bypass switch
Q4	Input Rectifier switch
RPA	RPA board (Redundant Parallel Architecture) for Parallel System (option)
SNMP	Advanced SNMP Card (option)
XA	Terminals for 24 Vdc Auxiliary Power Supply connection (option)

2.3 LAYOUT SG SERIES 100 & 120 PUREPULSE™

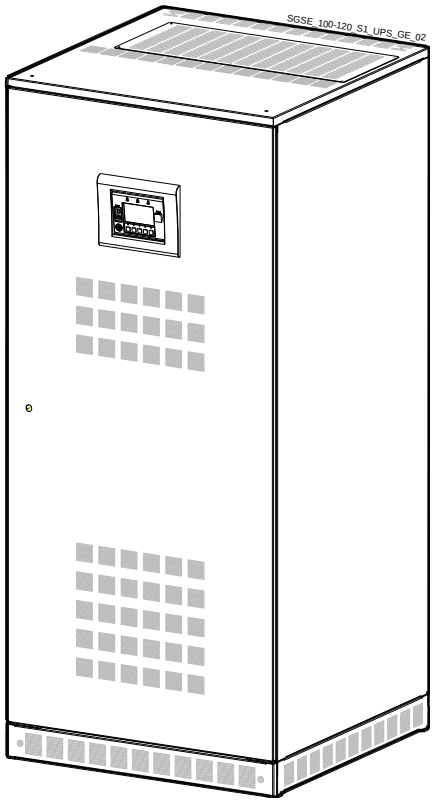

Fig. 2.3-1 General view

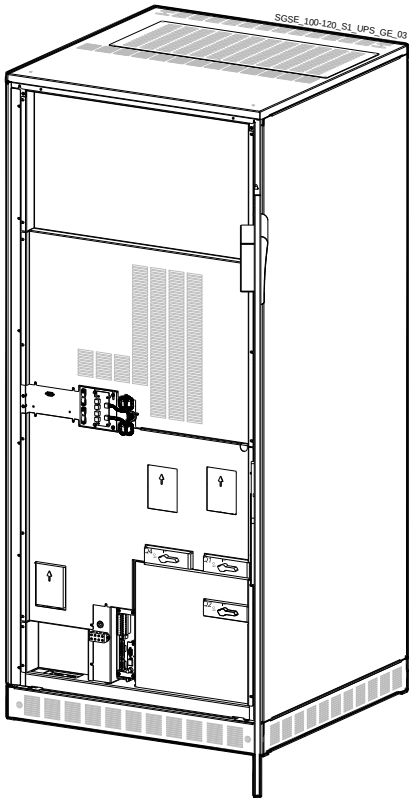

Fig. 2.3-2 General view with open doors

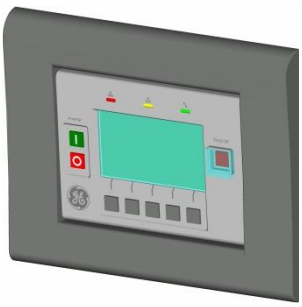

Fig. 2.3-4 Control panel

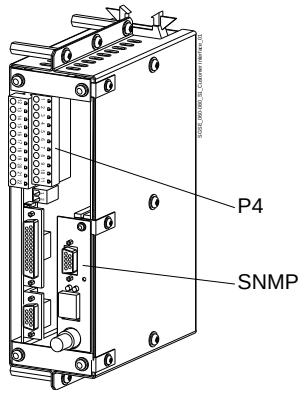

Fig. 2.3-5 Connectivity Rack

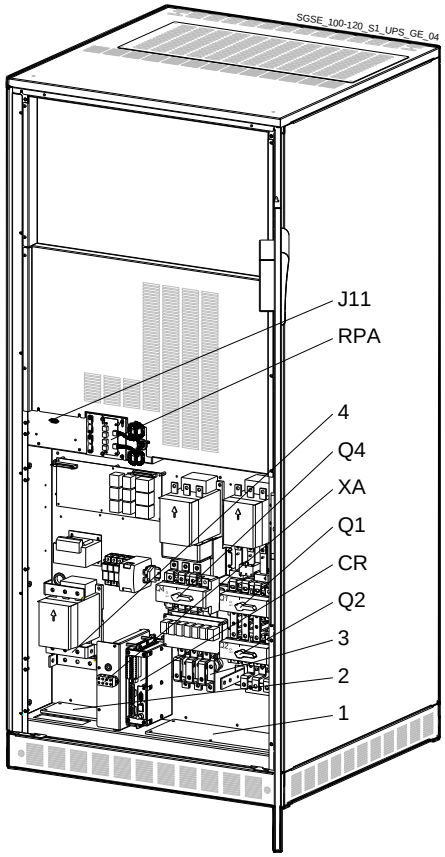

Fig. 2.3-3 General view without protection panels

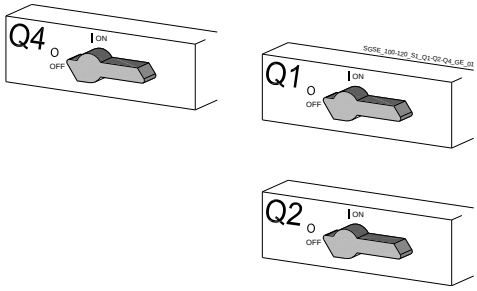

Fig. 2.3-6 Manual operated switches Q1, Q2 and Q4

1	Opening for input and output of power connection cables
2	Opening for input of the battery connection cables
3	Bus bars for Mains Input and Load Output
4	Bus bars for external Battery connection
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J11	Serial port RS232 for IMT protocol (option)
P4	Customer Interface Board
Q1	UPS output switch
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Q4	Input Rectifier switch
RPA	RPA board (Redundant Parallel Architecture) for Parallel System (option)
SNMP	Advanced SNMP Card (option)
XA	Terminals for 24 Vdc Auxiliary Power Supply connection (option)

2.4 LAYOUT SG SERIES 100 & 120 PUREPULSE™ WITH EMC FILTER (OPTION)

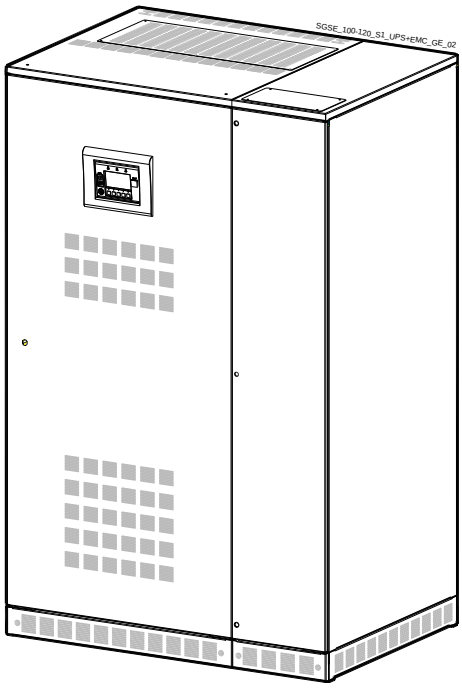

Fig. 2.4-1 General view

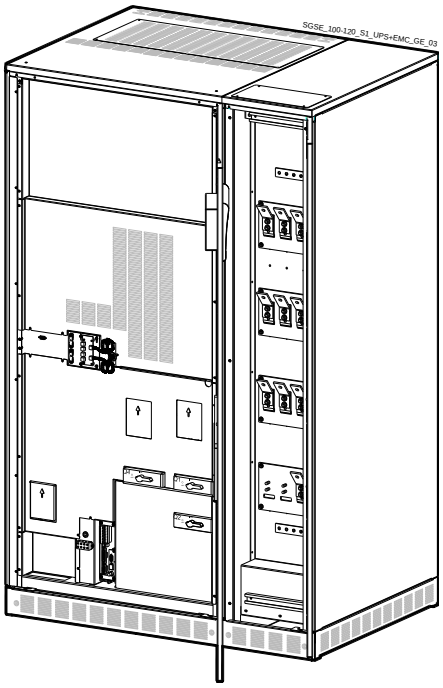

Fig. 2.4-2 General view with open doors

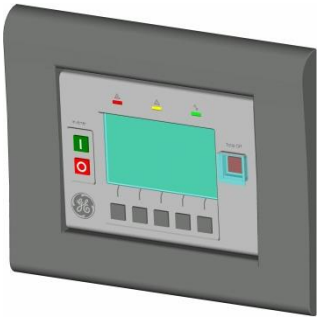

Fig. 2.4-4 Control panel

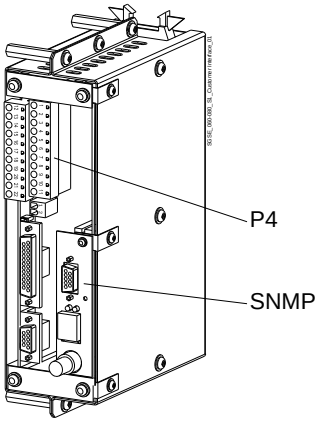

Fig. 2.4-5 Connectivity Rack

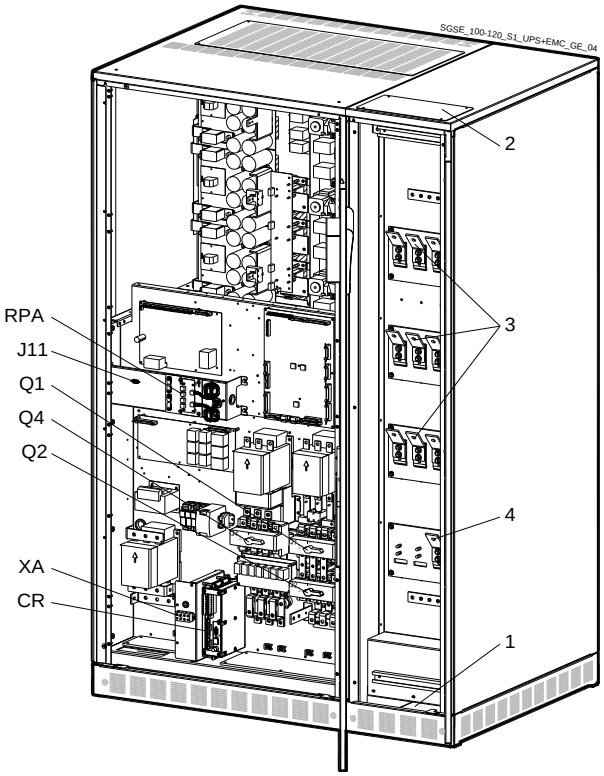

Fig. 2.4-3 General view without protection panels

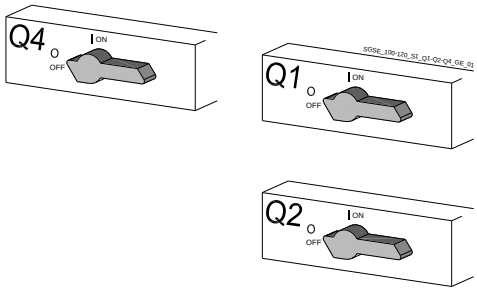

Fig. 2.4-6 Manual operated switches Q1, Q2 and Q4

1	Opening for bottom cable entry
2	Opening for top cable entry
3	Bus bars for Mains Input and Load Output
4	Bus bars for external Battery connection
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J11	Serial port RS232 for IMT protocol (option)
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Q1	UPS output switch
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RPA	RPA board (Redundant Parallel Architecture) for Parallel System (option)
SNMP	Advanced SNMP Card (option)
XA	Terminals for 24 Vdc Auxiliary Power Supply connection (option)

3 INTRODUCTION

An **Uninterruptible Power Supply** (UPS) provides the power for *critical Loads* that need a reliable, continuous, disturbance free supply.

In case the power provided by the *Mains Fails*, or exceeds the permitted tolerances, the power to supply the *Load* is provided by the *Battery* for the specified time at the rated *Load* (or longer at a reduced *Load*) or until the *Mains* power returns.

SG Series 60 - 120 PurePulse™ is a true double conversion ***VFI*** *(Voltage Frequency Independent)* UPS system where the *Load* is continuously supplied by the *Inverter* through the *Rectifier*.

SG Series 60 - 120 PurePulse™ can be configured, if chosen, for the ***SEM*** mode *(Super Eco Mode)* permitting maximum energy saving.

If the *Inverter* is not able to supply the required *Output Voltage*, or when overload or short-circuit on the output occur, the *Load* is instantly transferred to the *Mains* via the *Automatic Bypass*.

The UPS automatically returns to normal mode when the failure condition is restored.

Key features:

More Critical equipment supported
Rated at 0.9 Power Factor, ***SG Series 60 - 120 PurePulse™*** delivers more real power than other UPS in the market.
With today's trend toward power factor corrected loads, ***SG Series 60 - 120 PurePulse™*** can support more total *Load* than any other UPS available, allowing you to support a greater number of today's enterprise computing *Power Factor Corrected (PFC)* equipment.

No single point of failure
Redundant Parallel Architecture (RPA) is an exclusive ***GE*** technology.
With *RPA*, ***SG Series 60 - 120 PurePulse™*** UPS are controlled in a true peer-to-peer configuration where all critical elements and functions (including *Bypass*) are redundant.
SG Series 60 - 120 PurePulse™ is designed to be the most reliable power protection system available on the market today.

High Efficiency
Thanks to *IGBT* technology and *Space Vector Modulation (SVM)* strategy, ***SG Series 60 - 120 PurePulse™*** guarantee a high overall performance.
Intelligent Energy Management (IEM) combined with *RPA*, results in the most cost efficient and reliable UPS solution in the industry.

Fully digital
Digital Signal Processor (DSP), Flash memory and *SVM* strategy are the technology corner stones of a new age of power quality and power reliability.

Extremely flexible
Tailor made power protection to meet your individual installation requirements; ***SG Series 60 - 120 PurePulse™*** offers various options like *EMC filter* and our comprehensive *software* for mission control and data protection to cover all your application needs.

4 DESCRIPTION

The *SG Series 60 - 120 PurePulse*™ is one of the best performing and most reliable three-phase UPS systems providing critical power protection for a wide range of applications.

Every *SG Series 60 - 120 PurePulse*™ system operates in *VFI mode (Voltage Frequency Independent)* yielding the maximum levels of power reliability for all mission-critical processes.

With proven technology the *SG Series 60 - 120 PurePulse*™ UPS provides top class reliability and performance.

With backfeed protection and compliance to *EMC standards* the *SG Series 60 - 120 PurePulse*™ complies to current and future standards.

Reliability can be further increased by paralleling up to eight UPS units utilising GE's unique *RPA*™ *technology (Redundant Parallel Architecture)*.
With *RPA* every UPS is controlled in a true peer-to-peer configuration with redundancy in all critical elements and functions, eliminating all single points of failure.
The decentralised bypass offers great flexibility to up or down grade the system in case future needs might change.

PurePulse™ is an innovative control algorithm applied on the *IGBT Rectifier*.
This current source *Rectifier* assures an *Input Total Harmonic Distortion (THDi)* of less than 2%, and draws a pure sinusoidal waveform from the *Mains*.

The advantages of *GE's PurePulse*™ *technology* span from savings in the sizing of upfront equipment (such as generator sets, cabling and circuit breakers) to a total elimination of costs for additional active or passive input filters.

PurePulse™ is a breakthrough innovation from *GE*.

NOTE !

Through their complete life cycle, all *GE UPS systems* are fully supported by service teams which provide world-class, 24x7 preventive and corrective services, training and application expertise.

4.1 BLOCK DIAGRAM AND MAIN ELEMENTS

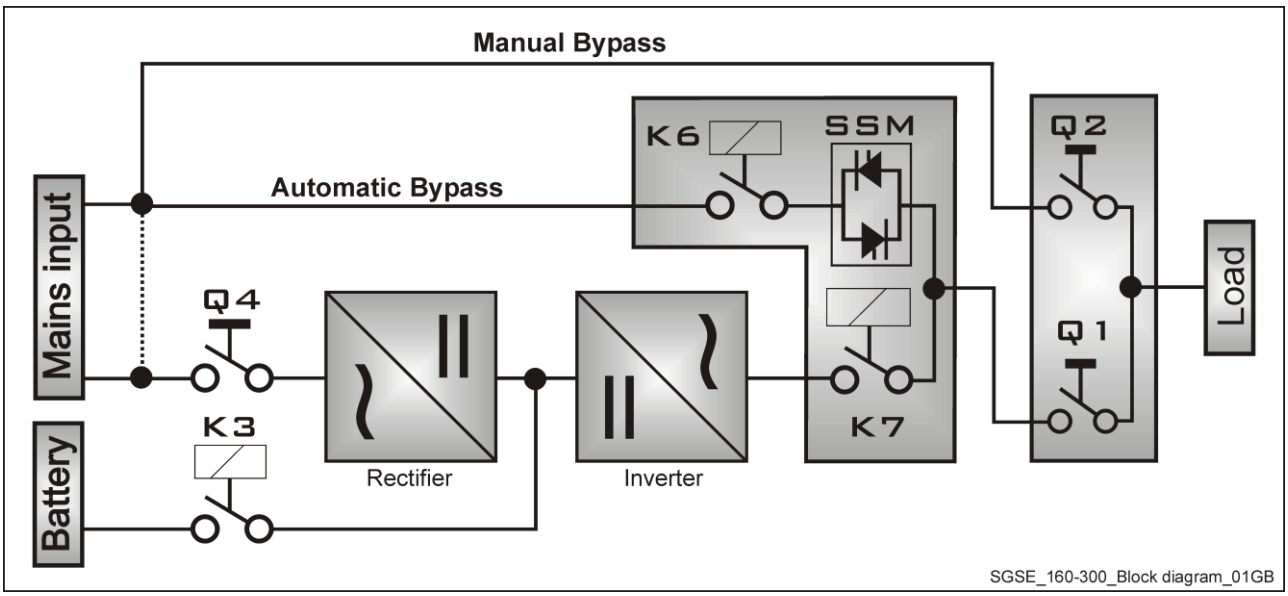


Fig. 4.1-1 Block Diagram UPS

The *SG Series 60 - 120 PurePulse*™ system can be divided into the following main elements:

Control System
SG Series 60 - 120 PurePulse™ is designed with microprocessor-controlled signal processing circuits.
The interface between the operator and the unit is provided by the monitoring system on the front panel. This monitoring system consists of an active mimic diagram, a keyboard and a backlit display.

Rectifier
The standard *Rectifier* consists of a controlled bridge, which converts the 3-phase *Mains Voltage* into a controlled and regulated DC-voltage.
This regulated DC-voltage is used to supply power to the *Inverter*, and to provide charging power to the *Battery*.

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

Automatic Bypass
The Automatic Bypass consists of a static semiconductor-switch *(SSM: Static Switch Module)*, used to provide an uninterrupted transfer of the *Load* from *Inverter to Mains*.

Back-feed Protection
All *SG Series 60 - 120 PurePulse*™ UPS's are equipped with an automatic system for the protection against voltage back feeding towards *Mains*, 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 *Manual Bypass Q2*.

Manual Bypass
The *Manual Bypass* consists of a pair of manual switches *(Q1* and *Q2)*, which removes the UPS from the *Load* for maintenance, while still supplying the *Load* with power directly from the *Mains*.

Battery
The *Battery* supplies the DC power to the *Inverter* when the *Mains* is out of acceptable tolerances.

4.2 OPERATION MODES

4.2.1 Normal operation mode VFI (Voltage Frequency Independent)

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

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

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

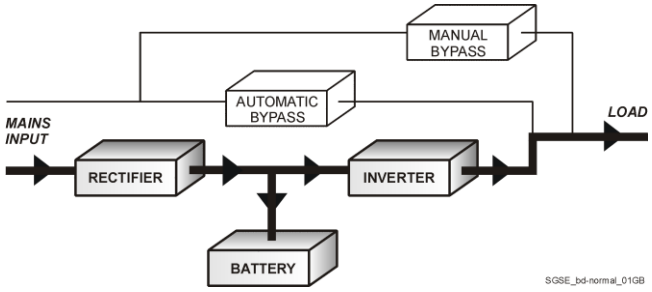


Fig. 4.2.1-1 Block diagram normal operation mode

4.2.2 SEM mode operation (Super Eco Mode)

When the *SEM* 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.

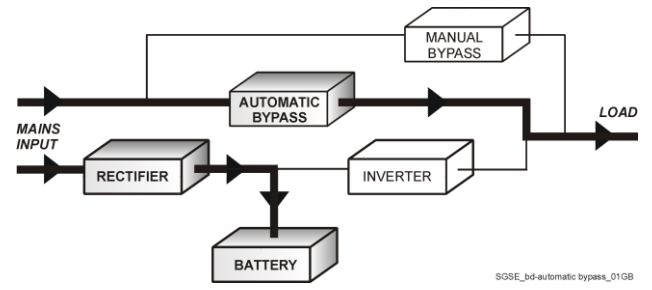


Fig. 4.2.2-1 Block diagram SEM operation mode

The *SEM* 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 *SEM* mode", or switching between operation modes at required time, can be done through the UPS *control panel* (see *Section 7.5-7*).

RPA
Redundant Parallel Architecture

In case of Parallel System

SEM mode (Super 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 SEM.

4.2.3 Mains failure operation

When the *Mains* is no longer within acceptable tolerances, the *Battery* will provide the DC power to the *Inverter*.
The *Inverter* will maintain continuous AC power to the *Load* until the *Battery Voltage* reaches the lower limit of the *Inverter* operation capability.
During the discharge, the *LCD screen* displays the estimated time the *Battery* can support the *critical Load*.
Prior to complete *Battery* discharge, the "***stop operation***" alarm (shut-down imminent) warns the operator that the *Battery* is almost discharged and the UPS is about to shut down.

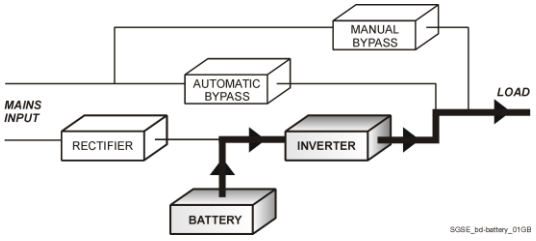


Fig. 4.2.3-1 Block diagram Mains Failure operation

RPA
Redundant Parallel Architecture

In case of parallel operation

With a Parallel System for power capacity (see Section 3.3)

- *With the **Bypass Mains power available,** a "Battery low" warning on any unit will cause the Load to be transferred to Mains (after a selectable time delay).*
- *With **Bypass Mains power** not available, a "Battery low" warning on any unit will start the "**stop operation**" timer (adjustable).*
  *The Load will shut down at the end of the "**stop operation**" time period.*

With a Parallel System for redundancy (see Section 3.3)

- *When a Battery low warning occurs on a unit not necessary to support the present Load, this unit will shut down after a timeout period (selectable).*
  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 "**stop operation**" timeout (selectable).*
  *The Load will shut down at the end of the "**stop operation**" time period.*

4.2.4 Mains recovery operation

As soon as the AC input power recovers, the ***Rectifier* will start automatically**, supplying DC power to the *Inverter* and recharging the *Battery*.
If the *Inverter* was previously shut down due to low *Battery*, the *Load* will be initially powered by *Mains* through the *Automatic Bypass*.
When the *Battery* is sufficiently recharged to ensure a minimum time of operation with the present *Load*, the *Inverter* will start automatically and the *Load* will be transferred back to the *Inverter*.

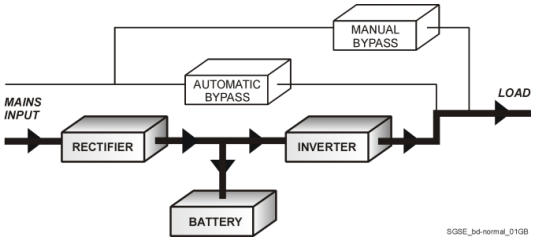


Fig. 4.2.4-1 Block diagram Mains recovery operation

RPA
Redundant Parallel Architecture

In case of parallel operation

*When the AC input power recovers, **the Rectifiers will start up sequentially,** according to their number in the Parallel System. This minimizes the **initial inrush current.***
*The **Inverters will start up automatically**, but only when the Battery has been sufficiently recharged 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 output.

4.2.5 Automatic Bypass

In normal operation, the *Load* is supplied by the *Inverter*.

When the control system detects a fault in the *Inverter*, an overload condition or a short-circuit condition, the *Automatic Bypass* will transfer the critical *Load* to the *Mains* without interruption.

When the *Inverter* recovers, or the overload or short-circuit condition is corrected, the *Load* will be automatically transferred back to the *Inverter*.

If the UPS is unable to return to normal mode following an automatic transfer to *Bypass mode*, an alarm condition will be initiated.

A *Manual Bypass* (operator initiated) will not be considered as an alarm condition.

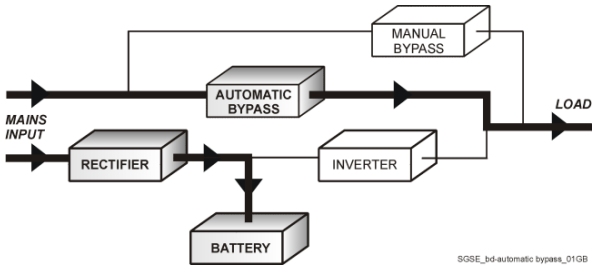


Fig. 4.2.5-1 Block diagram Automatic Bypass

RPA
Redundant Parallel Architecture

In case of parallel operation

Each unit has its own internal Bypass.

These units are continuously exchanging information, enabling all of the internal Bypass circuits in a parallel system to operate simultaneously.

If the Inverter of a unit fails, its Bypass circuit remains available to the Parallel System.

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

4.2.6 Manual Bypass

The *Manual Bypass* circuit consists of manual switches ***Q1*** and ***Q2***, which permits transfer of the *Load* directly to the unconditioned AC power without interruption, leaving the UPS available for maintenance.

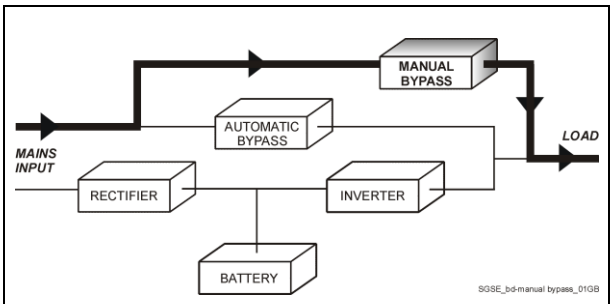


Fig. 4.2.6-1 Block diagram Manual Bypass

RPA
Redundant Parallel Architecture

4.3 PARALLEL SYSTEM OPERATION

4.3.1 Introduction to the Parallel System

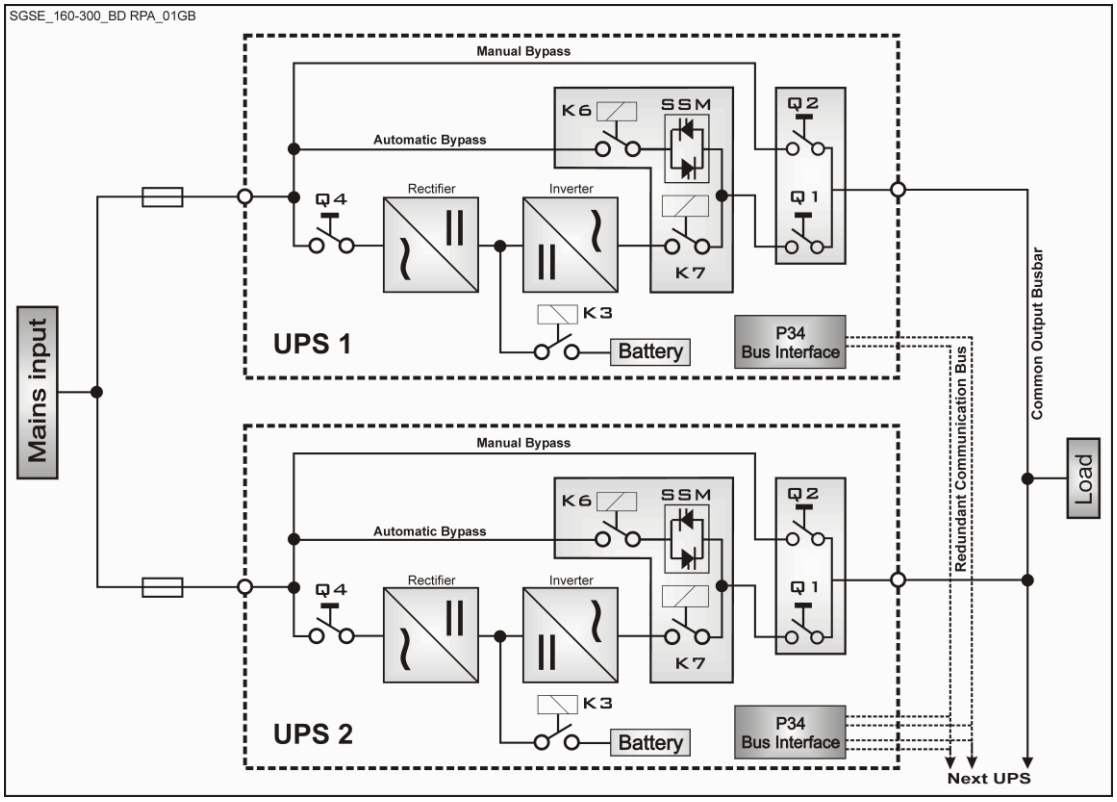


Fig. 4.3.1-1 Block diagram RPA Parallel System operation

Two or more equal power units can be paralleled to increase the output power (**paralleling for capacity**) or to improve the overall reliability of an UPS system (**paralleling for redundancy**).
The outputs of parallel units are connected to a common power bus, and in normal operation the units connected on the parallel bus share the *Load* equally.
The modular concept of ***SG Series 60 - 120 PurePulse™*** allows parallel operation of **up to 6 units**, without using paralleling switchgear, external bypass circuits or common control circuitry (see *Fig. 4.3.1-1*).

Parallel units for power capacity
Several units can be paralleled in order to achieve output power greater than the maximum power of a single unit.
The maximum total power shared between the paralleled units is equal to the **total installed nominal power**.
In the event of a failure of one unit, the power supplied by the UPS system becomes insufficient and the *Load* will be transferred to the *Mains Bypass* source.

Parallel units for redundancy
The nominal power rating of the **n out of n+1** redundant paralleled modules must be equal to or higher than the required *Load* power.
The *Load* will be equally **shared by the n+1 units** connected on the output bus.
Should **one of the n+1 paralleled units** trip Off-line, **the remaining (n) modules** will supply the *Load*, maintaining conditioned power to the *critical Load*.
From this results **higher reliability and security for the *Load* plus a higher *MTBF*** (Mean Time Between Failures).

Features of RPA Parallel System
The ***SG Series 60 - 120 PurePulse™ Parallel System*** is designed to provide a complete ***Redundant Parallel Architecture***, and is free from common equipment.
Not only the ***Inverters*** but also the ***Bypass*** functions are redundant.

When one UPS needs maintenance or service, the *Load* is powered by the other units.

The redundant communication bus to which all units are connected keeps each unit informed about the status of all the other units.

The ***control panel*** located on each unit allows controlling and monitoring the status of this unit.

4.3.2 System control

A **high-speed redundant, serial communication** bus guarantees the exchange of data and thus the communication between the CPU's of each unit.

Each module controls is own function and operational status and communicates with all other modules, in order to act or react if necessary, adapting to the new conditions.

4.3.3 Synchronization

All units are identical, but one unit is arbitrarily selected as the reference and all the other units synchronize to this unit, which in turn synchronizes to the *Mains Bypass* voltage, as long as the latter is within tolerances.

In case of reference failure, another unit in the *Parallel System* is automatically chosen to take over the reference role.

The *Bypass Input* for all the units of the *Parallel System* must be supplied from the same AC source (no phase shift allowed between them).

4.3.4 Load sharing

On each unit of the *Parallel System*, *Inverter Output Voltage* and *Current* are measured and applied to a *Load* sharing bus.

An eventual difference between the units is therefore automatically equalized.

NOTE !

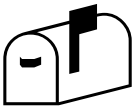
It is strongly recommended that no transformers, automatic circuit breakers or fuses should be installed between the units output and the *Load* common bus bars.

However, it is recommended that a disconnection or isolation switch is installed in order to totally isolate a unit if needed.

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)



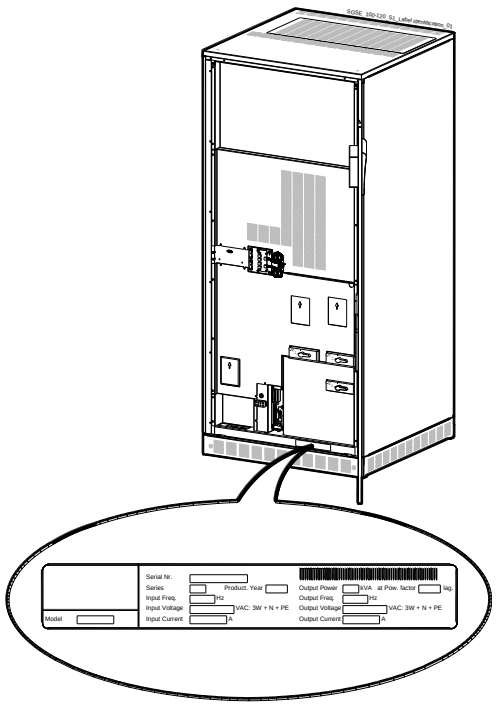


Fig. 3.5-1 Identification label

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 please mention the data marked on the identification label.

4.5 WARRANTY

GE, 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 !

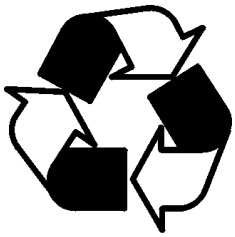
This warranty does not cover failures of the product which result from incorrect installation, misuse, alterations by persons other than authorised agents, or abnormal working conditions.

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, 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 packaged on a pallet suitable for handling with a forklift.

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 site.

Do not stack other packages on top: This could damage the UPS.

If the UPS must be lifted by crane, use suitable lifting straps and spreader bars.

Forklift

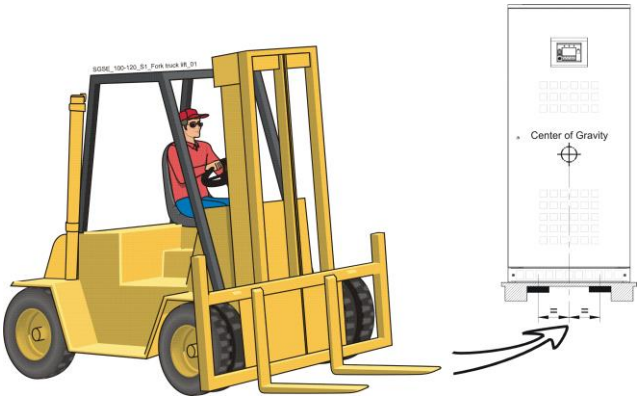


Fig. 5.1-1 Position of the forklift when moving the unpacked UPS

Crane

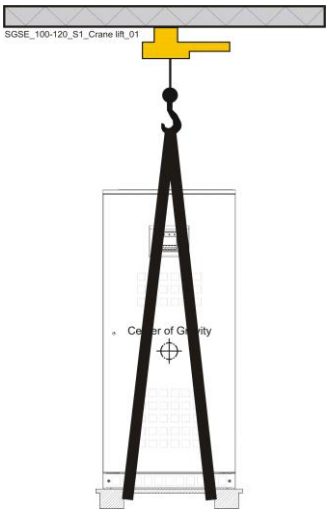


Fig. 5.1-2 Position of the carrying belts when moving the unpacked UPS

Forklift

The UPS may be lifted with a forklift in upright position.

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

WARNING !

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.

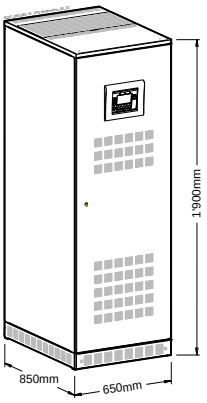
WARNING !

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

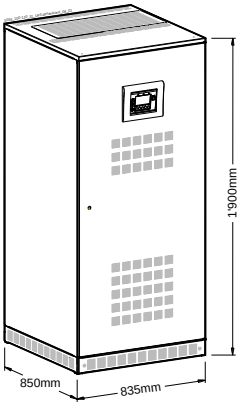
When loading / unloading and when moving the UPS, pay attention to:

5.1.1 Dimensions and weights

SG Series 60 & 80 PurePulse™

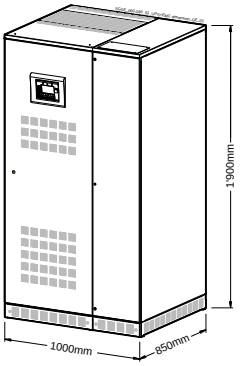


SG Series 100 & 120 PurePulse™

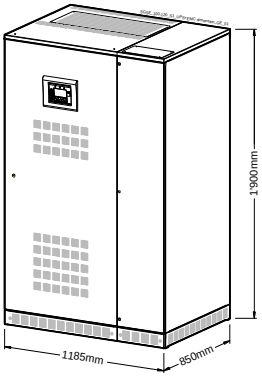


Dimensions and weights *SG Series 60 – 120 PurePulse™*		
60 kVA	Dimensions (W x D x H): Weight: Floor loading:	650 x 850 x 1900 mm 550 kg 995 kg/m²
80 kVA	Dimensions (W x D x H): Weight: Floor loading:	650 x 850 x 1900 mm 630 kg 1140 kg/m²
100 kVA	Dimensions (W x D x H): Weight: Floor loading:	835 x 850 x 1900 mm 860 kg 1212 kg/m²
120 kVA	Dimensions (W x D x H): Weight: Floor loading:	835 x 850 x 1900 mm 860 kg 1212 kg/m²

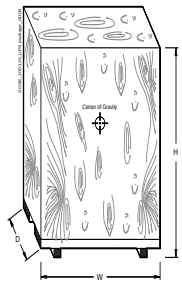
SG Series 60 & 80 PurePulse™ with EMC Filter (option)



SG Series 100 & 120 PurePulse™ with EMC Filter (option)

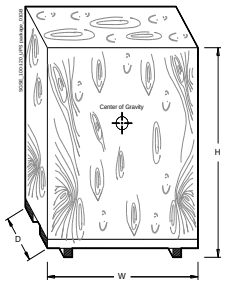


Dimensions and weights *SG Series 60 – 120 PurePulse™* with EMC Filter		
60 kVA	Dimensions (W x D x H): Weight: Floor loading:	1000 x 850 x 1900 mm 660 kg 777 kg/m²
80 kVA	Dimensions (W x D x H): Weight: Floor loading:	1000 x 850 x 1900 mm 740 kg 871 kg/m²
100 kVA	Dimensions (W x D x H): Weight: Floor loading:	1185 x 850 x 1900 mm 985 kg 978 kg/m²
120 kVA	Dimensions (W x D x H): Weight: Floor loading:	1185 x 850 x 1900 mm 985 kg 978 kg/m²



Dimensions and weights package
SG Series 60 – 120 PurePulse™

	Carton package (standard)		Wooden crate	
	Dimensions (W x D x H)	Weight	Dimensions (W x D x H)	Weight
SG Series 60 PurePulse™	835 x 955 x 2020 mm	615 kg	890 x 1070 x 2210 mm	690 kg
SG Series 80 PurePulse™		695 kg		770 kg
SG Series 100 PurePulse™ *SG Series 120 PurePulse™*	940 x 1015 x 2020 mm	920 kg	1070 x 1070 x 2210 mm	1000 kg



Dimensions and weights package
SG Series 60 – 120 PurePulse™
with EMC Filter (option)

	Carton package (standard)		Wooden crate	
	Dimensions (W x D x H)	Weight	Dimensions (W x D x H)	Weight
SG Series 60 PurePulse™ with EMC Filter	1185 x 955 x 2020 mm	740 kg	1240 x 1070 x 2210 mm	825 kg
SG Series 80 PurePulse™ with EMC Filter		820 kg		905 kg
SG Series 100 PurePulse™ with EMC Filter *SG Series 120 PurePulse™ with EMC Filter*	1295 x 1015 x 2020 mm	1075 kg	1425 x 1070 x 2210 mm	1175 kg

Weights *SG Series 60 – 120 PurePulse™* and options

	UPS						Options in additional cabinet							
UPS model	UPS standard (kg)	Floor loading per UPS standard (kg/m²)	UPS with EMC Filter (kg)	Floor loading for UPS with EMC Filter (kg/m²)	UPS with Top entry cables cabinet (kg)	Floor loading for UPS with Top entry cables cabinet (kg/m²)	Transformer Rectifier or bypass (500x850x1900m) (kg)	Battery cabinet empty (500x850x1900m) (kg)	Battery cabinet empty (850x850x1900m) (kg)	Battery cabinet empty (1500x850x1900m) (kg)	Battery cabinet 50Ah (500x850x1900m) (kg)	Battery cabinet 75Ah (850x850x1900m) (kg)	Battery cabinet 2x50Ah (850x850x1900m) (kg)	Battery cabinet 2x75Ah (1500x850x1900m) (kg)
SG Series 60 PurePulse™	550	995	660	777	620	730	340	200	250	370	670	1000	1170	1800
SG Series 80 PurePulse™	630	1140	740	871	700	824	380							
SG Series 100 PurePulse™	860	1212	985	978	935	929	450	–			–			
SG Series 120 PurePulse™														

Note: Single weights have to be added up for system configuration to get the total weight!

NOTE !

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

5.2 DELIVERY

When delivered, inspect the **package integrity** and **the physical condition of the cabinets** carefully.

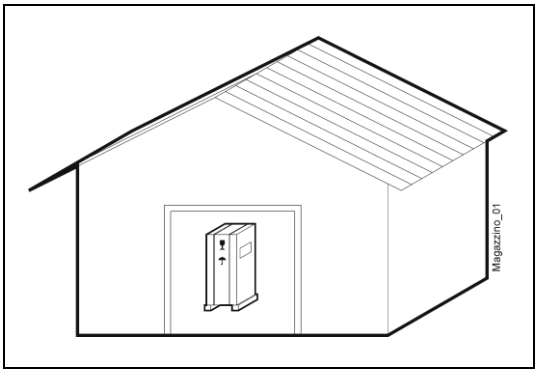
In case of any damage sustained during transport, immediately inform the carrier and contact your local ***Service Centre***.

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.

5.3.2 Storage of 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).

Recharge stored maintenance free *Battery* every:

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

5.4 PLACE OF INSTALLATION

5.4.1 UPS location

NOTE !

UPS installation and connection must be performed by QUALIFIED SERVICE PERSONNEL only.
If optional cabinets and accessories are included with the UPS, please refer to those accompanying manuals for installation and operating instructions.

It is important to have a clean, dust-free environment provided with proper ventilation and air-conditioning to keep the ambient temperature within the specified operating range.

The recommended air inlet temperature is from **20°C** (68°F) to **25°C** (77°F) (max. **40°C / 104°F**). Refer to *Section 5.5*.

Check for sufficient floor load capacity before installing the UPS and the *Battery*.
Refer to *Section 5.1.1*.

For *Battery* installation follow the local codes and the recommendation of the battery supplier.

NOTE !

Temperature is very important for valve-regulated batteries (maintenance free).
Operation at temperatures higher than 25°C (77°F) will reduce battery life.

The ***SG Series 60 - 120 PurePulse™*** UPS can radiate radio frequency energy.
Although some *RFI* (Radio Frequency Interference) filtering is inherent to the UPS there is no guarantee that the UPS will not influence sensitive devices such as cameras and monitors that are positioned close by.
If interference is expected, the UPS should be moved away from the sensitive equipment.

Positioning of the UPS *SG Series 60 – 120 PurePulse™*

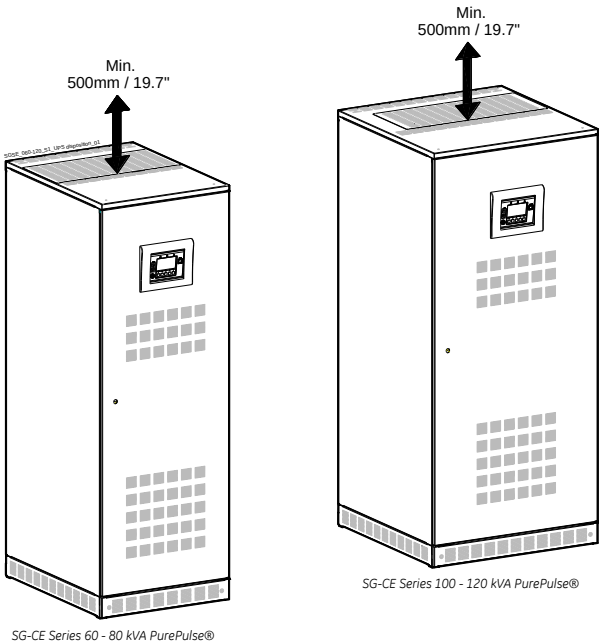


Fig. 5.4.1-1 Positioning of the UPS SG Series 60-120 PurePulse™

The rear panel of the UPS may be mounted flush to a wall or other structure.

Clearance around the front of the unit should be sufficient to enable free passage of personnel with the doors fully open, and to allow sufficient airflow to the door vents.

To guarantee proper cooling air exhaust, the recommended minimum clearance between ceiling and top of the UPS is **500mm** (19.7").

In case of options in additional cabinets see *Section 10. – OPTIONS*.

A single-phase power outlet (230 Vac) should be provided near the UPS for connection of power tools, test equipment or connectivity devices.
This outlet must be grounded.

Opening for input and output cable connections *SG Series 60 – 120 PurePulse™*

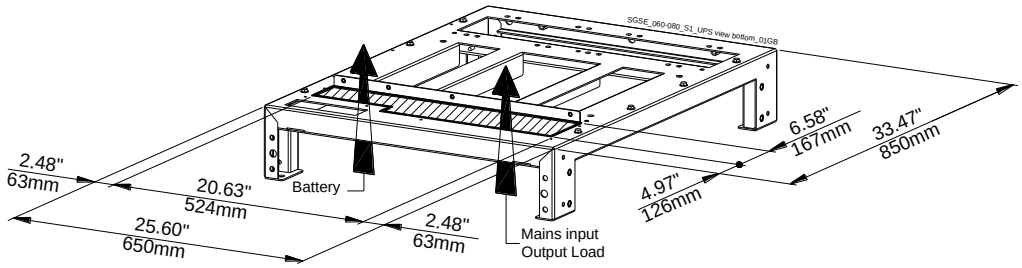


Fig. 5.4.1-2 SG Series 60 & 80 PurePulse™ - Opening on the bottom of the cabinet for input and output cables

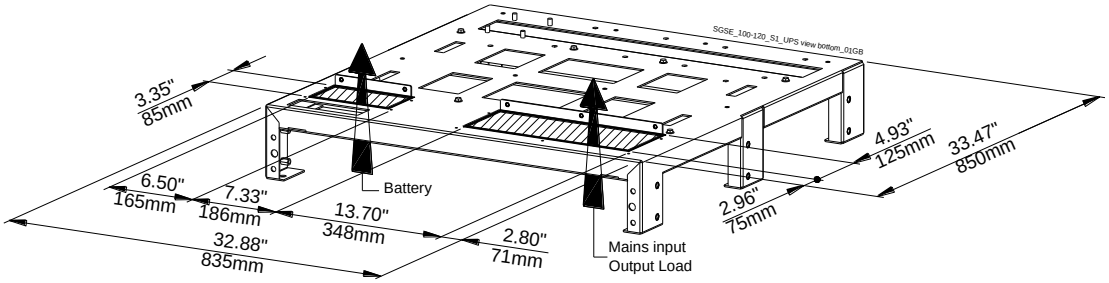


Fig. 5.4.1-3 SG Series 100 & 120 PurePulse™ - Opening on the bottom of the cabinet for input and output cables

SG Series 60 - 120 PurePulse™ provided an opening on the bottom of the cabinet for the connection of input and output cables.
Pay attention to the position of this opening when choosing the placement of the UPS.

The option *"EMC Filter* or *Top Entry Cables Cabinet"* allows the connection of input and output cables from the top of the UPS. See *Section 10 – Options*.

Fixing of the UPS cabinet *SG Series 60 – 120 PurePulse™* on the floor

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

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

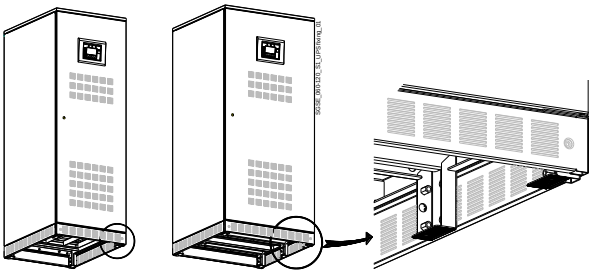


Fig. 5.4.1-4 Fixing of the UPS cabinet on the floor

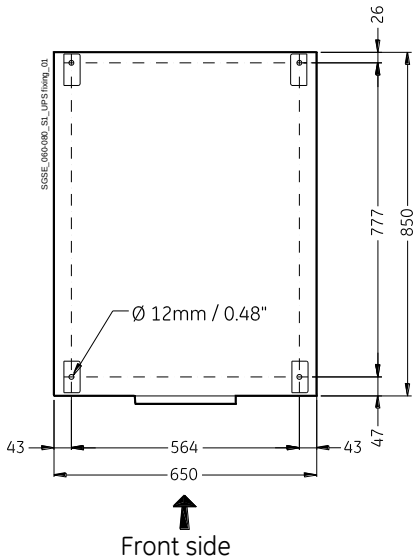


Fig. 5.4.1-5 SG Series 60 & 80 PurePulse™ UPS cabinet floor fixing points

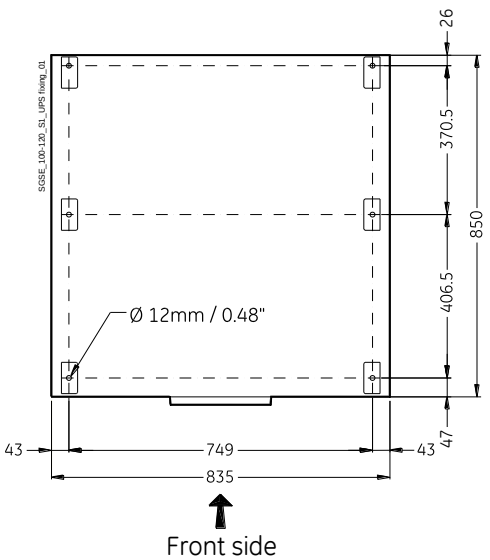
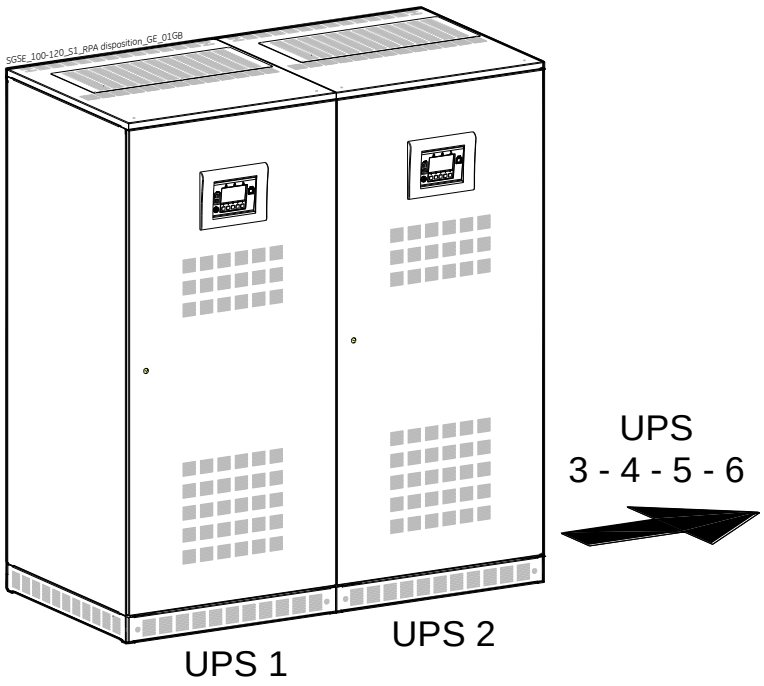


Fig. 5.4.1-6 SG Series 100 & 120 PurePulse™ UPS cabinet floor fixing points



RPA
Redundant Parallel Architecture

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

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

Fig. 5.4.1-7 RPA system disposition

5.4.2 Battery location

Batteries require a well-ventilated room with controlled temperature to obtain reliable operation.

The *Battery* can be install immediately adjacent to the UPS (left or right side) or remotely from the UPS. If the *Battery* is installed remotely from the UPS, a wall mounted DC disconnect device must be installed within line-of-site to both the UPS and the *Battery*.

The optimal room temperature for the *Battery* is 20°C (68°F) to 25°C (77°F).

The life of valve-regulated batteries will be reduced by 50% for each additional **10°C** (18°F) that the *Battery* ambient temperature is above **25°C** (77°F).

The *Battery System* associated with larger UPS is usually either rack mounted or installed in multiple *Battery Cabinets*.

Installation and assembly must be made according to the local standards and *Battery System* manufacturer's recommendations.

The *Battery Circuit Breaker* or *Battery Fuse Box* must be mounted as near as possible to the *Battery*.

WARNING !

***Battery* installation and connection must be performed by qualified personnel only.**

Read all safety instructions before proceeding with the installation (see Section 1).

Battery discharging and/or charging activities may cause the emission of hydrogen gas; therefore, the room requires proper ventilation and fresh air.

Comply with the EN50272-2 standard.

5.5 VENTILATION AND COOLING

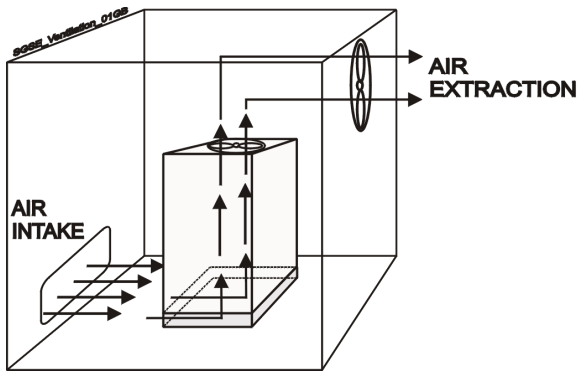


Fig. 5.5-1 Installation on plain floor

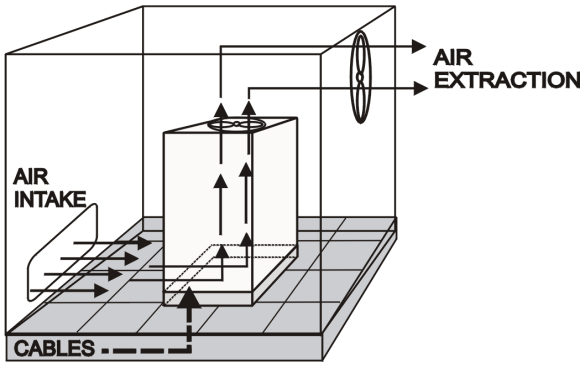


Fig. 5.5-2 Installation on raised floor

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

Air inlets for UPS ventilation are located on the front of the UPS, while air outlets are on top of the cabinet.

A suitable ventilation or cooling system must be installed to extract the heat from the UPS room.

NOTE !

Do not put anything on the top of the cabinet.

Air filtering systems could be required when the UPS operates in a dirty environment.

In order to prevent overheating of the UPS, the available air intake flow rate must exceed the total air exhaust flow rate requirement of the UPS system.
Contact your ***Dealer*** or the nearest ***Service Centre*** for appropriate solutions.

The below table indicates the heat dissipation at full *Load* at **PF = 0.8** lag. and charged *Battery*, up to **1000 m** (3280 ft) altitude, for cooling air **25°C** (77°F) to **30°C** (86°F).

UPS model	Losses		Cooling air flow	
	VFI	*SEM*	*VFI*	*SEM*
SG Series 60 PurePulse™	4.52 kW	1.03 kW	1320 m³/h	300 m³/h
SG Series 80 PurePulse™	6.18 kW	1.37 kW	1805 m³/h	400 m³/h
SG Series 100 PurePulse™	7.24 kW	1.80 kW	2115 m³/h	525 m³/h
SG Series 120 PurePulse™	9.26 kW	2.06 kW	2710 m³/h	600 m³/h

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.

Be aware of the heavy weight of the UPS, pay attention when moving the UPS cabinet.

White colour = without any anomaly

Red colour = anomaly evidence

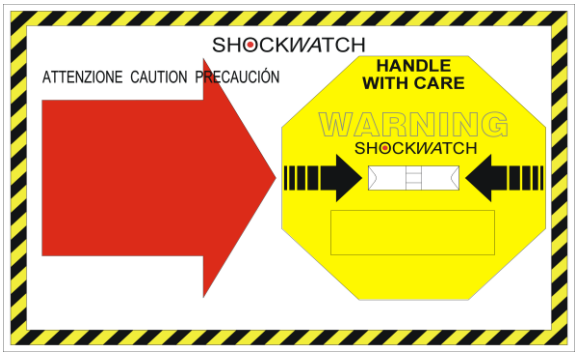


Fig. 5.6-1 ShockWatch device

Fig. 5.6-2 TiltWatch device

The package of the *SG Series 60 - 120 PurePulse™* is equipped with *ShockWatch* (indicator for shock), and *TiltWatch* (indicator for overthrow) on the outside.

These devices indicate an eventual shock or overthrow during transport.

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

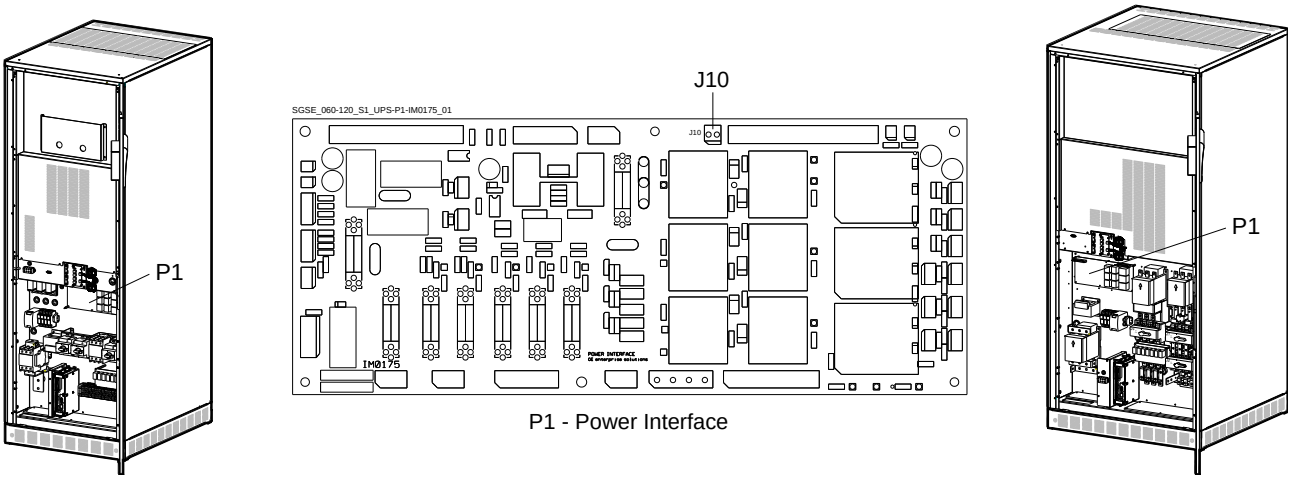
NOTE !

Be aware of the heavy weight of the UPS, pay attention when moving the UPS cabinet.

Take care not to damage the UPS when moving by forklift.

Included in the delivery you can find the following parts:

- An accessories bag.
- Air inlet grids, which must be mounted on the bottom of the cabinet UPS with the screws included.
- Control Bus cables for inter-connecting the UPS modules (only for RPA system).
- The documentation includes the *"Installation Guide"* with a *CD-Rom* and the *"UPS Safety Rules"*.



SG Series 60 & 80 PurePulse™ *SG Series 100 & 120 PurePulse™*

Fig. 5.6-3 P1 – Power interface

In addition you can find a cable (standard length: 5m) with the thermal protection sensor.
This is to compensate the battery charge voltage (only for type VRLA without maintenance) based on the working temperature.
The sensor must be mounted in the battery cabinet while plug ***J10*** must be connected to "***P1-Power Interface***".

When the sensor is disconnected, the floating voltage is calibrated for temperature = **20°C**.

If the battery cabinet is not mounted side by side of the UPS, the cable connecting the temperature sensor to the UPS should be run in a protective conduit.

	**WARNING !** **Cable with the sensor installation and connection must be performed by QUALIFIED SERVICE PERSONNEL only.**

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

5.7 ELECTRICAL WIRING

⚠	**WARNING !** **UPS installation and connection must be performed by QUALIFIED SERVICE PERSONNEL only.** **Refer to the "*Safety prescriptions - Installation*" described on *Section 1*.**

5.7.1 Mains input connection

Ensure that the AC and DC external isolators are OFF and locked out to prevent their inadvertent operation.
Do not apply power to the equipment prior to the commissioning by a qualified service engineer.
Before any other input connection, connect and check the earthing wire.

The *Mains input* power connection can be common or separate for *Bypass supply* and *Rectifier input*, depending on the electrical system provided by the customer.

Common mains input Rectifier & Bypass

The **same power source** is to be used for both *bypass supply* and *Rectifier input* (input ***F3***).

Bear in mind that when the *Mains fuses* are opened there is a supply failure to the *Rectifier* as well as to the *bypass* and *Manual Bypass switch*.

⚠	**In this case, the interconnection links *BR1*, *BR2* and *BR3* on the input bus bars MUST REMAIN CONNECTED.**

***Separate mains input Rectifier & Bypass* (recommended)**

The *Bypass* and *Rectifier* use different power sources (***F1*** and ***F2*** inputs).

In this case, when the *Rectifier-input fuses* are opened, the *Automatic Bypass* and the *Manual Bypass* are supplied by the other connection.

⚠	**In this case, the interconnection links *BR1*, *BR2* and *BR3* on the input terminals or bus bars MUST BE REMOVED. See *Fig. 5.8.2-1* and *5.8.4-1*.**

Common input Rectifier & Bypass

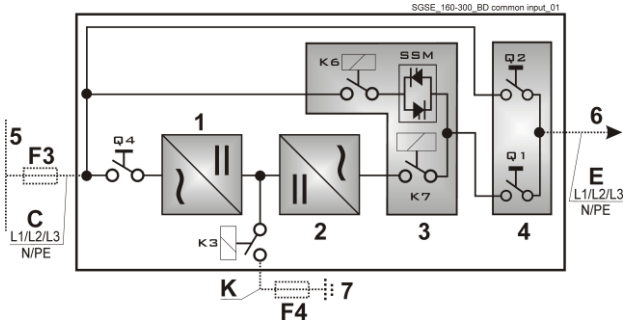


Fig. 5.7.1-1 Common mains input Rectifier & Bypass

Separate input Rectifier & Bypass

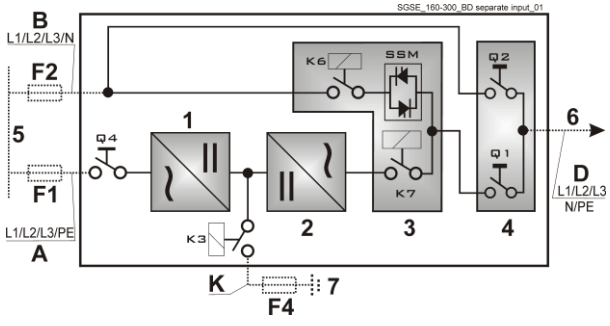


Fig. 5.7.1-2 Separate mains input Rectifier & Bypass

1 = Rectifier
2 = Inverter
3 = Automatic Bypass
4 = Manual Bypass
5 = Mains input
6 = Load
7 = Battery

5.7.2 Input/output over current protection and wire sizing

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 60364, IEC 61140, IEC 61557).

The cabling of the UPS system has to be sized according to the UPS power rating.
Exceptions are only allowed to suit local prescriptions.
Sizing of circuit *breakers*, *fuses* and *cables* for *input mains*, *output load* and *battery* must meet the requirements of local and national electrical codes.

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

The protection of the UPS mains input must be exclusively with 3 pole breakers.
Disconnection of the Neutral is not permitted.
The UPS needs the connection of the Neutral to the input, to guarantee the function in TN mode (Neutral-Earth).

Caution when using *four-pole circuit breakers* as protection to the *UPS Load*.
A potential problem exists for situations with *non-linear Loads*, causing the *neutral current* to be higher then the *phase current*.

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 !

If you use *ELCB breakers* to protect the input connections, consider the high leakage current towards the earth generated by the noise suppression capacitors.
If these *ELCB breakers* are strictly necessary, we suggest to use the largest type suitable for non-linear current and for delayed operation.

To ensure the circuit selectivity in case of ***short- circuit in the load equipment***, special care must be taken in choosing the ***fuse or circuit breaker ratings*** installed in the output distribution circuits.

Due to the relatively low short-circuit capability of the *UPS Inverter*, a short-circuit in the *Load* will cause an immediate transfer to *Mains*.
The *largest fuse* in the output distribution should be **at least 1.6 time** smaller than the *fuses* supplying the *bypass line*.

If circuit selectivity is required while the *Load* is fed from the *Inverter* (*Bypass Mains* not available), the *largest fuse* or *circuit breaker* should be rated at no more than **20%** of the *UPS output current rating*.

Common mains input Rectifier & Bypass

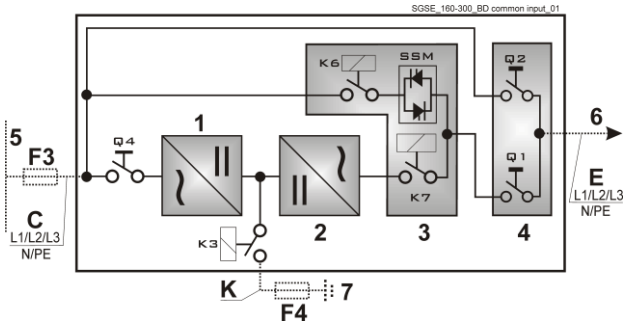


Fig. 5.7.2-1 Common mains input Rectifier & Bypass

Separate mains input Rectifier & Bypass

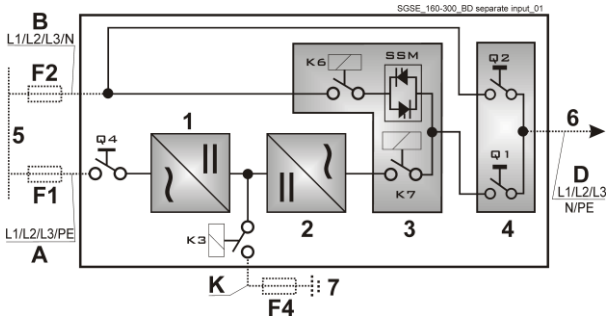


Fig. 5.7.2-2 Separate mains input Rectifier & Bypass

1 = Rectifier
2 = Inverter
3 = Automatic Bypass
4 = Manual Bypass
5 = Mains input
6 = Load
7 = Battery

Fuses AgL / circuit breakers (3x380/220V, 3x400/230V, 3x415/240V)				
UPS model	**F1**	**F2**	**F3**	**F4**
SG Series 60 PurePulse™	3 x 100A	3 x 100A	3 x 100A	2 x 160A
SG Series 80 PurePulse™	3 x 125A	3 x 125A	3 x 125A	2 x 250A
SG Series 100 PurePulse™	3 x 160A	3 x 160A	3 x 160A	2 x 315A
SG Series 120 PurePulse™	3 x 200A	3 x 200A	3 x 200A	2 x 355A

Cables section (mm²) A, B, C, D, E, K / Recommended by European Standards (EN)				
UPS model	**A**	**B**	**C + D + E**	**K**
SG Series 60 PurePulse™	3 x 25 + 16	4 x 25	4 x 25 + 16	2 x 50 + 25
SG Series 80 PurePulse™	3 x 35 + 25	4 x 35	4 x 35 + 25	2 x 120 + 70
SG Series 100 PurePulse™	3 x 50 + 25	4 x 50	4 x 50 + 25	2 x 150 + 95
SG Series 120 PurePulse™	3 x 70 + 35	4 x 70	4 x 70 + 35	2 x 185 + 95

Cables section (mm²) A, B, C, D, E, K / Recommended in Switzerland				
UPS model	**A**	**B**	**C + D + E**	**K**
SG Series 60 PurePulse™	3 x 35 + 25	4 x 35	4 x 35 + 25	2 x 70 + 35
SG Series 80 PurePulse™	3 x 50 + 25	4 x 50	4 x 50 + 25	2 x 150 + 95
SG Series 100 PurePulse™	3 x 70 + 35	4 x 70	4 x 70 + 35	2 x 185 + 95
SG Series 120 PurePulse™	3 x 95 + 50	4 x 95	4 x 95 + 50	2 x 240 + 120

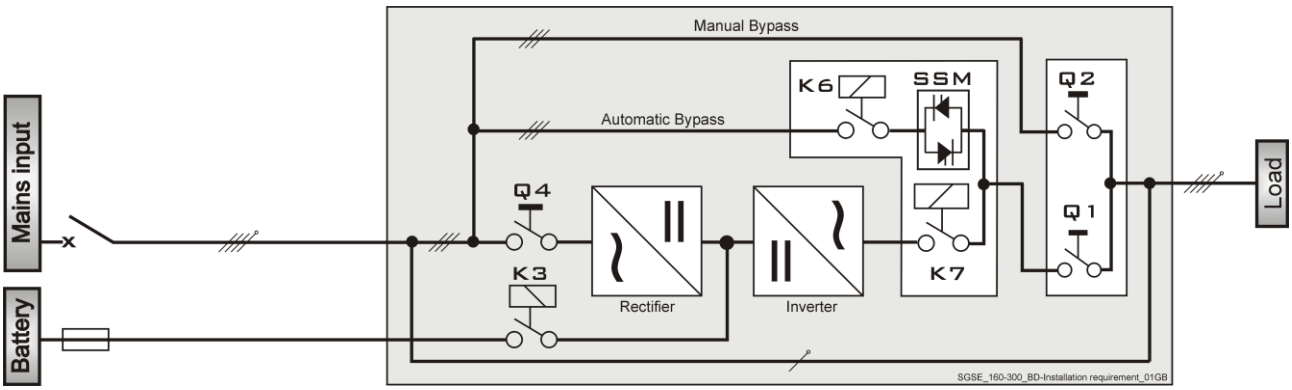
NOTE !

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

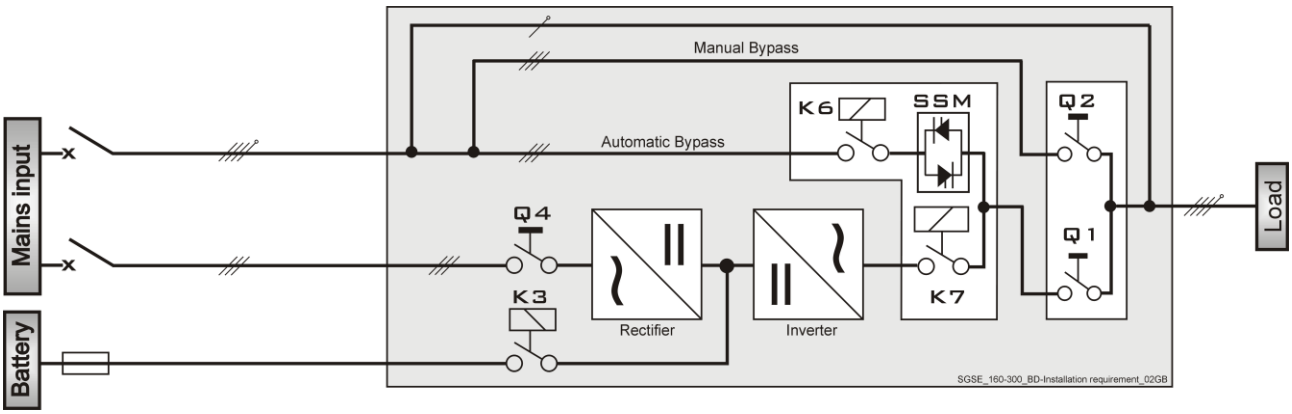
5.7.3 Installation requirements

Typical examples for the connection of the *SG Series 60 – 120 PurePulse™*.

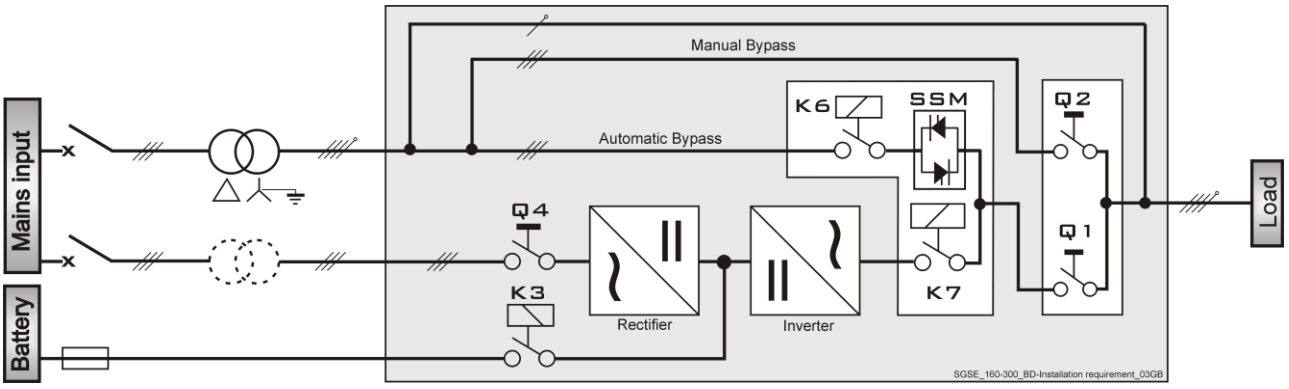
Single UPS with common input for Rectifier & bypass



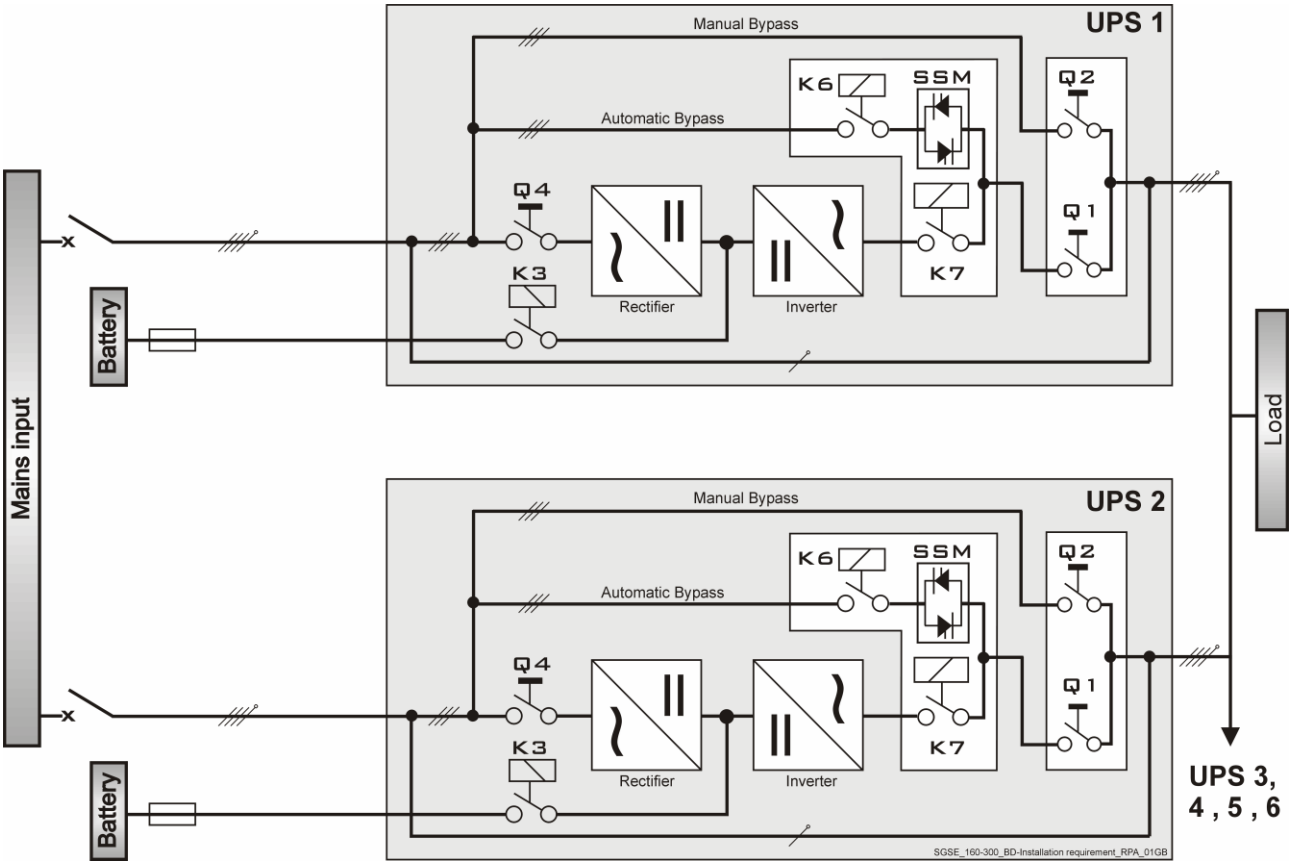
Single UPS with separate input for Rectifier & bypass



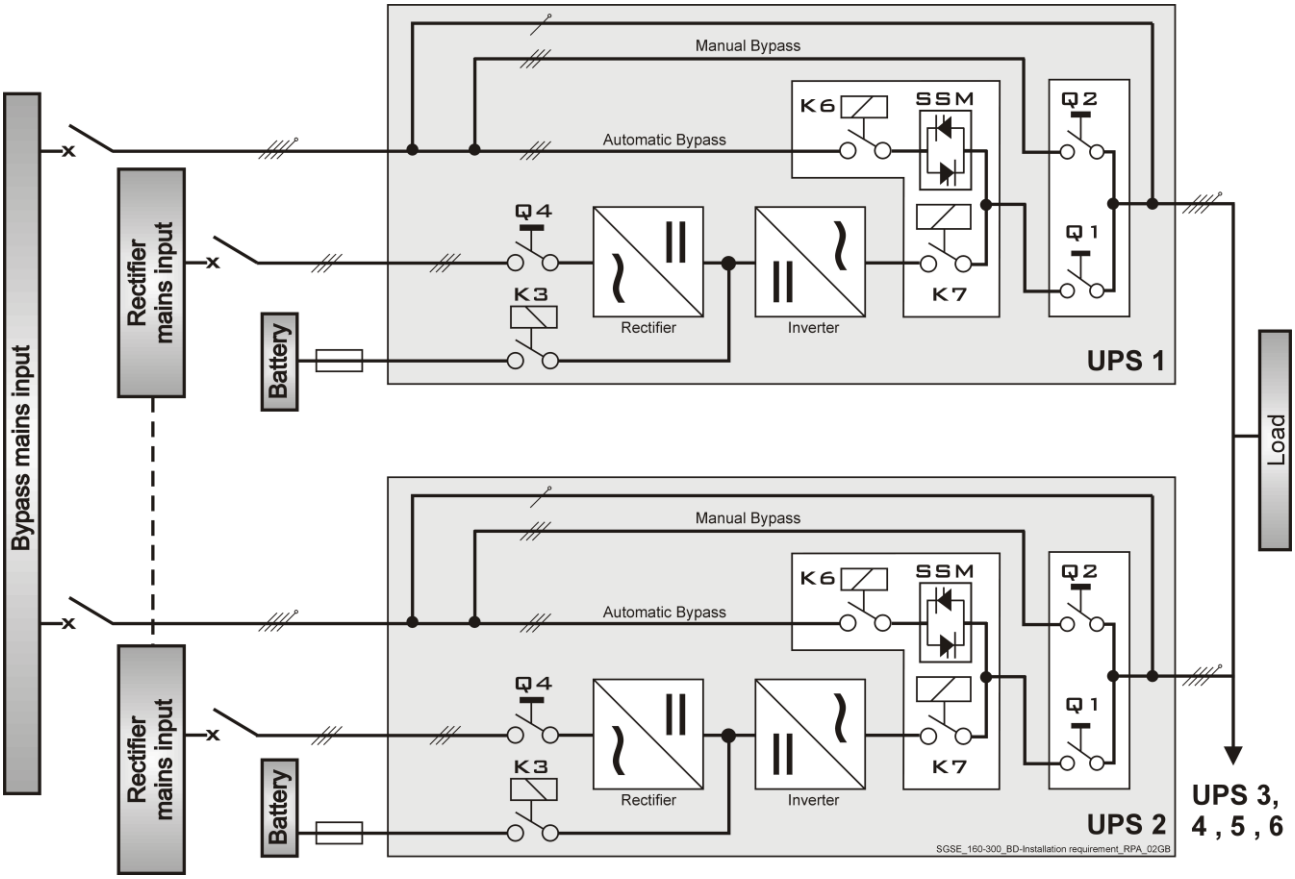
UPS single unit with separate Mains input for Rectifier and Bypass and galvanic separation



UPS Parallel System with common input Rectifier & bypass



UPS Parallel System with separate input for Rectifier & bypass



5.8 ELECTRICAL CONNECTION

WARNING !

UPS installation and connection must be performed by QUALIFIED SERVICE 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.

Carefully read the following recommendations before proceeding:

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

Access to the terminals or bus bars for the cable connections

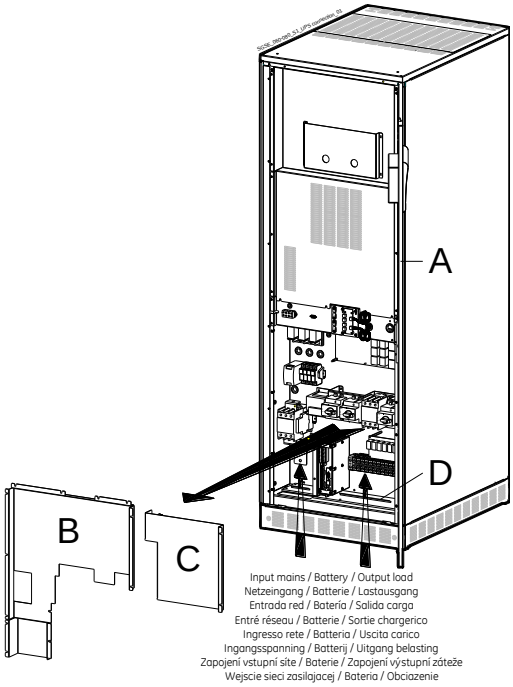


Fig. 5.6-1 SG Series 60 & 80 PurePulse™ Access to the input / output connections

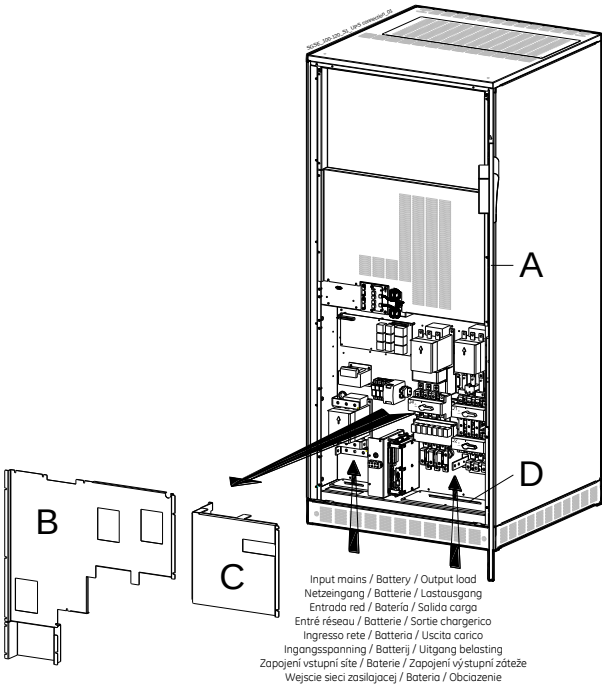


Fig. 5.6-2 SG Series 100 & 120 PurePulse™ Access to the input / output connections

To access *Input, Output and Battery connections* proceed as follows:

- Open the front door "**A**" of the UPS cabinet.
- Remove the front protection panel "**B**".
- Remove the front protection panel "**C**".
- Cut an opening into rubber "**D**" to allow cables passage.

NOTE !

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

5.8.1 *SG Series 60 & 80 PurePulse™ - Power connection with common input mains*

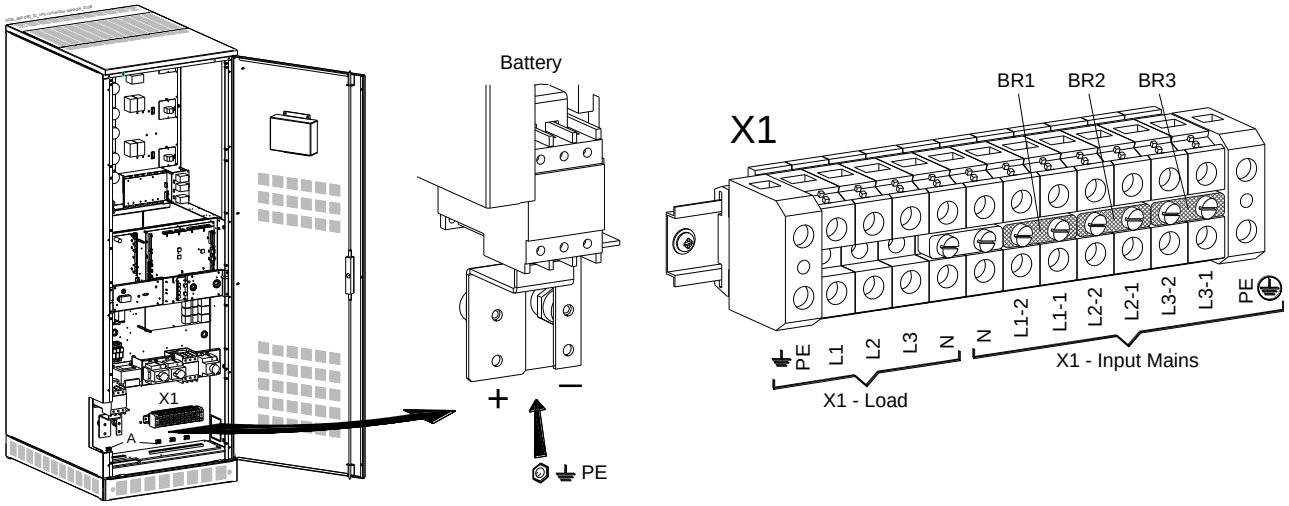


Fig. 5.6.1-1 SG Series 60 & 80 PurePulse™ - Power connections common input mains

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

Battery power cables (+ / - / PE) are connected to bus bars using **M8** bolts. Torque wrench at **22Nm**.

Fix the cables on accessory *"A"* with the enclosed cable ties.

X1 – Input Mains / Common Input Rectifier / Bypass			
L1-1	Rectifier + Bypass Phase L1		
L2-1	Rectifier + Bypass Phase L2	**N**	Neutral
L3-1	Rectifier + Bypass Phase L3	**PE**	Main ground
⚠	NOTE ! **The interconnection links *BR1*, *BR2* and *BR3* MUST REMAIN CONNECTED.**		

X1 – Load / Output Load					
L1	Load phase L1	**L2**	Load phase L2	**L3**	Load phase L3
N	Neutral	**PE**	Ground		

External battery connection			
+	Positive pole of the battery	⚠	**UPS PARALLELED ON THE SAME BATTERY: This configuration is not possible for *UPS Parallel System SG Series 60 – 120 PurePulse™*.**
-	Negative pole of the battery		**Do not insert the *Battery Fuses* before the commissioning!**
PE	Battery cabinet ground		

⚠	NOTE ! **To meet standards concerning electromagnetic compliance, the connection between the UPS and external *Battery* must be done by using a shielded cable or suitable shielded (steel) conduit!** **This UPS is only designed to operate in a wye-configured electrical system with a solidly grounded neutral.** **If the UPS is equipped with an input bypass transformer, the secondary of the transformer must be wye-configured with neutral solidly grounded.**

5.8.2 *SG Series 60 & 80 PurePulse™ - Power connection with separate input mains*

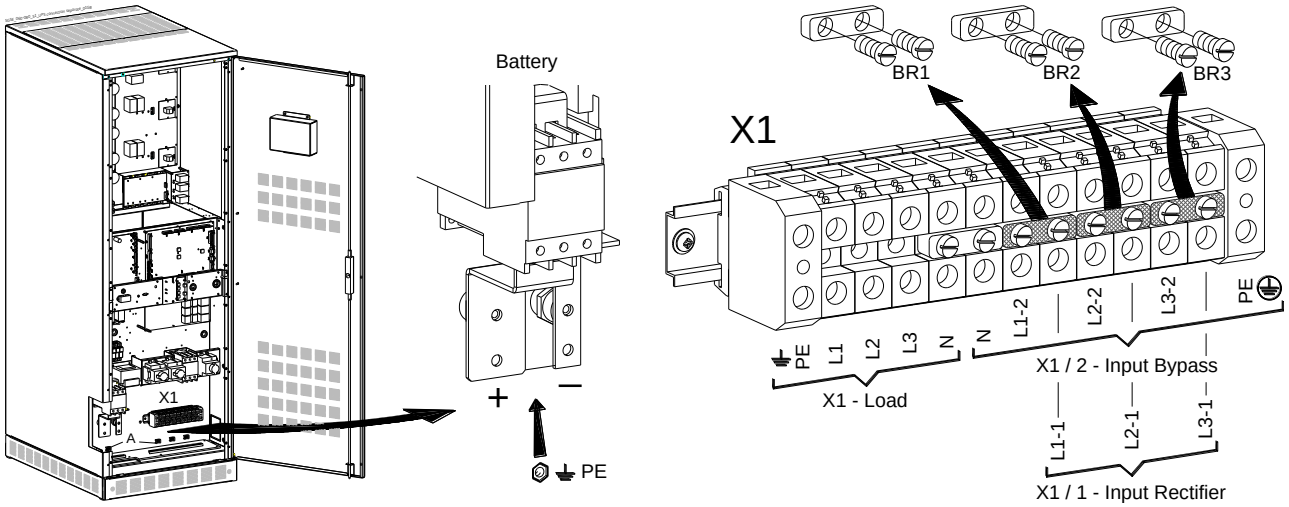


Fig. 5.6.2-1 SG Series 60 & 80 PurePulse™ - Power connections with separate input mains

Max. rating *X1* terminals: **50mm²**.
Input/output terminals must be tightened with a proper screwdriver applying torsion force: **2.5 Nm**.
Battery power cables (+ / - / PE) are connected to bus bars using **M8** bolts. Torque wrench at **22Nm**.
Fix the cables on accessory "***A***" with the enclosed cable ties.

Separate Input Rectifier / Bypass			
X1 / 1 - Input Rectifier		***X1 / 2 - Input Bypass***	
L1-1	Rectifier phase L1	**L1-2**	Bypass phase L1
L2-1	Rectifier phase L2	**L2-2**	Bypass phase L2
L3-1	Rectifier phase L3	**L3-2**	Bypass phase L3
PE	Main ground	**N**	Neutral (Bypass)

NOTE !
The interconnection links *BR1*, *BR2* and *BR3* MUST BE REMOVED (see *Fig. 5.8.2-1*).

X1 – Load / Output Load					
L1	Load phase L1	**L2**	Load phase L2	**L3**	Load phase L3
N	Neutral	**PE**	Ground		

External battery connection			
+	Positive pole of the battery	**UPS PARALLELED ON THE SAME BATTERY:** **This configuration is not possible for *UPS Parallel System SG Series 60 – 120 PurePulse™*.**	
-	Negative pole of the battery	**Do not insert the *Battery Fuses* before the commissioning!**	
PE	Battery cabinet ground		

NOTE !

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

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

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

5.8.3 *SG Series 100 & 120 PurePulse™* - Power connection with common input mains

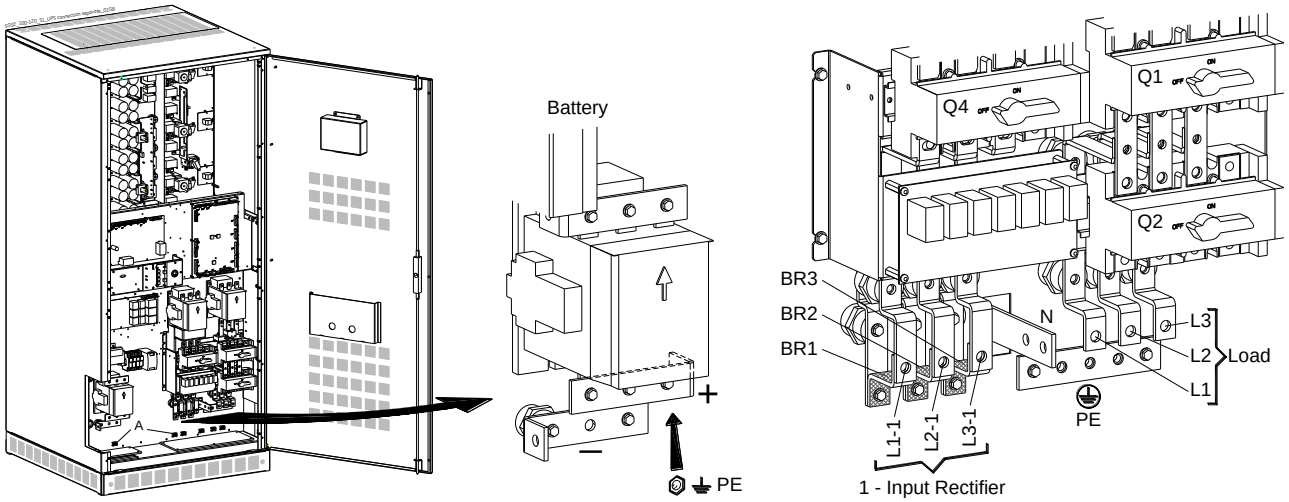


Fig. 5.6.3-1 SG Series 100 & 120 PurePulse™ - Power connections common input mains

Power connection cables are connected to bus bars using **M8 bolts**.

The bolts of the connection cables must be tightened with a torque wrench at **22Nm**.

Fix the cables on accessory "***A***" with the enclosed cable ties.

Common Input Rectifier / Bypass			
L1-1	Rectifier + Bypass Phase L1		
L2-1	Rectifier + Bypass Phase L2	**N**	Neutral
L3-1	Rectifier + Bypass Phase L3	**PE**	Main ground
⚠	NOTE ! **The bus bars *BR1*, *BR2* and *BR3* MUST REMAIN CONNECTED.**		

Output Load					
L1	Load phase L1	**L2**	Load phase L2	**L3**	Load phase L3
N	Neutral	**PE**	Main ground		

External battery connection			
+	Positive pole of the battery	⚠	**UPS PARALLELED ON THE SAME BATTERY:** **This configuration is not possible for *UPS Parallel System SG Series 60 – 120 PurePulse™*.**
-	Negative pole of the battery		**Do not insert the *Battery Fuses* before the commissioning!**
PE	Battery cabinet ground		

⚠	NOTE ! **To meet standards concerning electromagnetic compliance, the connection between the UPS and external *Battery* must be done by using a shielded cable or suitable shielded (steel) conduit!** **This UPS is only designed to operate in a wye-configured electrical system with a solidly grounded neutral.** **If the UPS is equipped with an input bypass transformer, the secondary of the transformer must be wye-configured with neutral solidly grounded.**

5.8.4 *SG Series 100 & 120 PurePulse™ - Power connection with separate input mains*

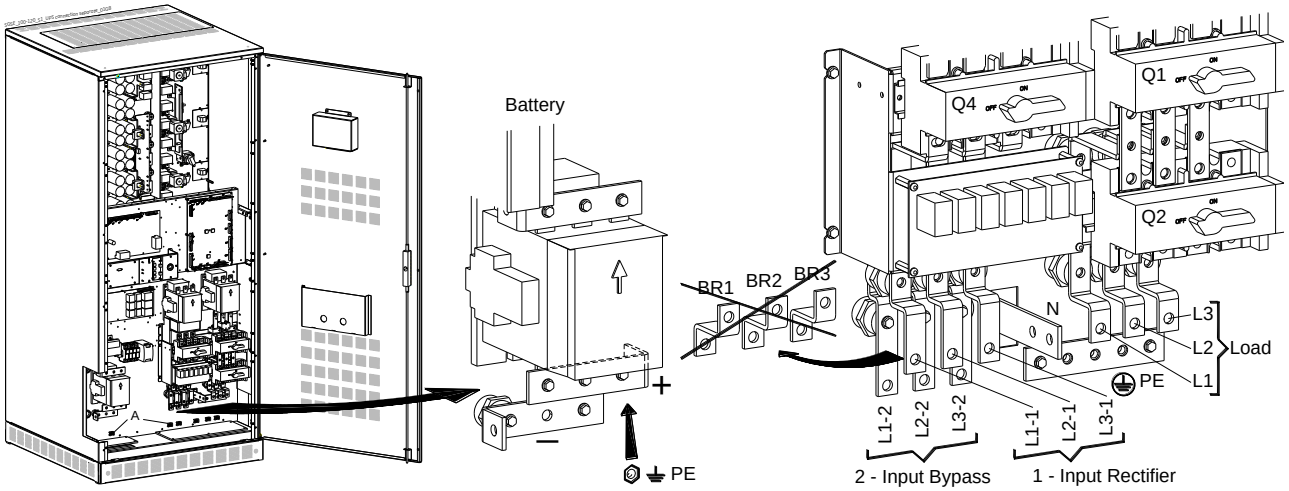


Fig. 5.6.4-1 SG Series 100 & 120 PurePulse™ - Power connections with separate input mains

Power connection cables are connected to bus bars using **M8 bolts**.

The bolts of the connection cables must be tightened with a torque wrench at **22Nm**.

Fix the cables on accessory "***A***" with the enclosed cable ties.

Separate Input Rectifier / Bypass			
1 - Input Rectifier		***2 - Input Bypass***	
L1-1	Rectifier phase L1	**L1-2**	Bypass phase L1
L2-1	Rectifier phase L2	**L2-2**	Bypass phase L2
L3-1	Rectifier phase L3	**L3-2**	Bypass phase L3
PE	Main ground	**N**	Neutral (Bypass)

NOTE !
The Bus bars *BR1*, *BR2* and *BR3* MUST BE REMOVED (see *Fig. 5.8.4-1*).

Output Load					
L1	Load phase L1	**L2**	Load phase L2	**L3**	Load phase L3
N	Neutral	**PE**	Main ground		

External battery connection		
+	Positive pole of the battery	**UPS PARALLELED ON THE SAME BATTERY:** **This configuration is not possible for *UPS Parallel System SG Series 60 – 120 PurePulse™*.**
-	Negative pole of the battery	**Do not insert the *Battery Fuses* before the commissioning!**
PE	Battery cabinet ground	

NOTE !

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

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

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

5.8.5 Set-up for SG Series 60 - 120 PurePulse™ when functioning as frequency converter

When the ***SG Series 60 - 120 PurePulse™*** is utilized for **different output frequency compared 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 situations where the UPS needs to be powered down for maintenance purposes, the critical *Load* must also be powered down during this time.
The UPS cannot be transferred to *Manual Bypass*, as serious damage to the *Load* could be the result.

When the set-up parameters of the UPS are set for *frequency converter*, the ***SEM mode*** *(Super Eco Mode)* operation is automatically disabled.

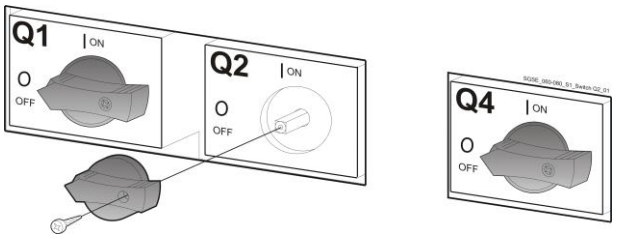


Fig. 5.8.5-1 SG Series 60 & 80 PurePulse™ Switch Q2 – Manual Bypass

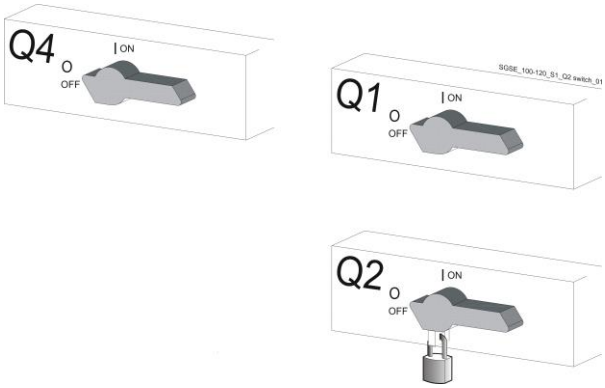


Fig. 5.8.5-2 SG Series 100 & 120 PurePulse™ Switch Q2 – Manual Bypass

When the UPS is used as a frequency converter, circuit breaker *Q2 - Manual Bypass* should either be removed or be blocked in the open position by means of a padlock or a similar device, to avoid any accidental closure.
See *Fig. 5.8.5-1* e *5.8.5-2*.

In order to avoid improper operation, only the *Rectifier input* should be powered (***L1-1, L2-1*** and ***L3-1)*, therefore *BR1*, *BR2*** and ***BR3*,** on AC input bars **MUST BE REMOVED**.
See *Fig. 5.8.2-1* and *5.8.4-1*.

Special care must be taken in choosing the **fuse ratings** installed in the output distribution **(max. 20% of the UPS rated current)**.
Avoid high inrush current due to transformer magnetisation or motor starting.

NOTE !

At site only a qualified service engineer may change a unit, initially delivered as a frequency converter, into a normally operating "standard" UPS.

RPA
Redundant Parallel Architecture

5.9 RPA PARALLEL SYSTEM CONNECTION

WARNING !

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

5.9.1 Power wiring of parallel units

To guarantee good *Load* sharing between the units of a *Parallel System*, we recommend that the cable length from the input distribution board (5) to the output distribution board (9) is equal for each unit (a+b = c+d = e+f = g+h = i+l = m+n = o+p = q+r).
Tolerance: **+/-10%**.

The AC input power of the *Bypass* must be the same for all units of the *Parallel System* - no phase shift allowed between units.

NOTE !

It is strongly recommended that no transformers, automatic circuit breakers or fuses should be inserted between the unit's output and the *Load* common bus bars.

However, it is recommended that a disconnection or isolation switch is installed in order to totally isolate a unit if needed.

Verify that power wiring and control wiring run in separate conduits or cable trays.
The power wiring requires two separate conduits: one for input and one for output cables.

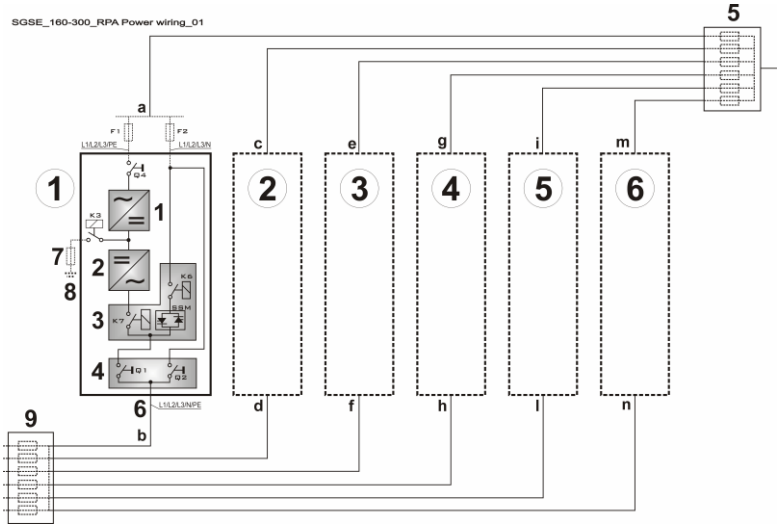


Fig. 5.9.1-1 Power wiring of RPA Parallel System

1	=	Rectifier
2	=	Inverter
3	=	Automatic Bypass
4	=	Manual Bypass
5	=	Input Mains Distribution
6	=	Unit Output Load
7	=	External Battery fuse or MCB
8	=	External Battery
9	=	Common bus bar and Output Load Distribution
①	=	UPS Number 1
②	=	UPS Number 2
③	=	UPS Number 3
④	=	UPS Number 4
⑤	=	UPS Number 5
⑥	=	UPS Number 6

5.9.2 Parallel control bus connection

In case of parallel operation, the communication between the units takes place through the ***Control Bus Cables***.

Each parallel unit is equipped with an additional board "***P13*** – ***RPA Board***" where the connectors ***J52*** **(A)** and ***J62*** **(B)** are located.
A short control cable provided with a ferrite ring core links the parallel board "***P13 – RPA Board***" with the parallel bus socket on which must be connected the **control bus cables** ***JA*** and ***JB*** on PCB "***P34 – Bus Interface***".
All the parallel units are connected to the same control bus.

This connection allows:

- The microprocessors of each unit to communicate with each other.
- The oscillators of each unit to be locked together.
- The regulation loops to compare the output current of each unit in order to equally share the *Load* current.

For increased reliability, this connection is made with redundant cables.
In this way, communication is maintained between units in case one of the control cables should fail or be accidentally damaged or disconnected.

The standard length of the control bus cable between two parallel units is **12m** / **40 ft**.
The maximal overall length of bus connection, between the first and the last unit, should not exceed **84m** / **276 ft**.
Verify that control wiring run in an individual separate steel conduit.

NOTE !

Under no circumstance should the control bus cable connecting *JA (1/2/3/4/5)* and *JB (1/2/3/4/5)* be connected or disconnected after the system has been powered On.

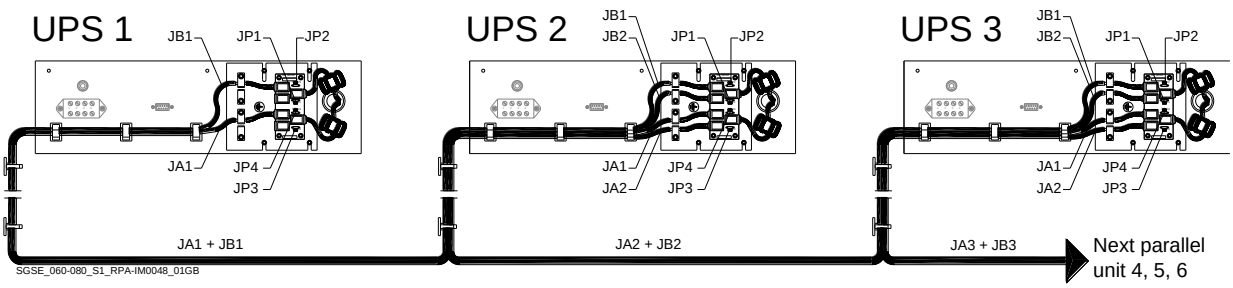


Fig. 5.9.2-1 RPA System - Control bus connection

The shield of the control bus cable, connected on *JA* and *JB* must be connected to ground with the appropriate cable clamps fitted on the parallel bus socket.

It is important to place the units in sequence of their assigned number.
A unit number from ***1*** to ***6*** is defined by the setting of parameters and displayed on the panel (***1*** to ***6***).
This number is also marked inside and outside the packaging.

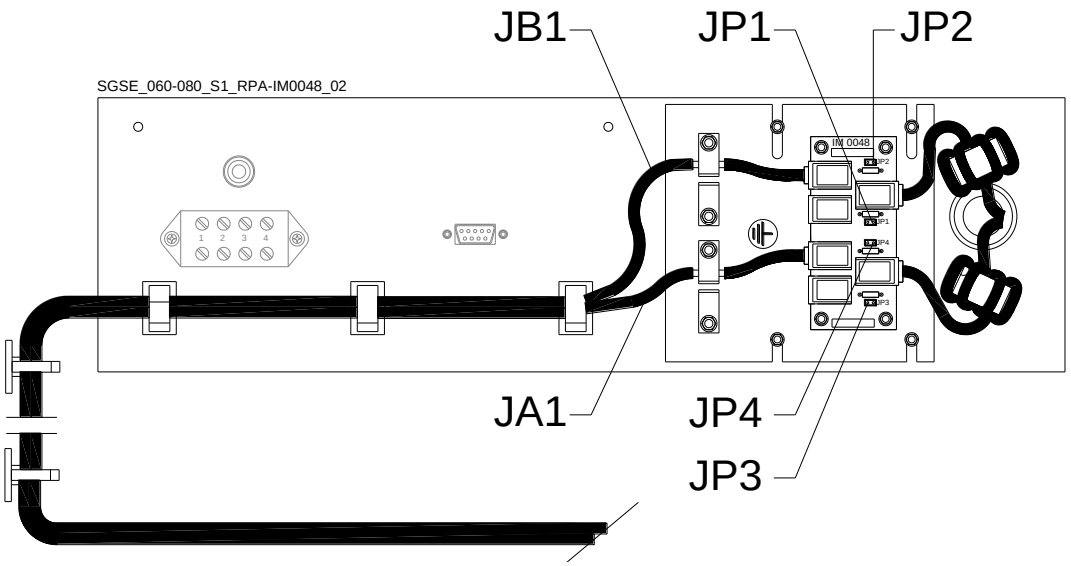


Fig. 5.9.2-2 Bus connection on first and last units

First and last units

On the parallel bus PCB "***P34 – Bus Interface (IM0048)***", of the **first and last** units (terminal) of the *Parallel System* the Jumpers ***JP1***, ***JP2***, ***JP3*** and ***JP4*** **MUST BE INSERTED**.

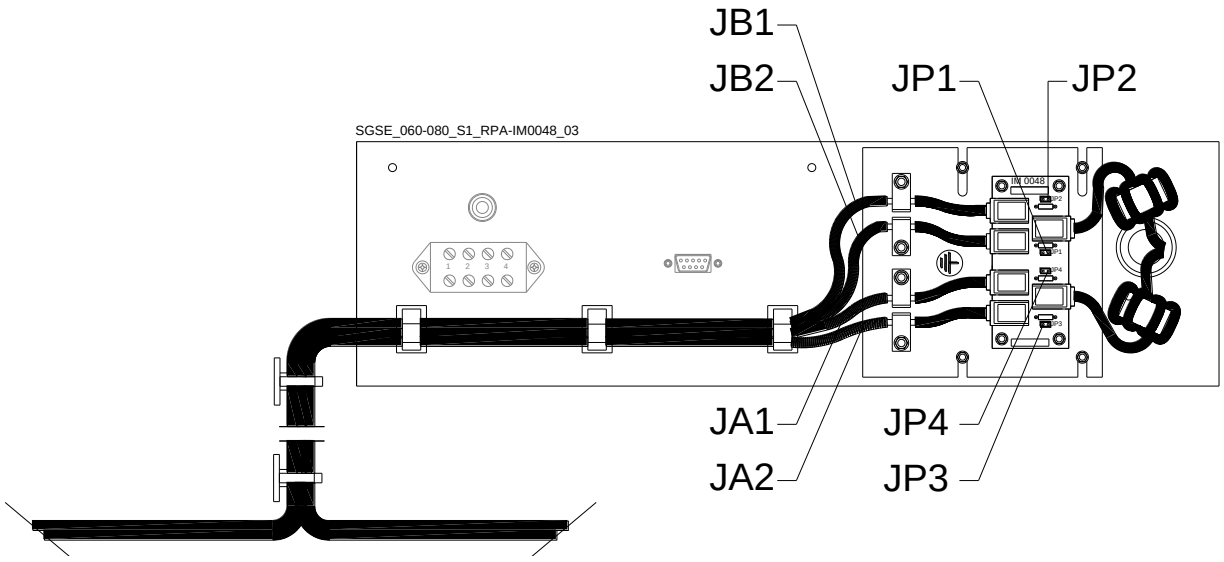


Fig. 5.9.2-3 Bus connection on intermediate units

Intermediate units

On the parallel bus PCB "***P34 – Bus Interface (IM0048)***" of the **intermediate units** of the *Parallel System* the Jumpers ***JP1***, ***JP2***, ***JP3*** and ***JP4*** **MUST BE REMOVED**.

NOTE !

In a *Parallel System* composed of 2 or more units, only the first and last units (having 1 input *JA* and *JB* free) have the Jumper *JP1*, *JP2*, *JP3* and *JP4* inserted on parallel bus PCB "*P34 – Bus Interface (IM0048)*". See *Fig. 5.9.2-2*.

5.9.3 Control bus cable location

WARNING !
This installation must be verified by trained personnel before the initial start-up.
ENSURE THAT THE UPS INSTALLATION IS COMPLETELY POWERED DOWN.

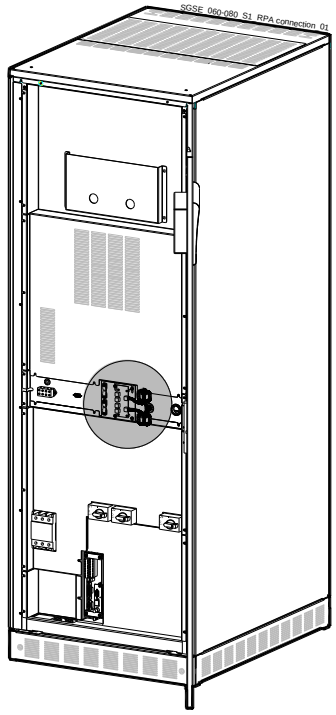


Fig. 5.9.3-1 View electronic module on intermediate unit

Access to the control bus connection

The control bus connection between parallel units must be made on the front of the ***electronic module*** fitted behind the front doors.

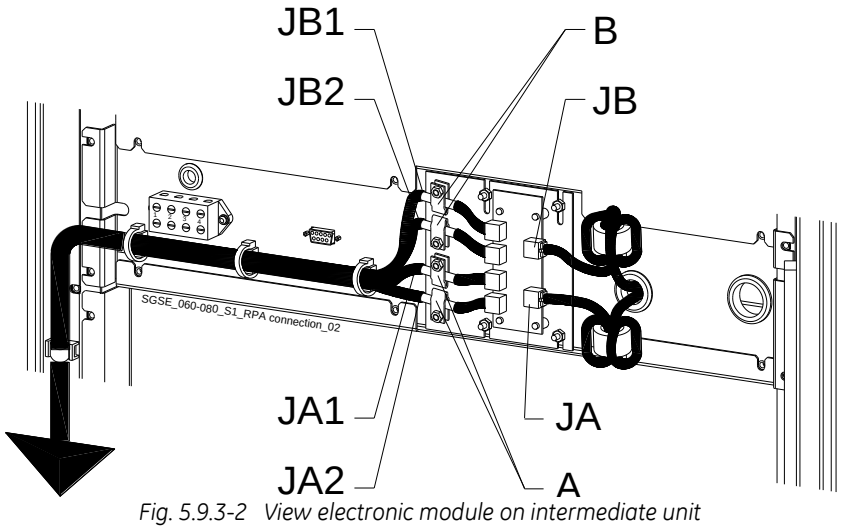


Fig. 5.9.3-2 View electronic module on intermediate unit

Control bus cables connection

- Plug the cables ***JA*** *(1/2/3/4/5)* and ***JB*** *(1/2/3/4/5)* onto the RJ connectors ***JA*** and ***JB*** located on parallel bus PCB "***P34 – Bus Interface (IM0048)***" [going to *"P13 – RPA Board" J52(A)* and *J62(B)*.
- Fix both cables ***JA*** *(1/2/3/4/5)* and ***JB*** *(1/2/3/4/5)* to parallel bus socket connecting the cable shield to ground by means the cable clamps "***A***" and "***B***".

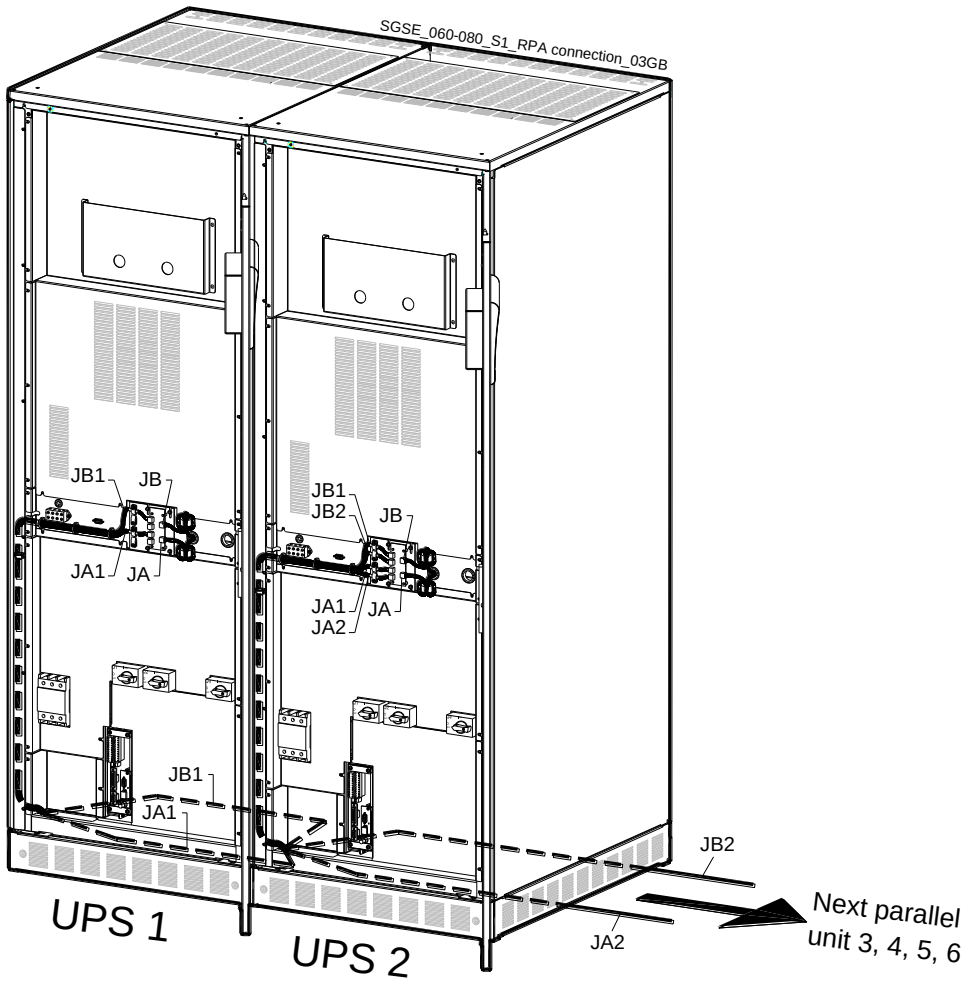


Fig. 5.9.3-3 Control Bus cable routing and connection

Control bus cables routing

Place and fix the cables ***JA-1/2/3/4/5*** and ***JB-1/2/3/4/5*** inside the UPS cabinets in the position illustrated in the drawing *Fig. 5.9.3-3*.

	**NOTE !** **Pay attention when cabling and routing the bus cables *JA* and *JB* inside the UPS cabinet.** **In case one unit should be removed from the *Parallel System*, the bus cables *JA* and *JB* must be removed from the cabinet without disconnecting them from the metal plate where the sockets *JA* and *JB* are located.**

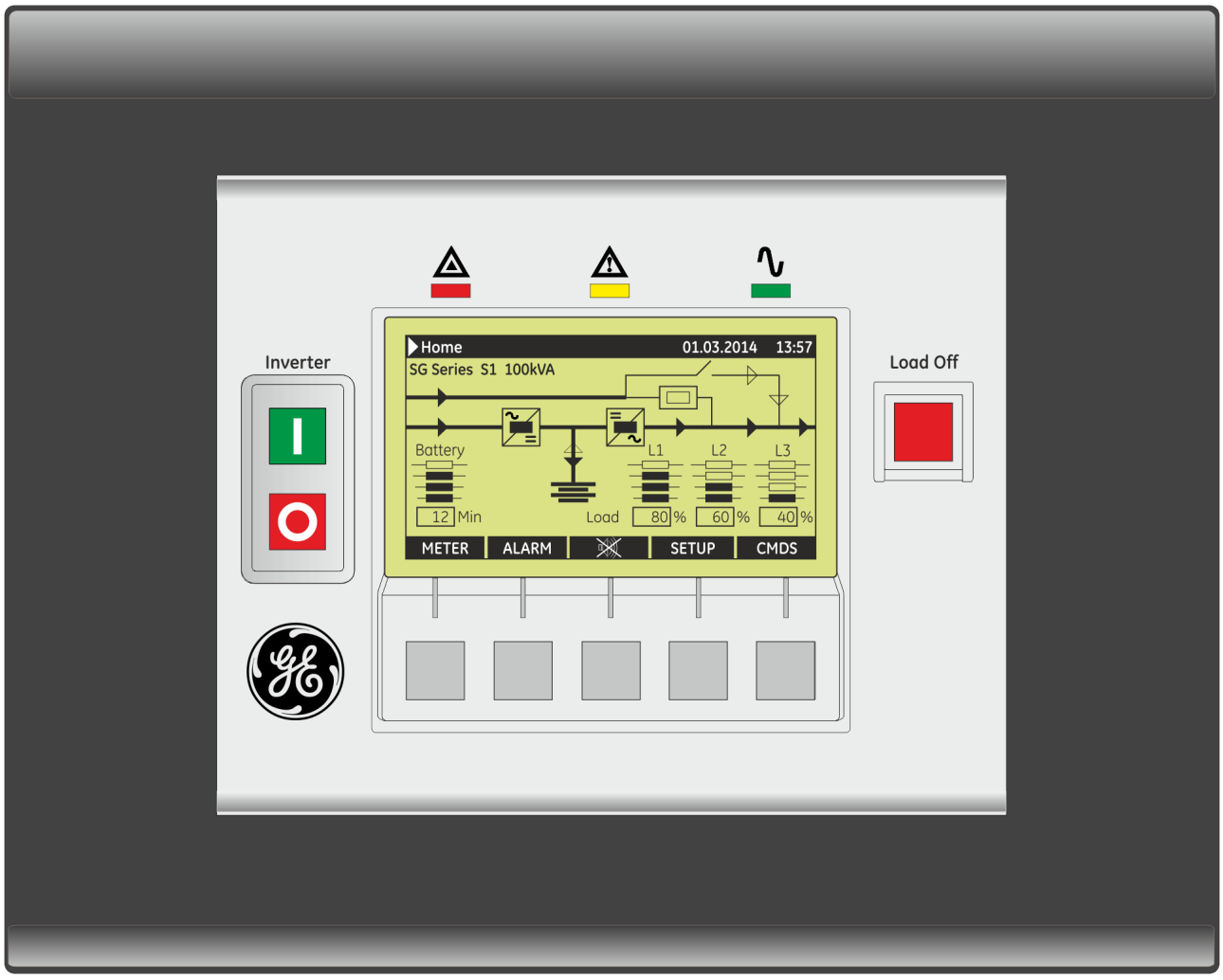
For reliability reasons the cables ***JA-1/2/3/4/5*** and ***JB-1/2/3/4/5*** connecting the units should be run in separated protected conduits (as indicated in *Fig. 5.9.3-3*) separated from the power cables.

It is important that the cable *JA* must be the same length as cable *JB*.

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

6 CONTROL PANEL

6.1 CONTROL PANEL



LCD_SG_060-120_S1_Front_GE_01GB

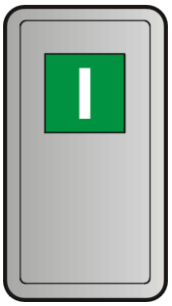
Fig. 6.1-1 Control panel

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

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

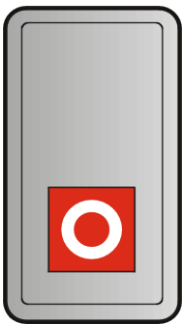
6.2 TABLE OF FUNCTIONS AND INDICATIONS ON CONTROL PANEL

Inverter



Key to switch the Inverter ON (I)

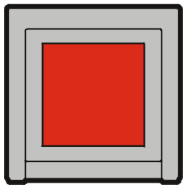
Inverter



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.

Load Off



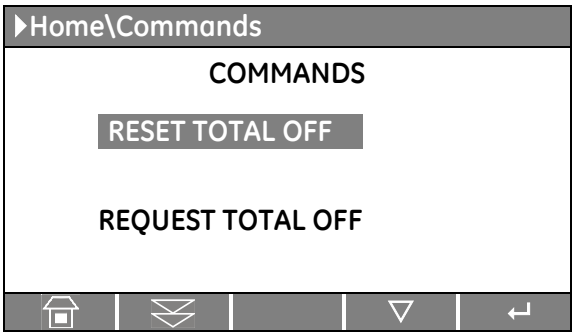
Key "Load Off"
The key *"Load Off"* is protected by a transparent cover.
By pressing it, you immediately separate the UPS from the *Load*.

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

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

To Restore the command *"Load Off"*

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



RPA
Redundant Parallel Architecture

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

	**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 (>125%) and the *Load* cannot be transferred on *Mains*.

LED Alarm (yellow colour)

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

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

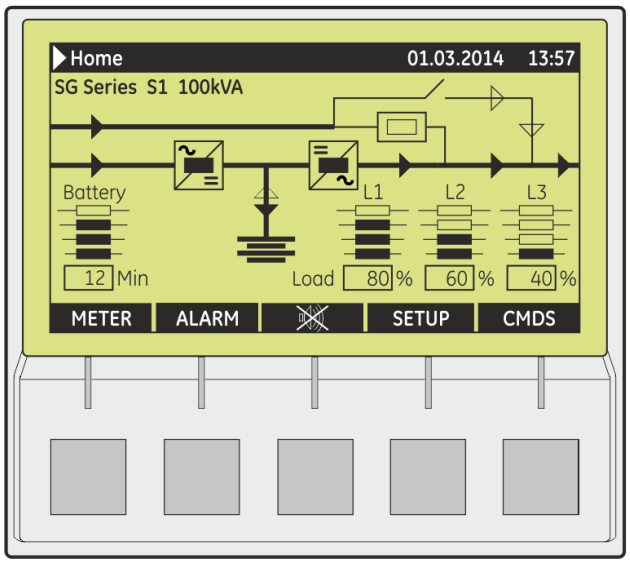
The *LED Alarm* is also lighted when the *Load* is not protected by UPS or in case *Q1 is open*.

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 *SEM* 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*.



LCD_SG_060-120_S1_LCD-Home_01GB

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.

7 LCD SCREEN

7.1 HOME SCREEN

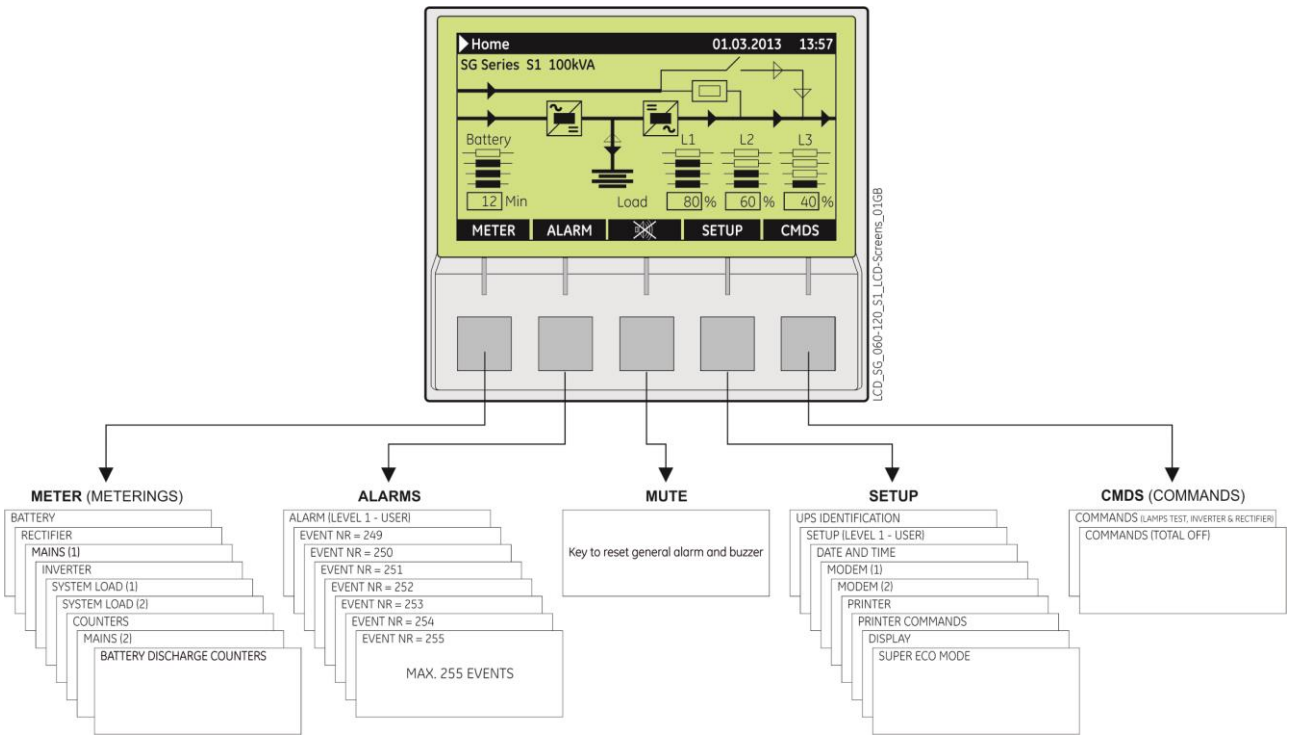


Fig. 7.1-1 LCD display

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*.

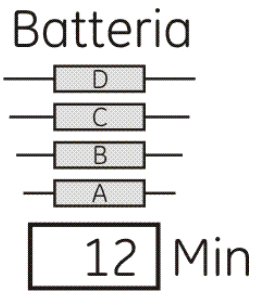
The *LCD screen*, after 5 minutes of inactivity, shuts down the backlight.
To reactivate it, it is sufficient to press any keys.

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 keys *"MEASURES"* and *"ALARMS"* together automatically sets the *LCD* communication for "ENGLISH".

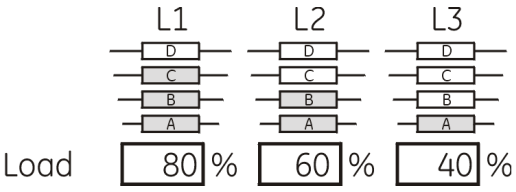
SG Series S1 100kVA UPS Model UPS series number UPS nominal rating (kVA)



Battery level LED

All *LED light* indicate a battery autonomy of 100%.

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



Load level LED

All *LED Off* indicate a *Load* status at ≤25%.

LED A	Indicates a *Load* level between 26% and 50%.
LED A, B	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%.

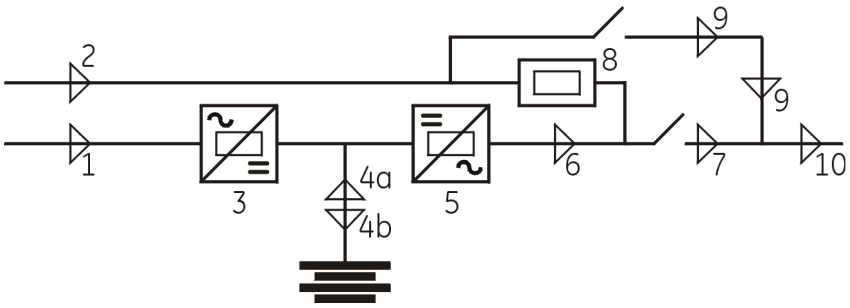


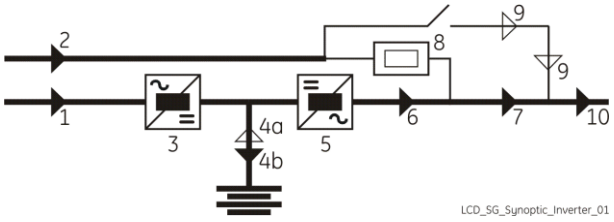
Fig. 7.1-2 LEDs on Synoptic Diagram

LEDs on Synoptic Diagram

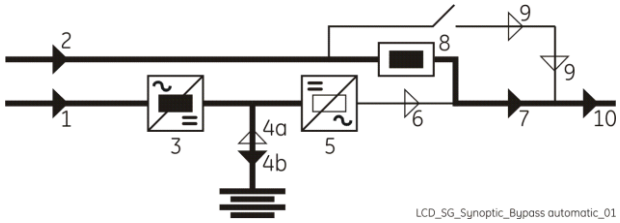
LED 1	Mains Rectifier OK
LED 2	Mains Bypass OK
LED 3	Rectifier ON
LED 4a	Discharging Battery
LED 4b	Charging Battery
LED 5	Inverter available
LED 6	Inverter ON
LED 7	Q1 closed
LED 8	Automatic Bypass ON
LED 9	Manual Bypass Q2 ON
LED 10	Load on UPS

Examples of typical scenarios in the Synoptic Diagram:

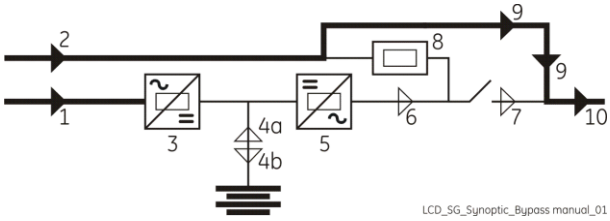
Load supplied by Inverter



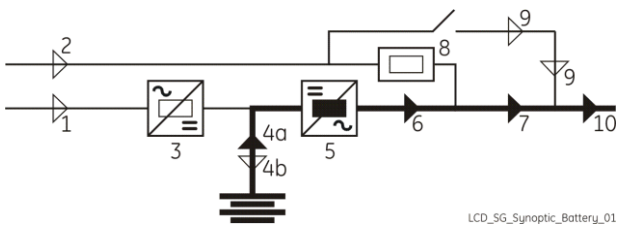
Load supplied by Automatic Bypass



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.

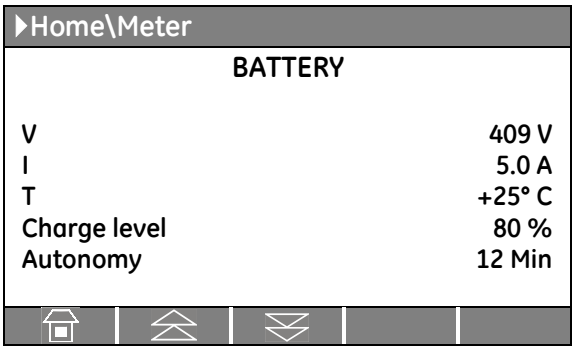
In this mode the keys perform the following functions:

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

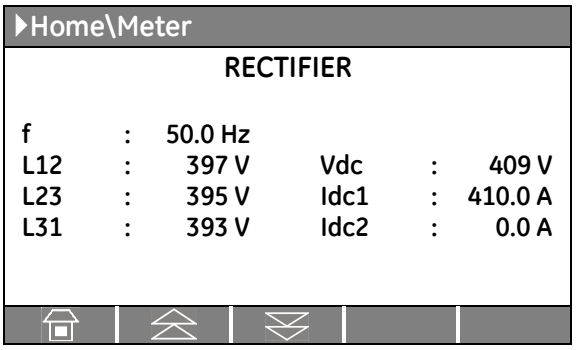
V The battery voltage.

I The battery current (negative values correspond to the discharge of the battery).

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.



Rectifier Mains data screen

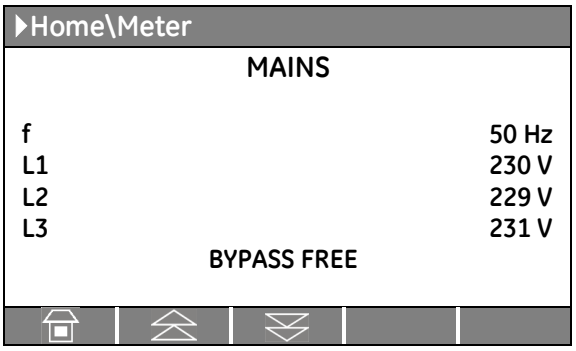
f The input frequency of the Rectifier.

L12
L23
L31 The voltage levels between the three phases (line-to-line).

Vdc Rectifier voltage output.

Idc1 Output current Rectifier bridge.

Idc2 Output current 2nd *Rectifier Bridge* (optional 12 pulse *Rectifiers* only).

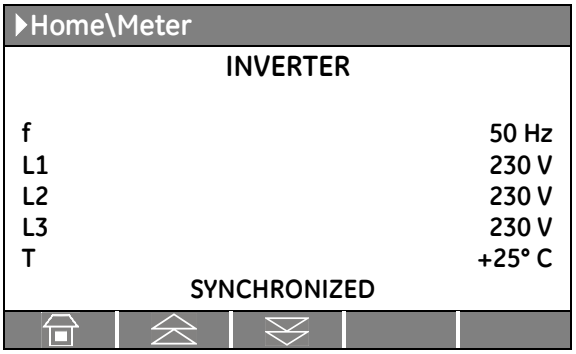


Bypass Mains data screen

f The frequency of the Mains.

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

Bypass Bypass status: FREE / LOCKED.



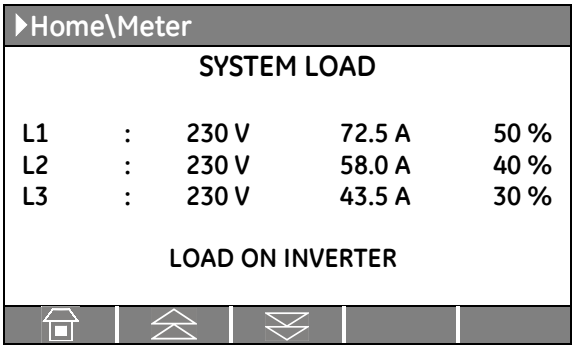
Inverter data screen

f The output frequency of the *Inverter*.

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

T The temperature of the Inverter bridge.

The synchronization status of the Inverter with respect to Mains (SYNCHRONIZED / NOT SYNCHRONIZED).



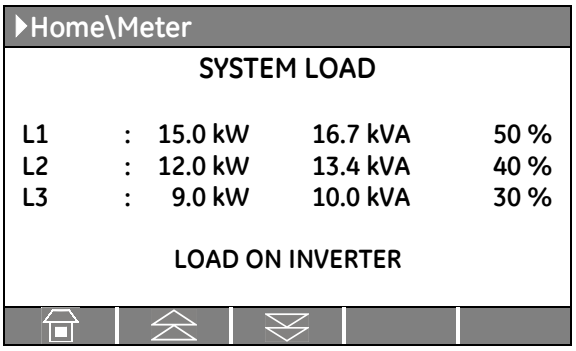
Load on phases screen 1

... V Output voltage PHASE/NEUTRAL for each phase.

... A The output current as RMS values (for RPA: total value of *Parallel System*).

... % The output Load as percentage (for RPA: with respect to the rated power of *Parallel System*).

The source of the power supplied to the Load.



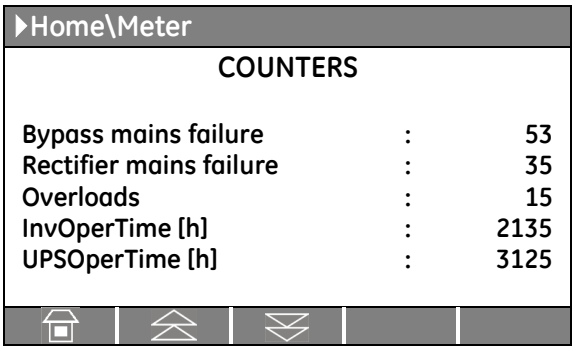
Load on phases screen 2

... kW The Load active power (kW) (for RPA: total value of *Parallel System*).

... kVA The Load apparent power (kVA) (for RPA: total value of *Parallel System*).

... % The output *Load* as percentage (for RPA: with respect to the rated power of *Parallel System*).

The source of the power supplied to the Load.



Statistics screen

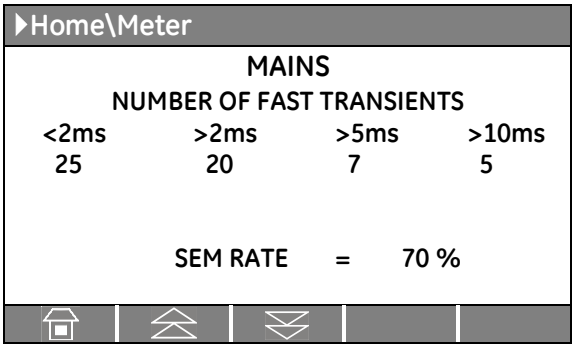
The total number of minor Mains faults (Bypass Mains out of tolerance faults).

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).

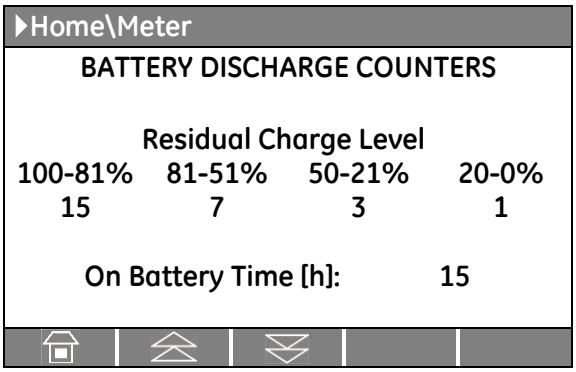


SEM mode statistic screen (Super Eco Mode)

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 *SEM* mode operation.



Statistics battery discharge screen

Residual Charge Level
The number of discharges combined with the percentage of the available residual battery capacity at the time utility power is restored.

On Battery Time [h]
The total operating time of the UPS on battery (in hours).

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.

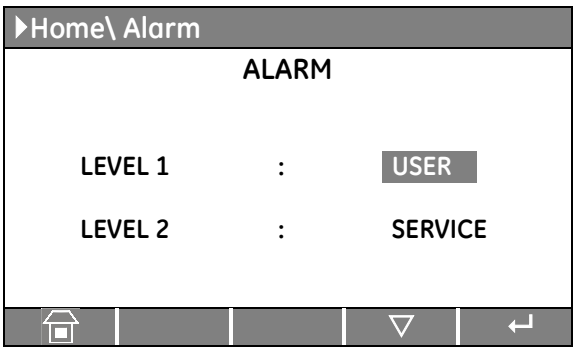
Move forward to the following event.

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)***.



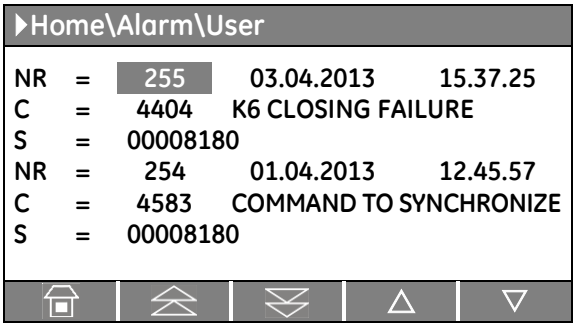
Alarms screen

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 (information reserved for the connectivity and the diagnostic).

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 iUPSGuard"*.

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	*Alarms*	*Meaning*
4000	SETUP VALUES LOST	Parameters are lost and have been replaced with default values. Please call nearest *Service Centre* for intervention.
4001	REGULATION BOARD FAILURE	A blocked *DSP* on the *Control board* causes this alarm, and consequently the shut-down of *Rectifier* and *inverter* and the opening of *K3*.
4004	UPS FAILURE ON PARALLEL SYSTEM	The master unit detected the slave unit missing on the communication bus even though switch *Q1* is still closed.
4006	BUS JA CRC FAILURE	The parallel communication bus system is subject to high errors rate on channel *JA*.
4007	BUS JB CRC FAILURE	The parallel communication bus system is subject to high errors rate on channel *JB*.
4008	BUS JA FAILURE	There is an interruption in the channel *JA* of the parallel communication bus system.
4009	BUS JB FAILURE	There is an interruption in the channel *JB* of the parallel communication bus system.
4010	CONNECTIVITY BUS FAILURE	The connectivity communication bus is faulty or interrupted.
4100	RECTIFIER FUSES FAILURE	The u-switch mounted on the *Rectifier input fuses* indicates a blown fuse, and consequently it is shut down. Clearance of this condition allows you to restart the *Rectifier*.
4102	K4 CLOSING FAILURE	*K4* not closed despite a closing command being issued. Signalled by auxiliary contact. *Rectifier* cannot start.
4103	K4 OPENING FAILURE	*K4* not open despite an opening command being issued. Signalled by auxiliary contact. *Mains* remains connected to *Rectifier bridge*.
4104	BATTERY FUSES FAILURE	This function, when enabled on input programmable relays (password required), warns the user about the external *Battery Fuses* failure or *MCB* opening, signalled by NO free contact.

Code	Alarms	Meaning
4105	RECTIFIER OVERTEMPERATURE	Temperature sensor indicates a situation of overtemperature on the Rectifier bridge. Only the alarm is given. The *Rectifier*, when in an Off state, cannot start as long as this condition persists.
4106	RECTIFIER TRANSFORMER OVERTEMPERATURE	The temperature sensor inside the input transformer winding indicates overtemperature. Only the alarm is given. The *Rectifier*, when in an Off state, cannot start as long as this condition persists.
4110	RECTIFIER MAINS OUT OF TOLERANCE	*Rectifier Input Mains* is 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), and the *Inverter* will be shut down. It will restart automatically only when the *Battery* has recharged enough for a minimum runtime.
4116	HIGH BATTERY VOLTAGE	Dangerous high DC Voltage caused inverter shut-down. *Inverter* restarts automatically after *Battery* returns to floating voltage.
4117	BATTERY EARTH FAULT	A leakage current to earth has been detected on the DC circuit.
4118	BATTERY FAULT	During battery test the voltage falls under the critical level (depending setting parameters). Battery test is stopped.
4121	HIGH DC RIPPLE	A high ripple is present in the battery voltage.
4130	TURN ON RECT. OR SHUTDOWN UPS	*Rectifier* and *Inverter* are OFF. The DC power supply is discharging the *Battery*. *Rectifier* must be restarted or *Battery* must be disconnected in order to avoid damage.
4140	RECTIFIER CONTROL FAILURE	*Rectifier Voltage* hasn't reached the set value (probably fault on regulation loop). *LED Rectifier* on control panel is blinking.
4141	ISMAX DETECTION RECTIFIER	After 3 IS-Max condition within the time frame specified in respective parameter, the *Rectifier* remains shut-down.
4142	RECTIFIER CURRENT MAX	Will cause immediate shut-down of the *Rectifier*. Based on the value inserted in the respective parameter.
4304	K7 CLOSING FAILURE	*K7* not closed despite a closing command. Signalled by auxiliary contact. *Load* will be supplied by *Mains*.
4305	K7 OPENING FAILURE	*K7* not open despite an opening command. Signalled by auxiliary contact. *Load* will be supplied by *Mains*.
4307	INVERTER TRANSFORMER OVERTEMPERATURE	The temperature sensor of the *Inverter Transformer* indicates overtemperature. Elapsed *"stop operation"* time, *Inverter* shut-down. With *Mains OK*, *Load* is transferred on *Mains*.

Code	Alarms	Meaning
4308	DC FUSES FAILURE	Blown input DC fuse(s) F1 of the *Inverter*. *Inverter* cannot be started as long as present.
4309	DRIVER FAILURE	An abnormal condition has been detected on one or more power modules of the *Inverter* (temperature or overcurrent). *Inverter* shut-down and cannot be started as long as the alarm is present.
4310	IGBT RECTIFIER DRIVER FAILURE	Indicates a failure on the driver board or the *Rectifier IGBT bridge*. The *Rectifier* is shut-down.
4312	INVERTER VOLTAGE OUT OF TOLERANCE	*Inverter Output Voltage* is out of the tolerances (± 10%). *Inverter* is switched OFF.
4320	ISMAX DETECTION	Detection of *Inverter Bridge* (Is) current limit causing the *Inverter OFF* and automatic re-start. After 3 times the *Inverter* switches-Off, and it can be restarted manually.
4321	HIGH CURRENT SHARING	A high exchange current value is detected between the UPS of the *Parallel System*.
4340	INVERTER CONTROL FAILURE	The "Slave" oscillator is not in synchronized with the Master; thus causing the shut-down of its *Inverter*. If after a restart the condition remains, the *LED* inside the *Inverter* symbol on the panel will not light up, indicating that this *Inverter* cannot supply the *Load* anymore.
4404	K6 CLOSING FAILURE	*K6* open despite a closing command being issued. Signalled by auxiliary contact. The *Load* cannot be supplied by *Automatic Bypass*.
4405	K6 OPENING FAILURE	*K6* closed despite an opening command being issued. Signalled by auxiliary contact.
4406	SSM FAILURE	A faulty current has been detected in the static-switch causing the opening of the *contactor K6* for 10 seconds. After 3 times K6 remains definitively open. Only a GE Service Engineer can reset the alarm.
4408	K8 CLOSING FAILURE	*K8* open despite a closing command being issued. Signalled by auxiliary contact. The *Load* cannot be supplied by *Automatic Bypass*.
4409	K8 OPENING FAILURE	*K8* closed despite an opening command being issued. Signalled by auxiliary contact.
4410	BYPASS MAINS OUT OF TOLERANCE	The *Mains Bypass Voltage* is out of the tolerances (± 10%). *K6* opens, synchronization with *Mains* is inhibited and transfer to *Mains* is blocked.
4420	K3 CLOSING FAILURE	*K3* open despite a closing command. *Inverter* is switched OFF. It can be restarted manually after recovery of the alarm condition.

Code	Alarms	Meaning
4421	K3 OPENING FAILURE	*K3* not open despite an opening command. Be aware the *DC Capacitors* could remain charged.
4520	NO INVERTER POWER	The *Load* supplied by *Mains* exceeds the *Inverter* power. The *Load* remains supplied by *Mains* until the alarm stays ON.
4522	FAN FAILURE	The *Fan Control Board* indicates a malfunction of one or more ventilators.
4530	LOAD LOCKED ON MAINS	*Load* is locked on *Mains* because 3 transfers on *Mains* have been detected in a short time (default 30 sec.). The transfer will be free after a time defined in parameter (default 30 sec.).
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 EPO (Emergency Power Off) from an external safety device connected on Customer Interface Board. Consequently *K3, K4, K6, K7, K8* open, *Rectifier*, *Inverter* and *SSM* are switched Off.
4570	OVERLOAD	The UPS system is in an overload condition >125% on *Inverter*, or >150% on *Mains*. With *Mains* unavailable, a sequence of *"stop operation"* starts. Time out depends on degree of overload.
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* <100%.
4581	INVERTER AND MAINS NOT SYNCHRONIZED	The voltages of *Mains* and *Inverter* are not synchronized, which causes the opening of *K6*.
4697	BATTERY OVERTEMPERATURE	Detection of *Battery* overtemperature condition. Only a GE Service Engineer can reset the alarm.
4698	BATTERY POWER INSUFFICIENT	In case of *Mains Failure*, with the actual *Load*, the run time would be below stop operation time (default 3 minutes).
4700	DC LOW	*Battery voltage* is at the lowest limit. *Inverter* will remain Off until the *battery voltage* reaches the value in parameter.
4701	POWER SUPPLY BOARD FAILURE	Detection of a failure on the *Power Supply Board*, in particular from the *DC supply*. Can be enabled or disabled with respective parameter.
4702	LOSS OF REDUNDANCY	A time of lost redundancy superior than specified in respective parameter was detected.
4900	LOAD LOCKED ON INVERTER	The *Load* is locked on *Inverter* after 3 *Load* transfers within 30 seconds. After time out (default 30 sec.) *Bypass* will be free.

Code	*Alarms*	*Meaning*
4955	OVERTEMPERATURE	An overtemperature condition has been detected on *Inverter*. Elapsed *"stop operation"* time, *Inverter* shut-down. With *Mains OK*, *Load* is transferred on *Mains*.
4998	LOAD OFF DUE TO EXTENDED OVERLOAD	*Load Off* after time-out of *"stop operation"* for overload on *Inverter* or *Bypass* (time depending on the % of overload).
4999	LOAD OFF DUE TO 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).
4119	BATTERY TEST STARTED	Start of *Manual* or *Automatic Battery Test*.
4120	BATTERY TEST STOPPED	End of *Manual* or *Automatic Battery Test*.
4161	RECTIFIER ON	*Rectifier* started.
4162	RECTIFIER OFF	*Rectifier* shut-down.
4163	GENERATOR ON	*Customer Interface* (X1 - 11, 22) received a *Gen-set ON* signal. Operating mode depend on setting of Parameters.
4164	GENERATOR OFF	*Customer Interface* (X1 - 11, 22) received a *Gen-set OFF* signal. Function *Bypass* enabled depends on setting of Parameter.
4302	INVERTER CANNOT BE TURNED ON	*Inverter* cannot be switched on because one of the following conditions is still present: *- Overtemperature - K7 opening Failure* *- Low Battery Voltage - High Battery Voltage* *- Inverter Fuses - DC Low* *- Overload - EPO (Emergency Power Off)*
4303	INVERTER CANNOT BE TURNED OFF	*Inverter* cannot be switched OFF, because the *Load* cannot be switched to *Mains* (voltage out of tolerance, not synchronized, BP 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 activated by the *control panel* or automatically for alarm presence.
4411	BYPASS MAINS OK	*Bypass Input Mains* is again within tolerance (voltage, frequency and phase).
4500	COMMAND LOAD OFF	Disconnection of the *Load* by opening *K6* and *K7* for: *EPO / Load Off / Overload / Stop Operation*.
4521	NO BYPASS POWER	With the *Load* supplied by *Automatic Bypass*, a *Mains Failure* or *K6* opening occurred.
4534	MULTIPLE LOAD TRANSFER	2 transfers *Inverter- Mains* have been detected in a short time (default 30 sec.).
4535	BYPASS LOCKED	*Bypass* is not available. *Contactor K6* is open, *SSM* deactivated.
4536	BYPASS FREE	*Bypass* is enabled. *Contactor K6* is closed.
4561	LOAD OFF	Push-button *"Load Off"* on the UPS Control Panel has been pressed, with the output circuit switch *Q1* closed.
4562	DETOUR ON	The auxiliary contact indicates that *Manual Bypass Q2* was closed.

Code	*Message*	*Meaning*
4564	DETOUR OFF	The auxiliary contact indicates that *Manual Bypass Q2* was 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 detected with alarm 4570.
4580	INVERTER AND MAINS SYNCHRONIZED	The voltages of *Inverter* and *Mains Bypass* are synchronized.
4582	COMMAND NOT TO SYNCHRONIZE	Command not to synchronize with *Mains*.
4583	COMMAND TO SYNCHRONIZE	Command to synchronize with *Mains*.
4600	COMMAND UPS ON	The *SEM 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 STAND BY	The function *SEM mode* is enabled, and according to the time program the UPS will run in *SEM mode*, supplying the Load normally by mains.
4602	Q1 OPEN	The auxiliary contact indicates that the output switch *Q1* was opened.
4603	Q1 CLOSED	The auxiliary contact indicates that the output switch *Q1* was closed.
4699	BATTERY TEST IMPOSSIBLE	*Automatic Battery Test* is not possible due to: - *No Mains Rectifier or Bypass.* - *Battery not fully charged.* - *Load is below 10% or above 80%.* Test is postponed for 1 week.
4763	REMOTE CONTROL ON	*Inverter* can be started or shut-down by remote control. Commands source can be chosen depending on the value of parameter (Service only): *0 = Only local panel* *1 = Only Remote Control* *2 = Both*
4764	REMOTE CONTROL OFF	*Inverter* cannot be started or shut-down by remote control. Commands source can be chosen depending on the value of parameter (Service only): *0 = Only local panel* *1 = Only Remote Control* *2 = Both*

7.3.4 Event report SG Series 60 - 120 PurePulse™

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

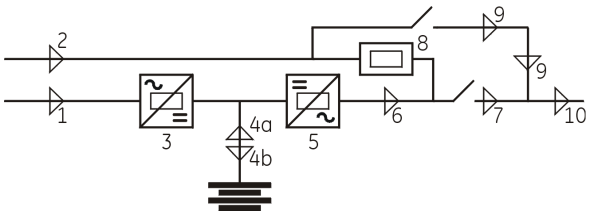
In order to make the diagnosis easier from our *Diagnostic Centre* we suggest you make a copy of this page, fill it out with the requested data and send it by fax.

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 4a	❑ ON	❑ OFF
LED 4b	❑ 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
LOAD	.....	%
BATTERY	.....	minutes

Description of repair actions taken:

.....

.....

.....

Actual situation:

.....

.....

.....

Remarks:

.....

.....

.....

.....

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

Remark: exact data and time are very important.

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

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 key 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.

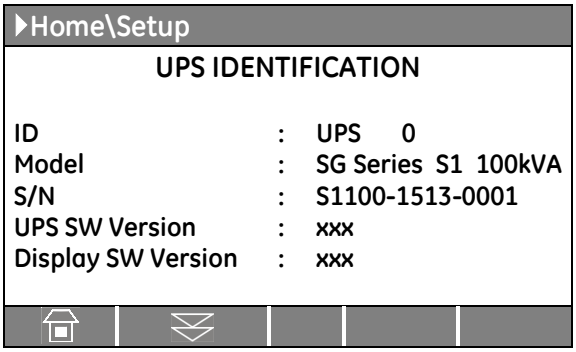
Allows to access a value to be set or modified.

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

Set or modify the selected value.

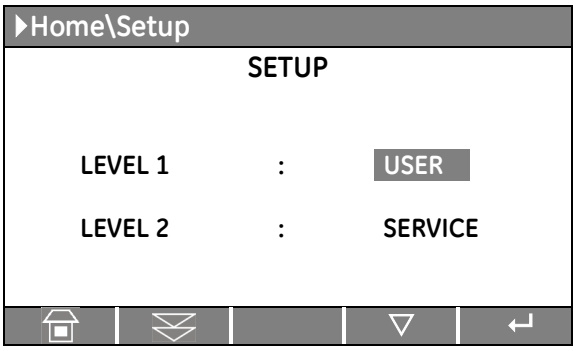
Save the set or modified value and return to the selected screen.

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.



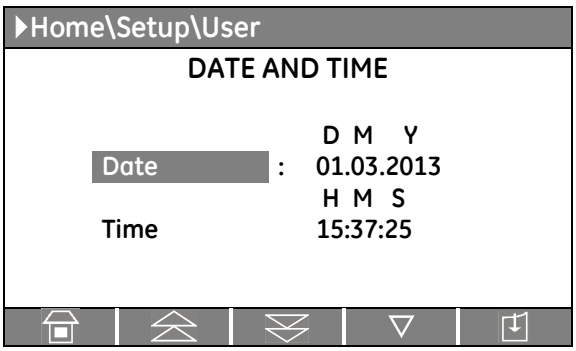
Setup screen

LEVEL 1 USER

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

LEVEL 2 SERVICE

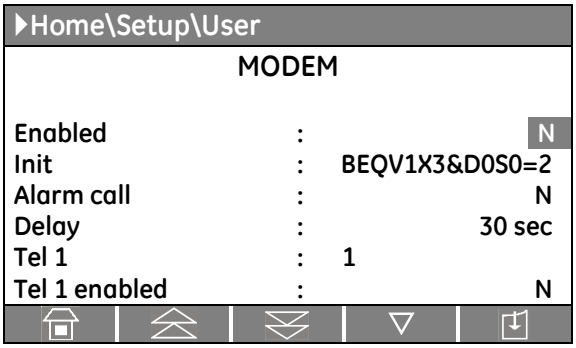
Service only allowed.
At this level the parameters access is protected by a code.



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.

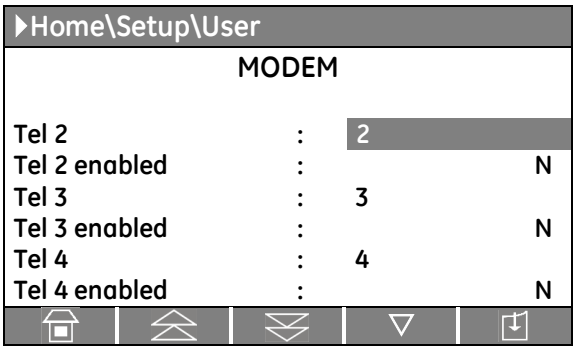
When editing this parameter the UPS considers that a blank character terminates the string.
If no blank character is found then all 40 characters are used.

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 dialing.
It is useful because since the events typically do not occur isolated but in certain sequences, you can eliminate the need for multiple dial-outs for such a sequence of events.

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

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



Modem screen 2

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

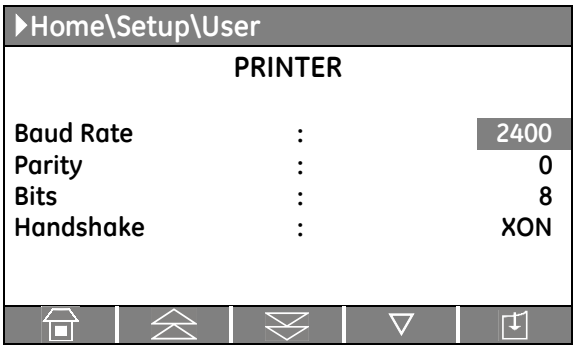
Tel 2 enabled
This parameter *Y/N* specifies if the *second telephone number* will be used for dial-out.

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

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

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.



Printer setup screen

The UPS is capable of communicating to a serial printer, to printout disparate information.
Please be sure to have a serial printer with a serial *RS232* interface.
This is the only printer-interface supported by the UPS.

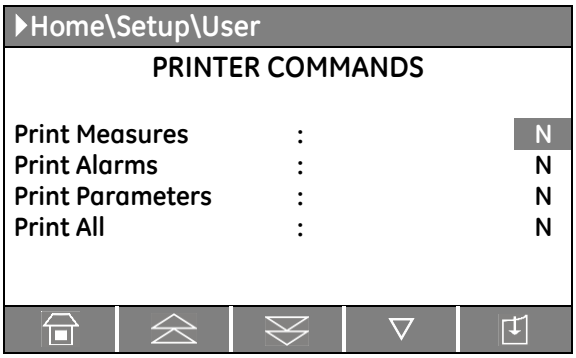
Baud Rate
This parameter controls the baud rate used for data transmission.

Parity This parameter controls the parity used for data transmission.
Odd (O) even (E) and *"No Parity" (NO)* can be selected.
In case *"No Parity" (NO)* has been set, automatically the parameter *"8 bits"* is used, independently of the value of *"Bits"* set.

Bits This parameter controls the length of the data word on the serial line during data transmission.

Handshake This parameter is used to determine the communication protocol used when printing.
Valid values are *"XON"* standing for the *XON/XOFF* protocol or *"NO"* standing for any protocol.

NOTE !
Please configure your printer with the following parameters: 2400/8/N (2400 bauds/sec, 8 bits, no parity).



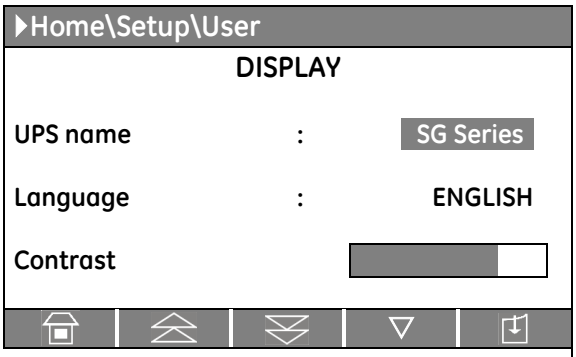
Printer command screen

Print Measures This *Y/N* parameter is used to print only the measurement data.

Print Alarms This *Y/N* parameter is used to print only the sequence of all Alarms/Events.

Print Parameters This *Y/N* parameter is used to print only the list of User and Service Parameters.

Print All This parameter *Y/N* is used to print all the available information in the sequence *metering*, *alarms*, *user* and *service parameters*.

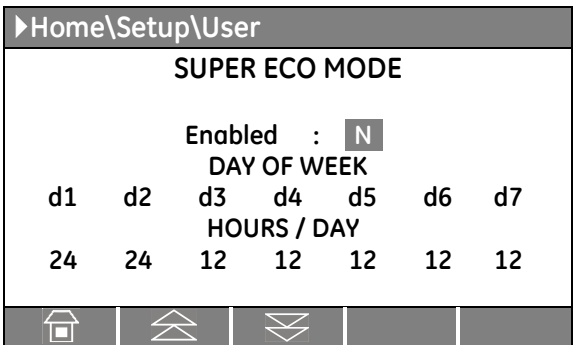


LCD Display screen

UPS Name The user can choose the name of the UPS model shown on the main page (max. 9 characters).

Language This parameter allows the choice of language used to display the information.
Valid choices are: *English, German, Italian, Spanish, French, Finnish, Polish, Portuguese, Czech, Slovakian, Chinese, Swedish, Russian and Dutch*.

Contrast This parameter controls the contrast of the *LCD screen* in ten steps (0 – 9).



SUPER 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 *SEM mode (Super Eco Mode)*.
If the value is *Y* and the current time is in the interval for the current day, the *SEM mode* is active.

The activation / deactivation of *SEM* 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 *SEM 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 *SEM mode*.
The hour is given in 24-hour format.

These intervals are defined by:

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

SEM STOP: The hour of the day before which the *SEM mode* is enabled.

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

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

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

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

Example 1:

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

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

Example 2:

***SEM STOP* before *SEM START*.**
SEM START 18:00, *SEM STOP* 06:00 for weekday ***d4 - Tuesday***.
Means that on ***d4 - Tuesday*** the *SEM 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*
SEM START	00:00	00:00	00:00	18:00	00:00	00:00	00:00
SEM STOP	23:59	23:59	23:59	06:00	23:59	23:59	23:59

Example 3:

***SEM mode* during the night and week-end.**
If the *SEM 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*
SEM START	00:00	00:00	18:00	18:00	18:00	18:00	18:00
SEM STOP	23:59	23:59	06:00	06:00	06:00	06:00	06:00

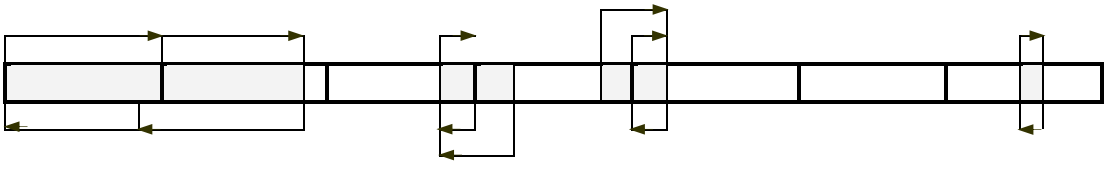
Example 4:

If the *SEM* 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*
SEM START	00:00	00:00	18:00	18:00	00:00	00:00	12:00
SEM STOP	23:59	20:00	23:59	06:00	06:00	00:00	13:00

SEM START

SEM STOP



In dark colour are displayed the times with *SEM mode* operation.

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

Note that on day ***d6 - Thursday*** the interval has length 0 (zero), therefore the *SEM mode* is not enabled on this day.

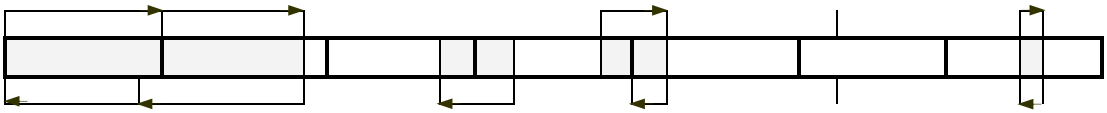
Example 5:

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

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

SEM START

SEM STOP



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

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

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

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

The *SEM START* time of weekday ***d5 - Wednesday*** has no effect as it is preceded by the *SEM 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 *SEM mode* operation, verify:

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

NOTE !

The *SEM 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:

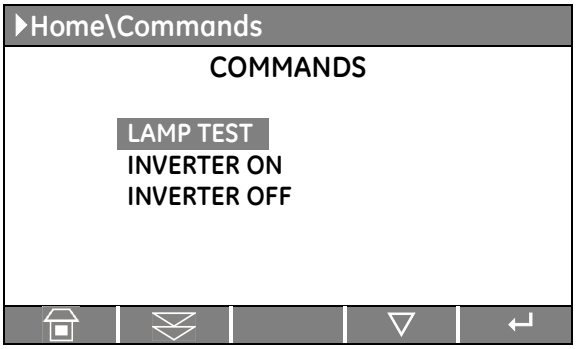
Return to HOME screen.

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.

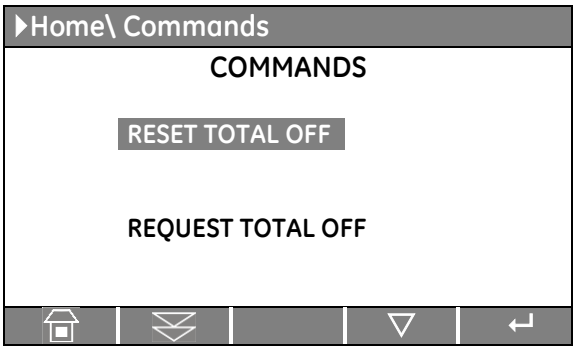


Commands screen 1

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.

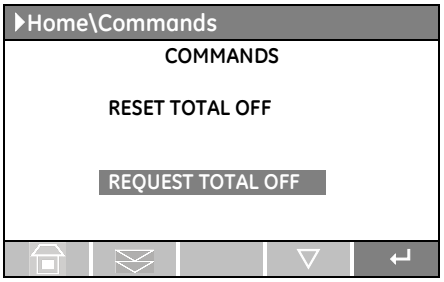


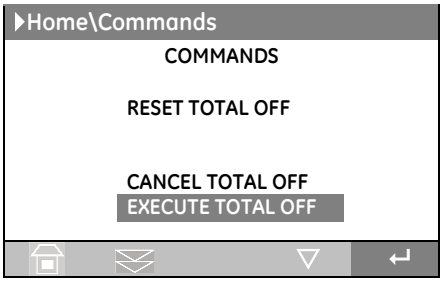
Commands screen 2

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

REQUEST TOTAL OFF
Command *"Load Off"*.

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





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

8 OPERATION

NOTE !

SG Series 60 - 120 PurePulse™ requires the introduction of a "START-UP KEY" code to perform the first commissioning.

The *"START-UP KEY"* code can be introduced by a *SERVICE TECHNICIAN GE* only.

The introduction of the *"START-UP KEY"* code is mandatory to proceed to the first start-up of the UPS.

RPA
Redundant Parallel Architecture

This symbol refers to the operations of a RPA Parallel System.

WARNING !

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

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

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

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

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

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

8.1 PROCEDURES FOR SINGLE *SG Series 60 - 120 PurePulse™*

8.2 PROCEDURES FOR SINGLE *SG Series 60 - 120 PurePulse™* FUNCTIONING AS FREQUENCY CONVERTER

8.3 PROCEDURES FOR *SG Series SG Series 60 - 120 PurePulse™* PARALLEL SYSTEM

8.1 PROCEDURES FOR SINGLE SG Series 60 - 120 PurePulse™

8.1.1 Initial start-up of the SG Series 60 - 120 PurePulse™

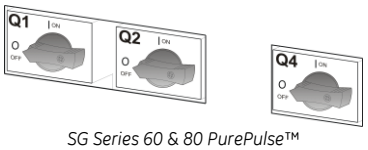
WARNING !

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

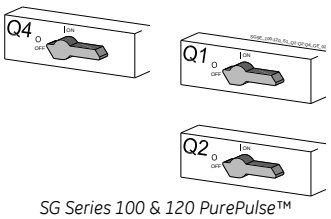
Ensure that the *Output Load distribution* can be powered and all the *Output Isolators* are open.

Open the front door and make sure that:

- All the ***connections*** to the input/output terminals or bus bars of the UPS have been made correctly.
- The ***safety screens*** are fixed in their position.
- The switches ***Q1***, ***Q2*** and ***Q4*** **are open (Pos. O)** and the ***"External Battery Protection"*** *(Switch or Fuses)* **must be open** (Pos. O).

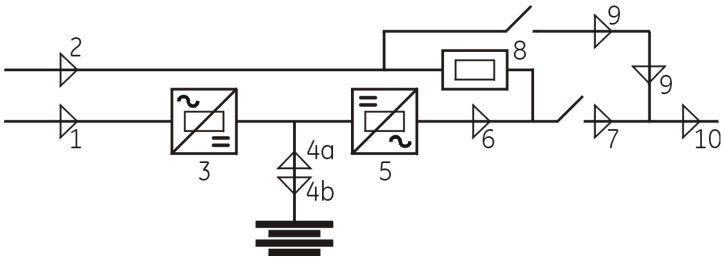


SG Series 60 & 80 PurePulse™



SG Series 100 & 120 PurePulse™

Q1 UPS Output switch
Q2 Manual Bypass switch
Q4 Rectifier Input switch

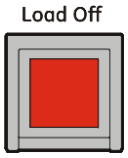


LEDs on Synoptic Diagram

LED 1	*Mains Rectifier OK*	*LED 6*	*Inverter ON*
LED 2	*Mains Bypass OK*	*LED 7*	*Q1 closed*
LED 3	*Rectifier ON*	*LED 8*	*Automatic Bypass ON*
LED 4a	*Discharging Battery*	*LED 9*	*Manual Bypass Q2 ON*
LED 4b	*Charging Battery*	*LED 10*	*Load on UPS*
LED 5	*Inverter available*		

Key Inverter ON

Key Inverter OFF



Key Load Off

LED Stop Operation

LED Alarm

LED Operation

1. Switch-ON the Mains voltage from the input distribution (both Rectifier and Bypass if separated).

The UPS performs a *SELFTEST*.

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

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**		

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.

Continue ►

During the first commissioning *SG Series 60 - 120 PurePulse™* requests a set-up of the UPS configuration parameters presented in the following screens.

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

WARNING !

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

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

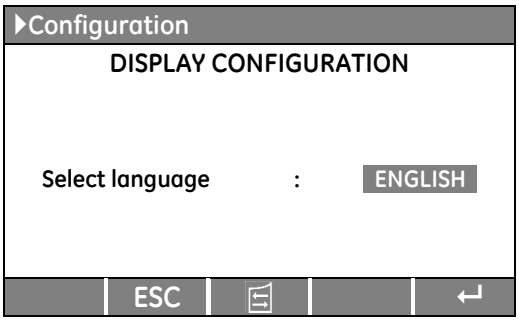
In this mode the keys perform the following functions:

↵ Confirm the selection made and select the next parameter.

ESC Re-establish default value.

Modify or insert the selected value.

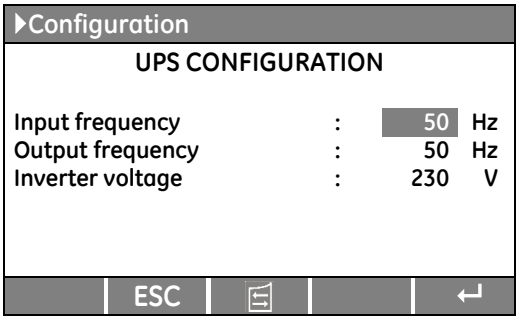
Save the configuration of set parameters.



DISPLAY CONFIGURATION screen

Select language

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



UPS CONFIGURATION screen

Input frequency

Input frequency value (50 Hz / 60Hz).

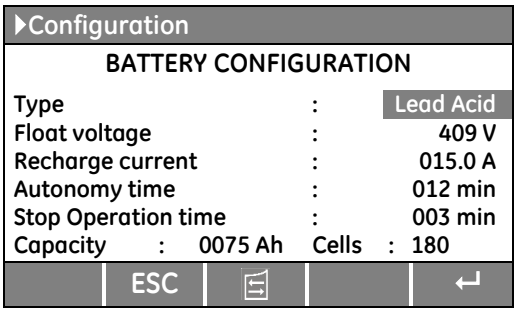
Output frequency

Inverter output frequency value (50 Hz / 60Hz).

Inverter voltage

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

Continue ▶



BATTERY CONFIGURATION screen

Recharge type of the battery

Recharge type (Lead Acid / NiCd / Boost).

Lead - Acid	Sealed Battery (VRLA), NiCd without boost-charge and Open Battery without boost-charge.
NiCd	Nickel Cadmium Battery with boost-charge.
Boost	Open Battery with boost-charge.

Float voltage

Voltage to maintain battery charging.
Float voltage = Number of battery cells x battery float voltage per cell.
Typical battery float voltage per cell (ask the battery manufacturer for confirmation):

Sealed Battery (VRLA):	2.27 Vdc for cell	177÷192 cells x 2.27 Vdc = **402÷436 Vdc**
NiCd Battery without boost-charge:	1.41 Vdc for cell	284÷309 cells x 1.41 Vdc = **401÷436 Vdc**
NiCd Battery with boost-charge:	1.41 (1.55 boost-charge) Vdc for cell	281 cells x 1.41 Vdc = **397** (436) **Vdc**
Open Battery without boost-charge:	2.23 Vdc for cell	180÷195 cells x 2.23 Vdc = **402÷435 Vdc**
Open Battery with boost-charge:	2.23 (2.35 boost-charge) Vdc for cell	180÷185 cells x 2.23 Vdc = **402** (423)**÷413** (435) **Vdc**

Recharge current

Maximum battery recharge current.
Max 20% of battery capacity (Ah). Example: 100Ah - max recharging current 20A.

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)							
180 cells	Autonomy at full Load at PF=0.8						U floating **= 409 Vdc (2.27 Vdc - cell)**
UPS model	Battery with expected trickle life 5 years						Battery with expected trickle life 10 years
	50Ah	75Ah	2x50Ah	2x75Ah	4x50Ah	4x75Ah	
SG Series 60 PurePulse™	13	22	31	53	77	139	According to client requirement
SG Series 80 PurePulse™	9	15	22	36	52	95	
SG Series 100 PurePulse™	-	12	17	27	37	65	
SG Series 120 PurePulse™	-	9	13	22	32	51	

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 table).

Capacity

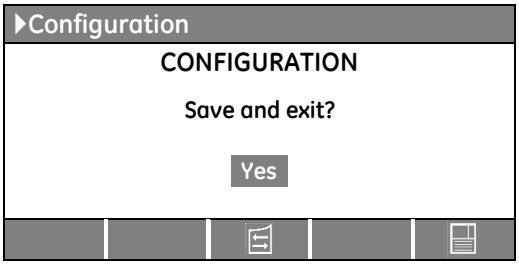
Ah capacity of the Battery.

Cells

Number of cells of the Battery, see "**Float voltage**".

Example: **180 battery cells** 30 blocks / 12 Vdc Battery 60 blocks / 6 Vdc Battery 180 blocks / 2 Vdc Battery

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 from a GE SERVICE PERSON as it requires an access code.

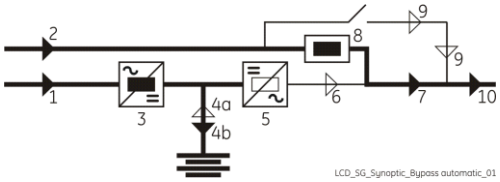
Continue ▶

2. *Close input Rectifier switch Q4 (Pos. I).*

3. *Close UPS output switch Q1 (Pos. I).*

- The *Load* is supplied by the *Mains* through the *Automatic Bypass.*
- *Rectifier* starts automatically, blinking *LED 3 (Rectifier ON)* indicates Soft-start.
- At the end of *Rectifier* Soft-start the *LED 3 (Rectifier ON)* remains lit.

The *Synoptic Diagram* must display the status *"**LOAD SUPPLIED BY AUTOMATIC BYPASS**"*.



4. *Connect the Battery to the UPS by closing the "External Battery Protection" (Switch or Fuses).*

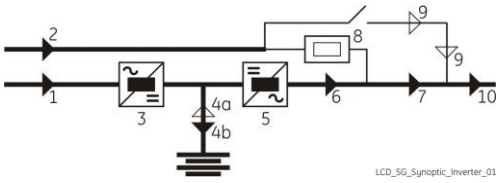
DANGER !

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

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

- Soft-start of *Inverter* indicated with blinking *LED 5 (Inverter available).*
- At the end of Soft-start the *LED 5 (Inverter available)* remains lit.
- Automatic transfer from *Bypass* to *Inverter.*
- UPS output *LED* indicates *Load on Inverter.*
- *LED Alarm* turn Off and the *LED Operation* must be lit.

The *Synoptic Diagram* must display the status *"**LOAD SUPPLIED BY INVERTER**"*.



END OF PROCEDURE

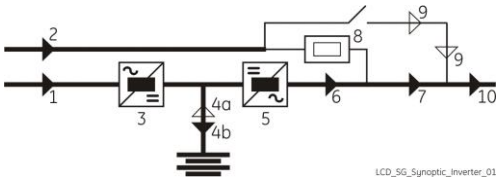
NOTE !

The *Battery* must be charged for at least 10 hours, in order to ensure the full backup runtime in case of a *Mains Failure*.

8.1.2 UPS shut-down with load transfer on Manual Bypass Q2

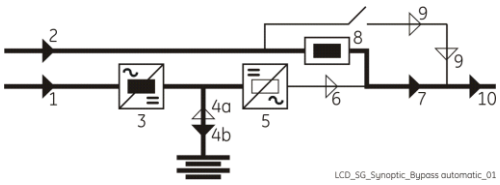
Initial status:

Load supplied from Inverter.



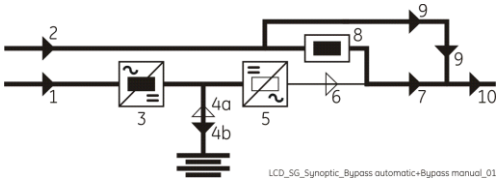
1. ***Disconnect the Inverter by pressing "Inverter OFF" (O) key and hold until the LED 5 (Inverter available) turns OFF.***
   - *Load* is transferred to *Mains* by *Automatic Bypass*.
   - *Inverter* shuts down. *LED 5 (Inverter available)* must be OFF.
   - *LED Alarm* is lit and the *LED Operation* is Off.

   The *Synoptic Diagram* must display the status "***LOAD SUPPLIED BY AUTOMATIC BYPASS***".



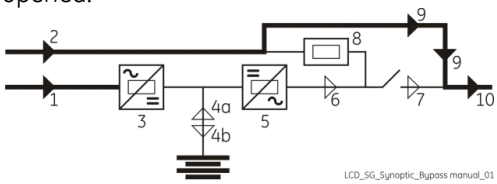
2. ***Close Manual Bypass switch Q2 (Pos. I).***
   - *Load* is now supplied parallel through *Automatic Bypass* and *Manual Bypass Q2*.
   - *LED 9 (Manual Bypass Q2 ON)* is lit.

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



3. ***Open UPS output switch Q1 (Pos. O) and then press "Load Off" button.***
   - *Load* is now supplied from *Manual Bypass Q2*.
   - *Rectifier* shuts down and all output and input *contactors* are opened.

   The *Synoptic Diagram* must display the status "***LOAD SUPPLIED BY MANUAL BYPASS Q2***".



4. ***Open input Rectifier switch Q4 (Pos. O).***

5. ***Disconnect the Battery from the UPS.***
   - **Wait *5 minutes*** for DC-Link Capacitors discharge.

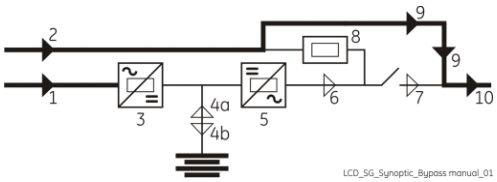
END OF PROCEDURE

DANGER !
It will take 5 minutes for the DC capacitors to discharge
Open only the front door, do not open any other part of the UPS.

8.1.3 From Manual Bypass Q2 to normal function VFI

Initial status:

Load supplied from Manual Bypass Q2.

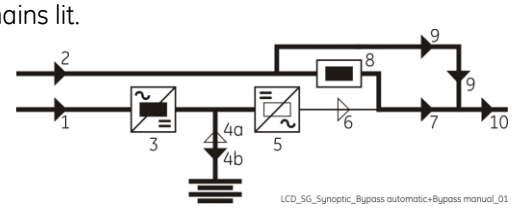


1. *Close input Rectifier switch Q4 (Pos. I).*

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

- *Load* is now supplied parallel through *Automatic Bypass* and *Manual Bypass Q2*
  LED 8 (Automatic Bypass ON) and *LED 9 (Manual Bypass Q2 ON)* are lit.
- *Rectifier* starts automatically, blinking *LED 3 (Rectifier ON)* indicates Soft-start.
- At the end of *Rectifier* Soft-start the *LED 3 (Rectifier ON)* remains lit.

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

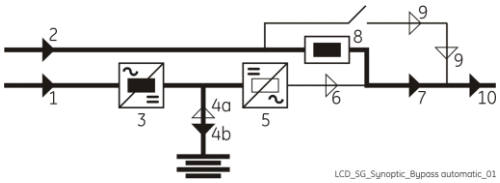


3. *Connect the Battery to the UPS by closing the "External Battery Protection" (Switch or Fuses).*

4. *Open Manual Bypass switch Q2 (Pos. O).*

- The *Load* is supplied by the *Mains* through the *Automatic Bypass*.
- *LED 9 (Manual Bypass Q2 ON)* turns OFF.

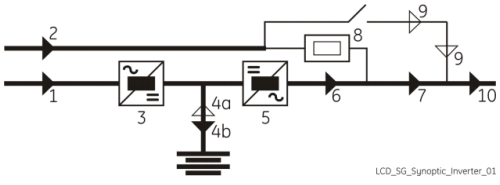
The *Synoptic Diagram* must display the status *"**LOAD SUPPLIED BY AUTOMATIC BYPASS**"*.



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

- Soft-start of *Inverter*, indicated with blinking *LED*.
- At the end of Soft-start the *LED* remains lit.
- Automatic transfer from *Bypass* to *Inverter*.
- *LED Alarm* turn Off and the *LED Operation* must be lit.

The *Synoptic Diagram* must display the status *"**LOAD SUPPLIED BY INVERTER**"*.



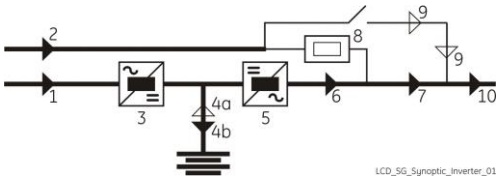
END OF PROCEDURE

8.1.4 Complete UPS shut-down

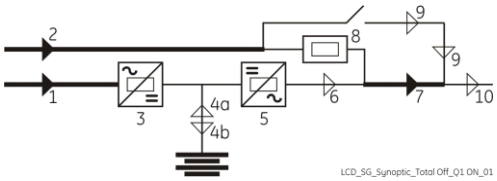
	**NOTE !** **Follow this procedure only in case the UPS system and the *Load* must be completely powered-down.**

Initial status:

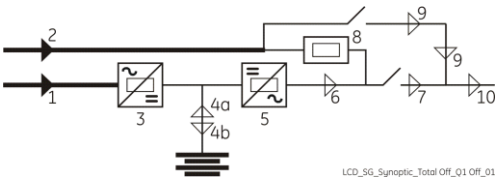
Load supplied from Inverter.



1. ***Press "Load Off" button.***
   - *Load* is disconnected from *UPS*.
   - *Rectifier* and *Inverter* are shut down, all output and input *contactors* will be opened.
   - *LED 3 (Rectifier ON), LED 5 (Inverter available)* and *LED 10 (Load on UPS)* are OFF.
   - *LED Alarm* is lit and the *LED Operation* is Off.



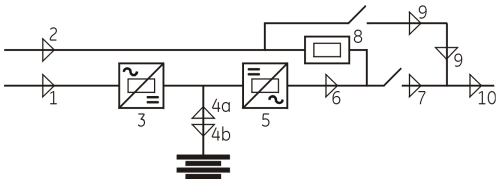
2. ***Open UPS output switch Q1 (Pos. O).***



3. ***Open input Rectifier switch Q4 (Pos. O).***

4. ***Disconnect the Battery from the UPS.***
   - **Wait *5 minutes*** for DC-Link Capacitors discharge.

5. ***Disconnect the Mains from the input distribution.***
   - All *LEDs* are OFF.



END OF PROCEDURE

	**DANGER !** **It will take 5 minutes for the DC capacitors to discharge.** **Open only the front door, do not open any other part of the UPS.**

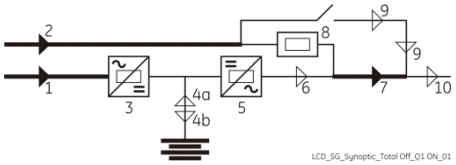
8.1.5 Restore to normal operation after "Load Off"

	WARNING ! **Please check and ensure the conditions of the connected load are safe before proceeding, as this procedure will result in the connection of power to the load circuit(s).**

8.1.5.1 Restore to normal operation after "Load Off" with Load not supplied

	NOTE ! **Before performing this operation, make sure that the UPS is in the following status:** - ***"Q2 - Manual Bypass switch"*** **MUST BE OPEN.** - ***"Q1 - UPS Output switch"*** **and** ***"Q4 -Rectifier Input switch"*** **MUST BE CLOSED.** - ***"External Battery Protection" (Switch or Fuses)*** **MUST BE DISCONNECTED.**

View of the *Synoptic Diagram* after performed the command *"Load Off"*, with LOAD NOT SUPPLIED (*Q2 - Manual Bypass switch* MUST BE OPEN).

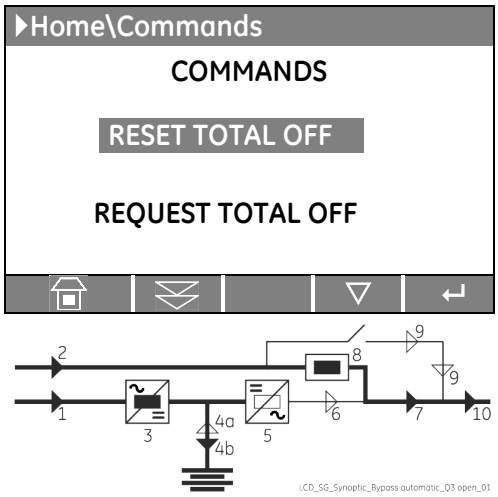


1. ***Restore the command "Load Off".***

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

   - The *Load* is supplied by the *Mains* through the *Automatic Bypass*.
   - *Rectifier* starts automatically, blinking *LED 3 (Rectifier ON)* indicates Soft-start.
   - At the end of Soft-start the *LED 3 (Rectifier ON)* remains lit.

   The *Synoptic Diagram* must display the status *"**LOAD SUPPLIED BY AUTOMATIC BYPASS**"*.

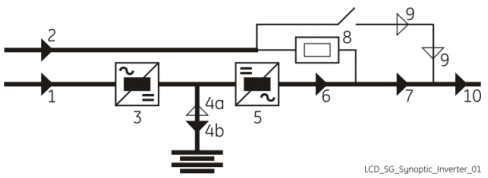


2. ***Connect the Battery to the UPS by closing the "External Battery Protection" (Switch or Fuses).***

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

   - Soft-start of *Inverter* indicated with blinking *LED 5 (Inverter available)*.
   - At the end of Soft-start the *LED 5 (Inverter available)* remains lit.
   - Automatic transfer from *Automatic bypass* to *Inverter*.
   - *LED Alarm* turns Off and the *LED Operation* must be lit.

   The *Synoptic Diagram* must display the status *"**LOAD SUPPLIED BY INVERTER**"*.

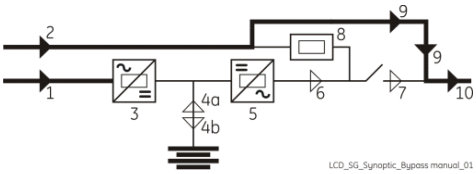


END OF PROCEDURE

8.1.5.2 Restore to normal operation after "Load Off" with Load supplied by Manual Bypass (Q2)

⚠	**NOTE !** **Before performing this operation, make sure that the UPS is in the following status:** - ***"Q2 - Manual Bypass switch"*** **MUST BE CLOSED.** - ***"Q1 - UPS Output switch"*** **and** ***"Q4 -Rectifier Input switch"*** **MUST BE OPEN.** - ***"External Battery Protection" (Switch or Fuses)*** **MUST BE DISCONNECTED.**

View of the *Synoptic Diagram* after performed the command *"Load Off"*, with *LOAD SUPPLIED BY MANUAL BYPASS (Q2 - Manual Bypass switch* MUST BE CLOSED).



1. Close the "Q4 - Rectifier Input switch" (Pos. I).

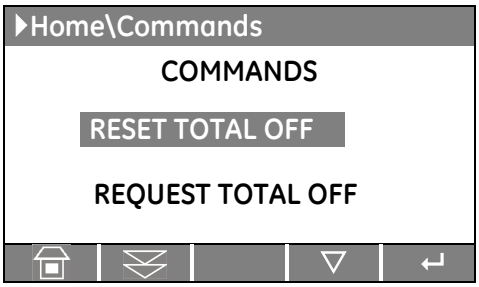
2. Close the "Q1 - UPS Output switch" (Pos. I).

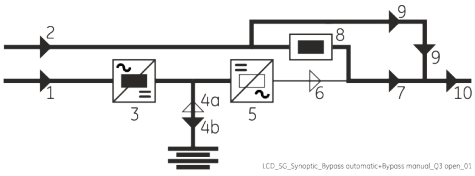
3. Restore the command "Load Off".

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

- The *Load* is supplied by the *Mains* through the *Automatic Bypass* and *Manual Bypass Q2*.
- *Rectifier* starts automatically, blinking *LED 3 (Rectifier ON)* indicates Soft-start.
- At the end of Soft-start the *LED 3 (Rectifier ON)* remains lit.

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



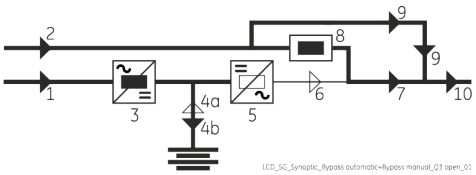


4. Connect the Battery to the UPS by closing the "External Battery Protection" (Switch or Fuses).

Continue ►

NOTE !

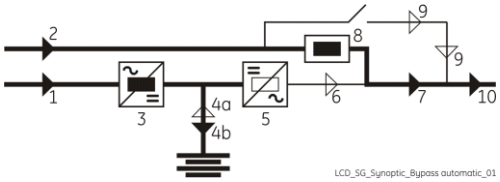
Before performing this operation, the *Synoptic Diagram* must display the status *"LOAD SUPPLIED BY AUTOMATIC BYPASS AND MANUAL BYPASS Q2"*!



5. *Open the "Q2 - Manual Bypass switch" (Pos. O).*

- The *Load* is supplied by the *Mains* through the *Automatic Bypass.*
- *LED 9 (Manual Bypass Q2 ON)* turns OFF.

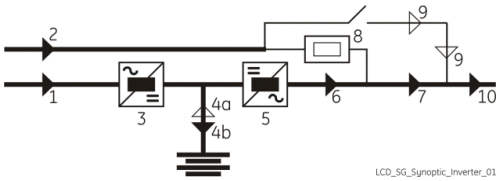
The *Synoptic Diagram* must display the status *"**LOAD SUPPLIED BY AUTOMATIC BYPASS**"*.



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

- Soft-start of *Inverter*, indicated with blinking *LED 5 (Inverter available).*
- At the end of Soft-start the *LED 5 (Inverter available)* remains lit.
- Automatic transfer from *Automatic Bypass* to *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

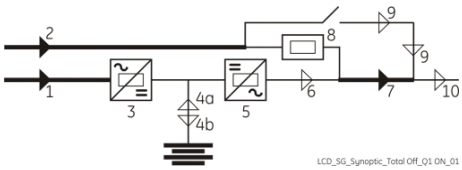
8.1.6 Restore to normal operation after "EPO - Emergency Power Off"

	**WARNING !** **Please check and ensure the conditions of the connected load are safe before proceeding, as this procedure will result in the connection of power to the load circuit(s).**

8.1.6.1 Restore to normal operation after "EPO - Emergency Power Off" with Load not supplied

	**NOTE !** **Before performing this operation, make sure that the UPS is in the following status:** - ***"Q2 - Manual Bypass switch"*** **MUST BE OPEN.** - ***"Q1 - UPS Output switch"*** **and** ***"Q4 -Rectifier Input switch"*** **MUST BE CLOSED.** - ***"External Battery Protection" (Switch or Fuses)*** **MUST BE DISCONNECTED.**

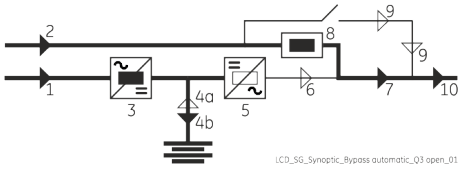
View of the *Synoptic Diagram* after performed the command *"EPO - Emergency Power Off"*, with LOAD NOT SUPPLIED (*Q2 - Manual Bypass switch* MUST BE OPEN).



1. ***Restore the "EPO - Emergency Power Off" button.***
   - Press *"MUTE"* key to reset *alarm* and *acoustical alarm*.
   - *LED Alarm* remains lit.

2. ***Press "Inverter OFF" (O) key.***
   - *Load* is transferred to Mains by *Automatic Bypass*.
   - *Rectifier* starts automatically, blinking *LED 3 (Rectifier ON)* indicates Soft-start.
   - At the end of *Rectifier* Soft-start the *LED 3 (Rectifier ON)* remains lit.

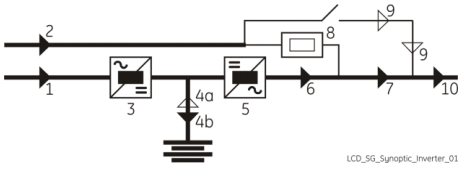
   The *Synoptic Diagram* must display the status *"**LOAD SUPPLIED BY AUTOMATIC BYPASS**"*.



3. ***Connect the Battery to the UPS by closing the "External Battery Protection" (Switch or Fuses).***

4. ***Insert the Inverter by pressing "Inverter ON" (I) key.***
   - Soft-start of *Inverter* indicated with blinking *LED 5 (Inverter available)*.
   - At the end of Soft-start the *LED 5 (Inverter available)* remains lit.
   - Automatic transfer from *Automatic bypass* to *Inverter*.
   - *LED Alarm* turns Off and the *LED Operation* must be lit.

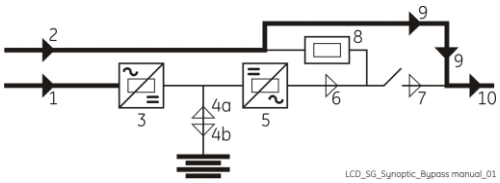
   The *Synoptic Diagram* must display the status *"**LOAD SUPPLIED BY INVERTER**"*.

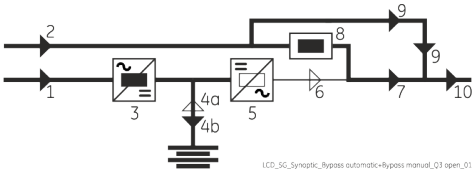


END OF PROCEDURE

8.1.6.2 Restore to normal operation after "EPO - Emergency Power Off" with Load supplied by Manual Bypass (Q2)

	**NOTE !** **Before performing this operation, make sure that the UPS is in the following status:** - ***"Q2 - Manual Bypass switch"*** **MUST BE CLOSED.** - ***"Q1 - UPS Output switch"*** **and** ***"Q4 -Rectifier Input switch"*** **MUST BE OPEN.** - ***"External Battery Protection" (Switch or Fuses)*** **MUST BE DISCONNECTED.**

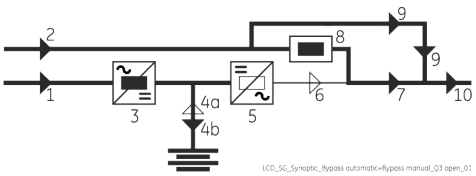
View of the *Synoptic Diagram* after performed the command *"EPO - Emergency Power Off"*, with *LOAD SUPPLIED BY MANUAL BYPASS (Q2 - Manual Bypass switch* MUST BE CLOSED).	

1. Close the "Q4 - Rectifier Input switch" (Pos. I).
2. Close the "Q1 - UPS Output switch" (Pos. I).
3. Restore the "EPO - Emergency Power Off" button. • Press *"MUTE"* key to reset *alarm* and *acoustical alarm*. • *LED Alarm* remains lit.
4. Press "Inverter OFF" (O) key. • The *Load* is supplied by the *Mains* through the *Automatic Bypass* and *Manual Bypass Q2*. • *Rectifier* starts automatically, blinking *LED 3 (Rectifier ON)* indicates Soft-start. • At the end of *Rectifier* Soft-start the *LED 3 (Rectifier ON)* remains lit. The *Synoptic Diagram* must display the status *"**LOAD SUPPLIED BY AUTOMATIC BYPASS AND MANUAL BYPASS Q2**"*. 
5. Connect the Battery to the UPS by closing the "External Battery Protection" (Switch or Fuses).

Continue ►

NOTE !

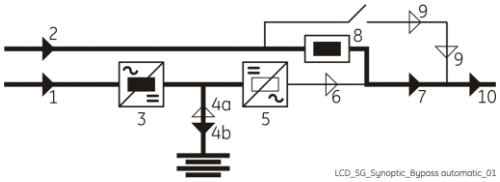
Before performing this operation, the *Synoptic Diagram* must display the status *"LOAD SUPPLIED BY AUTOMATIC BYPASS AND MANUAL BYPASS Q2"*!



6. *Open the "Q2 - Manual Bypass switch" (Pos. O).*

- The *Load* is supplied by the *Mains* through the *Automatic Bypass.*
- *LED 9 (Manual Bypass Q2 ON)* turns OFF.

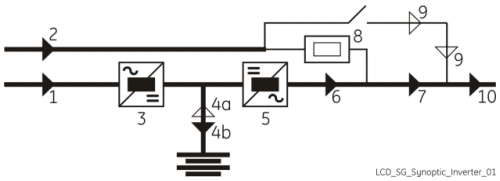
The *Synoptic Diagram* must display the status *"**LOAD SUPPLIED BY AUTOMATIC BYPASS**"*.



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

- Soft-start of *Inverter*, indicated with blinking *LED 5 (Inverter available).*
- At the end of Soft-start the *LED 5 (Inverter available)* remains lit.
- Automatic transfer from *Automatic Bypass* to *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

8.2 PROCEDURES SINGLE SG Series 60 - 120 PurePulse™ FUNCTIONING AS FREQUENCY CONVERTER

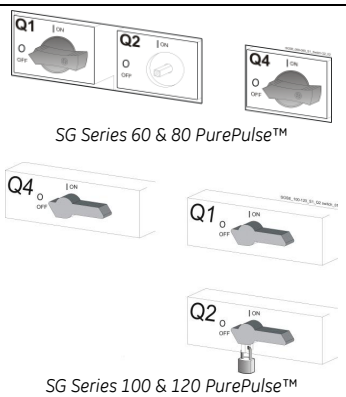
When the ***SG Series 60 - 120 PurePulse™*** functions as a *Frequency Converter*, the *Automatic Bypass* and *Manual Bypass* functions are disabled.
Therefore the *Load* cannot be transferred to *Mains* in case of overload, short circuit, or *Inverter* failure.
In situations where the UPS needs to be shut-down for maintenance purposes, also the *Load* must be shut-down or disconnected.

8.2.1 Initial Start-up of the SG Series 60 - 120 PurePulse™ as frequency converter

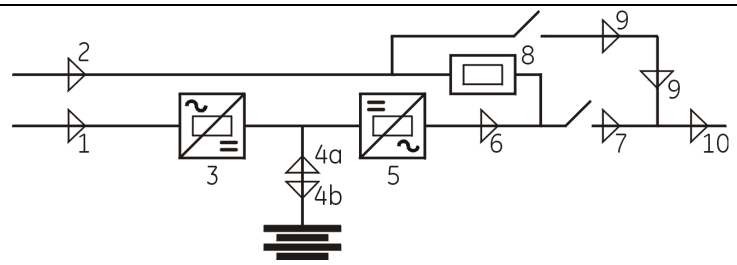
WARNING !
Before proceeding to turn on the UPS system, ensure that the *AC* and *DC external isolators* are OFF, and prevent their inadverted operation.
Ensure that the *Output Load distribution* can be powered and all the *Output Isolators* are open.

Open the front door and make sure that:

- All the ***connections*** to the input/output terminals or bus bars of the UPS have been made correctly.
- The ***safety screens*** are fixed in their position.
- The switches ***Q1*** and ***Q4*** **are open (Pos. O)** and the ***"External Battery Switch or Fuses"*** **must be open** (Pos. O).



Q1 *UPS Output switch*
Q4 *Rectifier Input switch*

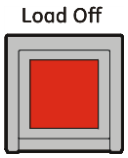


LEDs on Synoptic Diagram

LED 1	*Mains Rectifier OK*	*LED 6*	*Inverter ON*
LED 2	*Mains Bypass OK*	*LED 7*	*Q1 closed*
LED 3	*Rectifier ON*	*LED 8*	*Automatic Bypass ON*
LED 4a	*Discharging Battery*	*LED 9*	*Manual Bypass Q2 ON*
LED 4b	*Charging Battery*	*LED 10*	*Load on UPS*
LED 5	*Inverter available*		

Key Inverter ON

Key Inverter OFF



Key Load Off


LED Stop Operation


LED Alarm


LED Operation

1. Switch-ON the Mains voltage from the input distribution.

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) 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 *SG Series 60 - 120 PurePulse™* requests a set-up of the UPS configuration parameters presented in the following screens.

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

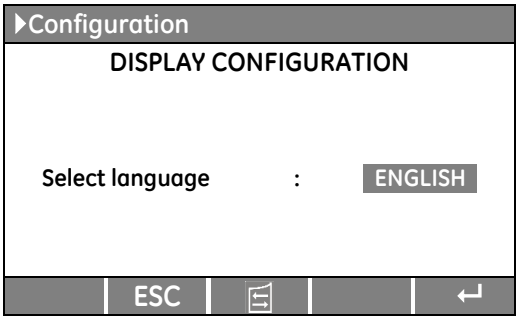
WARNING !

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

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

In this mode the keys perform the following functions:

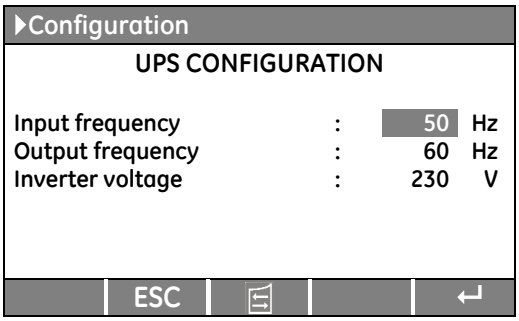
↵	Confirm the selection made and select the next parameter.
ESC	Re-establish default value.
	Modify or insert the selected value.
	Save the configuration of set parameters.



DISPLAY CONFIGURATION screen

Select language

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



UPS CONFIGURATION screen

Input frequency

Input frequency value (50 Hz / 60Hz).

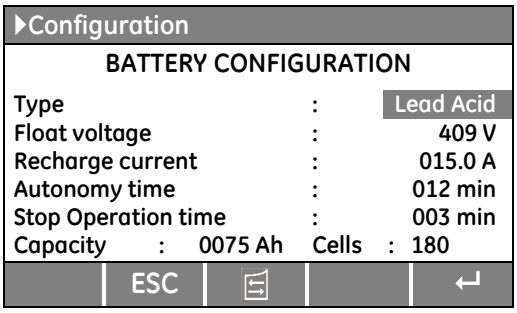
Output frequency

Inverter output frequency value (50 Hz / 60Hz).

Inverter voltage

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

Continue ►



BATTERY CONFIGURATION screen

Recharge type of the battery

Recharge type (Lead Acid / NiCd / Boost).

Lead - Acid	Sealed Battery (VRLA), NiCd without boost-charge and Open Battery without boost-charge.
NiCd	Nickel Cadmium Battery with boost-charge.
Boost	Open Battery with boost-charge.

Float voltage

Voltage to maintain battery charging.
Float voltage = Number of battery cells x battery float voltage per cell.
Typical battery float voltage per cell (ask the battery manufacturer for confirmation):

Sealed Battery (VRLA):	2.27 Vdc for cell	177÷192 cells x 2.27 Vdc = **402÷436 Vdc**
NiCd Battery without boost-charge:	1.41 Vdc for cell	284÷309 cells x 1.41 Vdc = **401÷436 Vdc**
NiCd Battery with boost-charge:	1.41 (1.55 boost-charge) Vdc for cell	281 cells x 1.41 Vdc = **397** (436) **Vdc**
Open Battery without boost-charge:	2.23 Vdc for cell	180÷195 cells x 2.23 Vdc = **402÷435 Vdc**
Open Battery with boost-charge:	2.23 (2.35 boost-charge) Vdc for cell	180÷185 cells x 2.23 Vdc = **402** (423)**÷413** (435) **Vdc**

Recharge current

Maximum battery recharge current.
Max 20% of battery capacity (Ah). Example: 100Ah - max recharging current 20A.

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)							
180 cells	Autonomy at full Load at PF=0.8						U floating **= 409 Vdc (2.27 Vdc - cell)**
UPS model	Battery with expected trickle life 5 years						Battery with expected trickle life 10 years
	50Ah	75Ah	2x50Ah	2x75Ah	4x50Ah	4x75Ah	
SG Series 60 PurePulse™	13	22	31	53	77	139	According to client requirement
SG Series 80 PurePulse™	9	15	22	36	52	95	
SG Series 100 PurePulse™	-	12	17	27	37	65	
SG Series 120 PurePulse™	-	9	13	22	32	51	

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 table).

Capacity

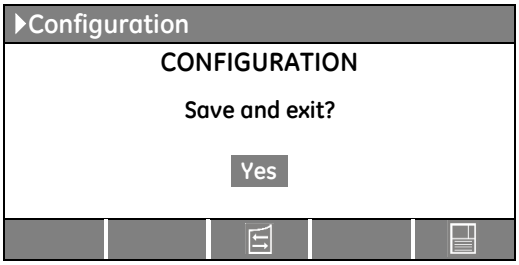
Ah capacity of the Battery.

Cells

Number of cells of the Battery, see "**Float voltage**".

Example: **180 battery cells** 30 blocks / 12 Vdc Battery 60 blocks / 6 Vdc Battery 180 blocks / 2 Vdc Battery

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 from a GE SERVICE PERSON as it requires an access code.

Continue ▶

2. *Close input Rectifier switch Q4 (Pos. I).*

3. *Close UPS output switch Q1 (Pos. I).*

- *Rectifier* starts automatically, blinking *LED 3 (Rectifier ON)* indicates Soft-start.
- At the end of *Rectifier* Soft-start the *LED 3 (Rectifier ON)* remains lit.

4. *Connect the Battery to the UPS by closing the "External Battery Protection" (Switch or Fuses).*

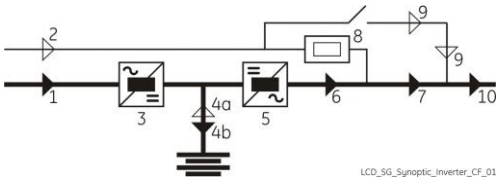
DANGER !

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

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

- Soft-start of *Inverter* indicated with blinking *LED 5 (Inverter available)*.
- At the end of Soft-start the *LED 5 (Inverter available)* remains lit.
- *Load* is now supplied from *Inverter*.
- *LED Alarm* turn Off and the *LED Operation* must be lit.

The *Synoptic Diagram* must display the status *"**LOAD SUPPLIED BY INVERTER**"*.



END OF PROCEDURE

NOTE !

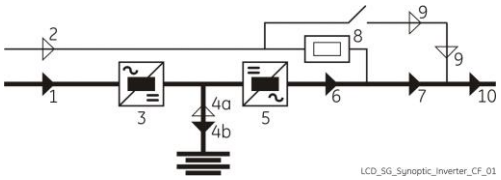
The *Battery* must be charged for at least 10 hours, in order to ensure the full backup runtime in case of a *Mains Failure*.

8.2.2 Complete shut-down of the SG Series 60 - 120 PurePulse™ as frequency converter

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

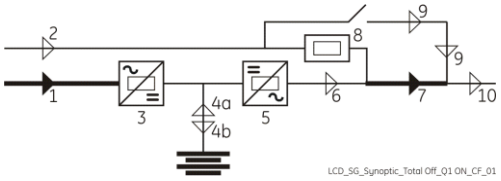
Initial status:

Load supplied from Inverter.

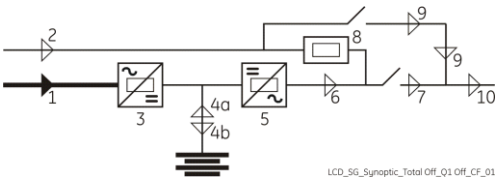


1. Press "Load Off" button.

- *Load* is disconnected from *UPS.*
- *Rectifier* is shut down and all output and input *contactors* will be opened.
- *LED 3 (Rectifier ON), LED 5 (Inverter available)* and *LED 10 (Load on UPS)* are OFF.
- *LED Alarm* is lit and the *LED Operation* is Off.



2. Open UPS output switch Q1 (Pos. O).



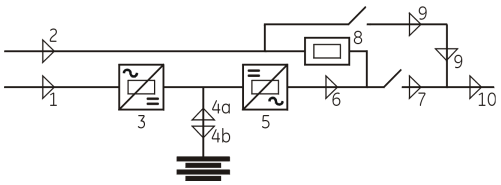
3. Open input Rectifier switch Q4 (Pos. O).

4. Disconnect the Battery from the UPS.

- **Wait *5 minutes*** for DC-Link Capacitors discharge.

5. Disconnect the Mains from the input distribution.

- All *LEDs* are OFF.



END OF PROCEDURE

	**DANGER !** **It will take 5 minutes for the DC capacitors to discharge.** **Open only the front door, do not open any other part of the UPS.**

8.2.3 Restore to normal operation after "Load Off" with Load not supplied

WARNING !

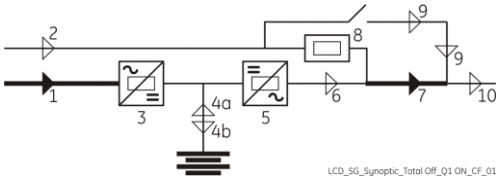
Please check and ensure the conditions of the connected load are safe before proceeding, as this procedure will result in the connection of power to the load circuit(s).

NOTE !

Before performing this operation, make sure that the UPS is in the following status:

- ***"Q1 - UPS Output switch"* and *"Q4 -Rectifier Input switch"* MUST BE CLOSED.**
- ***"External Battery Protection" (Switch or Fuses)* MUST BE DISCONNECTED.**

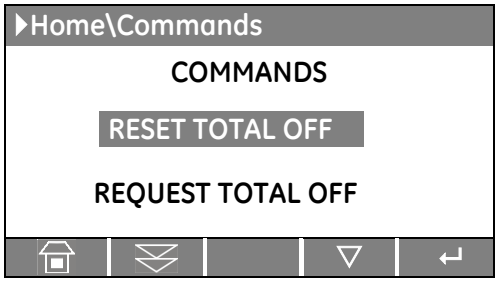
View of the *Synoptic Diagram* after performed the command *"Load Off"*, with LOAD NOT SUPPLIED.



1. ***Restore the command "Load Off".***

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

   - *Rectifier* starts automatically, blinking *LED 3 (Rectifier ON)* indicates Soft-start.
   - At the end of *Rectifier* Soft-start the *LED 3 (Rectifier ON)* remains lit.

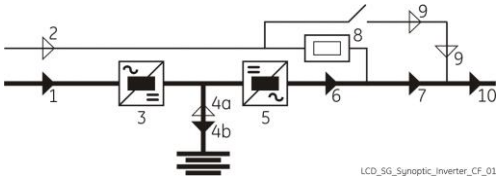


2. ***Connect the Battery to the UPS by closing the "External Battery Protection" (Switch or Fuses).***

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

   - Soft-start of *Inverter* indicated with blinking *LED 5 (Inverter available)*.
   - At the end of Soft-start the *LED 5 (Inverter available)* remains lit.
   - *LED Alarm* turns Off and the *LED Operation* must be lit.

   The *Synoptic Diagram* must display the status *"LOAD SUPPLIED BY INVERTER"*.



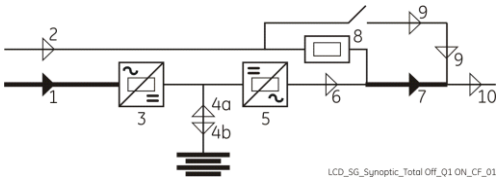
END OF PROCEDURE

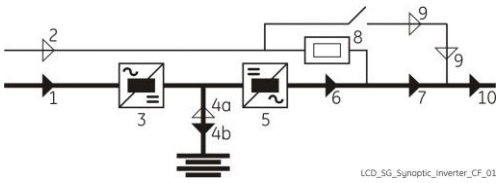
8.2.4 Restore to normal operation after "EPO - Emergency Power Off" with Load not supplied

	**WARNING !** **Please check and ensure the conditions of the connected load are safe before proceeding, as this procedure will result in the connection of power to the load circuit(s).**

	**NOTE !** **Before performing this operation, make sure that the UPS is in the following status:** - ***"Q1 - UPS Output switch"* and *"Q4 -Rectifier Input switch"* MUST BE CLOSED.** - ***"External Battery Protection" (Switch or Fuses)* MUST BE DISCONNECTED.**

View of the *Synoptic Diagram* after performed the command *"EPO - Emergency Power Off"*, with LOAD NOT SUPPLIED.



1. Restore the "EPO - Emergency Power Off" button. • Press *"MUTE"* key to reset *alarm* and *acoustical alarm*. • *LED Alarm* remains lit.
2. Press "Inverter OFF" (O) key. • *Rectifier* starts automatically, blinking *LED 3 (Rectifier ON)* indicates Soft-start. • At the end of *Rectifier* Soft-start the *LED 3 (Rectifier ON)* remains lit.
3. Connect the Battery to the UPS by closing the "External Battery Protection" (Switch or Fuses).
4. Insert the Inverter by pressing "Inverter ON" (I) key. • The *Inverter* will start-up. *LED 5 (Inverter available)* must be blinking. • At the end of Soft-start the *LED 5 (Inverter available)* remains lit. • *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

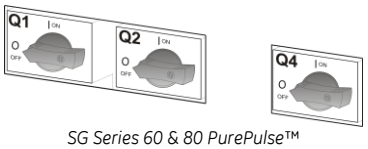
8.3 PROCEDURES FOR SG Series 60 - 120 PurePulse™ PARALLEL SYSTEM

8.3.1 SG Series 60 – 120 PurePulse™ Parallel System start-up

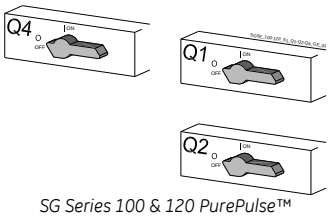
WARNING !
Before proceeding to turn on the UPS system, ensure that the *AC* and *DC external isolators* are OFF, and prevent their inadverted operation.
Ensure that the *Output Load distribution* can be powered and all the *Output Isolators* are open.

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

- All the ***connections*** to the input/output terminals or bus bars of the UPS have been made correctly.
- The ***safety screens*** are fixed in their position.
- The switches ***Q1***, ***Q2*** and ***Q4*** **are open (Pos. O)** and the ***"External Battery Protection"*** *(Switch or Fuses)* **must be open** (Pos. O).

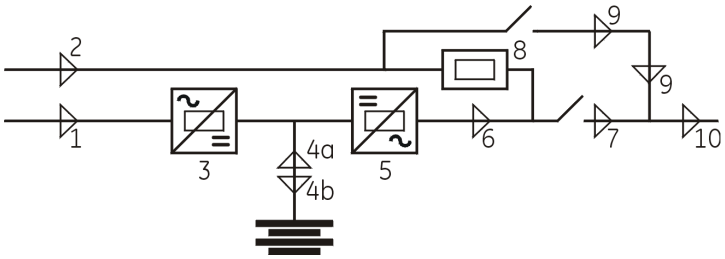


SG Series 60 & 80 PurePulse™



SG Series 100 & 120 PurePulse™

Q1 *UPS Output switch*
Q2 *Manual Bypass switch*
Q4 *Rectifier Input switch*

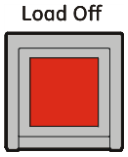


LEDs on Synoptic Diagram

LED 1	*Mains Rectifier OK*	*LED 6*	*Inverter ON*
LED 2	*Mains Bypass OK*	*LED 7*	*Q1 closed*
LED 3	*Rectifier ON*	*LED 8*	*Automatic Bypass ON*
LED 4a	*Discharging Battery*	*LED 9*	*Manual Bypass Q2 ON*
LED 4b	*Charging Battery*	*LED 10*	*Load on UPS*
LED 5	*Inverter available*		

Key Inverter ON

Key Inverter OFF



Key Load Off

LED Stop Operation

LED Alarm

LED Operation

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

The UPS performs a *SELFTEST*.

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

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

LED 1 (Mains Rectifier OK) and *LED 2 (Mains Bypass OK)* must be lit.
Press *"MUTE"* key to reset *acoustical alarm*. *LED Alarm* remains lit.

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 *SG Series 60 - 120 PurePulse™* requests a set-up of the UPS configuration parameters presented in the following screens.

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

WARNING !

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

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

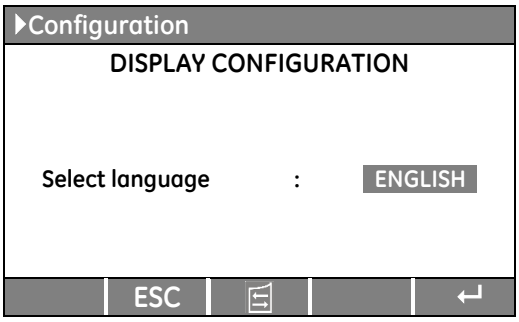
In this mode the keys perform the following functions:

↵ Confirm the selection made and select the next parameter.

ESC Re-establish default value.

Modify or insert the selected value.

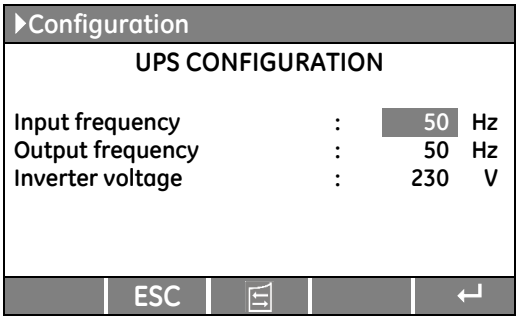
Save the configuration of set parameters.



DISPLAY CONFIGURATION screen

Select language

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



UPS CONFIGURATION screen

Input frequency

Input frequency value (50 Hz / 60Hz).

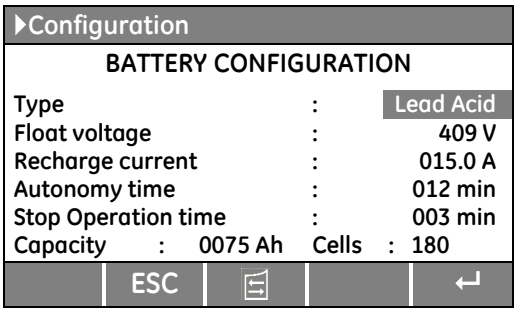
Output frequency

Inverter output frequency value (50 Hz / 60Hz).

Inverter voltage

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

Continue ►



BATTERY CONFIGURATION screen

Recharge type of the battery

Recharge type (Lead Acid / NiCd / Boost).

Lead - Acid	Sealed Battery (VRLA), NiCd without boost-charge and Open Battery without boost-charge.
NiCd	Nickel Cadmium Battery with boost-charge.
Boost	Open Battery with boost-charge.

Float voltage

Voltage to maintain battery charging.
Float voltage = Number of battery cells x battery float voltage per cell.
Typical battery float voltage per cell (ask the battery manufacturer for confirmation):

Sealed Battery (VRLA):	2.27 Vdc for cell	177÷192 cells x 2.27 Vdc = **402÷436 Vdc**
NiCd Battery without boost-charge:	1.41 Vdc for cell	284÷309 cells x 1.41 Vdc = **401÷436 Vdc**
NiCd Battery with boost-charge:	1.41 (1.55 boost-charge) Vdc for cell	281 cells x 1.41 Vdc = **397** (436) **Vdc**
Open Battery without boost-charge:	2.23 Vdc for cell	180÷195 cells x 2.23 Vdc = **402÷435 Vdc**
Open Battery with boost-charge:	2.23 (2.35 boost-charge) Vdc for cell	180÷185 cells x 2.23 Vdc = **402** (423)**÷413** (435) **Vdc**

Recharge current

Maximum battery recharge current.
Max 20% of battery capacity (Ah). Example: 100Ah - max recharging current 20A.

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)							
180 cells	Autonomy at full Load at PF=0.8						U floating **= 409 Vdc (2.27 Vdc - cell)**
UPS model	Battery with expected trickle life 5 years						Battery with expected trickle life 10 years
	50Ah	75Ah	2x50Ah	2x75Ah	4x50Ah	4x75Ah	
SG Series 60 PurePulse™	13	22	31	53	77	139	According to client requirement
SG Series 80 PurePulse™	9	15	22	36	52	95	
SG Series 100 PurePulse™	-	12	17	27	37	65	
SG Series 120 PurePulse™	-	9	13	22	32	51	

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 table).

Capacity

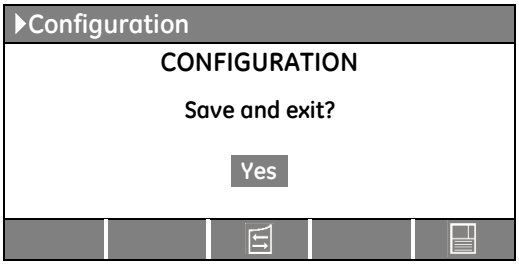
Ah capacity of the Battery.

Cells

Number of cells of the Battery, see "**Float voltage**".

Example: **180 battery cells** 30 blocks / 12 Vdc Battery 60 blocks / 6 Vdc Battery 180 blocks / 2 Vdc Battery

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 from a GE SERVICE PERSON as it requires an access code.

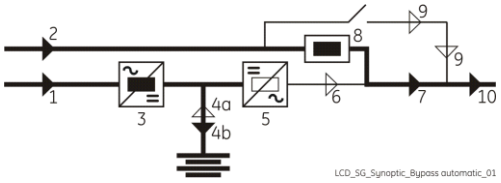
Continue ▶

2. *Close input Rectifier switch Q4 (Pos. I) on all Units.*

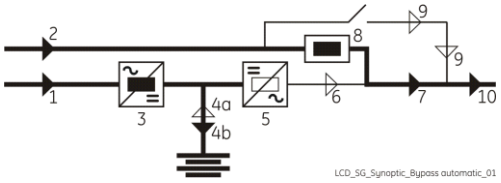
3. *Close UPS output switch Q1 (Pos. I) on all Units.*

- When closing *UPS output switch Q1* on the last unit of the *Parallel System*, the *Automatic Bypass* of all *Units* connects to the *Load*.
- *Rectifiers* start automatically, blinking *LED 3 (Rectifier ON)* indicates Soft-start.
- At the end of *Rectifier* Soft-start, the *LED 3 (Rectifier ON)* remains lit.

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



Synoptic diagram of first unit



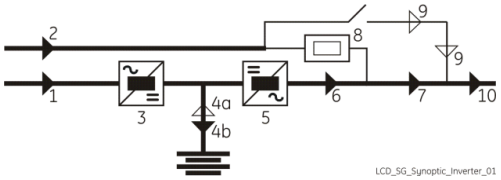
Synoptic diagram of other units

4. *Connect the Battery to all Units UPS by closing the "External Battery Protection" (Switch or Fuses).*

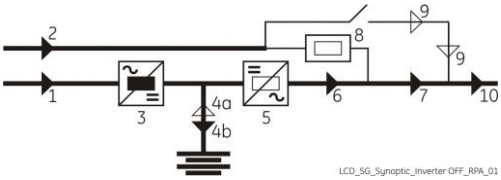
DANGER !
Before to perform this operation, check the right DC polarities on both side of the switch/fuse holder!

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

- Soft-start of *Inverter*, indicated with blinking *LED 5 (Inverter available)*.
- At the end of Soft-start the *LED 5 (Inverter available)* remains lit.
- In case of sufficient output power, the output will transfer to *Inverter*.
- *LED Alarm* turn Off and the *LED Operation* must be lit.



Synoptic diagram of first unit



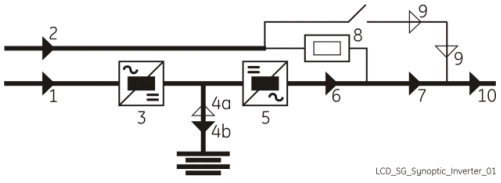
Synoptic diagram of other units

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

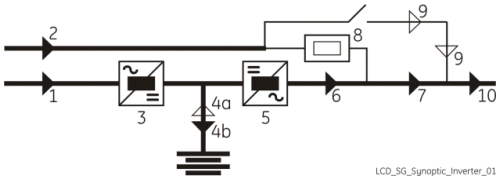
Do not start the next *Inverter* until the sequence of the previous ends.

- As soon as the output power of the *Inverters* is sufficient to supply the *Load*, the output of the units with running *Inverter* will transfer to *Inverter*.
- *LED Alarm* turn Off and the *LED Operation* must be lit.

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



Synoptic diagram of first unit



Synoptic diagram of other units

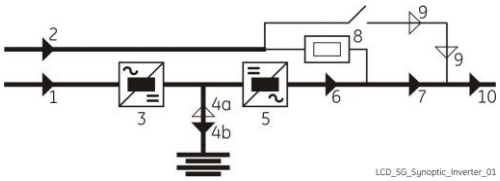
END OF PROCEDURE

NOTE !
The *Battery* must be charged for at least 10 hours, in order to ensure the full backup runtime in case of a *Mains Failure*.

8.3.2 Parallel UPS shut-down with load transfer on Manual Bypass Q2

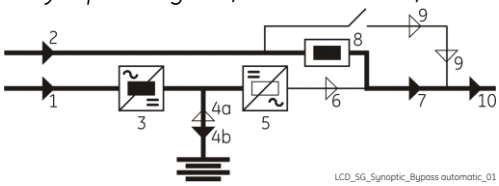
Initial status:

Load supplied from all Inverters of the Parallel System.

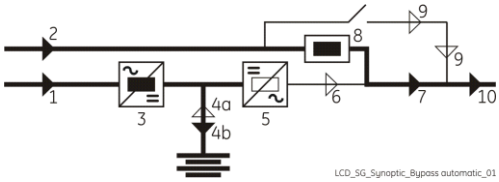


1. ***Disconnect the Inverter by pressing "Inverter OFF" (O) key on all Units, and hold until the LED 5 (Inverter available) turns OFF.***
   - At no redundancy, the system will transfer to *Mains* supply. *LED 5 (Inverter available)* is Off.
   - *LED Alarm* is lit and the *LED Operation* is Off.

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



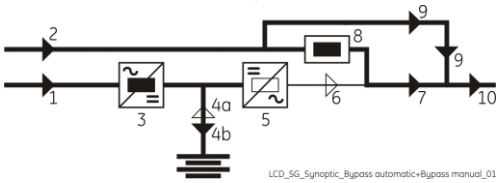
Synoptic diagram of first unit



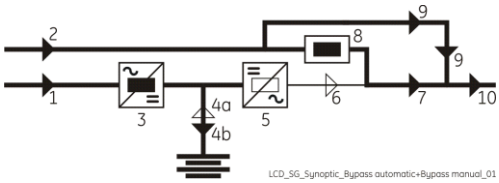
Synoptic diagram of other units

2. ***Close Manual Bypass switch Q2 (Pos. I) on all Units.***
   - *Load* is now supplied from *Mains* in parallel from *Automatic Bypass* and *Manual Bypass Q2* of all *Units*. *LED 9 (Manual Bypass Q2 ON)* is lit.

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



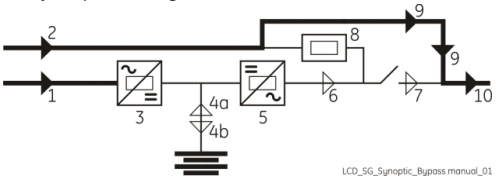
Synoptic diagram of first unit



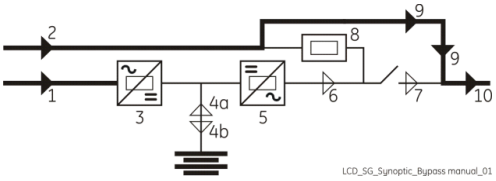
Synoptic diagram of other units

3. ***Open UPS output switch Q1 (Pos. O) and then press "Load Off" button on all Units.***
   - The *Load* is now supplied only through the *Manual Bypass Q2* of all *Units*.
   - All *Rectifiers* are shut-down and all output and input *contactors* are opened.

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



Synoptic diagram of first unit



Synoptic diagram of other units

4. ***Open input Rectifier switch Q4 (Pos. O) on all Units.***

5. ***Disconnect the Battery from all Units.***
   - **Wait *5 minutes*** for DC-Link Capacitors discharge.

END OF PROCEDURE

DANGER !

It will take 5 minutes for the DC capacitors to discharge

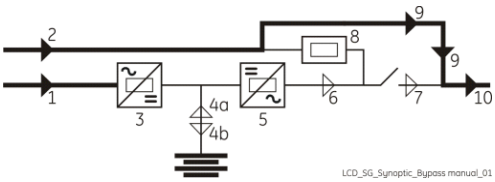
Open only the front door, do not open any other part of the UPS.

8.3.3 From Manual Bypass Q2 to normal function VFI

Initial status:

Load supplied from all Manual Bypass Q2 of the Parallel System.

All Manual Bypass Q2 of the Parallel System are closed.

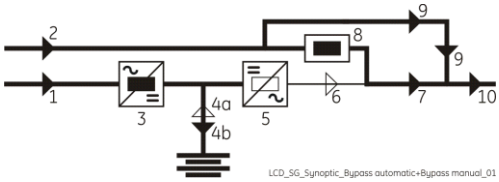


1. Close input Rectifier switch Q4 (Pos. I) on all Units.

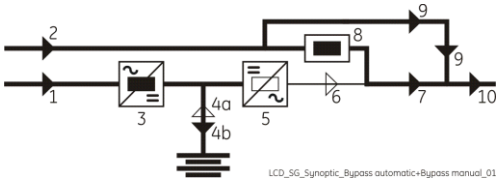
2. Close UPS output switch Q1 (Pos. I) on all Units.

- The *Rectifiers* will start automatically and at the closure of *UPS output switch Q1* of the *last Unit*, the output will be supplied parallel from *Automatic Bypass* and *Manual Bypass Q2* of all UPS units.
  Soft-start of *Rectifiers*, indicated with blinking *LEDs 3 (Rectifier)*.
- At the end of *Rectifiers* Soft-start, the *LEDs 3 (Rectifier)* remain lit.

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



Synoptic diagram of first unit



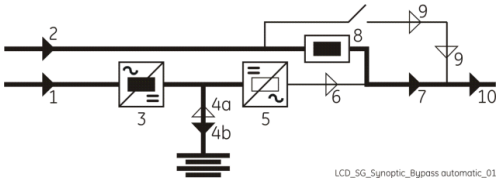
Synoptic diagram of other units

3. Connect the Battery to all Units by closing the "External Battery Protection" (Switch or Fuses).

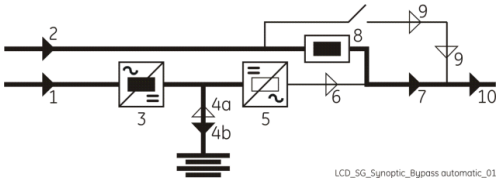
4. Open Manual Bypass switch Q2 (Pos. O) on all Units.

- The *Load* is supplied by the *Mains* through the *Automatic Bypass* of all *Units*.

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



Synoptic diagram of first unit

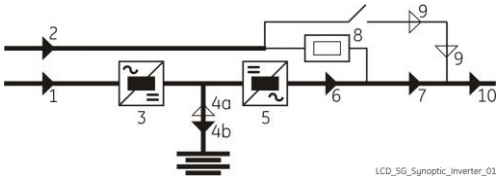


Synoptic diagram of other units

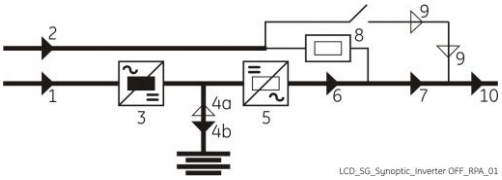
Continue ►

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

- Soft-start of *Inverter*, indicated with blinking *LED 5 (Inverter available)*.
- At the end of Soft-start the *LED 5 (Inverter available)* remains lit.
- In case of sufficient output power, the output will transfer to *Inverter*.



Synoptic diagram of first unit



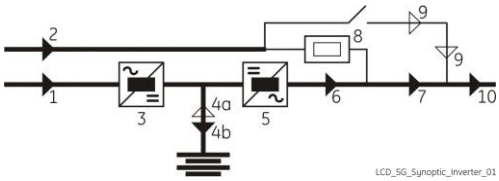
Synoptic diagram of other units

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

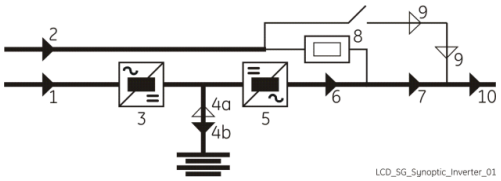
Do not start the next *Inverter* until the sequence of the previous one ends.

- Soft-start of *Inverter*, indicated with blinking *LED 5 (Inverter available)*.
- At the end of Soft-start the *LED 5 (Inverter available)* remains lit.
- As soon as the output power of the *Inverters* is sufficient to supply the *Load*, the output of the units with running *Inverter* will transfer to *Inverter*.
- *LED Alarm* turn Off and the *LED Operation* must be lit.

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



Synoptic diagram of first unit



Synoptic diagram of other units

END OF PROCEDURE

8.3.4 Separate a UPS unit from the Redundant Parallel System

NOTE:

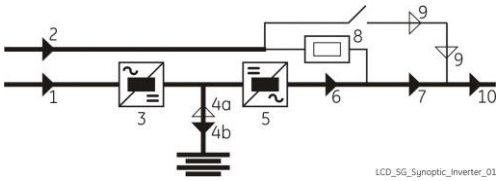
The *Load* is powered by the *UPS Redundant Parallel System*.
One UPS unit of the *Parallel System* has to be turned Off, while the *Load* is shared between the other units supplying the parallel bus.

WARNING!

The control bus cable connecting *J52 (A)* and *J62 (B)* cannot be connected or disconnected after the system has been powered on.

Initial status:

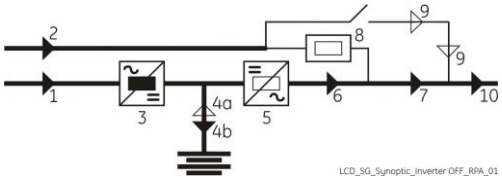
Load supplied from all Inverters of the Redundant Parallel System.



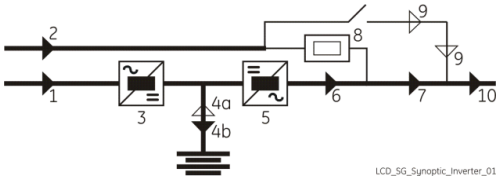
1. *Disconnect the Inverter by pressing "Inverter OFF" (O) key and hold until the LED 5 (Inverter available) turns OFF on the Unit to separate.*

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*.



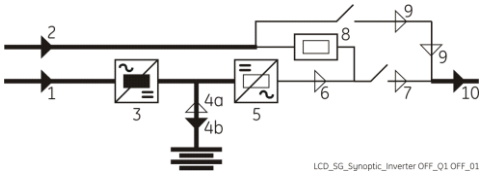
Synoptic diagram of the unit to separate



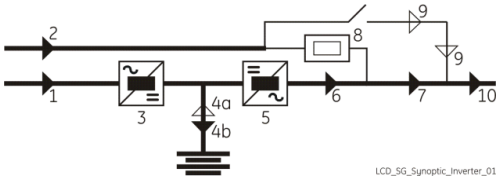
Synoptic diagram of other units

2. *Open UPS output switch Q1 (Pos. O) on the Unit to separate.*

- *LED Alarm* is lit and the *LED Operation* is Off.
- *LED 7 (Q1 closed)* is Off.



Synoptic diagram of the unit to separate



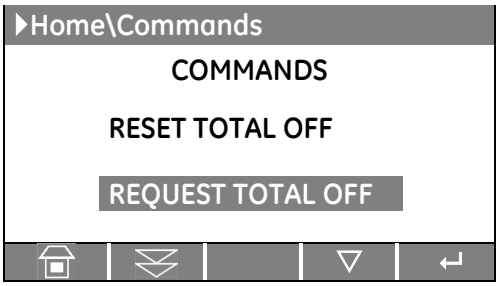
Synoptic diagram of other units

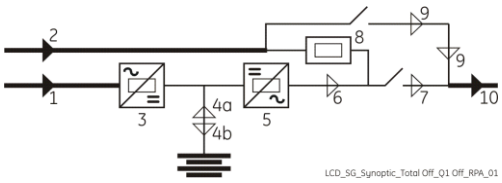
Continue ►

3. ***Perform the command "Load Off" on the Unit to separate only when the LED 7 (Q1 closed) is Off.***

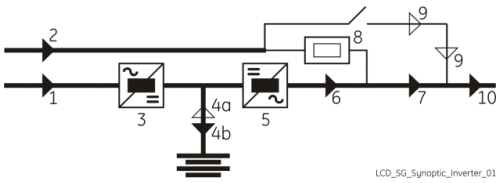
   Perform the command *"Load Off"* by entering the screen (see *Section 7.5)*:

   COMMANDS / **REQUEST TOTAL OFF**





Synoptic diagram of the unit to separate



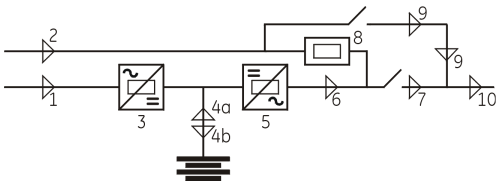
Synoptic diagram of other units

4. ***Open input Rectifier switch Q4 (Pos. O) on the Unit to separate.***

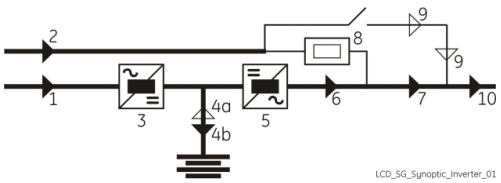
5. ***Disconnect the Battery on the Unit to separate.***

   - **Wait *5 minutes*** for DC-Link Capacitors discharge.

6. ***Disconnect the Mains supply on the Unit to separate.***



Synoptic diagram of the unit to separate



Synoptic diagram of other units

END OF PROCEDURE

DANGER !

It will take 5 minutes for the DC capacitors to discharge.
Open only the front door, do not open any other part of the UPS.

NOTE !

For any further intervention contact nearest *Service Centre*.

8.3.5 Reconnect a UPS unit to a Parallel System

NOTE:
The *Load* is still powered by the other units supplying the *parallel bus*.
This UPS unit will be powered on and connected to the *parallel bus* in order to share the *Load* with each other's.

WARNING !
The high speed bus cable connecting *J52* (A) and *J62* (B) in any case cannot be connected or disconnected after the system has been powered on.
The bus terminals must be properly connected before powering the additional unit.

Open the front door, of the Unit to reconnect, and make sure that:

- All the ***connections*** to the input/output terminals or bus bars of the UPS have been made correctly.
- The ***protection panels*** are fastened in their correct position.
- The switches ***Q1***, ***Q2*** and ***Q4*** **are open (Pos. O)** and the ***"External Battery Protection"*** *(Switch or Fuses)* **must be open** (Pos. O).

1. Switch-ON the Mains voltage, on the Unit to reconnect, from the input distribution (both Rectifier and bypass if separated).

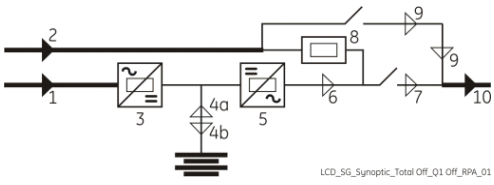
The UPS performs a *SELFTEST*.

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*.

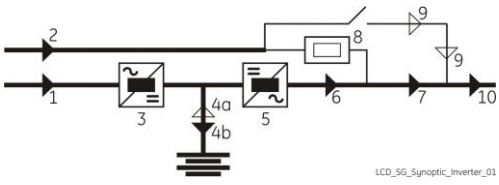
Overall test results

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

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.



Synoptic diagram of the unit to reconnect



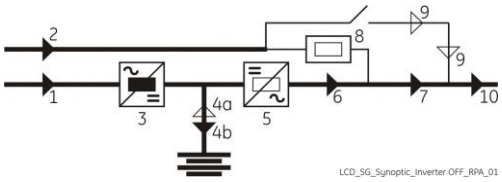
Synoptic diagram of other units

2. Close input Rectifier switch Q4 (Pos. I) on the Unit to reconnect.

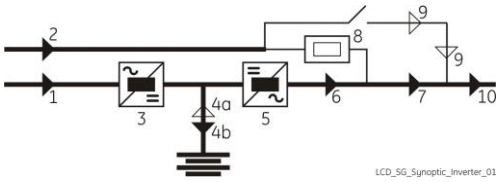
Continue ►

3. Close UPS output switch Q1 (Pos. I) on the Unit to reconnect.

- *Rectifier* starts automatically, blinking *LED 3 (Rectifier ON)* indicates Soft-start.
- At the end of *Rectifier* Soft-start the *LED 3 (Rectifier ON)* remains lit.



Synoptic diagram of the unit to reconnect



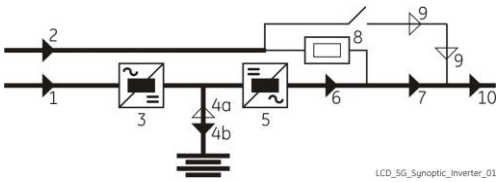
Synoptic diagram of other units

4. Connect the Battery on the Unit to reconnect by closing the "External Battery Protection" (Switch or Fuses).

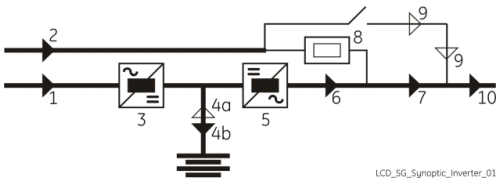
5. Insert the Inverter by pressing "Inverter ON" (I) key on the Unit to reconnect.

- After Soft-start of the *Inverter*, the *Inverter* connects automatically to the *other Units* of the *Parallel System*.
- *LED Alarm* turn Off and the *LED Operation* must be lit.

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



Synoptic diagram of the unit to reconnect



Synoptic diagram of other units

END OF PROCEDURE

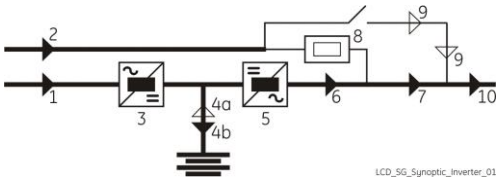
8.3.6 Complete Parallel System shut-down

NOTE !

The *UPS Parallel System* and the *Load* have to be completely powered down

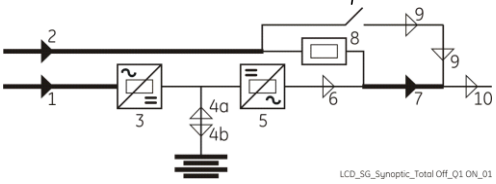
Initial status:

Load supplied from all Inverters of the Parallel System.

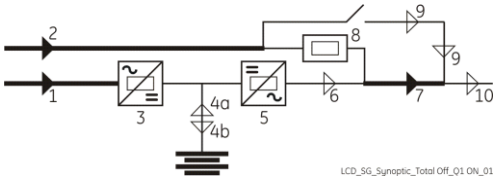


1. *Press "Load Off" button on any one of the units.*

- *Load* is disconnected from *UPS Parallel System.*
- *Rectifiers* and *Inverters* are shut down and all output and input *Contactors* will be opened.
- *LED 3 (Rectifier ON), LED 5 (Inverter available)* and *LED 10 (Load on UPS)* are OFF.
- *LED Alarm* is lit and the *LED Operation* is Off.



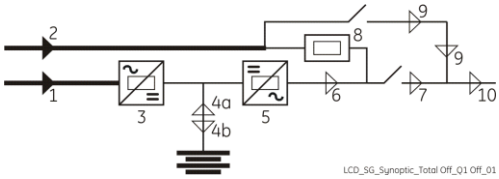
Synoptic diagram of first unit



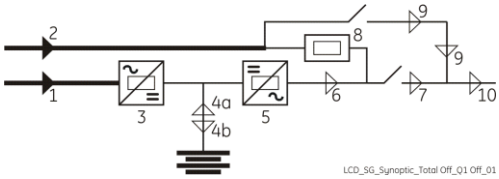
Synoptic diagram of other units

2. *Open UPS output switch Q1 (Pos. O) on all Units.*

- *LED 7 (Q1 closed)* is Off.



Synoptic diagram of first unit



Synoptic diagram of other units

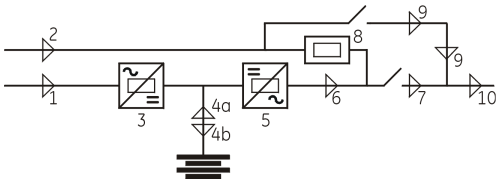
3. *Open input Rectifier switch Q4 (Pos. O) on all Units.*

4. *Disconnect the Battery on all Units.*

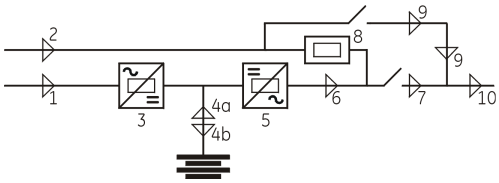
- **Wait *5 minutes*** for DC-Link Capacitors discharge.

5. *Disconnect the Mains supply on all Units.*

- All *LEDs* are OFF.



Synoptic diagram of first unit



Synoptic diagram of other units

END OF PROCEDURE

DANGER !

It will take 5 minutes for the DC capacitors to discharge.
Open only the front door, do not open any other part of the UPS.

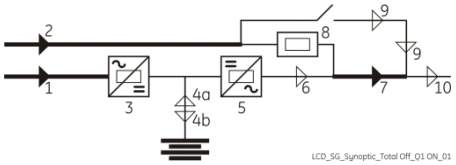
8.3.7 Restore to normal operation after "Load Off"

⚠	**WARNING !** **Please check and ensure the conditions of the connected load are safe before proceeding, as this procedure will result in the connection of power to the load circuit(s).**

8.3.7.1 Restore to normal operation after "Load Off" with Load not supplied

⚠	**NOTE !** **Before performing this operation, make sure the all units of the *Parallel System* are in the following status:** - ***"Q2 - Manual Bypass switch"* MUST BE OPEN.** - ***"Q1 - UPS Output switch"* and *"Q4 -Rectifier Input switch"* MUST BE CLOSED.** - ***"External Battery Protection" (Switch or Fuses)* MUST BE DISCONNECTED.**

View of the *Synoptic Diagram*, on all UPS units, after performed the command *"Load Off"*, with LOAD NOT SUPPLIED (*Q2 - Manual Bypass switch* MUST BE OPEN).

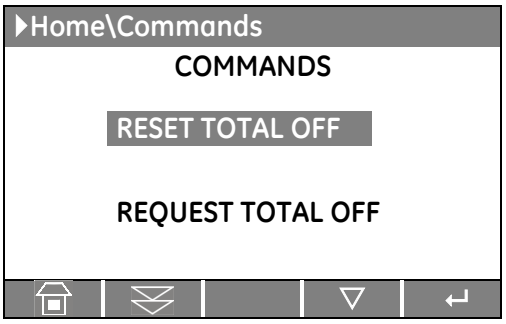


1. ***Restore the command "Load Off" of the Parallel System.***

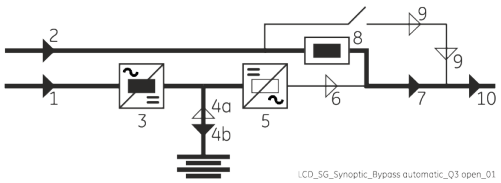
   Restore the command *"Load Off"*, on anyone of the *Parallel Units*, by entering the screen:

   COMMANDS / **RESET TOTAL OFF**

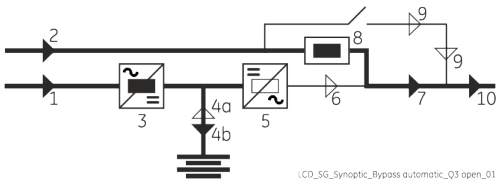
   - The *Load* is supplied by the *Mains* through the *Automatic Bypass* of all *Units*.
   - *Rectifiers* start automatically, blinking *LED 3 (Rectifier ON)* indicates Soft-start.
   - At the end of *Rectifier* Soft-start, the *LED 3 (Rectifier ON)* remains lit.
   - *LED Alarm* is lit.



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



Synoptic Diagram of first unit



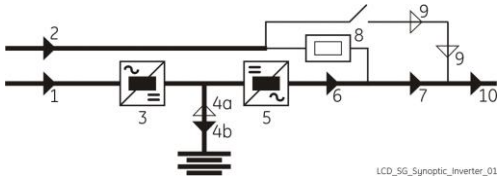
Synoptic Diagram of other units

2. ***Connect the Battery on all Units by closing the "External Battery Protection" (Switch or Fuses).***

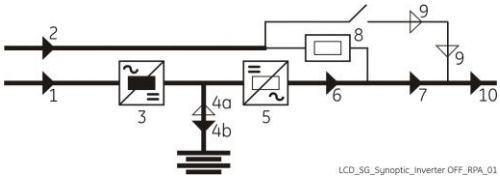
Continue ►

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

- Soft-start of *Inverter*, indicated with blinking *LED 5 (Inverter available)*.
- At the end of Soft-start the *LED 5 (Inverter available)* remains lit.
- In case of sufficient output power, the output will transfer to *Inverter*.
- *LED Alarm* turns Off and the *LED Operation* must be lit.



Synoptic Diagram of first unit



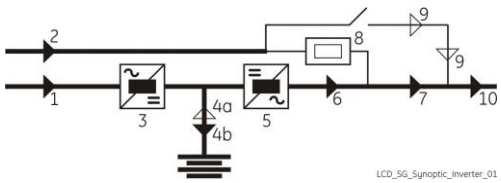
Synoptic Diagram of other units

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

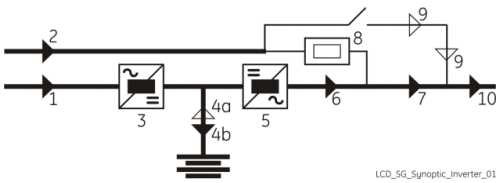
Do not start the next *Inverter* until the sequence of the previous ends.

- Soft-start of *Inverter*, indicated with blinking *LED 5 (Inverter available)*.
- At the end of Soft-start the *LED 5 (Inverter available)* remains lit.
- 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***".



Synoptic Diagram of first unit



Synoptic Diagram of other units

END OF PROCEDURE

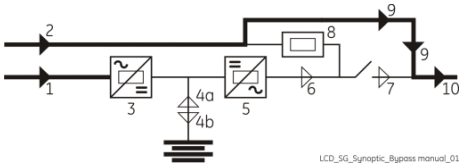
8.3.7.2 Restore to normal operation after "Load Off" with Load supplied by Manual Bypass (Q2)

NOTE !

Before performing this operation, make sure the all units of the *Parallel System* are in the following status:

- ***"Q2 - Manual Bypass switch"* MUST BE CLOSED.**
- ***"Q1 - UPS Output switch"* and *"Q4 -Rectifier Input switch"* MUST BE OPEN.**
- ***"External Battery Protection" (Switch or Fuses)* MUST BE DISCONNECTED.**

View of the *Synoptic Diagram*, on all UPS units, after performed the command *"Load Off"*, with *LOAD SUPPLIED BY MANUAL BYPASS (Q2 - Manual Bypass switch* MUST BE CLOSED).



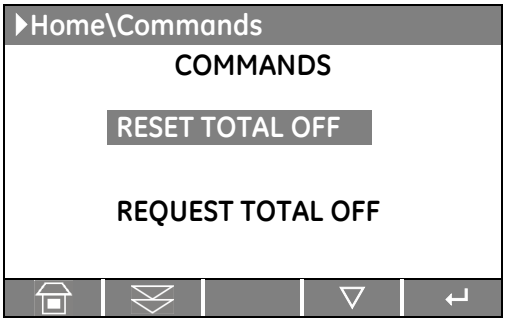
1. ***Close the "Q4 - Rectifier Input switch" (Pos. I) on all Units.***

2. ***Close the "Q1 - UPS Output switch" (Pos. I) on all Units.***

3. ***Restore the command "Load Off" of the Parallel System.***

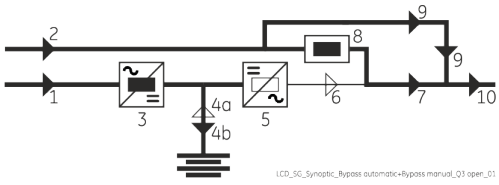
   Restore the command *"Load Off"*, on anyone of the *Parallel Units*, by entering the screen:

   COMMANDS / **RESET TOTAL OFF**

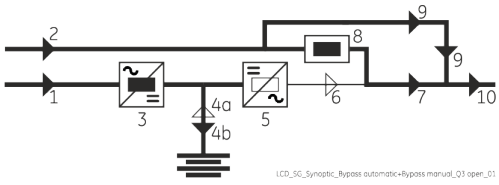


   - The *Load* is supplied by the *Mains* through the *Automatic Bypass* and *Manual Bypass Q2* of all *Units*.
   - *Rectifiers* start automatically, blinking *LED 3 (Rectifier ON)* indicates Soft-start.
   - At the end of *Rectifier* Soft-start, the *LED 3 (Rectifier ON)* remains lit. *LED Alarm* is lit.

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



Synoptic Diagram of first unit



Synoptic Diagram of other units

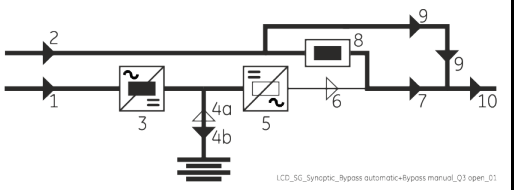
4. ***Connect the Battery on all Units by closing the "External Battery Protection" (Switch or Fuses).***

Continue ►

NOTE !

Before performing this operation, the *Synoptic Diagram*, on all UPS units, must display the status

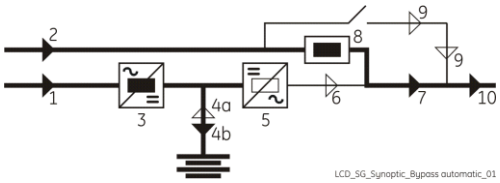
***"LOAD SUPPLIED BY AUTOMATIC BYPASS AND MANUAL BYPASS Q2"*!**



5. *Open the "Q2 - Manual Bypass switch" (Pos. O) on all Units.*

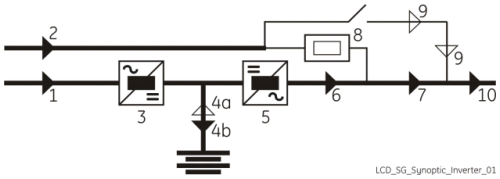
- The *Load* is supplied by the *Mains* through the *Automatic Bypass* of all *Units*.
- *LED 9 (Manual Bypass Q2 ON)* turns OFF.

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

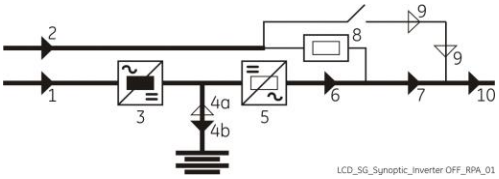


6 *Insert the Inverter by pressing "Inverter ON" (I) key on first unit.*

- Soft-start of *Inverter*, indicated with blinking *LED 5 (Inverter available)*.
- At the end of Soft-start the *LED 5 (Inverter available)* remains lit.
- In case of sufficient output power, the output will transfer to *Inverter*.
- *LED Alarm* turns Off and the *LED Operation* must be lit.



Synoptic Diagram of first unit



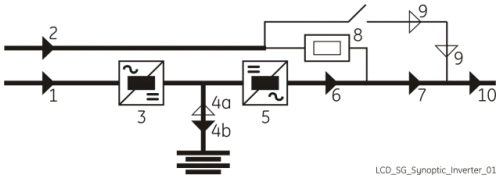
Synoptic Diagram of other units

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

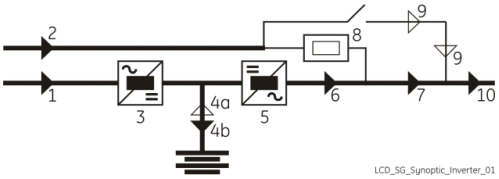
Do not start the next *Inverter* until the sequence of the previous ends.

- Soft-start of *Inverter*, indicated with blinking *LED 5 (Inverter available)*.
- At the end of Soft-start the *LED 5 (Inverter available)* remains lit.
- 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***".



Synoptic Diagram of first unit



Synoptic Diagram of other units

END OF PROCEDURE

8.3.8 Restore to normal operation after "EPO - Emergency Power Off"

WARNING !

Please check and ensure the conditions of the connected load are safe before proceeding, as this procedure will result in the connection of power to the load circuit(s).

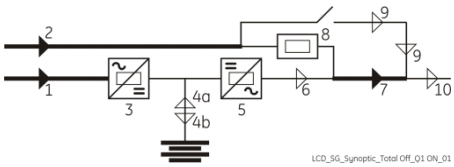
8.3.8.1 Restore to normal operation after "EPO - Emergency Power Off" with Load not supplied

NOTE !

Before performing this operation, make sure the all units of the *Parallel System* are in the following status:

- ***"Q2 - Manual Bypass switch"* MUST BE OPEN.**
- ***"Q1 - UPS Output switch"* and *"Q4 -Rectifier Input switch"* MUST BE CLOSED.**
- ***"External Battery Protection" (Switch or Fuses)* MUST BE DISCONNECTED.**

View of the *Synoptic Diagram*, on all UPS units, after performed the command *"EPO - Emergency Power Off"*, with LOAD NOT SUPPLIED (*Q2 - Manual Bypass switch* MUST BE OPEN).



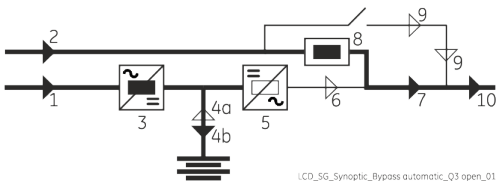
1. Restore the "EPO - Emergency Power Off" button.

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

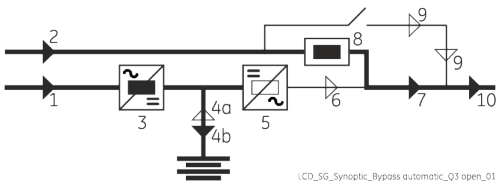
2. Press "Inverter OFF" (O) key on all Units.

- *Rectifiers* start automatically, blinking *LED 3 (Rectifier ON)* indicates Soft-start.
- At the end of *Rectifier* Soft-start, the *LED 3 (Rectifier ON)* remains lit.
- After pressing the *"Inverter OFF"* key on the last unit of the *Parallel System*, the output of all *Units* connect to *Automatic Bypass*.

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



Synoptic Diagram of first unit



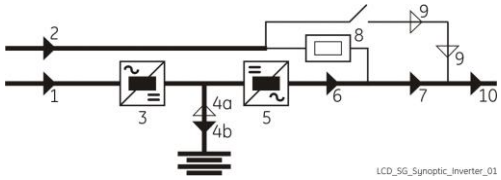
Synoptic Diagram of other units

3. Connect the Battery on all Units by closing the "External Battery Protection" (Switch or Fuses).

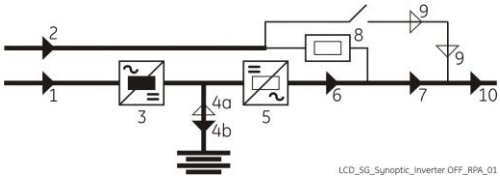
Continue ►

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

- Soft-start of *Inverter*, indicated with blinking *LED 5 (Inverter available)*.
- At the end of Soft-start the *LED 5 (Inverter available)* remains lit.
- In case of sufficient output power, the output will transfer to *Inverter*.
- *LED Alarm* turns Off and the *LED Operation* must be lit.



Synoptic Diagram of first unit



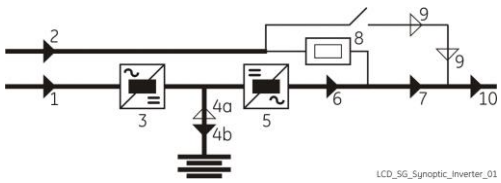
Synoptic Diagram of other units

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

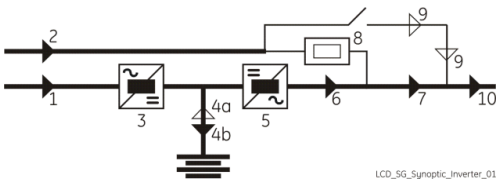
Do not start the next *Inverter* until the sequence of the previous ends.

- Soft-start of *Inverter*, indicated with blinking *LED 5 (Inverter available)*.
- At the end of Soft-start the *LED 5 (Inverter available)* remains lit.
- 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***".



Synoptic Diagram of first unit



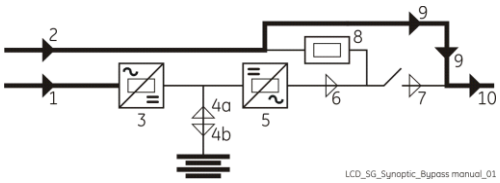
Synoptic Diagram of other units

END OF PROCEDURE

8.3.8.2 Restore to normal operation after "EPO - Emergency Power Off" with Load supplied by Manual Bypass (Q2)

	**NOTE !** **Before performing this operation, make sure the all units of the *Parallel System* are in the following status:** - ***"Q2 - Manual Bypass switch"*** **MUST BE CLOSED.** - ***"Q1 - UPS Output switch"*** **and** ***"Q4 -Rectifier Input switch"*** **MUST BE OPEN.** - ***"External Battery Protection" (Switch or Fuses)*** **MUST BE DISCONNECTED.**

View of the *Synoptic Diagram*, on all UPS units, after performed the command *"EPO - Emergency Power Off"*, with *LOAD SUPPLIED BY MANUAL BYPASS (Q2 - Manual Bypass switch* MUST BE CLOSED).



1. *Close the "Q4 - Rectifier Input switch" (Pos. I) on all Units.*

2. *Close the "Q1 - UPS Output switch" (Pos. I) on all Units.*

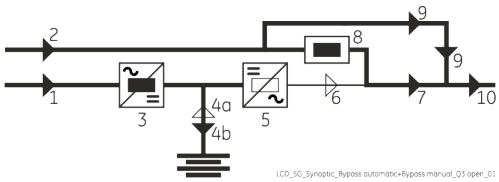
3. *Restore the "EPO - Emergency Power Off" button.*

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

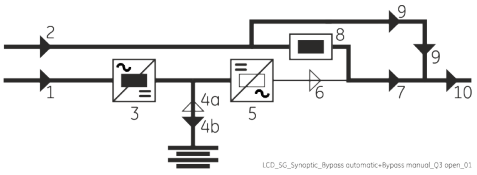
4. *Press "Inverter OFF" (O) key on all Units.*

- *Rectifiers* start automatically, blinking *LED 3 (Rectifier ON)* indicates Soft-start.
- At the end of *Rectifier* Soft-start, the *LED 3 (Rectifier ON)* remains lit.
- After pressing the *"Inverter OFF"* key on the last unit of the *Parallel System*, the output of all *Units* connect to *Automatic Bypass* and *Manual Bypass Q2*.

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



Synoptic Diagram of first unit



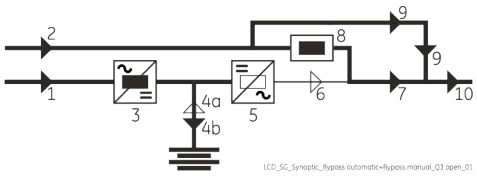
Synoptic Diagram of other units

5. *Connect the Battery on all Units by closing the "External Battery Protection" (Switch or Fuses).*

Continue ►

NOTE !

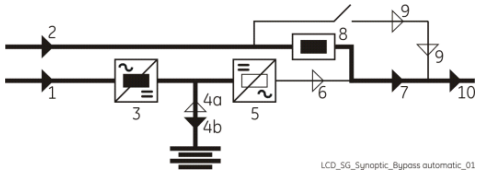
Before performing this operation, the *Synoptic Diagram*, on all UPS units, must display the status *"LOAD SUPPLIED BY AUTOMATIC BYPASS AND MANUAL BYPASS Q2"*!



6. *Open the "Q2 - Manual Bypass switch" (Pos. O) on all Units.*

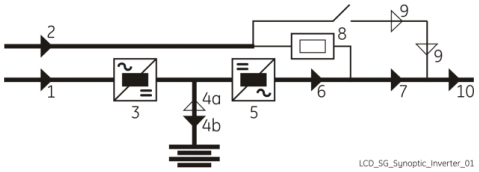
- The *Load* is supplied by the *Mains* through the *Automatic Bypass* of all *Units*.
- *LED 9 (Manual Bypass Q2 ON)* turns OFF.

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

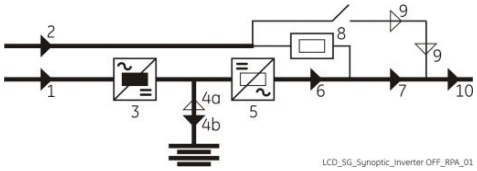


7 *Insert the Inverter by pressing "Inverter ON" (I) key on first unit.*

- Soft-start of *Inverter*, indicated with blinking *LED 5 (Inverter available)*.
- At the end of Soft-start the *LED 5 (Inverter available)* remains lit.
- In case of sufficient output power, the output will transfer to *Inverter*.
- *LED Alarm* turns Off and the *LED Operation* must be lit.



Synoptic Diagram of first unit



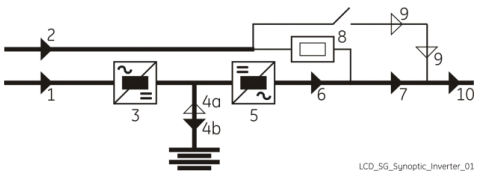
Synoptic Diagram of other units

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

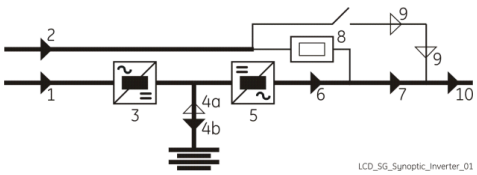
Do not start the next *Inverter* until the sequence of the previous ends.

- Soft-start of *Inverter*, indicated with blinking *LED 5 (Inverter available)*.
- At the end of Soft-start the *LED 5 (Inverter available)* remains lit.
- 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**"*.



Synoptic Diagram of first unit



Synoptic Diagram of other units

END OF PROCEDURE

9 CUSTOMER INTERFACE

9.1 CUSTOMER INTERFACE

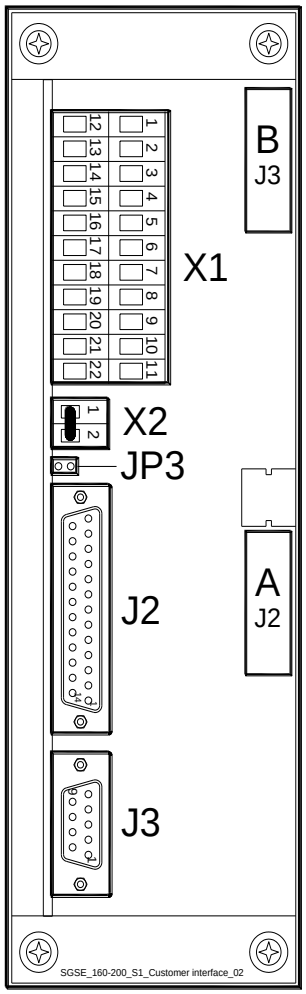


Fig. 9.1-1 Customer interface

Serial port J3 - RS232 (sub D - female 9 pin) Suitable for IMV protocol		
Pin 2: TX (out)	**Pin 3**: RX (in)	**Pin 5**: GND

J2 (sub D-female 25p) – Output signals on voltage free contacts			
J2 / 1, 2, 3	NO, C, NC	Mains Failure	(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	(def. Parameter RL=4)
J2 / 20, 21, 22	NO, C, NC	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"* and *"26 - EPO"*.

X1 terminals – 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	(def. Parameter RL=4)
X1 / 18, 19, 20	NO, C, NC	Acoustic Alarm	(def. Parameter RL=6)

X2 – Terminals for EPO (Emergency Power Off) connection		
X2 / 1, 2 or **J2 / 12, 25**	NC	*EPO (Emergency Power Off)*
Note: to enable this function, remove the *Jumper JP3* on *P4 – Customer Interface board*.		

Input contacts		
X1 / 10, 21 or **J2 / 10, 23**	NO	Programmable
X1 / 11, 22 or **J2 / 11, 24**	NO	Programmable / Generator ON

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

The connectors ***A-J2*** and ***B-J3*** can be used for additional ***Advanced SNMP Card*** or an additional ***Customer Interface*** (installation only when the UPS is switched Off).

Output signals on voltage-free contacts	
On terminals ***X1*** or ***J2*** connector, six of the following ***27 signals*** can be selected from the display, entering with the appropriate password.	
0- No Information	*14- Rectifier Mains Failure*
1- Buzzer	*15- Battery Discharge*
2- General Alarm	*16- Manual Bypass ON*
3- Load on Mains	*17- Rectifier ON*
4- Stop Operation	*18- Inverter ON*
5- Load on Inverter	*19- Boost Charge*
6- Mains Failure	*20- Battery Earth Fault*
7- DC Over Voltage	*21- Battery Fault*
8- Low Battery	*22- Relay Input 1*
9- Overload	*23- Relay Input 2*
10- Overtemperature	*24- Relay Output ON*
11- Inverter-Mains not synchr.	*25- Relay Output OFF*
12- Bypass Locked	*26- EPO*
13- Bypass Mains Failure	*27- SEM Mode ON*

Programmable functions on input contacts
Some UPS functions can be activated with parameters when an external Normally Open (NO) contact is closed on:
X1/10, 21 - J2/10, 23 or **X1/11, 22 - J2/11, 24**
Selectable functions by changing **parameters** (password required) are:
0 - No function — *1 - Inverter ON*
2 - Inverter OFF — *3 - Print All*
4 - Status Relay — *5 - Generator ON*
6 - External Bypass ON
7 - External Battery Fuses, or External K3 (See Alarm 4104 - "Battery Fuses")
Voltage free contacts: Max. DC / AC: 24V / 1.25A IEC 60950 (SELV circuit) Min. Signal Level: 5 Vdc / 5 mA

9.1.1 Serial Port *J3 - RS232* (sub D, female 9 pin)

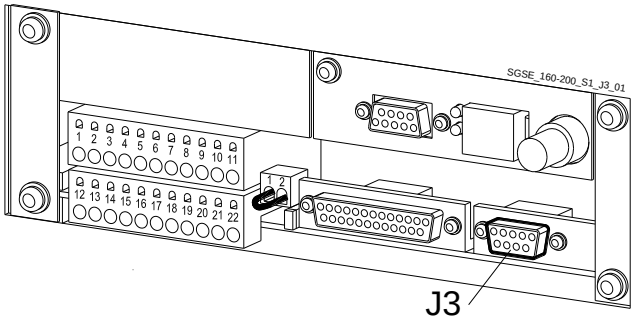


Fig. 9.1.1-1 Serial port J3

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

RPA
Redundant Parallel Architecture

The serial port *J3 - RS232* is enabled on all the units of the *Parallel System*.

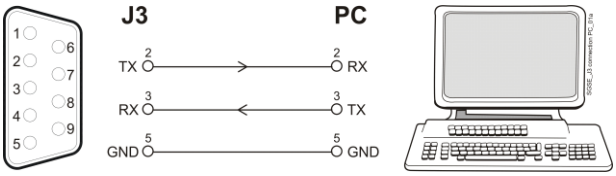


Fig. 9.1.1-2 Serial port J3 connection to PC with RS232 1:1 cable DB9m – DB9f

9.1.2 Serial Port *J11 - RS232* (sub D, female 9 pin) - Option

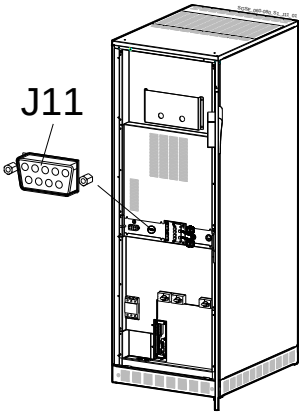


Fig. 9.1.2-1 SG Series 60 & 80 PurePulse™ - Serial port J11

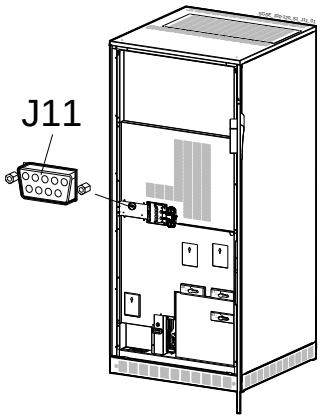


Fig. 9.1.2-2 SG Series 100 & 120 PurePulse™ - Serial port J11

Total remote management of the system on PC by means of *the ARGUS - Control Network Software* (optional).
This software enables the user to monitor the status of remote UPS from any computer connected to a *modem*, or through a *direct link* to the UPS.

Connection of a serial printer

From the display panel it is possible to select printing of measurements, alarms and parameters (see *Section 7.4 – SETUP / PRINTER*).

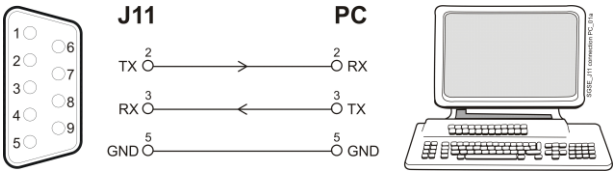


Fig. 9.1.2-3 Serial port J11 connection to PC with RS232 1:1 cable DB9m – DB9f

RPA
Redundant Parallel Architecture

The serial port *J11 - RS232* is enabled only one unit of the *Parallel System* (normally unit no. 1).

Do not use the serial port *J11* on the other units of the same *Parallel System*.

NOTE !

Communication on *J11* port is enabled also in case the *J3* connector is already connected.

9.1.3 Output signals on voltage-free contacts

The interface board provides **6 voltage free relay contacts** giving some UPS critical alarms and operation mode.

These signals are available either on connector ***J2*- (sub D, female 25 pin)** or terminal blocks ***X1***.

The meaning of the alarms on the free contacts in standard configuration (default) is the following:

X1 / 1, 2, 3	or	**J2 / 1, 2, 3**	**(NO, C, NC)**	**Mains Failure**	(def. Parameter RL=1)
X1 / 4, 5, 6	or	**J2 / 4, 5, 6**	**(NO, C, NC)**	**Load on Inverter**	(def. Parameter RL=3)
X1 / 7, 8, 9	or	**J2 / 7, 8, 9**	**(NO, C, NC)**	**Stop Operations**	(def. Parameter RL=5)
X1 / 12, 13, 14	or	**J2 / 14, 15, 16**	**(NO, C, NC)**	**Load on Mains**	(def. Parameter RL=2)
X1 / 15, 16, 17	or	**J2 / 17, 18, 19**	**(NO, C, NC)**	**General Alarm**	(def. Parameter RL=4)
X1 / 18, 19, 20	or	**J2 / 20, 21, 22**	**(NO, C, NC)**	**Acoustic Alarm**	(def. Parameter RL=6)

In case different alarms or operating status are required, they can be configured on the same terminals via software from the *control panel*.

The configuration can be changed in ***parameters mode*** by a trained operator using the appropriate password.

NOTE !

The programmable signals on *X1* and *J2* will be disabled with *Q1* open, with the exception of the signals for *"16 - Manual Bypass ON"* and *"26 - EPO"*.

9.1.4 Programmable input free contacts

Some programmable UPS functions (indicated in *Section 9.1*), can be activated by closing an external contact, if connected, on:

X1 / 10, 21	**or**	**J2 / 10, 23**	**User Input 1 (default = Not used)**
X1 / 11, 22	**or**	**J2 / 11, 24**	**User Input 2 (default = Emergency GEN ON)**

9.1.5 EPO (Emergency Power Off)

Be aware:
The reliability of the system depends on this contact NC (Normally Closed)!

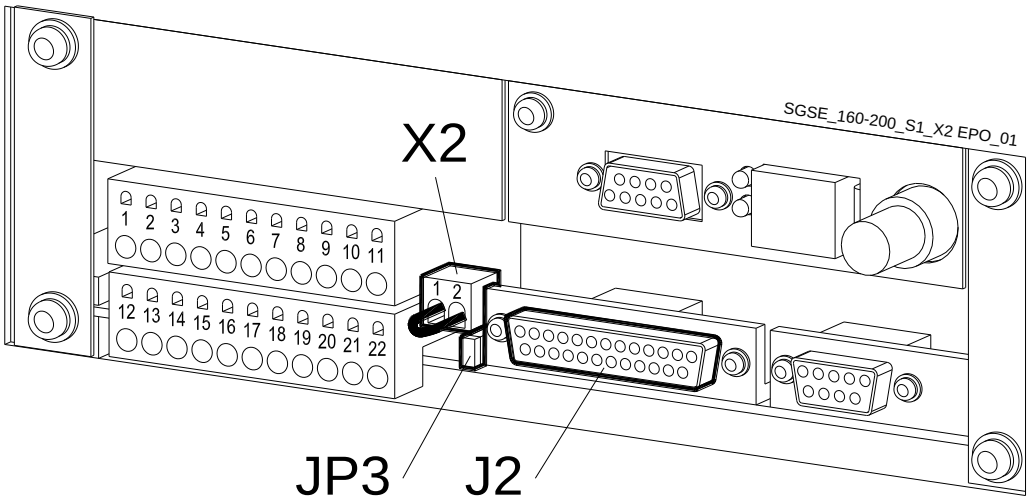


Fig. 9.1.5-1 X2 and J2 for connection EPO

An external Emergency switch (Normally Closed voltage-free contact) can be connected on terminals ***X2 / 1, 2*** or connector ***J2 / 12, 25*** of the ***P4 - Interface Customer***.

Remove the cable short-circuiting terminals ***X2 / 1, 2*** when using this external switch.

When opened, this contact causes the immediate opening of the *Contactors K3*, *K6* and *K7* as well as the shut-down of *Rectifier*, *Inverter* and *Static-Switch*.

NOTE !
This procedure could imply a *Load* shut-down.

NOTE !
To enable this function, remove jumper *JP3* on the *P4 - Customer Interface*, when the cables have already been connected on *X2 or J2*.
In case of parallel *Customer Interface* (up to 3) the *EPO* contact must be connected to one *Customer Interface* only, but the bridge on *X2 / 1, 2* and jumper *JP3* on the *P4 – Customer Interface* must be removed on all other boards.

RPA Redundant Parallel Architecture

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

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.

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.

9.1.6 Gen Set Signalling (GEN ON)

If an emergency generator set supplies the UPS in case of *Mains Failure* and the generator is considerably unstable in frequency, it should be suitable to install the signal "***Generator ON***" on ***X1 / 11, 22*** or ***J2 / 11, 24***).
See *Fig. 9.1-1 / 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 changes certain (programmable) functions such as:

- Enabling or disabling of synchronization and consequently the *Load* transfer to generator.
- Reduction or elimination or delay of *Battery* recharging during the generator operation.

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.

9.1.7 AUX external Maintenance Bypass

If the UPS system is equipped with an external *Maintenance Bypass Switch*, it is possible to connect a *NO* (Normally Open) voltage-free aux. contact from the *External Bypass Switch* to the programmable input ***X1 / 10, 21*** or ***J2 / 10, 23***, making the UPS operate as if the internal switch ***Q2*** has closed.

This function can be activated by changing a dedicated parameter (password required).

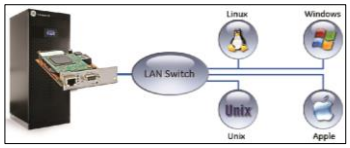
When this *NO* (Normally Open) contact closes, the output *Inverter Contactor* ***K7*** it is automatically opened and the *Load* transfer back to *Inverter* will be inhibited.

RPA Redundant Parallel Architecture

In a Parallel System, the input on the customer interface of each unit must be connected to a separate AUX contact of the External Maintenance Bypass Switch.

10 OPTIONS

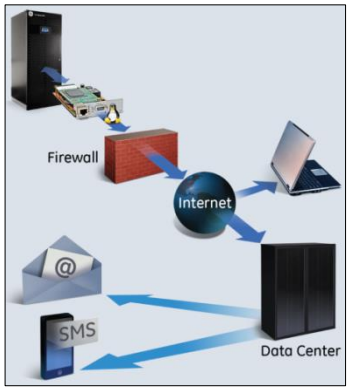
10.1 CONNECTIVITY OPTIONS



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* (UPS-MIB (RFC-1628); GE Single MIB; GE Parallel MIB).
The UPS can therefore be managed by a *Network Management System (NMS)* or by our applications (for instance *GE iUPSGuard, GE Data Protection* or *GE Service Software*), which uses this information to determine the state of the UPS in order to guarantee safe and orderly shutdown of the server, when needed.



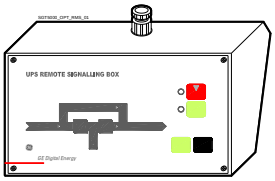
GE iUPSGuard

GE's *iUPSGuard* is a remote monitoring solution for UPS, providing status monitoring and alarm notification that supports all GE UPS product lines, anytime, anywhere.
iUPSGuard provides current and detailed information about UPS operation, including its configuration, internal alarms and operating conditions over web.
iUPSGuard notifies personnel of critical alarms and events via email or SMS, allowing a user or GE technician to make timely decisions on critical conditions.
In addition, comprehensive data collection and analysis improves diagnostics capability and enhances response time.
Continuous monitoring and ongoing maintenance help ensure maximum performance of your UPS equipment as it protects business critical applications.

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



Remote Signalling Box (RSB)

Equipped with mimic diagram, general alarm, stop operation, alarm reset and lamp.

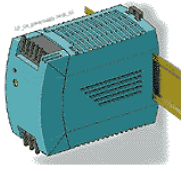
10.2 OPTIONS IN UPS CABINET

RPA
Redundant Parallel Architecture

RPA Kit

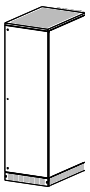
Redundant Parallel Architecture

Up to 6 units parallel possible for redundancy or capacity in RPA configuration.



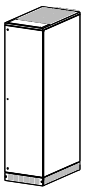
Auxiliary Power Supply (APS) 24 Vdc

10.3 OPTIONS IN ADDITIONAL CABINETS



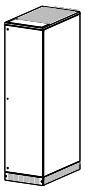
Rectifier or bypass or UPS input transformer

Located in additional cabinet (W x D x H):
500 x 850 x 1900 mm (19.69 x 33.47 x 74.81 inches).



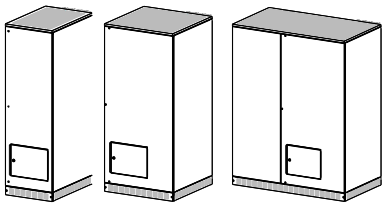
EMC Filter

EMC Filter is used to reduce conducted electromagnetic interference to the limits specified in the *EMC (Electromagnetic Compatibility) standards IEC 62040-2 / Category C2 (formerly Class A)*.
Located in additional cabinet (W x D x H) and delivered assembled to the UPS cabinet: 350 x 850 x 1900 mm (13.78 x 33.47 x 74.81 inches).



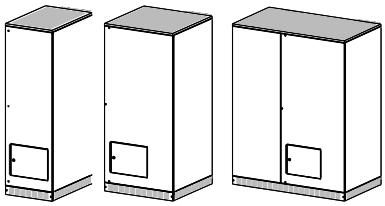
Top entry cables cabinet

Allows the connection of input and output cables from the top of the UPS.
Located in additional cabinet (W x D x H) and delivered assembled to the UPS cabinet: 350 x 850 x 1900 mm (13.78 x 33.47 x 74.81 inches).



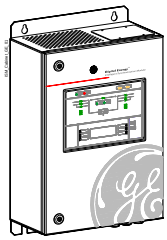
Empty battery cabinets

Dimensions (W x D x H):
500 x 850 x 1900 mm (19.69 x 33.47 x 74.81 inches).
850 x 850 x 1900 mm (33.47 x 33.47 x 74.81 inches).
1500 x 850 x 1900 mm (59.06 x 33.47 x 74.81 inches).



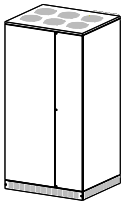
Battery cabinet 50Ah, 75Ah, 2 x 50Ah and 2 x 75Ah

Dimensions (W x D x H):
50Ah: 500 x 850 x 1900 mm (19.69 x 33.47 x 74.81 inches).
75Ah: 850 x 850 x 1900 mm (33.47 x 33.47 x 74.81 inches).
2x50Ah: 850 x 850 x 1900 mm (33.47 x 33.47 x 74.81 inches).
2x75Ah: 1500 x 850 x 1900 mm (59.06 x 33.47 x 74.81 inches).



ISM - Intelligent Synchronization Module

The *ISM* is an additional external accessory that can be used to synchronize two separated and independent UPS groups.
It is typically used in combination with a *Static Transfer Switch (STS)*, to perform additional redundancy to Load supply.
Located in additional cabinet (W x D x H):
350 mm x 190 mm x 584 mm (13.78" x 7.48" x 23.00 inches).



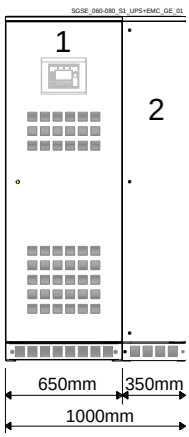
Parallel output cabinet with centralized maintenance bypass

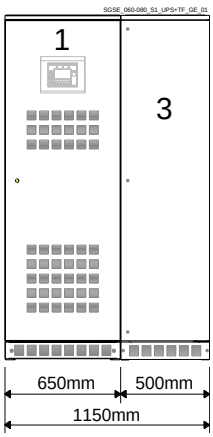
Located in additional cabinet (dimension according to RPA units).

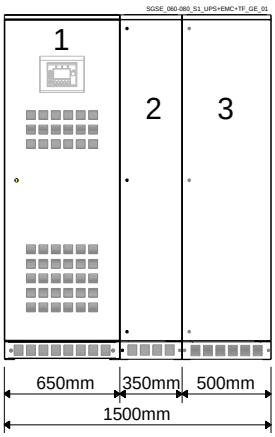
NOTE !

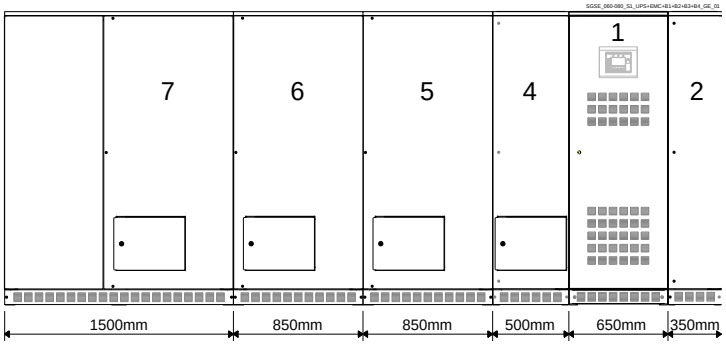
Connections for the options, supplied in separated additional cabinets, are described in the *"INSTALLATION GUIDE"* found inside the optional cabinet.

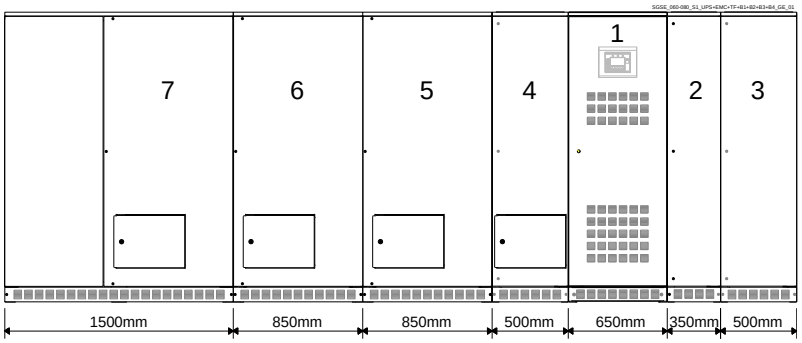
10.4 DISPOSITION OPTIONS SG SERIES 60 & 80 PUREPULSE™











1 = *SG Series 60 & 80 PurePulse™*
650 x 850 x 1900 mm
25.60 x 33.47 x 74.81”

2 = EMC filter and/or Top entry cables cabinet
350 x 850 x 1900 mm
13.78 x 33.47 x 74.81”

3 = Rectifier or bypass transformer
500 x 850 x 1900 mm
19.69 x 33.47 x 74.81”

4 = Battery cabinet 50Ah
500 x 850 x 1900 mm
19.69 x 33.47 x 74.81”

5 = Battery cabinet 75Ah
850 x 850 x 1900 mm
33.47 x 33.47 x 74.81”

6 = Battery cabinet 2 x 50Ah
850 x 850 x 1900 mm
33.47 x 33.47 x 74.81”

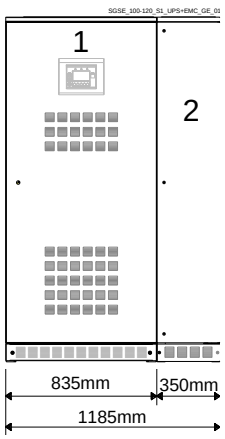
7 = Battery cabinet 2 x 75Ah
1500 x 850 x 1900 mm
59.06 x 33.47 x 74.81”

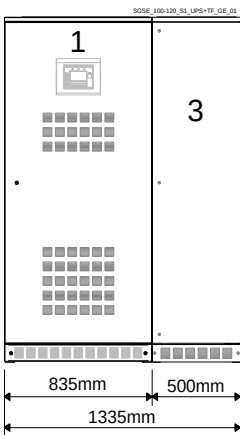
Weights *SG Series 60 & 80 PurePulse™* and options

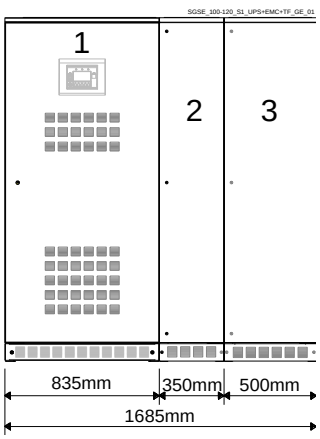
	UPS						Options in additional cabinet							
UPS model	UPS standard (kg)	Floor loading per UPS standard (kg/m²)	UPS with EMC Filter (kg)	Floor loading for UPS with EMC Filter (kg/m²)	UPS with Top entry cables cabinet (kg)	Floor loading for UPS with Top entry cables cabinet (kg/m²)	Transformer Rectifier or bypass (500x850x1900m) (kg)	Battery cabinet empty (500x850x1900m) (kg)	Battery cabinet empty (850x850x1900m) (kg)	Battery cabinet empty (1500x850x1900m) (kg)	Battery cabinet 50Ah (500x850x1900m) (kg)	Battery cabinet 75Ah (850x850x1900m) (kg)	Battery cabinet 2x50Ah (850x850x1900m) (kg)	Battery cabinet 2x75Ah (1500x850x1900m) (kg)
SG Series 60 PurePulse™	550	995	660	777	620	730	340	200	250	370	670	1000	1170	1800
SG Series 80 PurePulse™	630	1140	740	871	700	824	380							

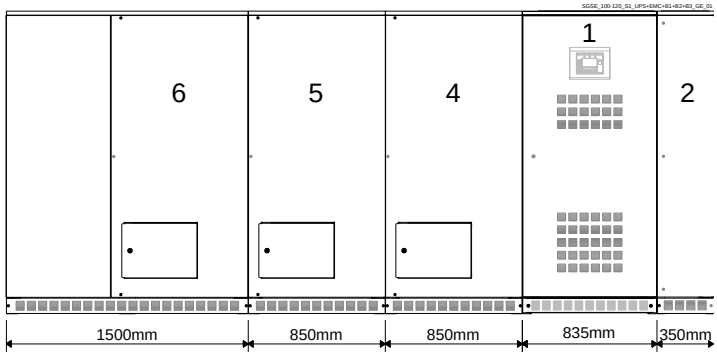
Note: Single weights have to be added up for system configuration to get the total weight!

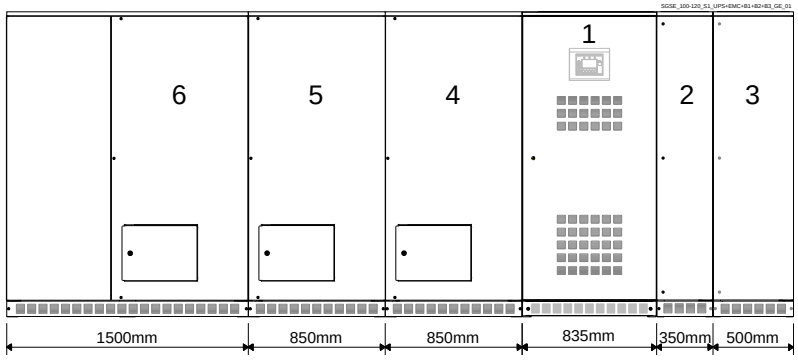
10.5 DISPOSITION OPTIONS SG SERIES 100 & 120 PUREPULSE™











1 = *SG Series 100 & 120 PurePulse™*
835 x 850 x 1900 mm
32.88 x 33.47 x 74.81”

2 = EMC filter and/or Top entry cables cabinet
350 x 850 x 1900 mm
13.78 x 33.47 x 74.81”

3 = Rectifier or bypass transformer
500 x 850 x 1900 mm
19.69 x 33.47 x 74.81”

4 = Battery cabinet 75Ah
850 x 850 x 1900 mm
33.47 x 33.47 x 74.81”

5 = Battery cabinet 2 x 50Ah
850 x 850 x 1900 mm
33.47 x 33.47 x 74.81”

6 = Battery cabinet 2 x 75Ah
1500 x 850 x 1900 mm
59.06 x 33.47 x 74.81”

Weights *SG Series 100 & 120 PurePulse™* and options

	UPS						Option in additional cabinet					
UPS model	UPS standard (kg)	Floor loading per UPS standard (kg/m²)	UPS with EMC filter (kg)	Floor loading for UPS with EMC filter (kg/m²)	UPS with Top entry cables cabinet (kg)	Floor loading for UPS with Top entry cables cabinet (kg/m²)	Rectifier / bypass transformer (500x850x1900m) (kg)	Battery cabinet empty (850x850x1900m) (kg)	Battery cabinet empty (1500x850x1900m) (kg)	Battery cabinet 75Ah (850x850x1900m) (kg)	Battery cabinet 2x50Ah (850x850x1900m) (kg)	Battery cabinet 2x75Ah (1500x850x1900m) (kg)
SG Series 100 PurePulse™	860	1212	985	978	935	931	450	250	370	1000	1170	1800
SG Series 120 PurePulse™												

Note: Single weights have to be added up for system configuration to get the total weight!

10.6 CONNECTION FOR OPTIONS IN UPS CABINET

WARNING !

The installation and cabling of the options must be performed by QUALIFIED SERVICE PERSONNEL only.
Make sure that the UPS installation is completely powered down.
Refer to the "*Safety prescriptions - Installation*" described on *Section 1*.

10.6.1 Auxiliary Power Supply (APS) 24 Vdc for *SG Series 60 & 80 PUREPULSE™*

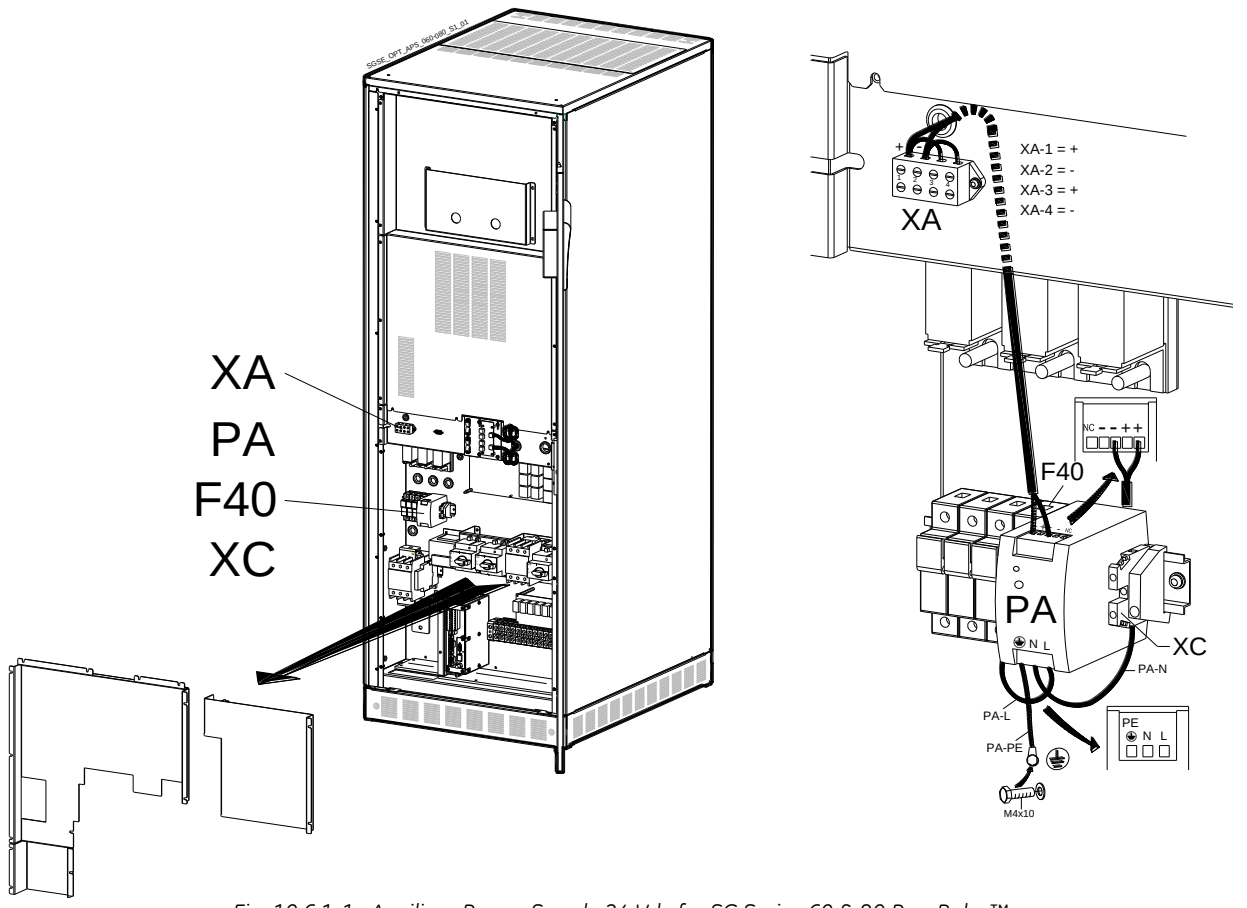


Fig. 10.6.1-1 Auxiliary Power Supply 24 Vdc for SG Series 60 & 80 PurePulse™

PA = Auxiliary Power Supply 24 Vdc **XA** = 24 Vdc Supply Connector **F40** = Terminal 230 Vac

Connection	From	To
Cable ***XA + (black)***	PA - APS: **+**	XA Connector: ***XA-1 (+)***
Cable ***XA – (grey)***	PA - APS: **–**	XA Connector: ***XA-2 (-)***
Cable ***PA-L (black)***	PA - APS: ***L***	F40 Terminal: ***L***
Cable ***PA-N (grey)***	PA - APS: ***N***	XC Terminal: ***N***
Cable ***PA-PE (yellow-green)***	PA - APS: ***PE***	UPS frame: ***PE***

NOTE !

Clamp the cables with the cable-ties.

10.6.2 Auxiliary Power Supply (APS) 24 Vdc for *SG Series 100 & 120 PUREPULSE™*

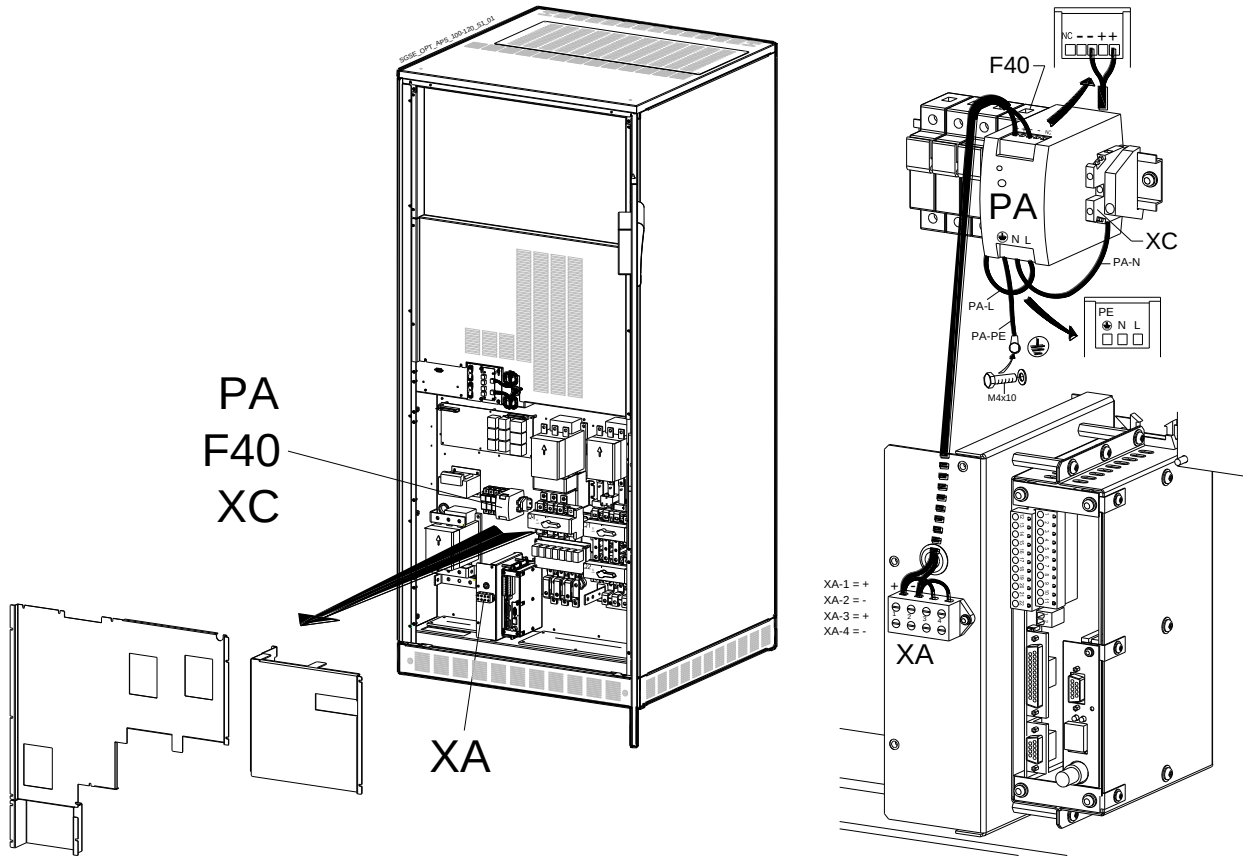


Fig. 10.6.2-1 Auxiliary Power Supply 24 Vdc for SG Series 100 & 120 PurePulse™

PA = Auxiliary Power Supply 24 Vdc XA = 24 Vdc Supply Connector F40 = Terminal 230 Vac

Connection	From	To
Cable ***XA + (black)***	PA - APS: **+**	XA Connector: ***XA-1 (+)***
Cable ***XA – (grey)***	PA - APS: **–**	XA Connector: ***XA-2 (-)***
Cable ***PA-L (black)***	PA - APS: ***L***	F40 Terminal: ***L***
Cable ***PA-N (grey)***	PA - APS: ***N***	XC Terminal: ***N***
Cable ***PA-PE (yellow-green)***	PA - APS: ***PE***	UPS frame: ***PE***

NOTE !
Clamp the cables with the cable-ties.

10.6.3 Remote Signalling Box (RSB)

The optional *Remote Signalling Box* allows monitoring of the operation of the UPS, using the potential free contacts fitted on the *"P4 - Customer Interface Board"* of the UPS.
It can be used by simply putting the box on a desktop or on a wall or, removing the box, it can be surface mounted.

The remote panel contains an internal buzzer and the following status indicators:

- ***Mimic diagram*** With *LEDs* indicating the operation of *Rectifier* and *Inverter*, and the power source supplying the critical *Load*.
- ***Alarm*** Indicating a critical situation on the UPS (LED light and audible alarm).
- ***Stop*** Indicating the UPS is preparing to shut down in a short time.
- ***Mute*** Push button, resets the buzzer.
- ***Test*** Push button checks all the LEDs and the buzzer of the remote panel.

The cable connecting the *RSB* to the UPS cabinet must be min. 16 wires / 0.25mm^2.
The ***plug B*** is included in the delivery of the option *RSB* (cable connecting *UPS* with *RSB* not included).
Maximal allowable length: **300 m** (985 ft).
It must be wired at one end with a D - female plug- 25 pin (*J2 – P4 Customer Interface Board*).

NOTE !
The alarms on free potential contacts can be connected on terminals *X1* instead *J2* (see correlation *X1 – J2* in *Section 9.1*).

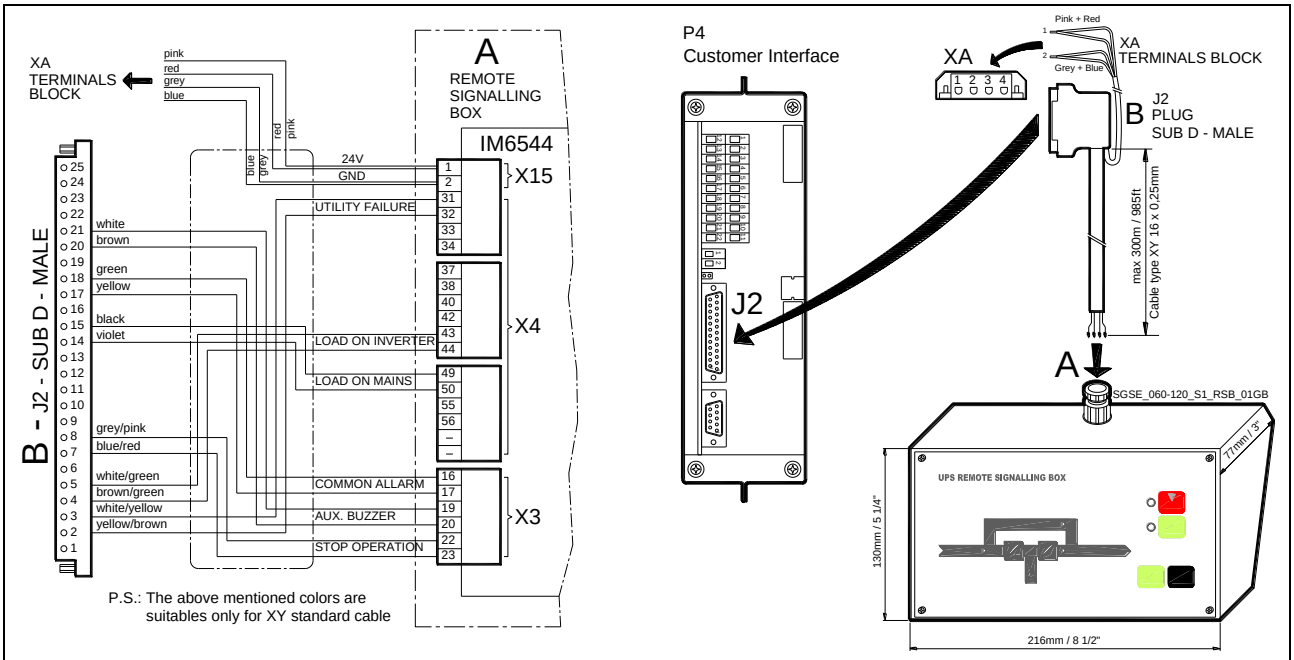


Fig. 10.6.3-1 Remote Signalling Box connection

A Terminals *X3*, *X4* and *X15* fitted inside the *Remote Signalling Box*.

B Plug *J2* (sub D - male - 25 pin) must be connected to the connector *J2* (sub D - female-25 pin) located on *"P4 - Customer Interface Board"*.

XA Terminals block *XA* for 24 Vdc supply *Remote Signalling Box*.

NOTE !
If the remote signal panel is plugged on connector *J2*, the terminal blocks *X1* cannot be used to drive an external alarms monitoring device, because it is supplied by the internal UPS low voltage power supply.

11 MAINTENANCE

WARNING !

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

11.1 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's Critical Power 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.

11.1.1 Service check

If this lamp lights up during normal operation, the unit has not been serviced for the last 20,000 hours by a *GE TRAINED TECHNICIAN*.
Some components of the UPS which need periodic maintenance, if not replaced, could cause a reliability reduction of the supply system.
We highly recommend that you contact your *GE Service Centre* for preventive maintenance work.

NOTE !

Never ignore a Service Check alarm!

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

Refer to *Section 11.1.2* to *11.1.6* for this important detail.

11.1.2 Fans and ventilation

We recommend a periodic cleaning of the ventilation channels and grids on the UPS system, in order to guarantee proper air circulation in the unit and in the *Battery*.

The fans eventually wear out and must be substituted when a UPS alarm is triggered, in order to ensure the reliability of the UPS.

11.1.3 Other components with limited lifetime

Various components, such as the DC and AC filter capacitors and the lithium battery on the "*P3 -Control Panel*" (memory saving), must be systematically replaced in order to maintain the UPS'S reliability.
The substitution of these components is signalled by a UPS alarm going off.

11.1.4 Battery

NOTE !

Perform mandatory battery maintenance per battery's manufacturer product manual. This includes electrical and thermal measurements, inspection, cleaning, replacement and re-torque of connections.

Failure to perform proper maintenance on the battery, per the battery manufacturer's recommendation, including scheduled battery replacement, may result in thermal damage to the equipment and an increased risk of personnel injury.

GE declines any responsibility for any damage to the system and the surrounding caused by battery when the battery maintenance program is provided by other than GE itself and GE authorized partners.

We recommend a periodic *Manual Battery Test*, especially if the *Automatic Battery Test* is disabled, in order to verify if the *Battery* can provide the expected backup time in case of *Mains Failure*.

We recommend that this test is performed at least every **3 months**, especially if the *Battery* is not sufficiently discharged during normal operation.
The discharge time you use should be at least half of the *Battery* runtime.

For *Battery Test* setting, a special code is required to enter user set-up parameters.
The start-up technician has access to this code and can program this feature during start-up.

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.

Long shut-down periods of the UPS system

To guarantee that the *Battery* is fully charged, the UPS system should be in operation for at least **12 hours every 3 months**.
If not the *Battery* may be permanently damaged.

11.1.5 UPS room conditions and temperature

The UPS room and the *Battery Room* have to be maintained clean and free from dust.
A high temperature of the UPS room and of the *Battery Room* affect the lifetime of several components inside the equipment.
The *Battery* is very sensitive to room temperatures above **25°C** (77°F).

11.1.6 Preventive maintenance program

a) Cleaning, a visual inspection and a mechanical inspection of the UPS modules.

b) Replacement of defective parts or the preventive replacement of parts with a defined lifetime.

c) "Updating" of the equipment (technical improvements subsequent to the delivery).

d) Check the calibration of *DC voltage* and *Inverter Output Voltage* and *Frequency*.

e) Check of the settings of the electronic regulation, the control and the alarm circuits of the *Rectifier(s)* and *Inverter(s)*.

f) Functional checks on *Thyristors*, *Diodes*, *Transformers*, *Filter Components*, e.g. to ensure that they are operating within the specified design parameters.

g) Overall performance test including a *Mains Failure* simulation with and without the *Load*.

h) Monitoring *Battery* operation in discharge and recharge mode including any boost charge duties.

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*

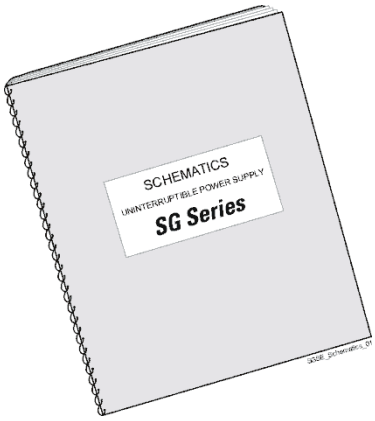
13 ANNEX

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.