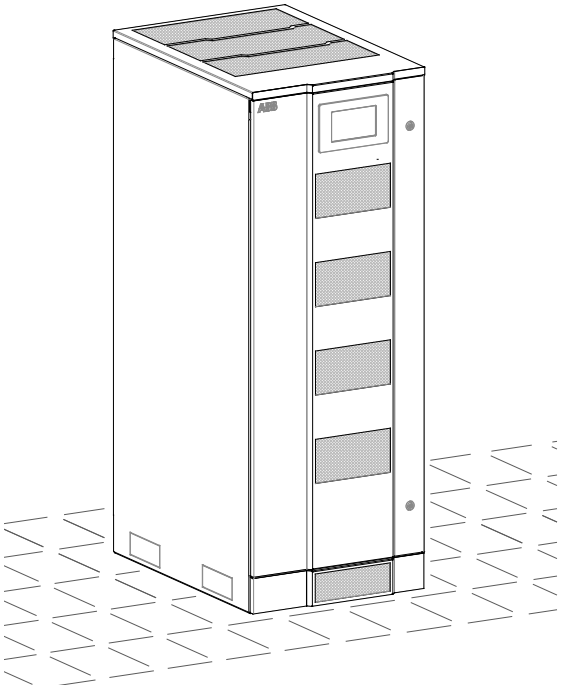
UPS USER MANUAL

TLE Scalable Series

40 to 150 kVA UL S1



Model	**TLE Scalable Series 40 to 150 UL S1** TLE Scalable Series 150/40 UL S1 TLE Scalable Series 150/50 UL S1 TLE Scalable Series 150/80 UL S1 TLE Scalable Series 150/100 UL S1 TLE Scalable Series 150/120 UL S1 TLE Scalable Series 150/150 UL S1
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Revision	Concern	Date
REV-B	ECN 2771 (IM0305 - UVR Control Board)	04/25/2018

Dear Customer,

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

We trust that the use of the **TLE Scalable Series 40 to 150** Uninterruptible Power Supply System, developed and produced to the highest standards of quality, will give you complete satisfaction.

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

Thank you for choosing **ABB**!

Start-up and commissioning!

An ABB Global Services Field Engineer must perform start-up and commissioning of the UPS.

Please contact ABB Service Center at least two weeks prior to schedule start-up and commissioning at 1-800-292-3739.

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ABB Service Center

To get important information on all equipment warranties, please contact the ABB Service Center or request service follow-up or by scanning the QR code.

http://new.abb.com/ups/service-ups

Preface

Congratulations on your choice of a TLE Scalable Series 40 to 150 Uninterruptible Power Supply (UPS).
It will keep you away from any trouble due to unexpected power problems.

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

Please refer to the accompanying Installation Guide, which describes how to prepare the installation site, and it provides weight, dimensions and procedures for moving, installing and connecting the UPS.

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

Note!

TLE Scalable Series 40 to 150 is a Category C3 UPS Product (according to IEC 62040-2).

This is a product for commercial and industrial application in the second environment – installation restrictions or additional measures may be needed to prevent disturbances.

We recommend that this manual be kept next to the UPS for future references.
If any problems are encountered with the procedures contained in this manual, please contact your ABB Service Center 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 and warning concerning electrical connections and personnel safety.

RPA
Redundant Parallel Architecture

Parallel System secured with "RPA – Redundant Parallel Architecture"

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

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1 Safety rules

Save these instructions!

This manual contains important instructions for models **TLE Scalable Series 40 to 150** that should be followed during installation and maintenance of the UPS and Battery.

General
- Move the UPS in an upright position in its original package to the final destination room.
  To lift the cabinets, use a forklift or lifting belts with spreader bars.
- Check for sufficient floor and elevator loading capacity.
- Check the integrity of the UPS equipment carefully.
  If you notice visible damage, do not install or start the UPS.
  Contact your ABB Service Center immediately.
- WARNING! RISK OF ELECTRICAL SHOCK!
  Do not remove covers, there are no user serviceable parts inside.
- After switching off takes 5 minutes for the DC capacitors to discharge because a lethally high voltage remains at the terminals of the electrolytic capacitors.
- UPS's and Battery system require a 12 months periodic maintenance to operate reliably and safely.
  This should be performed by qualified service personnel. The UPS contains its own energy source (Battery).
- The field-wiring outlets may be electrically live, even when the UPS is disconnected from the Utility.
- Dangerous voltages may be present during Battery operation.
- The Battery must be disconnected during maintenance or service work.
- This UPS contains potentially hazardous voltages.
- Be aware that the Inverter can restart automatically after the Utility voltage is restored.
- End user must follow applicable regional occupational safety codes/regulations during installation, operation and equipment maintenance. This may require additional field marking or labelling defining appropriate level of PPE (Personal Protection Equipment) to reduce the risk of Arc-flash related injuries.
  Contact our ABB Service Center 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 LEAKAGE CURRENT TO GROUND:
  Ground connection is essential before connecting to AC input!
- Switching OFF the Unit does not isolate the UPS from the Utility.
- Do not install the UPS in an excessively humid environment or near water.
- Avoid spilling liquids on or dropping any foreign object into the UPS.
- The Unit must be placed in a sufficiently ventilated area; the ambient temperature should not exceed 104°F (40°C).
- Optimal Battery life is obtained if the ambient temperature does not exceed 77°F (25°C).
- It is important that air can move freely around and through the Unit. Do not block the air vents.
- Avoid locations in direct sunlight or near heat sources.

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

Battery
- The Battery-voltage is dangerous for person's safety.
- When replacing the Battery, use the same 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.
- In case of air shipment, the cables +/- going to the Battery fuses/terminals shall be disconnected and isolated.

Safety instructions when working with Battery

Danger!

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.

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 unauthorized 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.
Battery 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. High energy through conductive materials could cause severe burns.

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 Disconnect charging source prior to connecting or disconnecting Battery terminals.
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 Determine if Battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded Battery can result in electrical shock.
The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance.

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

9 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.

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

11 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.

Throughout this manual the following symbols are defined:

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

1.2 Cyber security

UPS must be protected in a Security Restricted Area.

UPS must be installed in a location/room with mechanical lock.

Limit access to authorized personnel only and it shall stay under Authorized Personnel Operator to manage the accesses.

2 Layout

2.1 Layout TLE Scalable Series 40 to 150

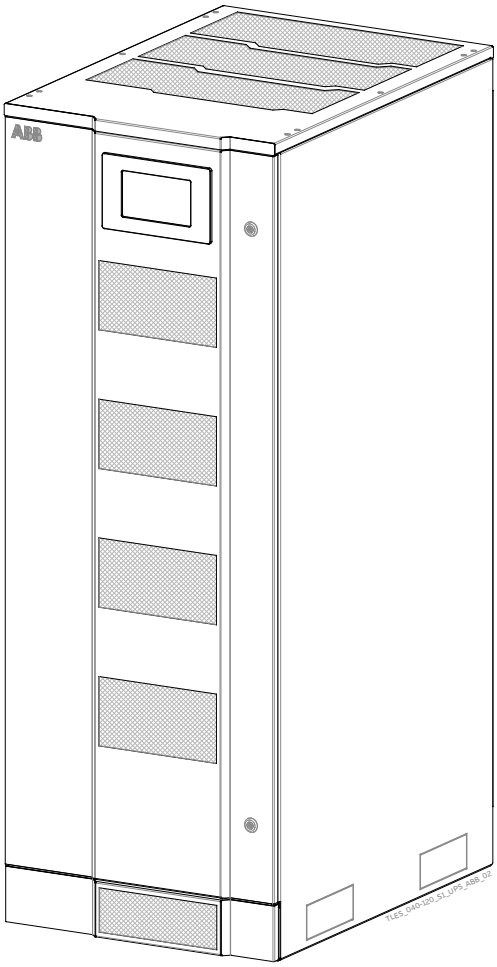


Fig. 2.1-1 TLE Scalable Series 40 to 150 - General view

Fig. 2.1-2 Control Panel

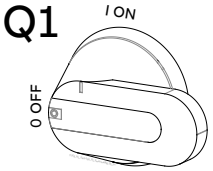


Fig. 2.1-3 Q1 - UPS Output switch

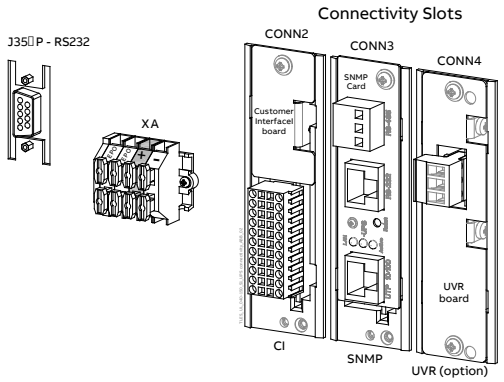


Fig. 2.1-4 Connectivity Slots

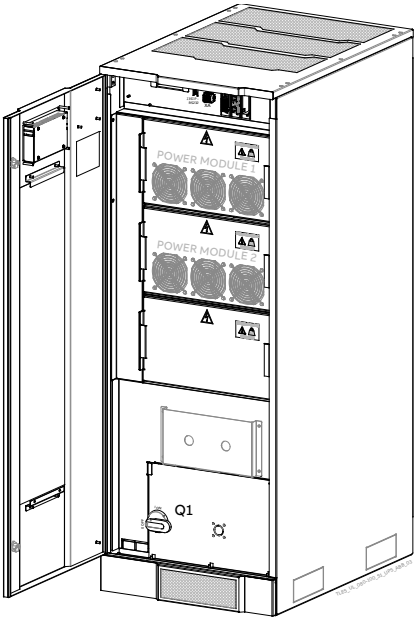


Fig. 2.1-5 TLE Scalable Series 40 & 50 General view with open door

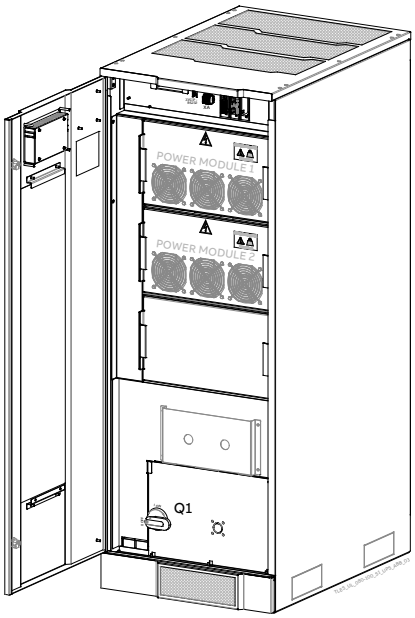


Fig. 2.1-6 TLE Scalable Series 80 & 100 General view with open door

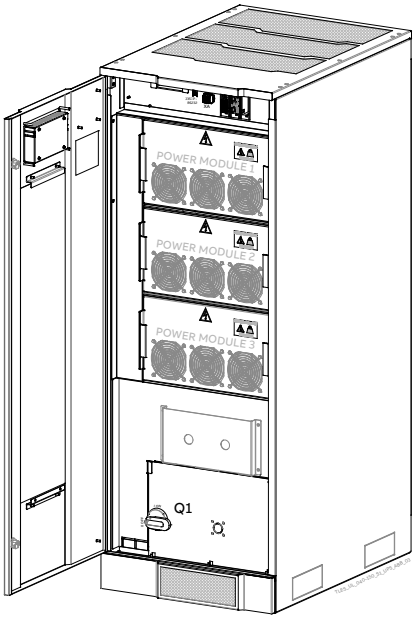


Fig. 2.1-7 TLE Scalable Series 120 & 150 General view with open door

3 Introduction

The **TLE Scalable Series 40 to 150 Uninterruptible Power Supply** (UPS) provides the energy supply for critical Loads which need a reliable, continuous free from voltage disturbances and frequency fluctuations supply.

In case the power provided by the Utility 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 Utility power returns.

TLE Scalable Series 40 t0 150 is a truly **VFI** (Voltage Frequency Independent) double conversion **Uninterruptible Power Supply** (UPS), equipped with automatic Bypass, where the **Load** is normally supplied by the **Inverter**.
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 Utility via the Automatic Bypass.
The UPS automatically returns to normal mode when the failure condition is restored.

TLE Scalable Series 40 to 150 can be configured, if chosen, for the "**SEM** - Super Eco Mode" permitting maximum energy saving.

Key features of the TLE Scalable Series 40 to 150

More Critical equipment supported

Rated at 1 Power Factor, TLE Scalable Series 40 to 150 delivers more real power than other UPS in the market.
With today's trend toward Power Factor corrected Loads, TLE Scalable Series 40 to 150 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.

High Efficiency

Thanks to type Advanced Neutral Point Clamped three level IGBT technology, TLE Scalable Series 40 to 150 guarantees 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 Advanced Neutral Point Clamped are the technology corner stones of a new age of power quality and power reliability.

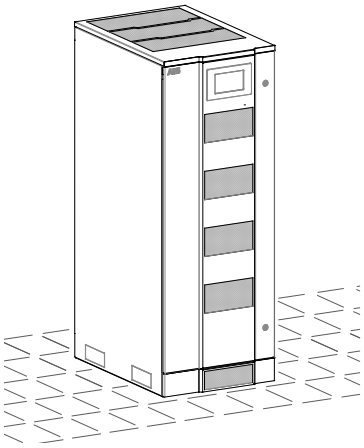
RPA™ - Redundant Parallel Architecture™ Parallel System

ABB provides a unique technology called Redundant Parallel Architecture™ (RPA™) that can parallel Uninterruptible Power Supply (UPS) Modules with true redundancy.
With RPA™, there is no need for external electronics or switches to control the UPS Modules in the Parallel System.
One of the UPS Modules in the system arbitrarily takes a leadership role, while the other UPS Modules have access to all control parameters.
If one UPS fails to operate, the Load is automatically redistributed among the others.
If the lead UPS fails to operate then a different UPS automatically takes on the leadership role.
The RPA™ systems are designed to have no single points of failure, ensuring the highest level of power protection for critical Loads.

Extremely flexible

Tailor made power protection to meet your individual installation requirements; TLE Scalable Series 40 to 150 offers various options like EMC filter and our comprehensive software for mission control and data protection to cover all your application needs.

4 Description



TLE Scalable Series 40 to 150 is one of the best performing and most reliable three-phase UPS systems providing critical power protection for a wide range of applications.

Every TLE Scalable Series 40 to 150 system operates in VFI mode (Voltage Frequency Independent) yielding the maximum levels of power reliability for all mission-critical processes.

With proven technology, the TLE Scalable Series 40 to 150 UPS provides top class reliability and performance.

With backfeed protection and compliance to EMC standards the TLE Scalable Series 40 to 150 complies to current standards.

Reliability can be further increased by paralleling up to six UPS Units utilizing ABB'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 decentralized bypass offers great flexibility to up or down grade the system in case future needs might change.

TLE Scalable Series 40 to 150, best in class efficiency

- High efficiency in double conversion mode up to 95.9% and "SEM - Super Eco Mode" operation mode up to 98.9%.
- High efficiency at partial and reduced Loads for cost benefits in operating conditions.
- Higher efficiency at partial Load in RPA Systems with adaptive capacity control (IEMi - Intelligent Energy Management integrated Operation Mode - option).
- TLE Scalable Series 40 to 150 products designed in compliance with UL 1779 standard, C3 level for immunity, i.e. can withstand possible disturbances and noise without affecting standard operating conditions.
- Advanced User Interface with touch screen display guided menu.
- Reduced energy consumption costs.
- Reduced size and costs of the air conditioning system.
- Compact design, saving installation space.

Note!

Through their complete life cycle, all ABB 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

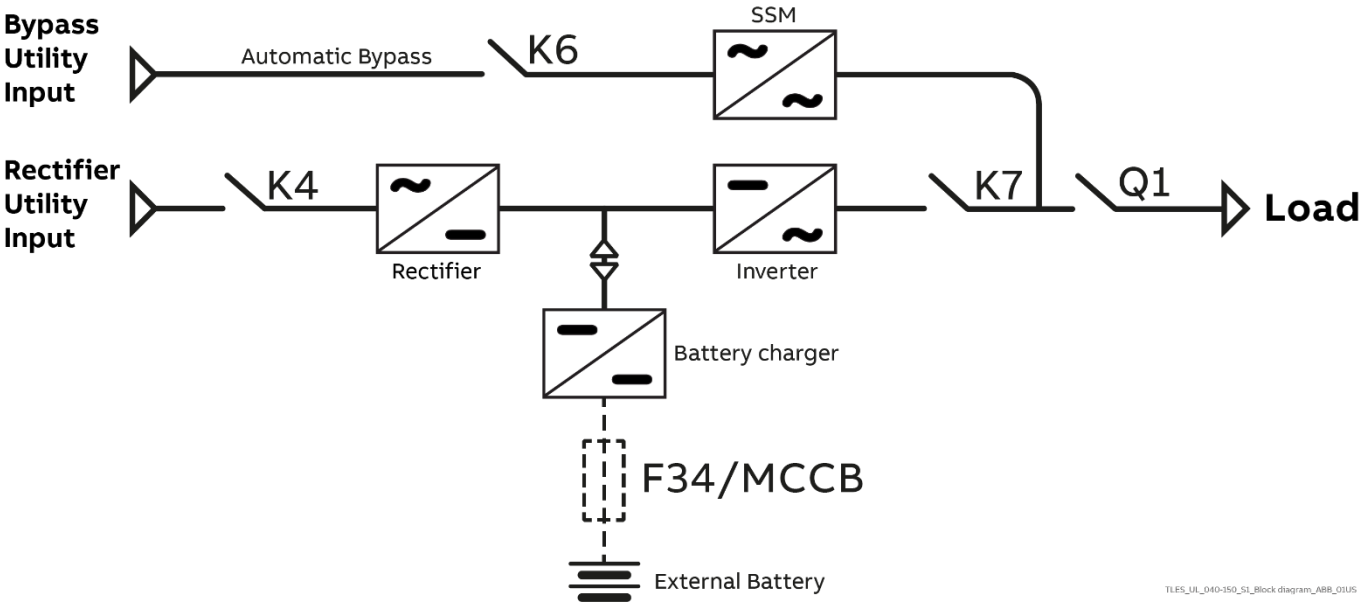


Fig. 4.1-1 TLE Scalable Series 40 to 150 - Block Diagram

The TLE Scalable Series 40 to 150 system can be divided into the following main elements:

Control System
TLE Scalable Series 40 to 150 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 Active IGBT Rectifier converts the 3-phase Utility voltage into a controlled and regulated DC-voltage, supplying the Inverter and to charge the Battery through the Battery-charger.
Thanks to modulation strategy applied to IGBT Bridge, the rectifier provides clean input power in terms of low THDi and Unity Power Factor.

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 Utility.

Back-feed Protection
All TLE Scalable Series 40 to 150 UPS's are equipped with an automatic system for the protection against voltage back feeding towards Utility, through the Bypass (UL 1778 and CSA C22.2 no. 107.3).
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.

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

4.2 Operation modes

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

4.2.1 Normal VFI Operation Mode (Voltage Frequency Independent)

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

The Rectifier, powered by the Utility, 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 Utility Power.

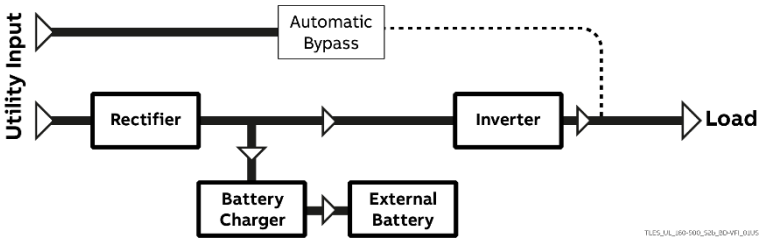


Fig. 4.2.1-1 Block diagram normal operation mode

4.2.2 SEM Operation Mode (Super Eco Mode)

When the “SEM - Super Eco Mode” Operation Mode is selected, and the Utility Power is available, the Load is normally powered through the Automatic Bypass.

When the Utility Voltage is detected out of the prescribed tolerances, the Load is automatically transferred to the Inverter.

When the Utility recovers, the Load returns to the Automatic Bypass after a variable time defined by the Control Unit.

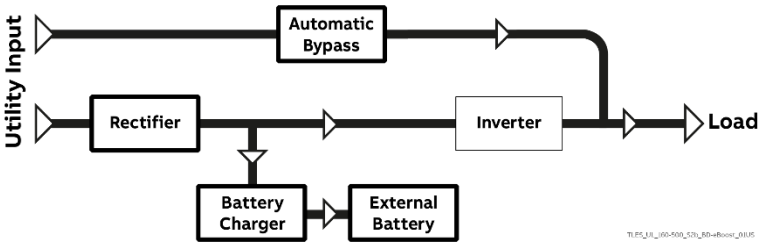


Fig. 4.2.2-1 Block diagram “SEM - Super Eco Mode” Operation Mode

The “SEM - Super Eco Mode” Operation Mode can be configured directly by the user for higher efficiency, considering the Utility reliability and criticality of the Load.

The selection between the two operation modes “VFI mode” and “SEM - Super Eco Mode”, or switching between operation modes at required time, can be done through the UPS Control Panel (see Section 6.4 / SEM).

Note!

The “SEM – Super Eco Mode” Operation Mode is available only if enabled at the factory by an ABB Service Technician.

RPA
Redundant Parallel Architecture

In case of RPA Parallel System

“SEM – Super Eco Mode” Operation Mode cannot be enabled for RPA Parallel System.

Attention! A Single Unit equipped with an RPA - Parallel board, must be considered as parallel, thus disabling “SEM – Super Eco Mode” Operation Mode.

4.2.3 Utility Failure Operation

When the Utility 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 the Battery completely discharging, the "**stop operation**" alarm (shut-down imminent) warns the operator that the Battery is almost discharged and the UPS is about to shut-down.

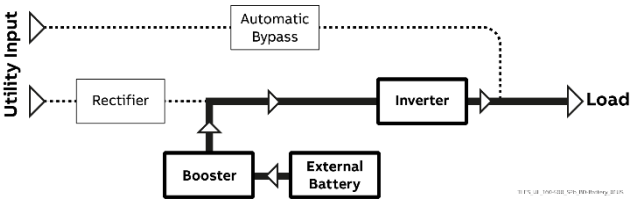


Fig. 4.2.3-1 Block diagram Utility Failure operation

RPA
Redundant Parallel Architecture

In case of RPA Parallel System

With a Parallel System for Power Capacity (see Section 4.3)

- With the **Bypass Utility power available,** a "Battery low" warning on any Unit will cause the Load to be transferred to Utility (after a selectable time delay).
- With **Bypass Utility 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 (RPA - see Section 4.3)

- 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 Utility 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 Utility through the Automatic Bypass.
When the Battery is recharged enough 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.

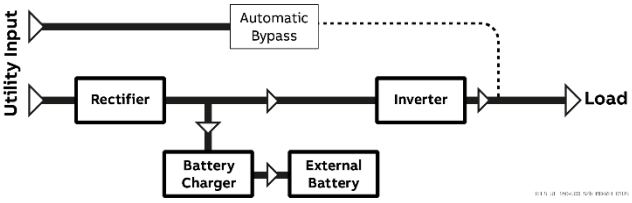


Fig. 4.2.4-1 Block diagram Utility recovery operation

RPA
Redundant Parallel Architecture

In case of RPA Parallel System

When the AC input power recovers, **the Rectifiers will start-up sequentially,** according to their number in the RPA 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 Utility 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.

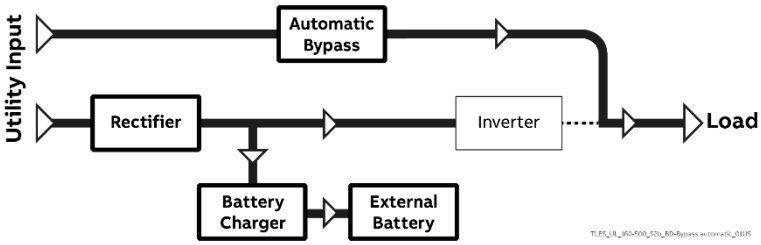


Fig. 4.2.5-1 Block diagram Automatic Bypass

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

RPA
Redundant Parallel Architecture

In case of RPA Parallel System

Each Unit has its own internal Bypass.

These Units are continuously exchanging information, enabling all of the internal Bypass circuits in an RPA Parallel System to operate simultaneously.

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

It is excluded only if the Unit is separated from the common bus by opening its “Q1 – UPS output switch”.

RPA
Redundant Parallel Architecture

4.3 RPA Parallel System operation

4.3.1 Introduction to the RPA Parallel System

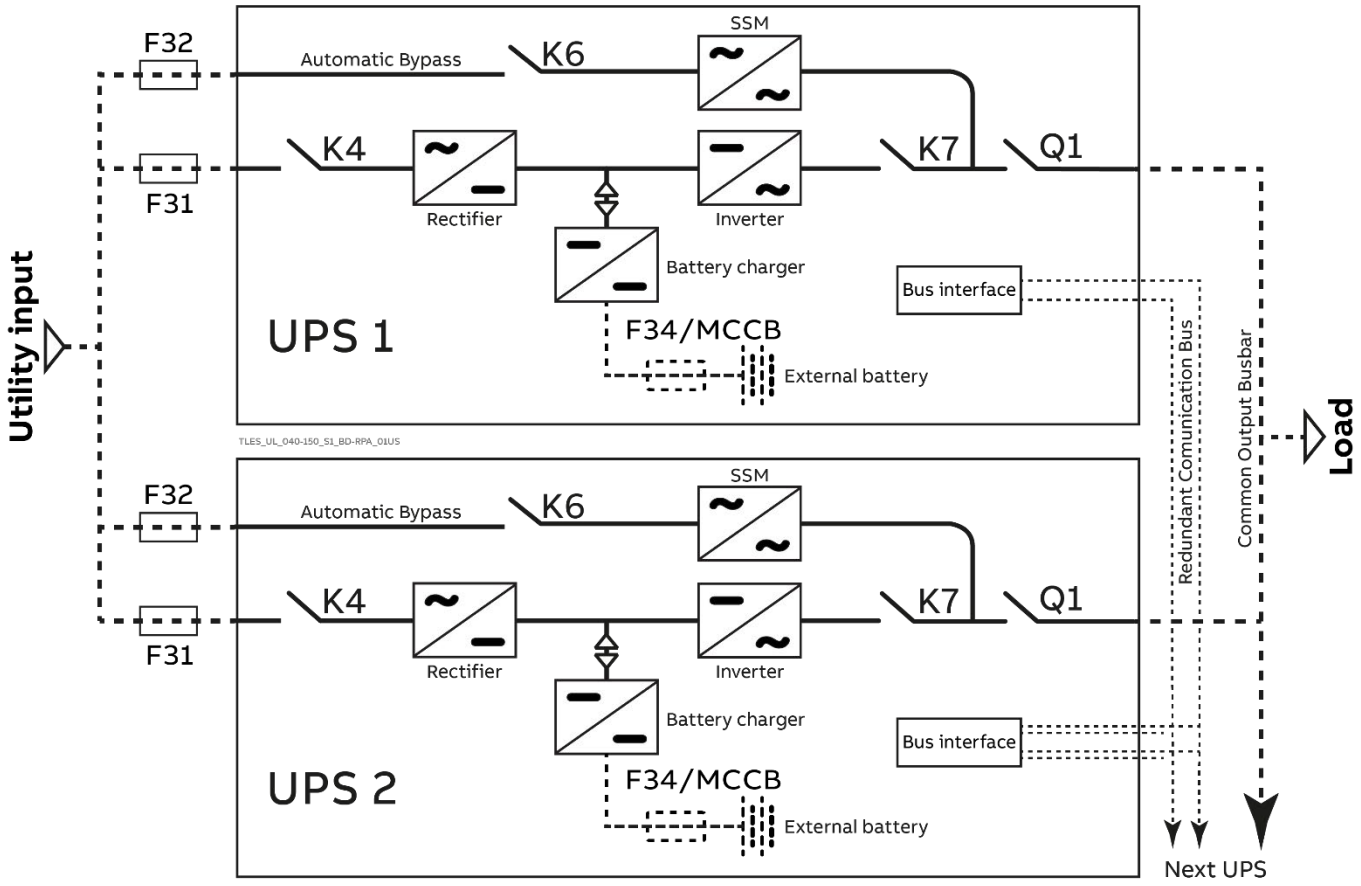


Fig. 4.3.1-1 Block diagram RPA Parallel System operation

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 TLE Scalable Series 40 to 150 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 Utility 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 result **higher reliability and security for the Load plus a higher MTBF** (Mean Time Between Failures).

4.3.2 Features of RPA Parallel System

The TLE Scalable Series 40 to 150 RPA 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.

4.3.3 System control

A **High-Speed Redundant and 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.

4.3.4 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 Utility Bypass voltage, as long as the latter is within tolerances.

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

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

4.3.5 Load sharing

On each Unit of the RPA 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.

4.3.6 IEMi Operation Mode (option)

Note!

"IEMi - Intelligent Energy Management integrated" and "SEM - Super Eco Mode" Operation Mode are mutually exclusive; they cannot be simultaneously available on a system.

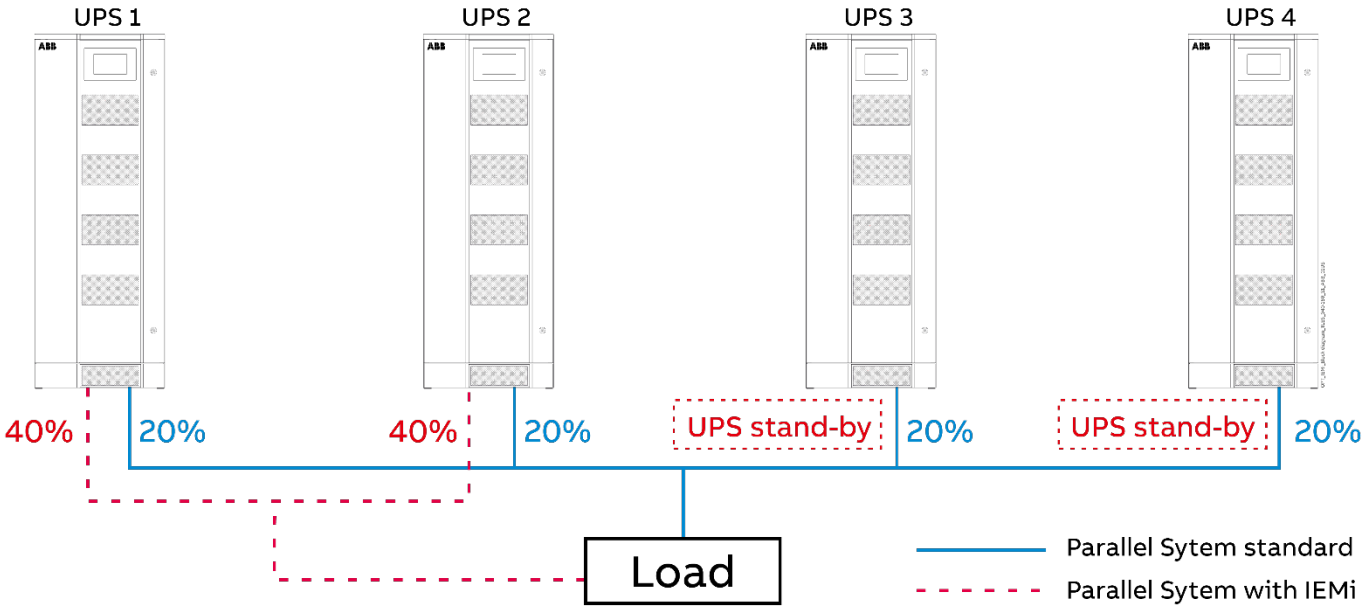


Fig. 4.3.6-1 Functional diagram of an RPA Parallel System in IEMi Operation Mode

ABB offers the **IEMi - Intelligent Energy Management integrated** option to optimize energy cost while maintaining the highest possible reliability for Parallel Redundant Uninterruptible Power Supply Units (max. 6).

For RPA Parallel System installations, secured with Redundant Parallel Architecture™ (RPA™), IEMi Operation Mode saves energy by dynamically utilizing the UPS Units as needed to meet the required Load without compromising the power quality to the critical Load.

The software will calculate the number of UPS Units which are needed for Load supply based on following:

- Redundancy (N+1 or N+2)
- Inverter operating time
- System Load
- IEMi Operation Mode programming
- Rectifier status

Particularly, the UPS control logic determines the minimal set of UPSs required to maintain a reliable supply to the critical Load.
Then, an efficiency optimization algorithm determines the best UPS configuration in order to maintain the running UPS in their highest efficiency operating region.
Energy losses are reduced by switching the Inverter section of one or more Units to a stand-by state.
The critical Load is fed by the remaining Units operating in double-conversion.
As Load increases, other Units are gradually switched on-line in order to maintain the required redundancy level.

The IEMi - Intelligent Energy Management integrated option is only available on parallel installations.
It is clear that in order to enjoy the benefits of IEMi operation a system programmed for N+1 redundancy requires a parallel installation of at least three UPSs, while four UPSs are required for N+2 redundancy.

IEMi - Intelligent Energy Management integrated is an option, and it is available only if introduced at the factory, or if introduced in field installations by an ABB GLOBAL SERVICES FIELD ENGINEER.

Benefits of IEMi - Intelligent Energy Management integrated include:

- Higher efficiency (reduced losses) in low-Load conditions (efficiency optimization)
- No compromise on power quality (double-conversion operation)
- No compromise on system reliability (redundant operation).

4.4 UPS paralleled on the same Battery

Note!
An RPA Parallel System with a Common Battery for two or more UPS (max. 4 Units), requires a particular installation and adequate setting of some parameters, (accessible only through "Service Code") and can therefore only be done by an ABB Service Technician.

Usually each UPS Unit runs with its own Battery.
In case of Parallel Units running with a Common Battery (max. 4 UPS - see Fig. 4.4-1), the sharing circuit between the individual UPS is integrated in the communication bus of the system in order to assure an equal sharing of the Rectifiers output currents.

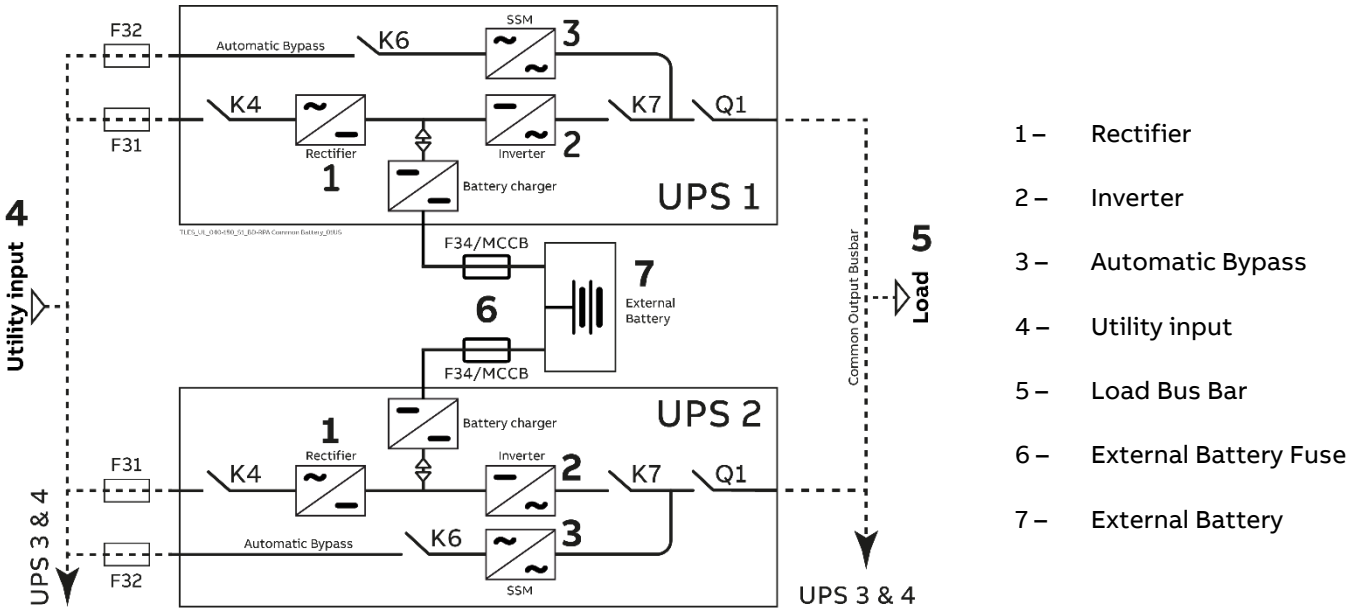


Fig. 4.4-1 Diagram RPA system with UPS on common Battery

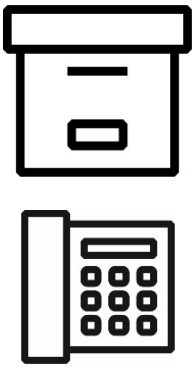
Note!
It is mandatory to install the fuses / MCB (6) on each line connecting the Rectifiers to the Common Battery (see Section 4.7.3 – Installation Guide).
Failure to comply will expose service personnel to risk of shock during maintenance.
It will also not allow safe operation of fuses, enhancing damage to the equipment and the environment in case of failure.

Pay attention to the following recommendations:

- The Units delivered for this functioning mode needs special parameters setting, so they must be prepared in advance before the installation.
- The installation must be performed only with the UPS system completely shut down.
- The AC Rectifiers input power (4) must be the same, with clockwise phase rotation for each Unit.
- Each Rectifier must be set for the same floating DC voltage and the same Battery current limitation.
- It is mandatory to install the fuses / MCB (6) on each line connecting the Rectifiers to the common Battery for maintenance / safety reasons (see Installation Guide to Section 4.7.3).
- In case a Unit must be powered down for maintenance, switch-OFF the concerned Unit before open the DC fuses / MCB on the Battery line (6).
- It is recommended to connect an external NO free contact "Battery Fuses" to the UPS and to enable the function by setting the parameter (see Section 9.1).
- If an emergency generator set supplies the UPS, and the free contact "Generator ON" is connected to the Customer Interface, connect a separate NO free contact on each Parallel Unit.
- The parameters enabling the Battery test, both manual and automatic, must be set in the same mode on all the Units sharing a Common Battery.
- Do not connect the temperature sensor for automatic Battery floating voltage compensation.
- Do not enable the function Boost charge.

4.5 Service and technical support

Your ABB Service Center
(see page 3)



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

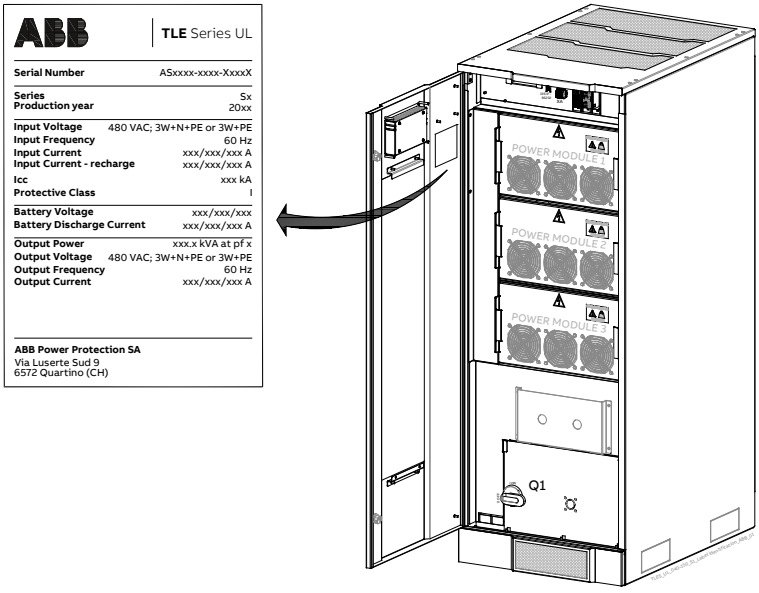


Fig. 4.5-1 Identification label

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.

4.6 Warranty

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

Note!

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

4.7 Recycling instructions

Note!

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

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

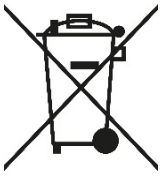
Packing material recycling!

ABB, in compliance with environment protection, uses only environmentally friendly material at the end of its service life, must be recovered conforming to the local applicable regulations.

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

Recycling at the end of service life!

ABB, 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!

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

5 Control Panel

5.1 Control Panel

Fig. 5.1-1 Control Panel

The Control Panel, positioned on the UPS front door, acts as the UPS user interface.

Main features:

- LCD Touch screen color graphic display. See Chapter 6.
  - Multilanguage communication interface:
    English, German, Italian, Spanish, French, Finnish, Polish, Portuguese, Czech, Slovenian, Chinese, Swedish, Russian and Dutch.
  - Synoptic diagram indicating UPS status.
- Command keys and parameters setting.
- UPS status control LED.

6 LCD screen

Composed of an LCD color “Touch Screen” which provides the following information to users:

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

6.1 Home screen

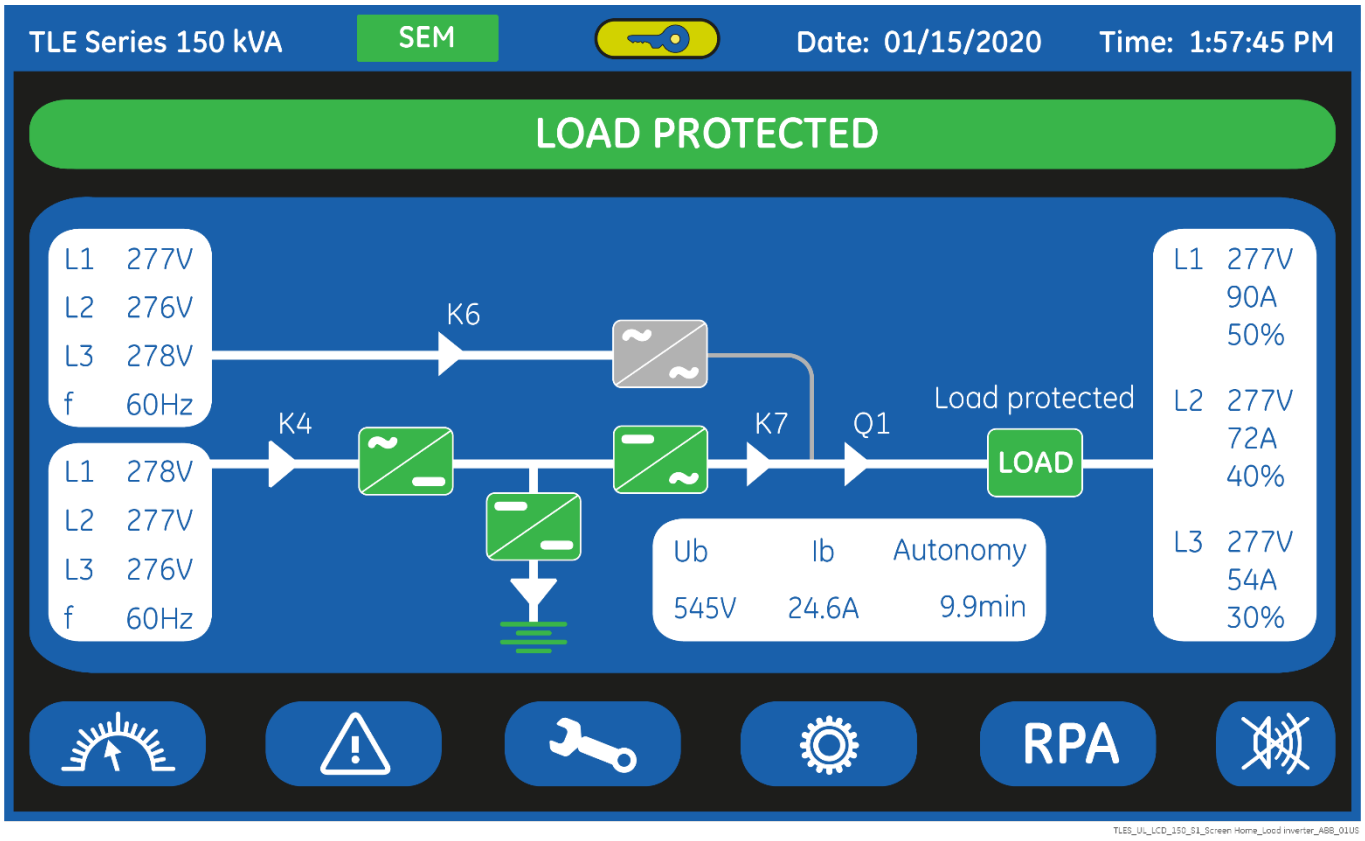


Fig. 6.1-1 LCD screen

The LCD screen, after 5 minutes of inactivity, shuts down the backlight.
To reactivate it, it is sufficient to press any keys mentioned to Section 6.1.1.

If the keypad remains inactive for 5 minutes or longer, during the viewing of a screen such as MEASURES, EVENTS, SETUP, RPA Parallel System or COMMANDS, the LCD screen returns automatically to the main screen.

Pressing the key “UPS status” for a few seconds automatically sets the “ENGLISH” language on the LCD screen.

6.1.1 Description of the selection keys

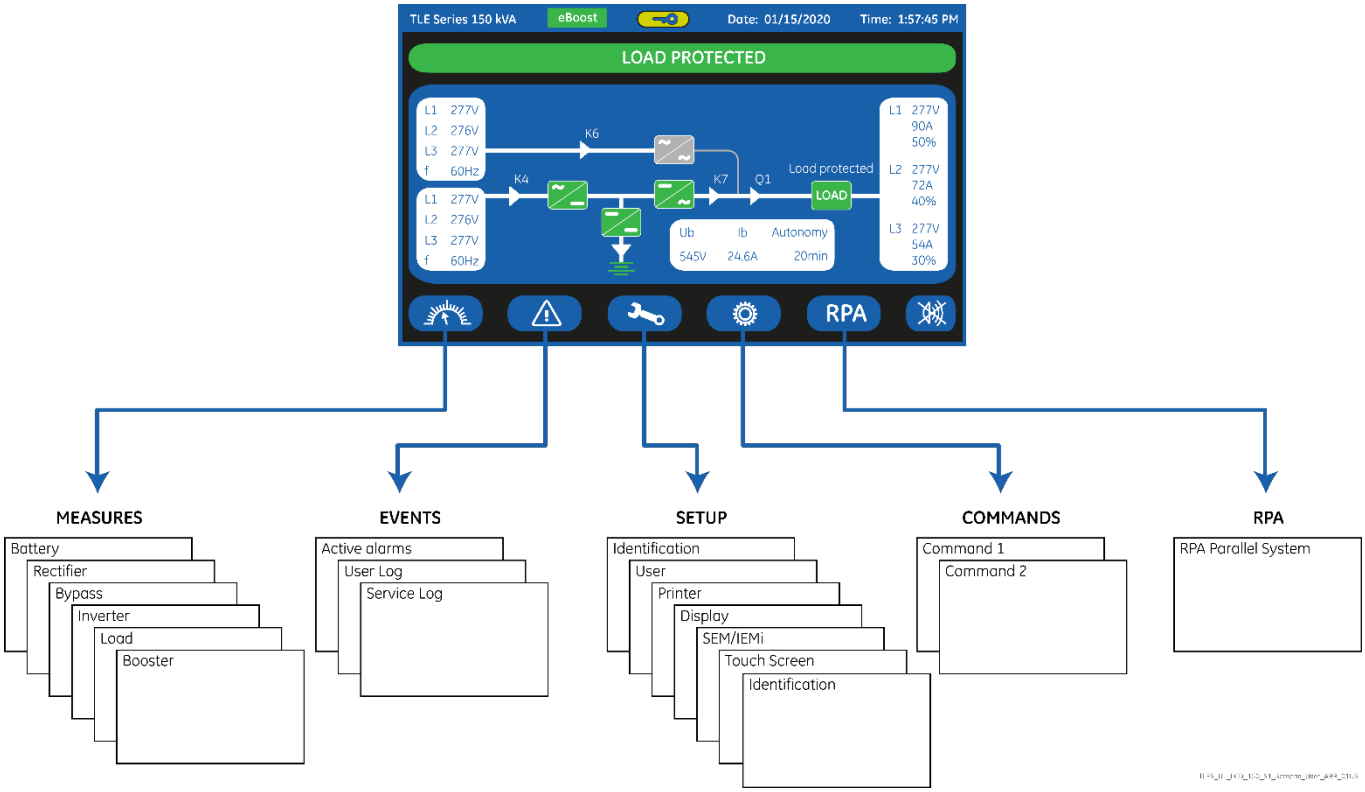


Fig. 6.1.1-1 LCD screen

MEASURES

Shows electric parameters values and statistics of use.
See Section 6.2.

EVENTS

Shows in chronological order, all the events occurred (alarms, messages, commands, handling, etc.).
See Section 6.3.

SETUP

Allows the user to customize some UPS functions to specific requirements and to view UPS identification data.
See Section 6.4.

COMMANDS

Allows the user to execute UPS operation commands.
See Section 6.5.

RPA Parallel System

Shows the status of operation of the RPA Parallel System.
See Section 6.6.

MUTE

Key to reset general alarm and buzzer.

6.1.2 Description of the signaling LEDs

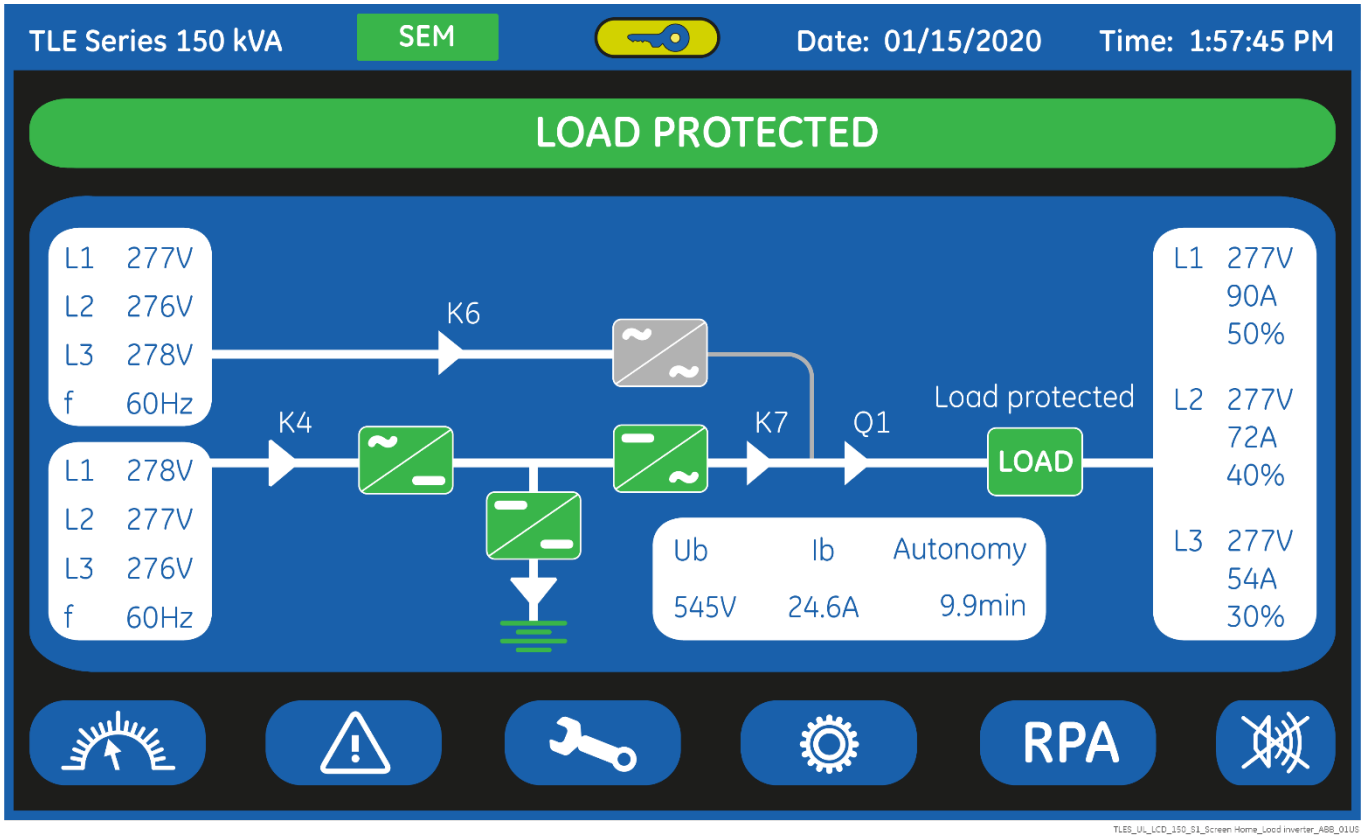


Fig. 6.1.2-1 LCD screen

TLE Series 500 kVA	UPS model
Date: 01/15/2020	Date (format “MM/DD/YYYY”).
Time: 1.57.45 PM	Time AM or PM (format “HH.MM.SS”).
eBoost	**eBoost (green color)** LED ON/lit indicates that the UPS is operating in eBoost™ mode.
IEMi	**IEMi (green color)** LED ON/lit indicates that the UPS is operating in IEMi mode.
	Service Key (yellow color) Key for disabling the Service Key procedure. Used only by the ABB Service Center.

LEDS UPS STATUS

LOAD PROTECTED **LED LOAD PROTECTED (green color)**

When lit, indicates that the UPS is functioning correctly and the Load is system protected (Load supplied either from Inverter or from Automatic Bypass in case of eBoost™ Operation Mode).

When blinking, indicates that a regular maintenance service is needed (SERVICE REQUIRED).
May be reset by an ABB Service Technician only.
See Section 9 – Maintenance – Service check.

The LED is OFF when the “Q1 – UPS output switch” is open, indicating that the Inverter is in service mode, not supplying the Load.

LED ALARM (yellow color)

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 – UPS output switch” is open.

LED STOP OPERATION (red color)

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

- The Battery is fully discharged and the Load cannot be transferred on Utility.
- Overtemperature or overload condition (>102%) and the Load cannot be transferred on Utility.

Bypass

Data regarding Bypass.
See Section 6.2.

Rectifier

Data regarding Rectifier.
See Section 6.2.

Load output

Data regarding Load.
See Section 6.2.

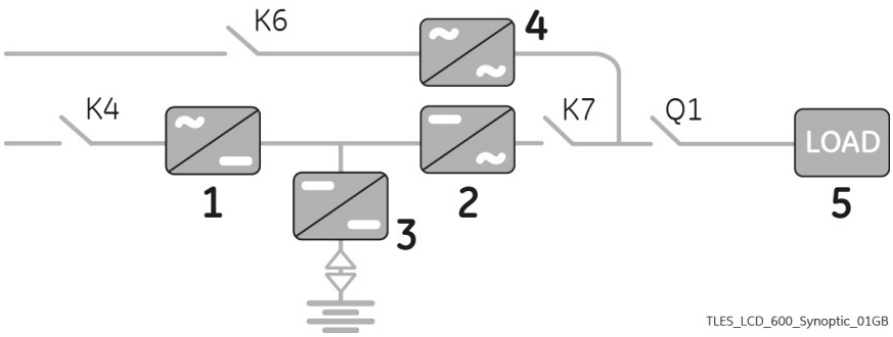
Battery

Data regarding Battery.
See Section 6.2.

Green color: indicates Battery charged.

Yellow color: indicates STOP OPERATION status.

Red color: indicates low Battery.

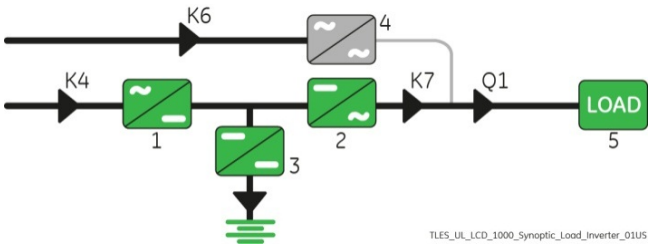


LEDs on Synoptic Diagram

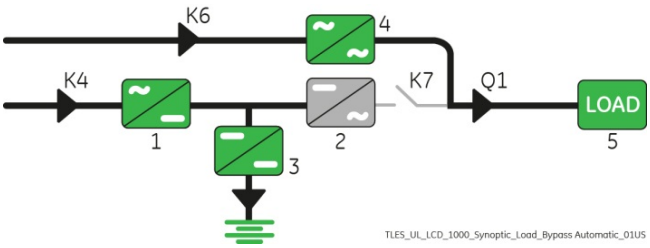
LED 1	Rectifier
LED 2	Inverter
LED 3	Booster/Battery charger
LED 4	Automatic Bypass
LED 5	LOAD

Examples of typical scenarios in the Synoptic Diagram:

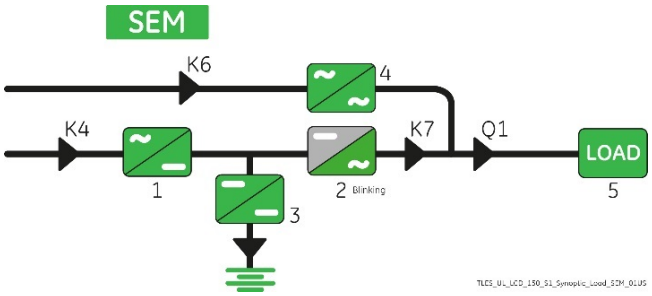
Load supplied by Inverter



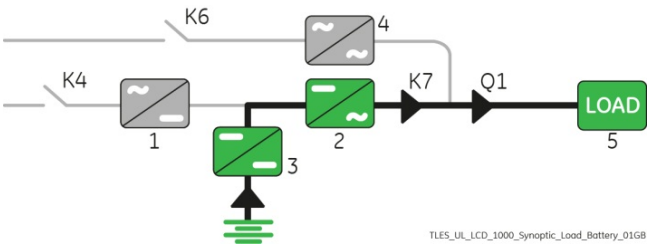
Load supplied by Automatic Bypass



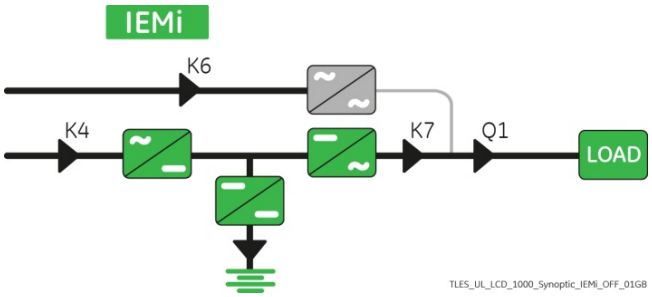
“SEM - Super Eco Mode” Operation Mode



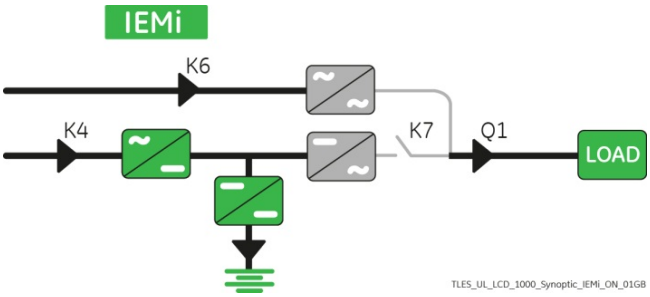
Load supplied by Battery



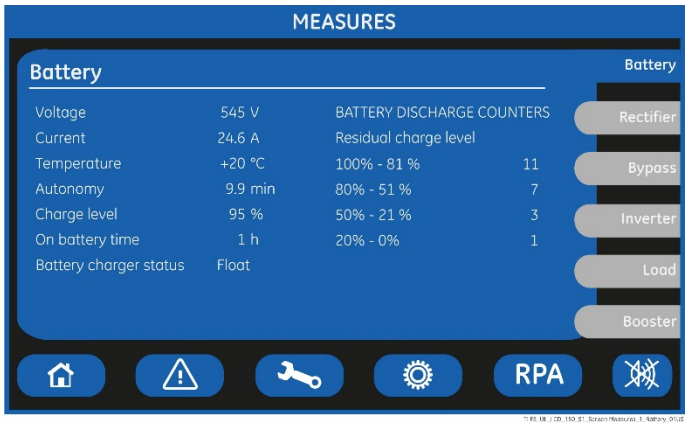
IEMi Operation Mode, Unit on-line



IEMi Operation Mode, Unit stand-by



6.2 Measures



MEASURES

The MEASURES mode is entered any time the "**MEASURES**" 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.

Shows the main screen EVENTS.
See Section 6.3.

Shows the main screen SETUP.
See Section 6.4.

Shows the main screen COMMANDS.
See Section 6.5.

RPA

Shows the operating status of the RPA PARALLEL SYSTEM.
See Section 6.6.

Key to reset general alarm and buzzer.

Battery — Shows the screen Battery.

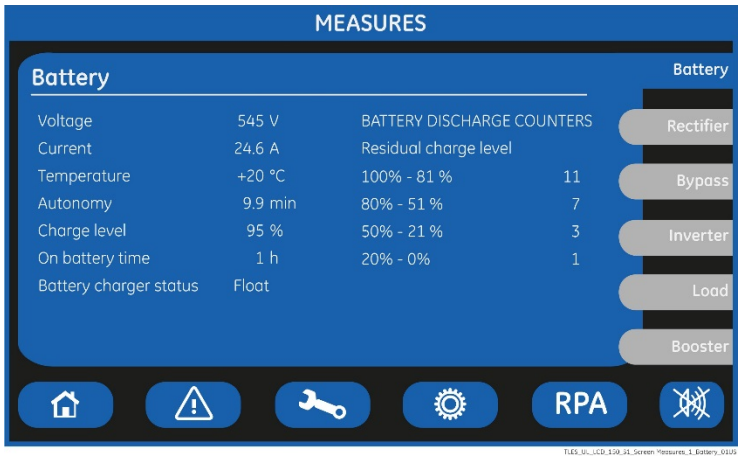
Rectifier — Shows the screen Rectifier.

Bypass — Shows the screen Bypass.

Inverter — Shows the screen Inverter.

Load — Shows the screen Load.

Booster — Shows the screen Booster.



Battery screen

Voltage
The Battery voltage.

Current
The Battery current (negative values correspond to the discharge of the Battery).

Temperature
The temperature of the Battery ("XXX" indicates sensor disabled).

Autonomy
The estimated backup time with the present Load.

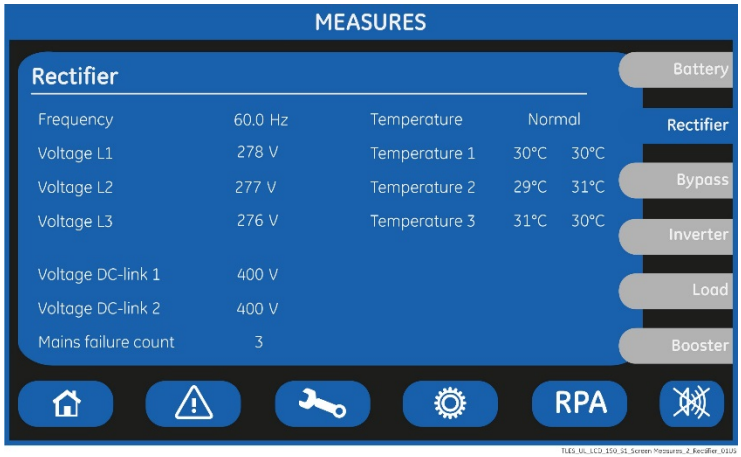
Note: the backup time is computed given the Unit Load.
Therefore, during IEMi Operation Mode, On-line Units may show a reduced backup time. However, following a power outage, all Inverters are forced on-line.
Therefore, during Battery operation every Unit shows the true Battery autonomy.

Charge level
The Battery charge level.

On battery time
Total operating time of the UPS on Battery (in hours).

BATTERY DISCHARGE COUNTER / Residual Charge Level
The number of discharges combined with the percentage of the available residual Battery capacity at the time Utility power is restored.

Battery charger status
Battery charge status (Off / Float / Boost).



Rectifier screen

Frequency
The input frequency of the Rectifier.

Voltage L1 / Voltage L2 / Voltage L3
3-phase input Utility voltage PHASE /NEUTRAL.

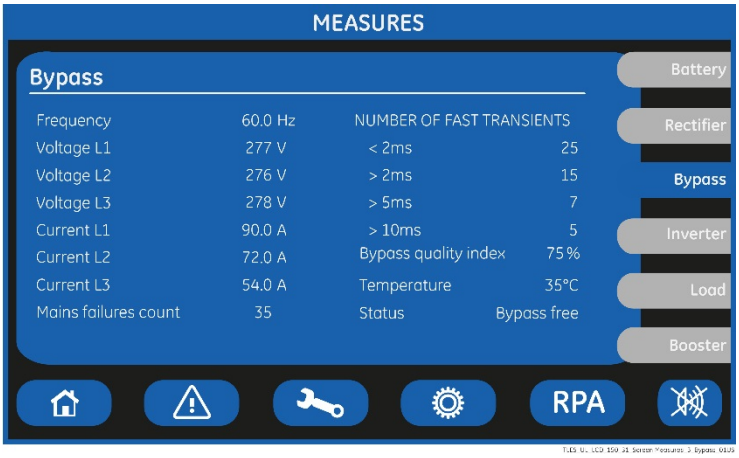
Voltage DC-link 1
DC-Link 1 voltage.

Voltage DC-link 2
DC-Link 2 voltage.

Main failure count
Total number of times a gap of Utility in the Rectifier has been reordered.

Temperature
Rectifier inlet L1 Coil temperature (Normal / Alarm).

Temperature 1 / 2 / 3
Temperature of the Rectifier bridge (Power Module 1 / 2 / 3).



Bypass screen

Frequency
The frequency of the input Utility.

Voltage L1 / Voltage L2 / Voltage L3
3-phase input Utility voltage PHASE /NEUTRAL.

Current L1 / Current L2 / Current L3
Input Utility current for the 3-phases.

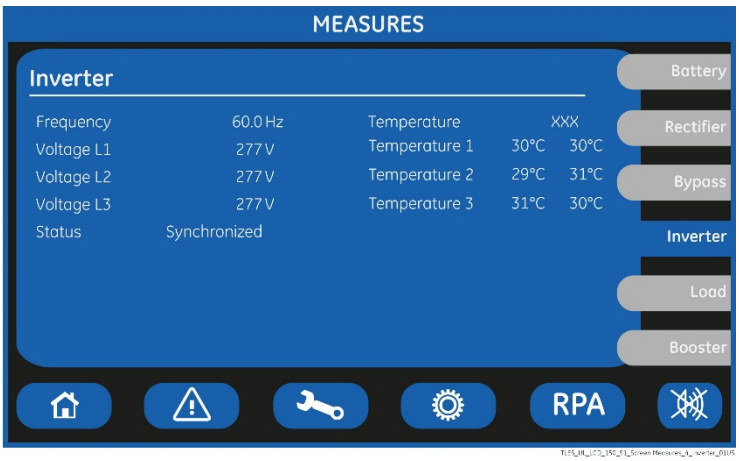
Main failure count
The total number of minor Utility faults (Bypass Utility out of tolerance faults).

Number of fast transients
The number of fast transients occurred on the Bypass Utility on the last seven days.

Bypass quality index
The statistic evaluation in % (100= good; 0= bad) of the Bypass utility.

Temperature
The temperature of the SSM - Static Switch Module (°C/ Alarm).

Status
Bypass status: free / blocked.



Inverter screen

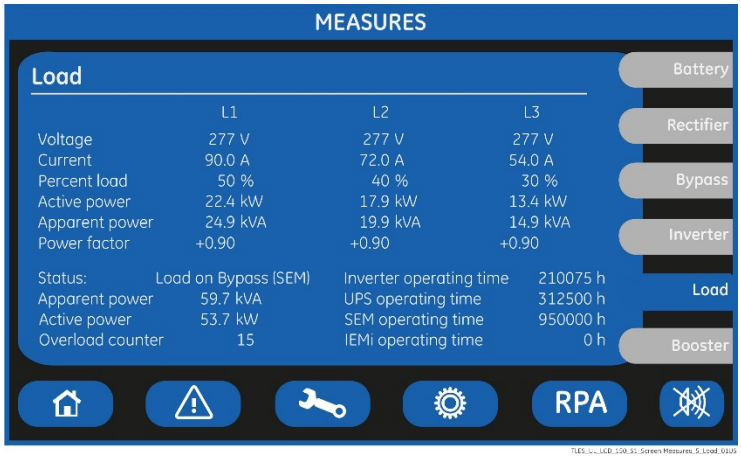
Frequency
The output frequency of the Inverter.

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

Status
The synchronization status of the Inverter with respect to Utility:
Synchronized.
Not synchronized.

Temperature
“XXX” indicates disabled function.

Temperature 1 / 2 / 3
Temperature of the Inverter bridge (Power Module 1 / 2 / 3).



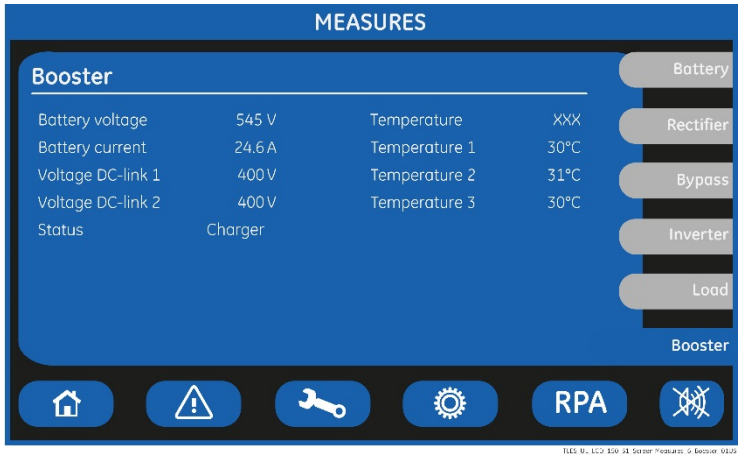
Load screen

Voltage L1 / L2 / L3
Output voltage PHASE/NEUTRAL for each phase.

Current L1 / L2 / L3
The output current as RMS values for each phase.

Percent load L1 / L2 / L3
The output Load as percentage for each phase.

Active power	Load active power (kW) for each phase.
Apparent power	Load apparent power (kVA) for each phase.
Power factor	Load power factor: (+) inductive Load / (-) capacitive Load
Status	Source of the power supplied to the Load.
Inverter operating time	Total operating time for the Inverter (in hours).
Apparent power	Total apparent Load power (kVA).
UPS operation time	Total operating time for the UPS (in hours).
Active Power	Total effective Load power (kW).
SEM operation time	Total operating time for the UPS in “SEM - Super Eco Mode” Operation Mode (in hours).
Overload counter	Total number of detected output overloads.
IEMi operation time	Total operating time for the UPS in IEMi Operation Mode (in hours). This counter is displayed only when IEMi Operation Mode is available (option).



Booster screen

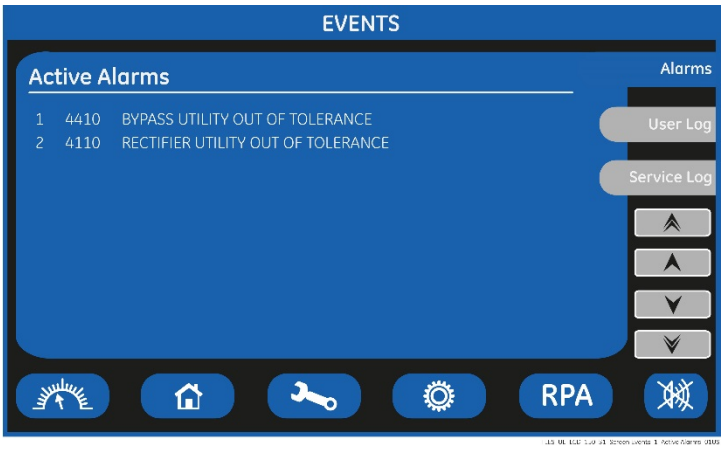
Battery voltage
The Battery voltage.

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

Voltage DC-link 1
DC-link 1 voltage.

Voltage DC-link 2	DC-link 2 voltage.
Status	Booster status (Off / Booster / Charger).
Temperature	“XXX” indicates disabled function.
Temperature 1 / 2 / 3	Temperature of the Booster (Power Module 1 / 2 / 3).

6.3 Events



EVENTS

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

The LCD will display a series of screens corresponding to the last 511 events (User Log).

In this mode the keys perform the following functions:

Shows the main screen MEASURES.
See Section 6.2.

Return to HOME screen.

Shows the main screen SETUP.
See Section 6.4.

Shows the main screen COMMANDS.
See Section 6.5.

Shows the operating status of the RPA PARALLEL SYSTEM.
See Section 6.6.

Key to reset general alarm and buzzer.

Shows the screen User Events.

Shows the screen Service Events. Reserved for the ABB Service Center.

Shows the previous 50 events.

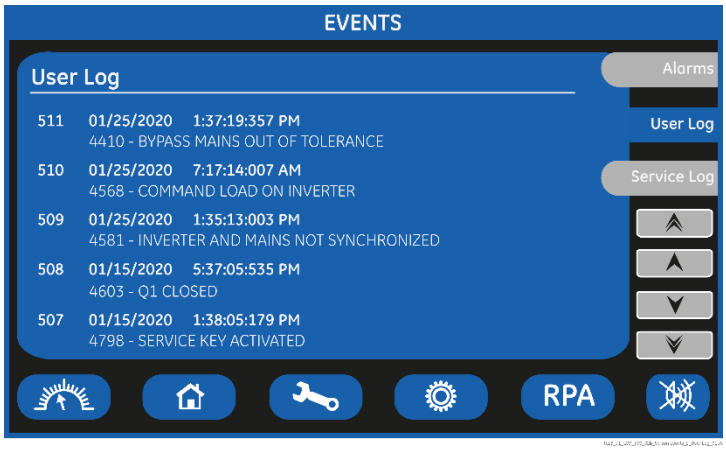
Shows the previous 5 events.

Shows the next 5 events.

Shows the next 50 events.

Screen Active Alarms

Shows active events with their ABB standard code and a text describing the event in the selected language.

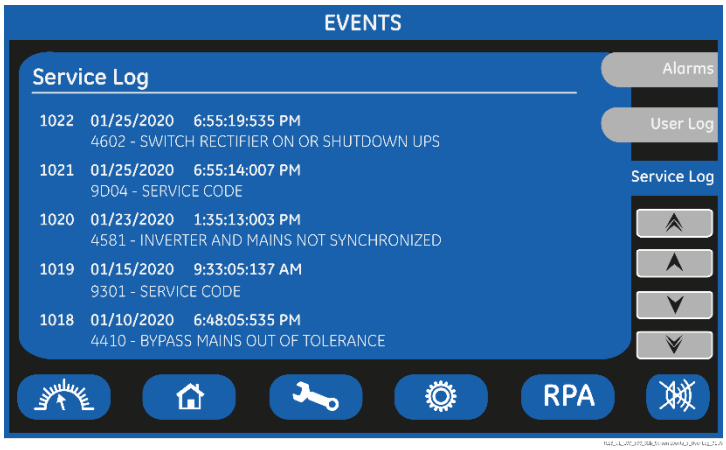


Screen User Log

User Log
Chronologically view 5 events per screenshot.

Event characteristic:

- Number chronologically assigned to an event (Nr. 511 is the more recent, Nr. 1 is the first).
- Data (MM/DD/YYYY).
- Exact hour of the moment when the event occurred (HH/MM/SS/ thousandth).
- Number of standard ABB code of the event.
- Explicit text describing the event in the selected language.



Screen Service Log

Service Log
Chronologically view 5 events per screenshot with service related info.

Event characteristic:

- Number chronologically assigned to an event (Nr. 1022 is the more recent, Nr. 1 is the first).
- Data (MM/DD /YYYY).
- Exact hour of the moment when the event occurred (HH/MM/SS/ thousandth).
- Number of standard ABB code of the event.

6.3.1 Events (alarms and messages)

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

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

6.3.2 Alarms list

Code	Alarm	Description
4000	SETUP VALUES LOST	Parameters are lost and have been replaced with default values. Please contact your ABB Service Center 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 “Q1 – UPS output switch” 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.
4011	EARTH LEAKAGE CURRENT	The Unit has detected an earth leakage current above a configured threshold (typically 5% of the maximum rated input current). Applicable to 3-wire (3ph+PE) distribution only.
4012	LOAD GROUND FAULT	The Unit has detected Load ground current above a configured threshold. Applicable to 3-wire (3ph+PE) distribution only.
4013	CAN BUS FAILURE	The Control Panel 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. Signaled by auxiliary contact. Rectifier cannot start.
4103	K4 OPENING FAILURE	K4 not open despite an opening command being issued. Signaled by auxiliary contact. Utility remains connected to Rectifier bridge.
4104	BATTERY FUSES FAILURE	This function, when enabled on input programmable relays (“Service Code” required), warns the user about the external Battery Fuses failure or MCB opening, signaled by NO free contact.

Code	Alarm	Description
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 UTILITY OUT OF TOLERANCE	Rectifier Input Utility is out of tolerance (voltage, frequency or phase sequence).
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.
4125	HIGH DC-LINK VOLTAGE	Detection of high voltage on the DC-link. The Rectifier, Booster and Inverter will switch off for protection purposes. The Rectifier may only be switched on again if the DC-link’s voltage value falls below 430Vdc.
4126	4^{th} LEG CONTROL SATURATION (Imax)	The current in the fourth leg has reached its highest value.
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 the 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.
4143	BOOSTER/BATTERY CHARGER CURRENT MAX	Detection of maximum current in the Booster/Battery charger. The Booster/Battery charger and Inverter will switch off for protection purposes.
4146	4TH LEG DRIVER FAILURE	The Booster’s driver indicates the presence of a defect which switches the power off.
4147	BATTERY CHARGER DRIVER FAILURE	The Battery charger driver indicates a defect, switching it off.
4150	BOOSTER OVERTEMPERATURE	The temperature of the Booster bridge exceeds the machine’s set limit or the coil’s sensor is on.
4151	4TH LEG OVERTEMPERATURE	The temperature of the 4^{th} leg’s bridge exceeds the machine’s set limit.

Code	Alarm	Description
4301	INVERTER FUSES	The alarm signals an Inverter outlet fuses fault, causing it to switch off immediately. It may only be manually switched on after the alarm has ceased.
4304	K7 CLOSING FAILURE	K7 not closed despite a closing command. Signaled by auxiliary contact. Load will be supplied by Utility.
4305	K7 OPENING FAILURE	K7 not open despite an opening command. Signaled by auxiliary contact. Load will be supplied by Utility.
4307	INVERTER TRANSFORMER OVERTEMPERATURE	The temperature sensor of the Inverter Transformer indicates overtemperature. Elapsed “stop operation” time, Inverter shut-down. With Utility OK, Load is transferred on Utility.
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.
4311	BOOSTER DRIVER FAILURE	Driver Booster error signal.
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 RPA 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.
4400	BYPASS FUSES FAILURE	Auxiliary contact signal (normally closed) indicates that one fuse of the Bypass Utility (F16/17/18) is open.
4404	K6 CLOSING FAILURE	K6 open despite a closing command being issued. Signaled by auxiliary contact. The Load cannot be supplied by Automatic Bypass.
4405	K6 OPENING FAILURE	K6 closed despite an opening command being issued. Signaled 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 an ABB Service Technician can reset the alarm.
4410	BYPASS UTILITY OUT OF TOLERANCE	The Utility Bypass Voltage is out of the tolerances (± 10%). K6 opens, synchronization with Utility is inhibited and transfer to Utility 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	Alarm	Description
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 Utility exceeds the Inverter power. The Load remains supplied by Utility until the alarm stays ON.
4522	FAN FAILURE	The Fan Control Board indicates a malfunction of one or more ventilators.
4530	LOAD LOCKED ON UTILITY	Load is locked on Utility because 3 transfers on Utility 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 UTILITY BY ERROR DETECTOR	Load is transferred to Utility because the error detector detected a disturbance on the output voltage.
4563	EMERGENCY OFF ACTIVATED	Alarm after detection of an EPO (Emergency Power Off) from an external safety device connected on Customer Interface Board. Consequently K4, K6, K7 open, Rectifier, Inverter and SSM are switched Off.
4570	OVERLOAD	The UPS system is in an overload condition >105% on Inverter, or >150% on Utility. With Utility unavailable, a sequence of “stop operation” starts. Time out depends on degree of overload.
4571	OVERLOAD: LOAD ON UTILITY	With Utility Bypass supply available and Load >115%, the Load is transferred on Utility. Load will be transferred again automatically on Inverter when Load <100%.
4581	INVERTER AND UTILITY NOT SYNCHRONIZED	The voltages of Utility and Inverter are not synchronized, which causes the opening of K6.
4608	ECO CONFIG FAILURE	The propagation of the eBoost / IEMi configuration to other Units in an RPA Parallel System failed.
4681	MAIN BOARD BATTERY CHANGE NEEDED	Notice to replace the Lithium Battery located on the Control Board.
4682	DC CAPACITORS CHANGE NEEDED	Notice to replace the DC Capacitors.
4683	AC CAPACITORS CHANGE NEEDED	Notice to replace the AC Capacitors.
4684	FAN REPLACEMENT NEEDED	Notice to replace the Fans.
4685	SERVICE MAINTENANCE OVERDUE	Notice to do the Service Maintenance.
4697	BATTERY OVERTEMPERATURE	Detection of Battery overtemperature condition. Only an ABB Service Technician can reset the alarm.
4698	BATTERY POWER INSUFFICIENT	In case of Utility 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.
4955	OVERTEMPERATURE	An overtemperature condition has been detected on Inverter. Elapsed “stop operation” time, Inverter shut-down. With Utility OK, Load is transferred on Utility.
4998	LOAD OFF DUE TO EXTENDED OVERLOAD	Load Off after time-out of “stop operation” for overload on Inverter (time depending on the % of overload).
4999	LOAD OFF DUE TO LOW BATT. OR TEMP.	Load Off after time-out of “stop operation” with missing Utility due to Battery low voltage or overtemperature condition.

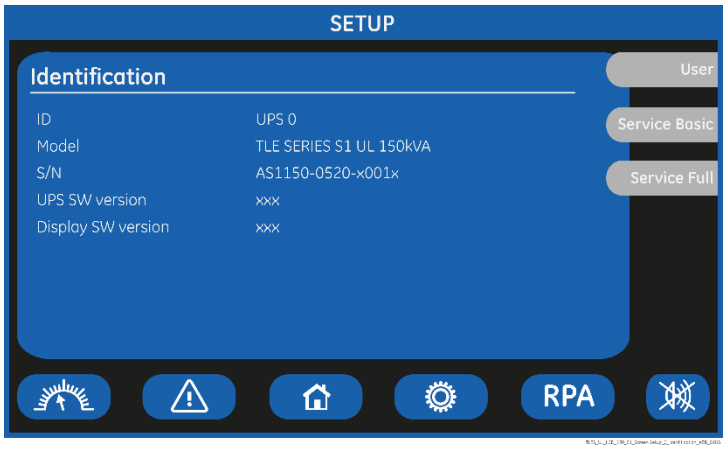
6.3.3 Messages list

Code	Message	Description
4002	WATCHDOG RESET	The microprocessor has detected an incorrect operation: Transfers the Load on Utility and performs a program reset. The Inverter will restart automatically and will supply the Load.
4003	SENSOR AUTO-CALIBRATION ERROR	The voltage/current reading were not correctly calibrated when the UPS was switched on.
4111	RECTIFIER UTILITY OK	Rectifier Input Utility 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.
4122	MANUAL BOOST CHARGE START	Recharging has been manually activated from the Control Panel, bringing the final Load up to the value of the respective parameter.
4123	AUTOMATIC BOOST CHARGE START	After the Battery has discharged, an automatic boost charge has started to recharge the Battery based on pre-defined settings.
4124	MANUAL/AUTOMATIC BOOST CHARGE STOP	The automatic boost charge has finished. The Battery's voltage will return to the maintenance value. A manually activated boost charge will finish if: it is manually interrupted, the initial timer setting has expired, or the Rectifier is not functioning correctly (Alarm 4140). The Battery voltage will return to the maintenance value.
4144	BOOSTER ON	The Booster is switched ON. It transfers energy from the Battery to the DC-link.
4145	BOOSTER OFF	The Booster is switched Off.
4148	BATTERY CHARGER ON	The Battery charger is switched on and is charging the Battery.
4149	BATTERY CHARGER OFF	The Battery charger is switched Off.
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 Utility (voltage out of tolerance, not synchronized, BP blocked).
4361	INVERTER ON	The command to start the Inverter has been activated on the Control Panel.

Code	Message	Description
4362	INVERTER OFF	The command to switch OFF the Inverter has been activated by the Control Panel or automatically for alarm presence.
4411	BYPASS UTILITY OK	Bypass Input Utility 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 Utility Failure or K6 opening occurred.
4534	MULTIPLE LOAD TRANSFER	2 transfers Inverter- Utility 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 “Q1 – UPS output switch” closed.
4562	DETOUR ON	The auxiliary contact indicates that “Q2 - Manual Bypass switch” was closed.
4564	DETOUR OFF	The auxiliary contact indicates that “Q2 - Manual Bypass switch” was opened.
4567	COMMAND LOAD ON UTILITY	The Control Unit received a command to transfer the Load on Utility.
4568	COMMAND LOAD ON INVERTER	The Control Unit received a command to transfer the Load on Inverter.
4572	NO MORE OVERLOAD	End of the overload condition detected with alarm 4570.
4580	INVERTER AND UTILITY SYNCHRONIZED	The voltages of Inverter and Utility Bypass are synchronized.
4582	COMMAND NOT TO SYNCHRONIZE	Command not to synchronize with Utility.
4583	COMMAND TO SYNCHRONIZE	Command to synchronize with Utility.
4600	COMMAND UPS ON	The eBoost operation 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 eBoost operation mode is enabled and according to the time program the UPS will run in eBoost mode, supplying the Load normally by Utility.
4602	Q1 OPEN	The auxiliary contact indicates that the “Q1 – UPS output switch” was opened.
4603	Q1 CLOSED	The auxiliary contact indicates that the “Q1 – UPS output switch” was closed.
4604	COMMAND IEMi ON	The IEMi Operation Mode function is enabled and according to the time program the UPS system will run in IEMi Operation Mode.
4605	COMMAND IEMi OFF	The IEMi Operation Mode has been disabled or the programmed time is expired.
4606	eBoost/IEMi ACTIVATION ALLOWED	eBoost/IEMi control signal has been cleared on the Customer Interface Board (X1 - 11, 22). Operating mode depends on scheduled activation of the functions.
4607	eBoost/IEMi ACTIVATION INHIBITED	Customer Interface Board (X1 - 11, 22) received an eBoost/IEMi control signal. eBoost™ Operation Mode and IEMi Operation Mode will be temporarily inhibited.

Code	Message	Description
4609	eBoost INHIBITED - LOW LOAD	eBoost™ Operation Mode inhibited due to minimal Load not reached.
4699	BATTERY TEST IMPOSSIBLE	Automatic Battery Test is not possible due to: - No Utility 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 (ABB 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 (ABB Service only): 0 = Only local panel 1 = Only Remote Control 2 = Both
4798	SERVICE KEY ACTIVATED	A valid Service Key has been entered. It will no longer be requested in the next 6 hours.
4799	SERVICE KEY DEACTIVATED	The Service Key validity period has expired.

6.4 Setup



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:

Shows the main screen MEASURES.
See Section 6.2.

Shows the main screen EVENTS.
See Section 6.3.

Return to HOME screen.

Shows the main screen COMMANDS.
See Section 6.5.

Shows the operating status of the RPA PARALLEL SYSTEM.
See Section 6.6.

Key to reset general alarm and buzzer.

User — Shows the screen User.

Service Basic — Shows the screen Service Full.
Reserved for the ABB Service Center, at this level the parameters access is protected by a "Service Code".

Service Full — Shows the screen Service Full.
Reserved for the ABB Service Center, at this level the parameters access is protected by a "Service Code".

Printer 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.

Baudrate
This parameter controls the baud rate used for data transmission.

Parity This parameter controls the parity used for data transmission.
odd / even / None can be selected.
In case “None” has been set, automatically the parameter “Data bits = 8” is used, independently of the value of “Data Bits” set.

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

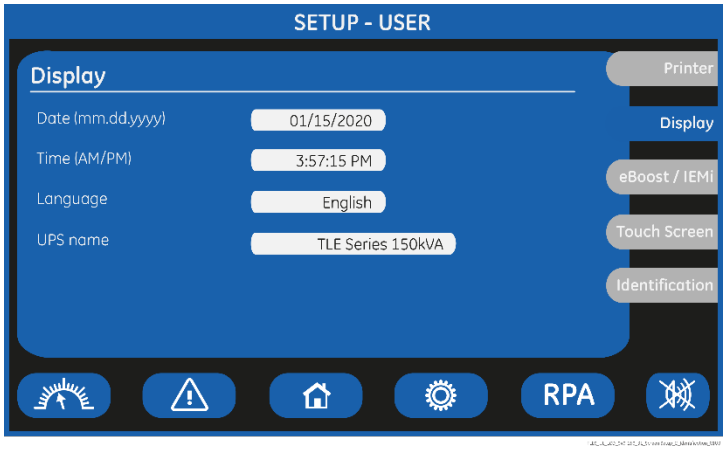
Stop bit Parameter not programmable.

Handshake This parameter is used to determine the communication protocol used when printing.
Valid values are “XON” standing for the XON/XOFF protocol or “None” standing for any protocol.

PRINTER COMMANDS By using the keys MEASURES / ALARMS / PARAMETERS / ALL it is possible to print selected data

Note!

Please configure your printer with the following parameters:
115200/None/8/2/None (115200 Bauds/sec, No Parity, 8 Data Bits, 2 Stop bit, No Handshake).



Display screen

Date
You can adjust the date of the real time clock existing in the UPS by the means of this parameter (“mm-month, dd-day, yyyy-year”).
The value you enter is thoroughly checked to be a correct date in the format “MM.DD.YYYY”.

Time 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 AM/PM format.

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, Slovenian, Chinese, Swedish, Russian and Dutch.

UPS name The user can choose the name of the UPS model shown on the main screen (max. 20 characters).

SEM SCREEN (option)

Enabled
This parameter (values Yes/No) enables or disables the “SEM - Super Eco Mode” Operation Mode.
If the value is “Yes” and the current time is in the interval for the current day, the SEM Operation Mode is active.

RPA
Redundant Parallel Architecture

In case of RPA Parallel System
If “SEM - Super Eco Mode” Operation Mode is currently disabled (No) and “Q1 – UPS output switch” is closed, when programming it to enable (Yes) the selected configuration will automatically be propagated to all Units in the RPA Parallel System.

The activation / deactivation of “SEM - Super Eco Mode” Operation 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 Yes/No parameter is automatically disabled if this condition is not satisfied).

In case this minimum time in VFI mode is not respected, the “SEM - Super Eco Mode” Operation Mode will be disabled.

If the value is “No”, the UPS is normally operating in VFI / double conversion mode at all times.

When the UPS is in “SEM - Super Eco Mode” Operating Mode the SEM LED is ON (green light).

Note!

The configuration of the activation schedule can only be updated when “SEM - Super Eco Mode” Operation Mode is disabled (Enabled: No).

DAY
For the weekdays from “Monday to Sunday”, the edit mode (edit day) allows to define time intervals when the UPS is operating in “SEM - Super Eco Mode” Operation Mode. The hour is given in 24-hour format.
These intervals are defined by:

Start Time: The hour of the day after which the “SEM - Super Eco Mode” Operation Mode is enabled.
The “SEM - Super Eco Mode” Operation Mode is enabled until the following “Stop Time” time is reached (the “Stop Time” time of the same day if this is later than the “Start Time” time, the “Stop Time” time of the following day otherwise).

Stop Time: The hour of the day before which the “SEM - Super Eco Mode” Operation Mode is enabled.

The SE“SEM - Super Eco Mode”M Operation Mode is enabled starting from the preceding “Start Time” time (the “Start Time” time of the same day if this is earlier than the “Stop Time” time, the “Start Time” time of the previous day otherwise).

Identical times for “Start Time” and “Stop Time” maintain the existing mode only in case the previous command was “Start Time” and the following command will be “Stop Time”.

HOURS/DAY
The number of “SEM - Super Eco Mode” Operation Mode hours per weekday “Monday to Sunday” is displayed in the operation mode parameter window (ceiling value).

Note!

To avoid undesired “SEM - Super Eco Mode” Operation Mode, verify:

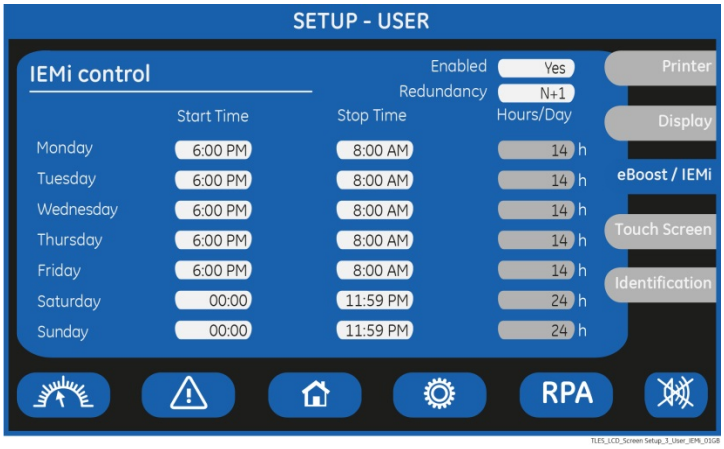
- **Date and Time.**
- **SEM screen how many hours of “SEM - Super Eco Mode” Operation Mode have been selected for each day of the week.**

Note!

The “SEM - Super Eco Mode” Operation Mode will become active only if the Load is supplied from the Inverter.

“SEM - Super Eco Mode” Operation Mode is only possible if the UPS Load exceeds a minimum threshold (default 10% of the rated capacity).

In case no-Load conditions, or anyway below said threshold, the UPS operates in VFI mode.



IEMi screen (option)

This screen is displayed only when IEMi Operation Mode is available (option).

Enabled
This parameter (values Yes/No) enables or disables the IEMi Operation Mode.
If the value is “Yes” and the current time is in the interval for the current day, the IEMi Operation Mode.

Redundancy
N + … Redundancy level: N+1, N+2.

Note! the redundancy level can only be updated when IEMi Operation Mode is disabled (Enabled: No).
In order to enjoy the benefits of IEMi Operation Mode, operation a system programmed for N+1 redundancy requires a parallel installation of at least three UPSs, while four UPSs are required for N+2 redundancy.
The IEMi Operation Mode must be available on all Units in an RPA Parallel System.

RPA
Redundant Parallel Architecture

In case of RPA Parallel System
If IEMi Operation Mode is currently disabled (No) and “Q1 – UPS output switch” is closed, when programming it to enable (Yes) the selected configuration will automatically be propagated to all Units in the RPA Parallel System.
If IEMi Operation Mode is currently enabled (Yes) and “Q1 – UPS output switch” is closed, when programming it to disable (N) all stand-by Inverters in the system will be switched on-line.

The activation / deactivation of IEMi Operation Mode is indicated each time in the event list. In order to force a test of all Inverters in the system, at least 1 minute of normal operation must be programmed during the week (the Yes/No parameter is automatically disabled if this condition is not satisfied).
In case this minimum time in normal VFI operation is not respected, the IEMi Operation Mode will be disabled. If the value is “No”, the UPS is operating in normal VFI / double conversion mode at all times.

When the UPS is in IEMi Operating Mode the IEMi LED is ON (green light).

IEMi

Note!

The configuration of the activation schedule can only be updated when IEMi Operation Mode is disabled (Enabled: No).

Day
For the weekdays from “Monday to Sunday”, the edit mode (edit day) allows to define time intervals when the UPS is operating in IEMi Operation Mode. The hour is given in 24-hour format.
These intervals are defined by:

Start Time: The hour of the day after which the IEMi Operation Mode is enabled.
The IEMi Operation Mode is enabled until the following “Stop Time” time is reached (the “Stop Time” time of the same day if this is later than the “Start Time” time, the “Stop Time” time of the following day otherwise).

Stop Time: The hour of the day before which the IEMi Operation Mode is enabled.

The IEMi Operation Mode is enabled starting from the preceding “Start Time” time (the “Start Time” time of the same day if this is earlier than the “Stop Time” time, the “Start Time” time of the previous day otherwise).
Identical times for “Start Time” and “Stop Time” maintain the existing mode only in case the previous command was “Start Time” and the following command will be “Stop Time”.

Hours/Day
The number of IEMi Operation Mode hours per weekday “Monday to Sunday” is displayed in the operation mode parameter window (ceiling value).

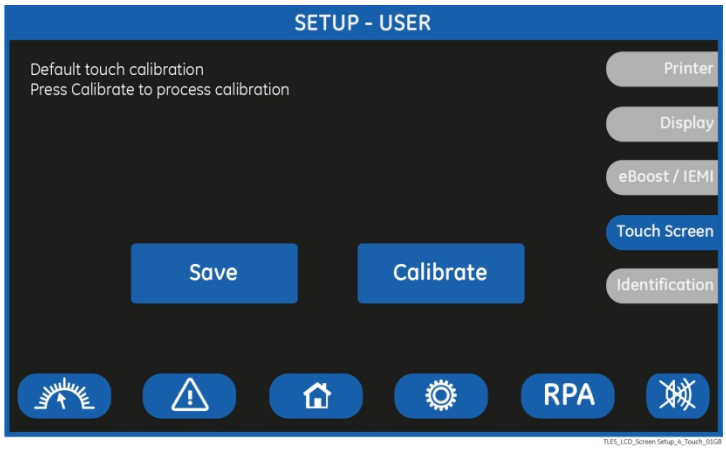
Note!

To avoid undesired IEMi Operation Mode, verify:

- **Date and Time.**
- **IEMi screen how many hours of IEMi Operation Mode have been selected for each day of the week.**

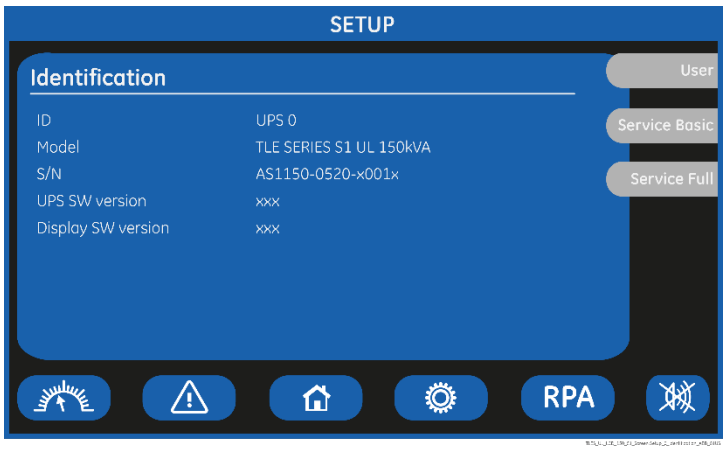
Note!

For IEMi Operation Mode to become active a manual Inverter start is required at start-up and after a Load Off reset.



Touch screen

This screen permits the adjustment (“Calibrate” key) of the LCD’s “Touch Screen” sensitivity.



Identification screen

ID
Number of UPS in the RPA Parallel System (0 for Single Unit).

Model
UPS model, power range and series number.

S/N
The UPS serial number.

UPS SW version
The UPS software version.

Display SW version
The LCD display software version.

6.5 Commands

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:

Shows the main screen MEASURES.
See Section 6.2.

Shows the main screen EVENTS.
See Section 6.3.

Shows the main screen SETUP.
See Section 6.4.

Return to HOME screen.

Shows the operating status of the RPA PARALLEL SYSTEM.
See Section 6.6.

Key to reset general alarm and buzzer.

Shows the screen Commands 2.

Shows the screen Commands 1.

Commands 1 screen

Allows the user to execute UPS operation commands.

Rectifier

Rectifier ON

Rectifier switching ON command.

Rectifier RESET

Rectifier restore command.
Reserved for the ABB Service Center.

Led Rectifier status

Indicates the Rectifier's status: ON = lit OFF = turned Off

Inverter

Inverter ON

Inverter switching ON command.

Note!

When eBoost™ Operation Mode or IEMi Operation Mode is enabled, control of Inverter status and selection of the feed path is done autonomously by the UPS control logic.

Therefore, Inverter ON / Inverter OFF commands are disabled when eBoost™ Operation Mode or IEMi Operation Mode is enabled.

Inverter OFF

Inverter switching OFF command.

This command is also used as EPO (Emergency Power Off) reset after the contact closing.

Note!

Inverter OFF command is disabled when eBoost™ Operation Mode or IEMi Operation Mode is enabled.

Led Inverter status

It indicates the Inverter status:
ON / OFF / Pre-charge / Pre-charge completed / Soft-start.

Module shutdown

Module shutdown
Load Off command for a single UPS.

Attention!

This command <u>will immediately disconnect</u> the Load!

"Module shutdown" cannot disconnect the UPS from the Load with "Q2 - Manual Bypass switch" (only if provided by customer) closed.

RPA
Redundant Parallel Architecture

For the RPA Parallel System

In an RPA Parallel System, the "Module shutdown" command disconnects the Load to the selected Unit only ("Q1 – UPS output switch" closed)!

Module shutdown RESET
"Module shutdown" restore command for an individual UPS.

Led Module shutdown status
Shows the "Module shutdown" status: ACTIVE / NOT ACTIVE.

System shutdown

System shutdown
Load Off command for an RPA Parallel System.

Attention!

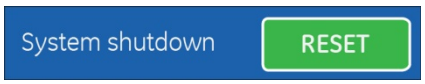
This command <u>will immediately disconnect</u> the Load!

"System shutdown" cannot disconnect the RPA Parallel System from the Load with "Q2 - Manual Bypass switch" (only if provided by customer) closed!

RPA
Redundant Parallel Architecture

For the RPA Parallel System

If "System shutdown" is pressed on one Unit connected to the Parallel Bus ("Q1 – UPS output switch" closed), all the Units are separated from the Load!



System shutdown RESET
"System shutdown" restore command for an RPA Parallel System.

RPA
Redundant Parallel Architecture

For the RPA Parallel System

The "System shutdown reset" must be done only on one Unit connected to the Parallel Bus ("Q1 – UPS output switch" closed)!

Led System shutdown status
Shows the "System shutdown" status: ACTIVE / NOT ACTIVE.

Booster

Only for ABB Service Center.

Commands 2 screen

Allows the user to execute UPS operation commands.

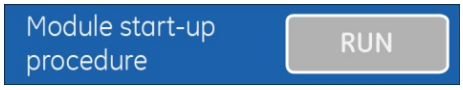
Buzzer TEST

Acoustical alarm test (acoustical alarm should be always activated).

Module shutdown procedure

Guides throught the procedures to shutdown a single UPS or an RPA Parallel System Unit.

Attention! For a single UPS this implies the Load disconnection.



Module start-up procedure

Guides throught the procedures to start-up the UPS.

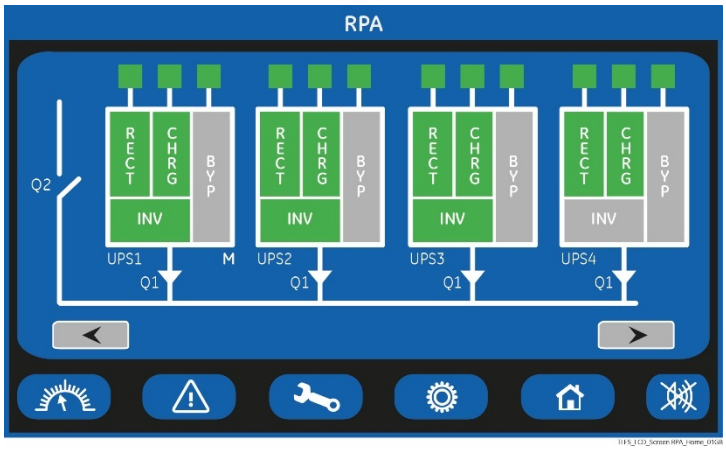
System on Bypass

Function not enabled.

Battery Charger

Function not enabled.

6.6 RPA Parallel System



RPA Parallel System (option)

The RPA PARALLEL SYSTEM is entered any time the "**RPA**" key is pressed.

This screen is only displayed when the RPA Parallel System is available (option).

The LCD screen will provide some information on the RPA Parallel System.

In this mode the keys perform the following functions:

Shows the main screen MEASURES.
See Section 6.2.

Note! During IEMi Operation Mode, the "Percent Load" information is computed based on on-line Units only.

Shows the main screen EVENTS.
See Section 6.3.

Shows the main screen SETUP.
See Section 6.4.

Shows the main screen COMMANDS.
See Section 6.5.

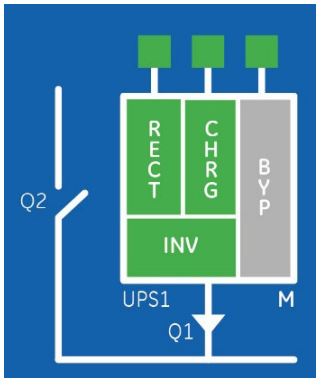
Return to HOME screen.

Key to reset general alarm and buzzer.

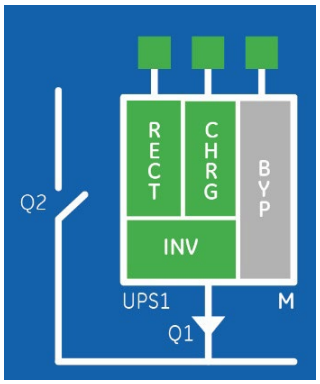
Shows the screen for the next RPA Parallel System Units

Shows the screen of the previous RPA Parallel System Units.

Description of the RPA Parallel System screen's main elements

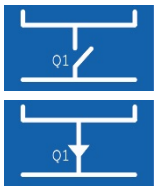


RECT	Rectifier green color = On / grey color = Off
CHRG / BST	Battery Charger / Booster green color = On / grey color = Off
INV	Inverter green color = On / grey color = Off
BYP	Automatic Bypass green color = On / grey color = Off
UPS1÷6	Number of UPS in the RPA Parallel System
M	Master Unit of the RPA System Parallel



Input Utility status (for RECT – Rectifier and BYP - Bypass)
Battery status (for CHRG – Battery Charger)
Green color = On / Grey color = Off

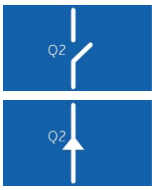
Q1 Load output switch



Open

Closed

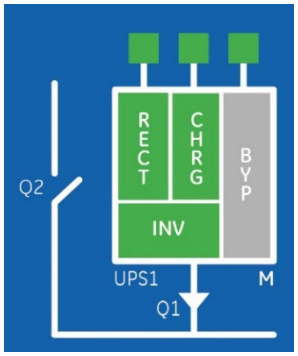
Q2 Manual Bypass switch (only if provided by customer)



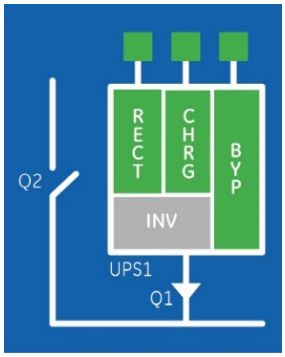
Open

Closed

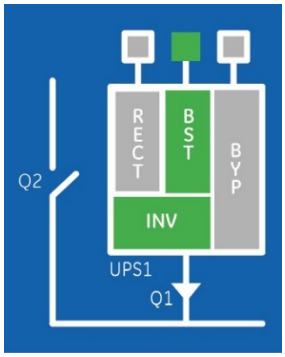
Examples of the main RPA Parallel System Unit status situations



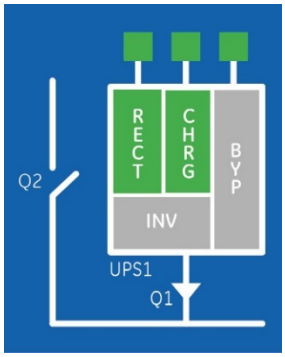
UPS with Load
supplied by Inverter or
On-line UPS in IEMi Operation Mode



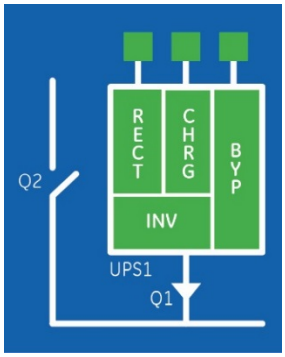
UPS with Load
supplied by Automatic Bypass



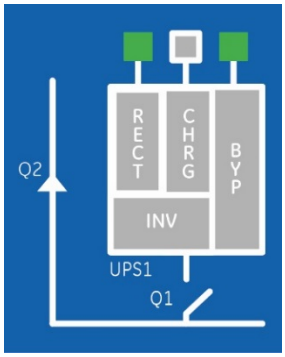
UPS with Load
supplied by Battery



UPS in stand-by in an
Redundant RPA Parallel System or
Stand-by UPS in IEMi Operation Mode



UPS in
eBoost Operation Mode

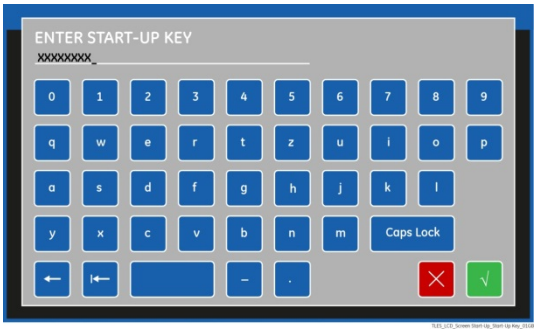


UPS with Load
supplied by Manual Bypass
(only if provided by customer)

7 Operation

Note!

TLE Scalable Series 40 to 150 requires the introduction of a “START-UP KEY” code to perform the first commissioning.



ESC ENTER

The "START-UP KEY" code can be introduced by an ABB Service Technician only.

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

Warning!

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

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

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

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

If you encounter any problems during the following procedures, you should not continue, but contact your ABB Service Centre.

RPA
Redundant Parallel Architecture

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

Note!

eBoost™ Operation Mode and IEMi Operation Mode must be disabled prior to performing any operation, including start-up, shut-down, removing/adding a Unit from/to an RPA Parallel System.

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:

7.1 Procedures for single TLE Scalable Series 40 to 150

7.1.1 Initial start-up of the TLE Scalable Series 40 to 150

Warning!

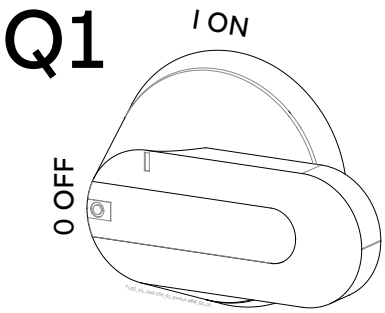
Before proceeding to turn ON the UPS system, ensure that the AC and DC external isolators are OFF and prevent their inadverted operation.

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

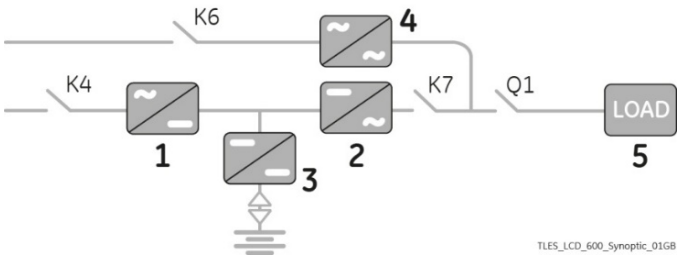
This procedure must be performed for the first start-up following the installation, with the UPS completely switched Off and not powered.

Open the front door and make sure that:

- All the **connections** to the input/output terminals or bus bars of the UPS have been made correctly.
- The **safety screens** are fixed in their position.
- The switch "**Q1 - UPS Output**" **is open** (Pos. O) and the **"Battery Cabinet Breaker" must be open** (Pos. O).



Q1 UPS Output switch



LEDs on Synoptic Diagram

LED 1	Rectifier	LED 4	Automatic Bypass
LED 2	Inverter	LED 5	LOAD on UPS
LED 3	Booster / Battery charger		

LED ALARM 

LED LOAD PROTECTED 

Command Inverter ON 

Command Inverter OFF 

Command System shutdown 

Command System shutdown RESET 

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

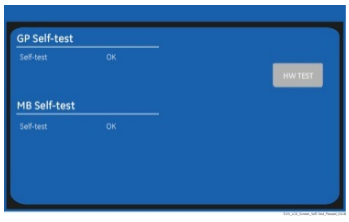
   The UPS performs a "Self-test".

   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 ABB Service Center.

   At this stage the Electronic Power Supply and Control Panel are switched ON and the Buzzer sounds.

   Press "MUTE" key to reset Acoustical Alarm.
   LED ALARM remains lit.

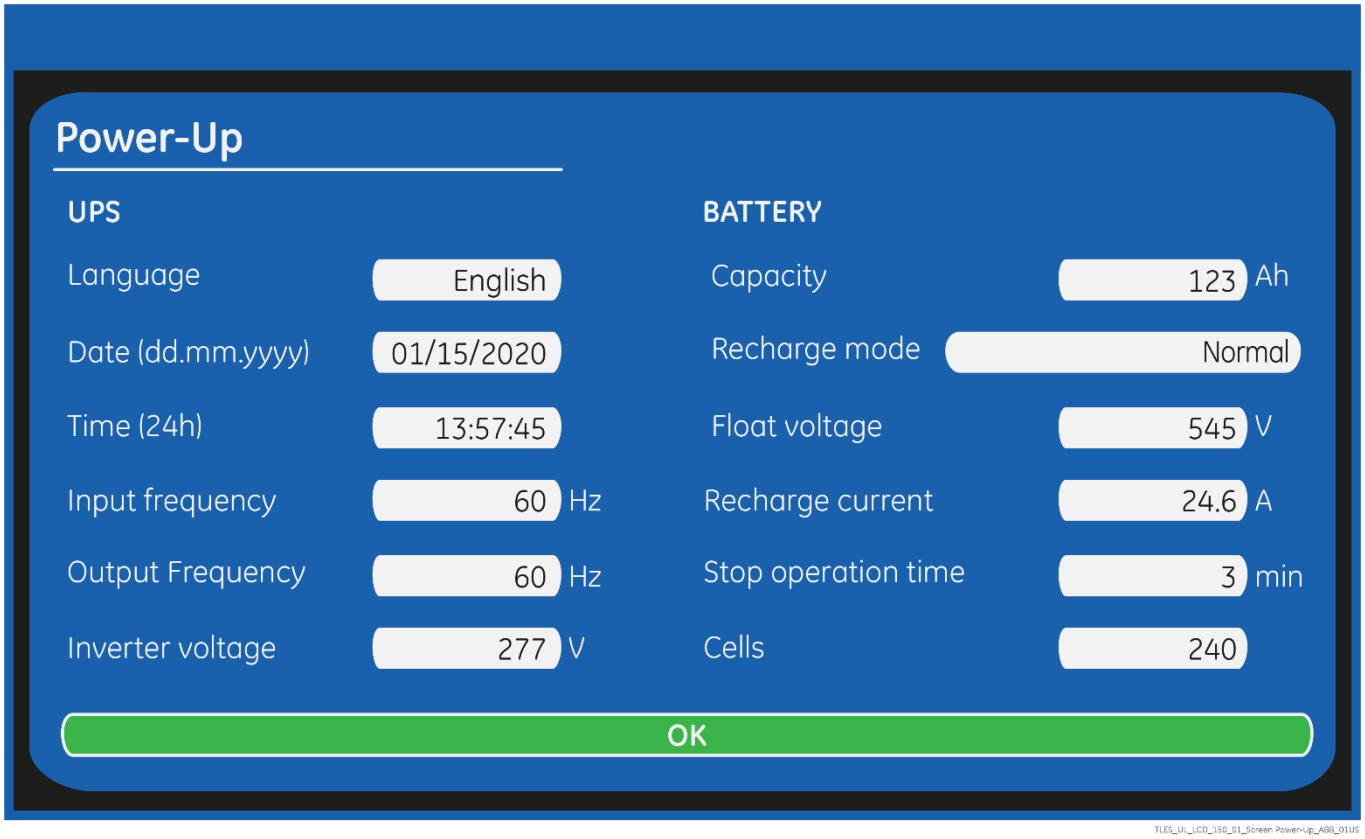


Continue →

During the first commissioning TLE Scalable Series 40 to 150 requests a set-up of the UPS configuration parameters presented in the following “Power-Up” screen.

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

Warning!
The set-up of the UPS configuration parameters must be done only by an ABB Service Technician!
The set-up of mistaken values could compromise the integrity and reliability of the UPS!



UPS

Language	This parameter allows the choice of language used to display the information.
Date (dd.mm.yyyy)	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.yyyy”.
Time (24h)	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.
Input Frequency	Frequency value of the Rectifier input Utility (50 Hz / 60Hz).
Output Frequency	Inverter output frequency value (50 Hz / 60Hz).
Inverter Voltage	Output voltage PHASE/NEUTRAL of the Inverter (277V).

Continue →

Battery

Capacity	Ah capacity of the Battery.
Recharge Mode	Recharge type of the Battery - Normal: Valve Regulated Lead Acid Battery (VRLA), NiCd without boost-charge and Flooded Lead Acid Battery without boost-charge. - NiCd boost: Nickel Cadmium Battery with boost-charge. - Wet lead acid boost: Flooded Lead Acid Battery with boost-charge. - Flywheel: Flywheel System. - Li-Ion LGG: Lithium Battery by LG brand. - Li-Ion SDI: Lithium Battery by Samsung brand.
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): Valve Regulated Lead Acid Battery (VRLA): 2.27Vdc for cell 240 cells x 2.27Vdc = **545Vdc** NiCd Battery without boost-charge: 1.41Vdc for cell 284÷309 cells x 1.41Vdc = **401 ÷ 436Vdc** NiCd Battery with boost-charge: 1.41 (1.55 boost-charge) Vdc for cell 281 cells x 1.41Vdc = **397** (436) **Vdc** Flooded Lead Acid Battery without boost-charge: 2.23Vdc for cell 180÷195 cells x 2.23Vdc = **402 ÷ 435Vdc** Flooded Lead Acid Battery with boost-charge: 2.23 (2.35 boost-charge) Vdc for cell 180÷185 cells x 2.23Vdc = **402** (423) **÷ 413** (435) **Vdc**
Recharge Current	Maximum Battery Recharge Current. Max 20% of Battery capacity (Ah). Example: 123Ah – max. recharging current 24.6A.
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.
Cells	Number of cells of the Battery, see “**Float voltage**”. Example: 240 Battery cells - 40 blocks / 12Vdc Battery - 80 blocks / 6Vdc Battery - 240 blocks / 2Vdc 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.

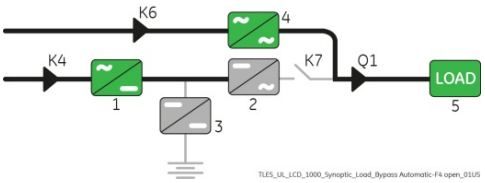
Continue →

2. Close “Q1 - UPS Output switch” (Pos. I).

- The Load is supplied by the Utility through the Automatic Bypass.
- Rectifier starts automatically. LED 1 (Rectifier) blinking, indicates Soft-start.
- At the end of Rectifier Soft-start the LED 1 (Rectifier) remains lit.

The Synoptic Diagram must display the status

“**Load supplied by Automatic Bypass**”.

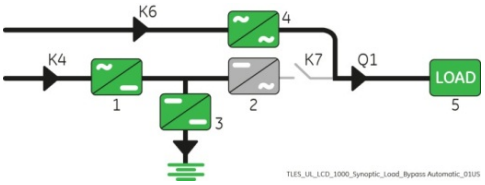


Note!

Ensure the LED 1 (Rectifier) is lit before carrying out this procedure (3).
It indicates that the DC-link 1 and DC-link 2 has reached 450Vdc (see screen MEASURES / Rectifier)!

Verify the right DC polarities on both side of the switch/fuse holder!

3. Connect the Battery to the UPS by closing the “Battery Cabinet Breaker (pos. I).



Note!

Before performing the next procedure (4) make sure that the LED 3 (Booster/Battery charger) is lit.

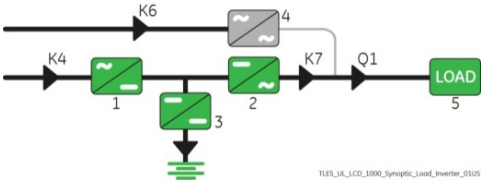
4. Insert the Inverter performing the command "Inverter ON".

Perform the “Inverter ON” command from the screen:
Commands 1 / Inverter / **ON**.

- Soft-start of the Inverter indicated with blinking LED 2 (Inverter).
- At the end of Inverter Soft-start the LED 2 (Inverter) remains lit.
- The Load is automatically transferred from Automatic Bypass to Inverter.
- LED ALARM turns OFF and the LED LOAD PROTECTED must be lit.

The Synoptic Diagram must display the status

“**Load supplied by Inverter**”.



5. Operation mode selection.

TLE Scalable Series 40 to 150 is delivered normally selected for permanent VFI operation.

The “SEM - Super Eco Mode” Operation Mode can be enabled and the SEM Start Time & SEM Stop Time can be programmed for each day of the week (see Section 6.4 SETUP / eBoost).

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 Utility Failure.

7.1.2 Complete UPS shut-down

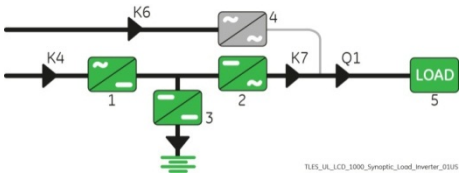
Note!

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

Make sure that "SEM - Super Eco Mode" Operation Mode is disabled before starting this procedure.

Initial status:

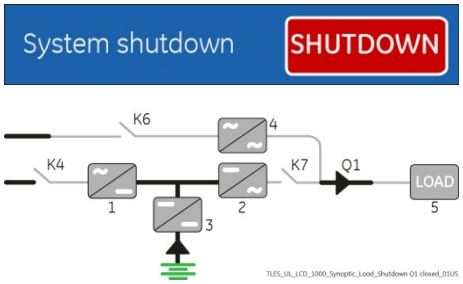
Load supplied by Inverter.



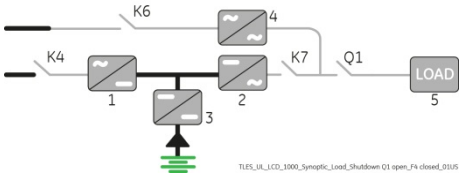
1. **Perform the command "System shutdown".**

   Perform the command "System shutdown" through the screen: Commands 1 / System shutdown / **SHUTDOWN**.

   - Load is disconnected from UPS.
   - Rectifier and Inverter are shut down and all contactors are opened.
   - LED 1 (Rectifier) and LED 2 (Inverter) are OFF.
   - LED ALARM is lit.



2. **Open "Q1 - UPS Output switch" (Pos. O).**



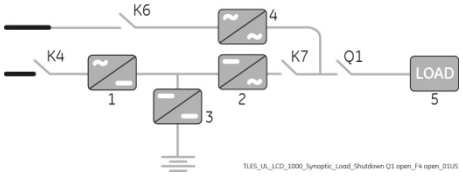
3. **Disconnect the Battery from the UPS by opening the "Battery Cabinet Breaker" (Pos. O).**

Note!

Before performing the next procedure (4) wait 5 minutes for DC-link Capacitors discharge.

Use the MEASURES/Rectifier screen to ensure that the DC-link 1 and DC-link 2 voltage has reached 10Vdc.

Press "MUTE" key to reset Acoustical Alarm.
LED ALARM remains lit.



4. **Disconnect the Utility from the input distribution.**

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.

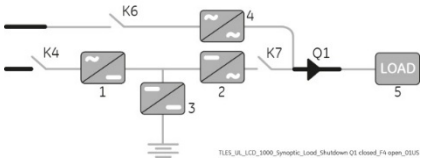
7.1.3 Restore to normal operation after “System shutdown” with Load not supplied

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” must be closed (Pos. I).**
- **“Battery Cabinet Breaker” must be open (Pos. O).**

Make sure that “SEM - Super Eco Mode” Operation Mode is disabled before starting this procedure.

View of the Synoptic Diagram after performed the command “System shutdown” with Load not supplied.

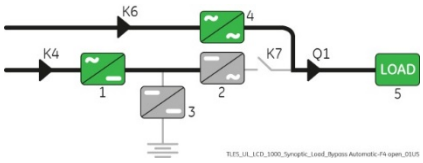


1. Restore the command “System shutdown”.

Restore the command “System shutdown” through the screen:
Commands 1 / System shutdown / **RESET**.

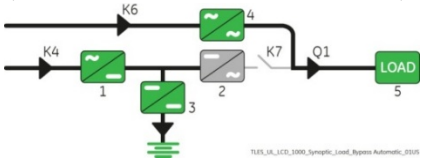
- The Load is supplied by the Utility through the Automatic Bypass.
- Rectifier starts automatically. LED 1 (Rectifier) blinking, indicates Soft-start.
- At the end of Rectifier Soft-start the LED 1 (Rectifier) remains lit.

The Synoptic Diagram must display the status
“**Load supplied by Automatic Bypass**”.



Note!
Ensure the LED 1 (Rectifier) is lit before carrying out this procedure (2).
It indicates that the DC-link 1 and DC-link 2 has reached 450Vdc (see screen MEASURES / Rectifier)!

2. Connect the Battery to the UPS by closing the “Battery Cabinet Breaker” (Pos. I).



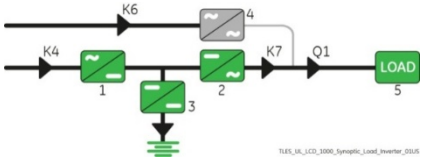
Note!
Before performing this procedure (3) make sure that the LED 3 (Booster/Battery charger) is lit.

3. Insert the Inverter performing the command “Inverter ON".

Perform the “Inverter ON” command from the screen:
Commands 1 / Inverter / **ON**.

- Soft-start of the Inverter indicated with blinking LED 2 (Inverter).
- At the end of Inverter Soft-start the LED 2 (Inverter) remains lit.
- The Load is automatically transferred from Automatic Bypass to Inverter.
- LED ALARM turns OFF and the LED LOAD PROTECTED must be lit.

The Synoptic Diagram must display the status
“**Load supplied by Inverter**”.



End of Procedure

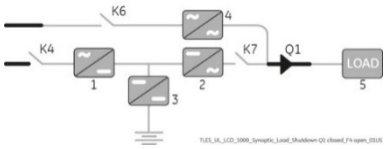
7.1.4 Restore to normal operation after “EPO - Emergency Power Off” with Load not supplied

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” must be closed (Pos. I).**
- **“Battery Cabinet Breaker” must be open (Pos. O).**

Make sure that “SEM - Super Eco Mode” Operation Mode is disabled before starting this procedure.

View of the Synoptic Diagram after performed the command “EPO - Emergency Power Off” with Load not supplied.

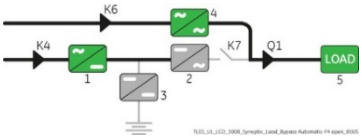


1. **Restore the “EPO -Emergency Power Off” button.**
   - Press “MUTE” key to reset Alarm and Acoustical Alarm. LED ALARM remains lit.

2. **Perform the “Inverter OFF” command.**
   Perform the “Inverter OFF” command from the screen:
   Commands 1 / Inverter / **OFF**.

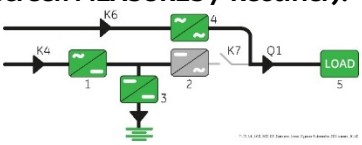
   - The Load is transferred to Utility by Automatic Bypass.
   - Rectifier starts automatically. LED 1 (Rectifier) blinking, indicates Soft-start.
   - At the end of Rectifier Soft-start the LED 1 (Rectifier) remains lit.

   The Synoptic Diagram must display the status
   “**Load supplied by Automatic Bypass**”.



Note!
Ensure the LED 1 (Rectifier) is lit before carrying out this procedure (3).
It indicates that the DC-link 1 and DC-link 2 has reached 450Vdc (see screen MEASURES / Rectifier)!

3. **Connect the Battery to the UPS by closing the “Battery Cabinet Breaker” (Pos. I).**

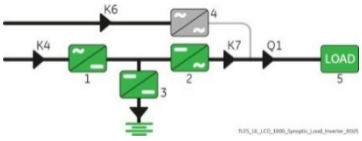


Note!
Before performing the next procedure (4) make sure that the LED 3 (Booster/Battery charger) is lit.

4. **Insert the Inverter performing the command “Inverter ON".**
   Perform the “Inverter ON” command from the screen:
   Commands 1 / Inverter / **ON**.

   - Soft-start of the Inverter indicated with blinking LED 2 (Inverter).
   - At the end of Inverter Soft-start the LED 2 (Inverter) remains lit.
   - The Load is automatically transferred from Automatic Bypass to Inverter.
   - LED ALARM turns OFF and the LED LOAD PROTECTED must be lit.

   The Synoptic Diagram must display the status
   “**Load supplied by Inverter**”.



End of Procedure

7.2 Procedures single TLE Scalable Series 40 to 150 functioning as Frequency Converter

When the TLE Scalable Series 40 to 150 functions as a Frequency Converter, the Automatic Bypass function is disabled.
Therefore, the Load cannot be transferred to Utility 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.

7.2.1 Initial Start-up of the TLE Scalable Series 40 to 150 as Frequency Converter

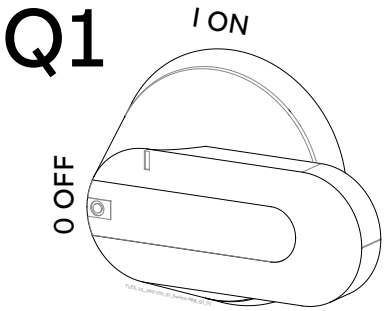
Warning!

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

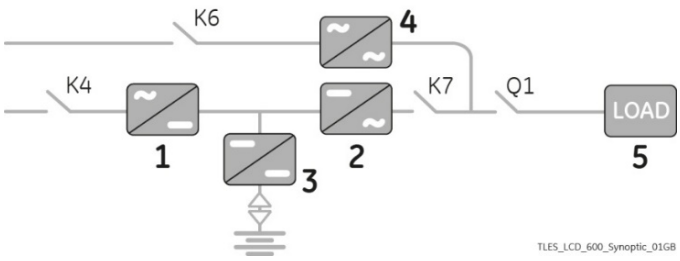
Ensure that the Output Load distribution can be powered and all the Output Isolators are open.

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 switch "**Q1 - UPS Output**" **is open** (Pos. O) and the **"Battery Cabinet Breaker" must be open** (Pos. O).



Q1 UPS Output switch



LEDs on Synoptic Diagram

LED 1	Rectifier	LED 4	Automatic Bypass
LED 2	Inverter	LED 5	LOAD on UPS
LED 3	Booster / Battery charger		

LED ALARM 

LED LOAD PROTECTED 

Command Inverter ON 

Command Inverter OFF 

Command System shutdown 

Command System shutdown RESET 

1. **Switch-ON the Utility voltage from the input distribution.**

   The UPS performs a "Self-test".

   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 ABB Service Center.

   At this stage the Electronic Power Supply and Control Panel are switched ON and the Buzzer sounds.

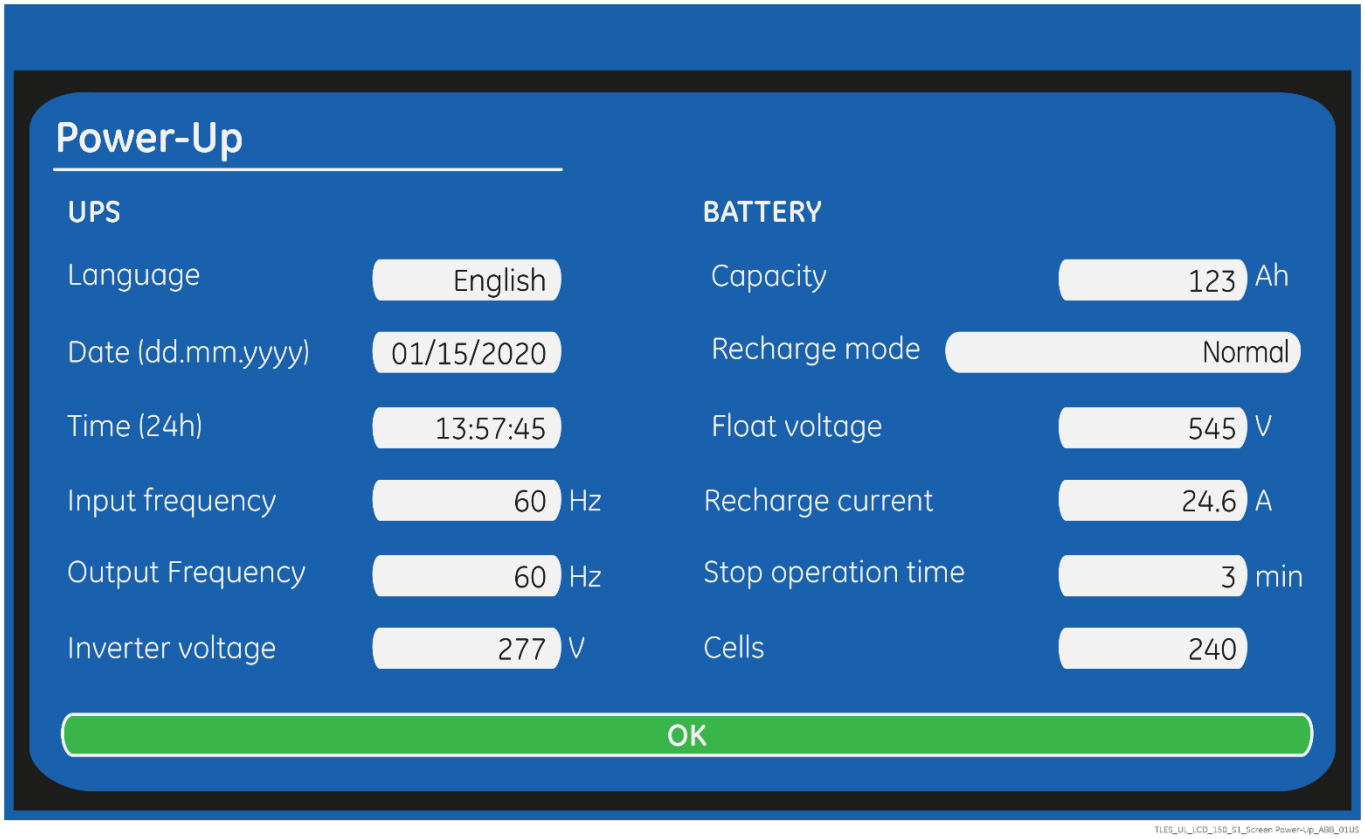
   Press "MUTE" key to reset Acoustical Alarm.
   LED ALARM remains lit.

Continue →

During the first commissioning TLE Scalable Series 40 to 150 requests a set-up of the UPS configuration parameters presented in the following “Power-Up” screen.

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

Warning!
The set-up of the UPS configuration parameters must be done only by an ABB Service Technician!
The set-up of mistaken values could compromise the integrity and reliability of the UPS!



UPS

Language	This parameter allows the choice of language used to display the information.
Date (dd.mm.yyyy)	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.yyyy”.
Time (24h)	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.
Input Frequency	Frequency value of the Rectifier input Utility (50 Hz / 60Hz).
Output Frequency	Inverter output frequency value (50 Hz / 60Hz).
Inverter Voltage	Output voltage PHASE/NEUTRAL of the Inverter (277V).

Continue →

Battery

Capacity	Ah capacity of the Battery.
Recharge Mode	Recharge type of the Battery - Normal: Valve Regulated Lead Acid Battery (VRLA), NiCd without boost-charge and Flooded Lead Acid Battery without boost-charge. - NiCd boost: Nickel Cadmium Battery with boost-charge. - Wet lead acid boost: Flooded Lead Acid Battery with boost-charge. - Flywheel: Flywheel System. - Li-Ion LGG: Lithium Battery by LG brand. - Li-Ion SDI: Lithium Battery by Samsung brand.
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): Valve Regulated Lead Acid Battery (VRLA): 2.27Vdc for cell 240 cells x 2.27Vdc = **545Vdc** NiCd Battery without boost-charge: 1.41Vdc for cell 284÷309 cells x 1.41Vdc = **401 ÷ 436Vdc** NiCd Battery with boost-charge: 1.41 (1.55 boost-charge) Vdc for cell 281 cells x 1.41Vdc = **397** (436) **Vdc** Flooded Lead Acid Battery without boost-charge: 2.23Vdc for cell 180÷195 cells x 2.23Vdc = **402 ÷ 435Vdc** Flooded Lead Acid Battery with boost-charge: 2.23 (2.35 boost-charge) Vdc for cell 180÷185 cells x 2.23Vdc = **402** (423) **÷ 413** (435) **Vdc**
Recharge Current	Maximum Battery Recharge Current. Max 20% of Battery capacity (Ah). Example: 123Ah – max. recharging current 24.6A.
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.
Cells	Number of cells of the Battery, see "**Float voltage**". Example: 240 Battery cells - 40 blocks / 12Vdc Battery - 80 blocks / 6Vdc Battery - 240 blocks / 2Vdc 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.

Continue →

2. Close “Q1 - UPS Output switch” (Pos. I).

- Rectifier starts automatically.
  LED 1 (Rectifier) blinking, indicates Soft-start.
- At the end of Rectifier Soft-start the LED 1 (Rectifier) remains lit.

Note!

Ensure the LED 1 (Rectifier) is lit before carrying out this procedure (3).
It indicates that the DC-link 1 and DC-link 2 has reached 450Vdc (see screen MEASURES / Rectifier)!

Verify the right DC polarities on both side of the switch/fuse holder!

3. Connect the Battery to the UPS by closing the “Battery Cabinet Breaker” (Pos. I).

Note!

Before performing the next procedure (4) make sure that the LED 1 (Rectifier) and LED 3 (Booster/Battery charger) is lit.

4. Insert the Inverter performing the command "Inverter ON".

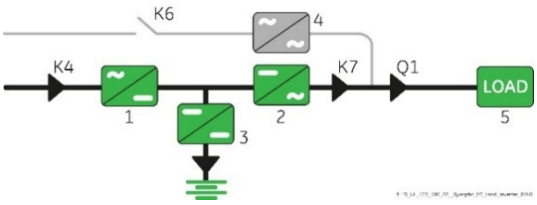
Before performing this procedure (4) make sure that the LED 1 (Rectifier) and LED 3 (Booster/Battery charger) are lit.

Perform the “Inverter ON” command from the screen:
Commands 1 / Inverter / **ON**.

- Soft-start of the Inverter indicated with blinking LED 2 (Inverter).
- At the end of Inverter Soft-start the LED 2 (Inverter) remains lit.
- Load is now supplied from Inverter.
- LED ALARM turns OFF and the LED LOAD PROTECTED 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 Utility Failure.

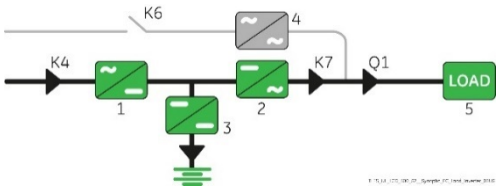
7.2.2 Complete shut-down of the TLE Scalable Series 40 to 150 as Frequency Converter

Note!

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

Initial status:

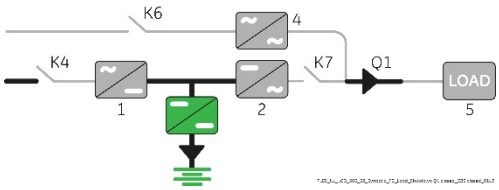
Load supplied by Inverter.



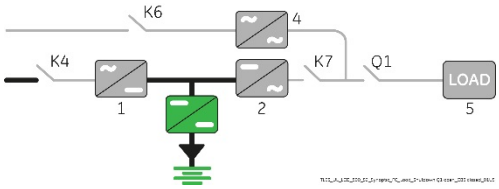
1. **Perform the command "System shutdown".**

   Perform the command "System shutdown" through the screen: Commands 1 / System shutdown / **SHUTDOWN**.

   - Load is disconnected from UPS.
   - Rectifier and Inverter are shut down and all contactors are opened.
   - LED 1 (Rectifier) and LED 2 (Inverter) are OFF.
   - LED ALARM is lit.



2. **Open "Q1 - UPS Output switch" (Pos. O).**



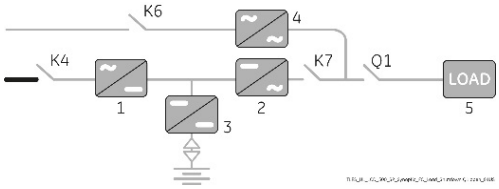
3. **Disconnect the Battery from the UPS by opening the "Battery Cabinet Breaker" (Pos. O).**

Note!

Before performing the next procedure (4) wait 5 minutes for DC-link Capacitors discharge.

Use the MEASURES/Rectifier screen to ensure that the DC-link 1 and DC-link 2 voltage has reached 10Vdc.

Press "MUTE" key to reset Acoustical Alarm.
LED ALARM remains lit.



4. **Disconnect the Utility from the input distribution.**

End of Procedure

Danger!

It will take 5 minutes for the DC capacitors to discharge.

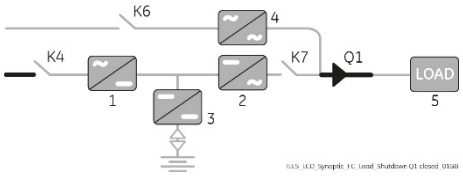
Open only the front door, do not open any other part of the UPS.

7.2.3 Restore to normal operation after “System shutdown” with Load not supplied

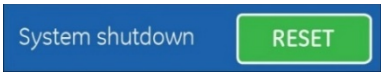
Warning!
Please check and ensure the conditions of the connected Load are safe before proceeding, as this procedure will result in the connection of power to the Load circuit(s).

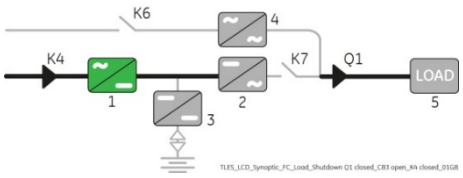
Note!
Before performing this operation, make sure that the UPS is in the following status:
- **“Q1 - UPS Output switch” must be closed (Pos. I).**
- **“Battery Cabinet Breaker” must be open (Pos. O).**

View of the Synoptic Diagram after performed the command “System shutdown” with Load not supplied.



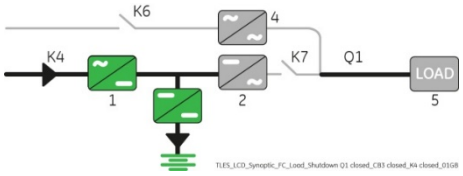
1. **Restore the command “System shutdown”.**
   Restore the command “System shutdown” through the screen:
   Commands 1 / System shutdown / **RESET**.





Note!
Ensure the LED 1 (Rectifier) is lit before carrying out this procedure (2).
It indicates that the DC-link 1 and DC-link 2 has reached 450Vdc (see screen MEASURES / Rectifier)!

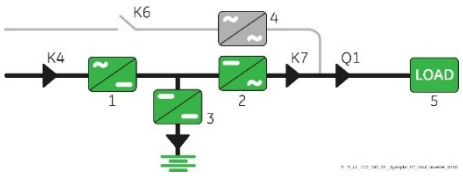
2. **Connect the Battery to the UPS by closing the “Battery Cabinet Breaker” (Pos. I).**



Note!
Before performing this procedure (3) make sure that the LED 3 (Booster/Battery charger) is lit.

3. **Insert the Inverter performing the command “Inverter ON".**
   Perform the “Inverter ON” command from the screen:
   Commands 1 / Inverter / **ON**.
   - Soft-start of the Inverter indicated with blinking LED 2 (Inverter).
   - At the end of Inverter Soft-start the LED 2 (Inverter) remains lit.
   - Load is now supplied from Inverter.
   - LED ALARM turns OFF and the LED LOAD PROTECTED must be lit.

   The Synoptic Diagram must display the status
   “Load supplied by Inverter”.



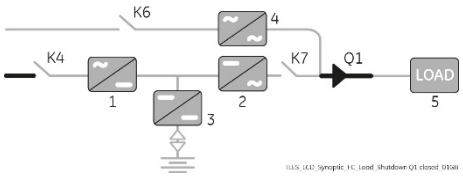
End of Procedure

7.2.4 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).

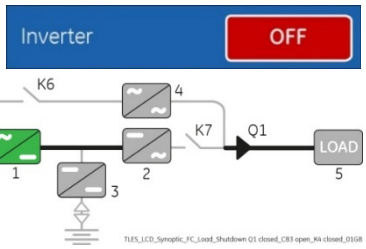
Note!
Before performing this operation, make sure that the UPS is in the following status:
- **“Q1 - UPS Output switch” must be closed (Pos. I).**
- **“Battery Cabinet Breaker” must be open (Pos. O).**

View of the Synoptic Diagram after performed the command “EPO - Emergency Power Off” with Load not supplied.



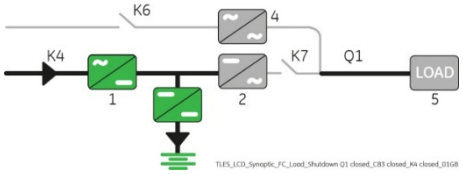
1. **Restore the “EPO -Emergency Power Off” button.**
   - Press “MUTE” key to reset Alarm and Acoustical Alarm. LED ALARM remains lit.

2. **Perform the “Inverter OFF” command.**
   Perform the “Inverter OFF” command from the screen:
   Commands 1 / Inverter / **OFF**.
   - Rectifier starts automatically. LED 1 (Rectifier) blinking, indicates Soft-start.
   - At the end of Rectifier Soft-start the LED 1 (Rectifier) remains lit.



Note!
Ensure the LED 1 (Rectifier) is lit before carrying out this procedure (3).
It indicates that the DC-link 1 and DC-link 2 has reached 450Vdc (see screen MEASURES / Rectifier)!

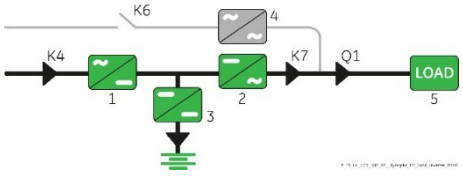
3. **Connect the Battery to the UPS by closing the “Battery Cabinet Breaker” (Pos. I).**



Note!
Before performing the next procedure (4) make sure that the LED 3 (Booster/Battery charger) is lit.

3. **Insert the Inverter performing the command “Inverter ON".**
   Perform the “Inverter ON” command from the screen:
   Commands 1 / Inverter / **ON**.
   - Soft-start of the Inverter indicated with blinking LED 2 (Inverter).
   - At the end of Inverter Soft-start the LED 2 (Inverter) remains lit.
   - Load is now supplied from Inverter.
   - LED ALARM turns OFF and the LED LOAD PROTECTED must be lit.

   The Synoptic Diagram must display the status
   “Load supplied by Inverter”.



End of Procedure

RPA
Redundant Parallel Architecture

7.3 Procedures for TLE Scalable Series 40 to 150 RPA Parallel System

7.3.1 TLE Scalable Series 40 to 150 RPA Parallel System start-up

Warning!

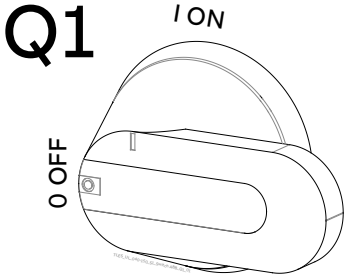
Before proceeding to turn ON the UPS system, ensure that the AC and DC external isolators are OFF and prevent their inadverted operation.

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

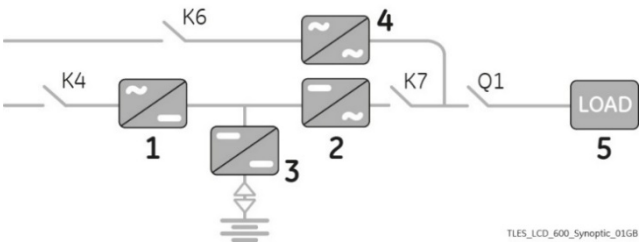
This procedure must be performed for the first start-up following the installation, with the Parallel System completely switched Off and not powered.

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

- All the **connections** to the input/output terminals or bus bars of the UPS have been made correctly.
- The **safety screens** are fixed in their position.
- The switch "**Q1 - UPS Output**" **is open** (Pos. O) and the "**Battery Cabinet Breaker**" **must be open** (Pos. O).



Q1 UPS Output switch



LEDs on Synoptic Diagram

LED 1	Rectifier	LED 4	Automatic Bypass
LED 2	Inverter	LED 5	LOAD on UPS
LED 3	Booster / Battery charger		

LED ALARM	ALARM	LED LOAD PROTECTED	LOAD PROTECTED
Command Inverter ON	Inverter ON	Command Inverter OFF	Inverter OFF
Command Module shutdown	Module shutdown SHUTDOWN	Command Module shutdown RESET	Module shutdown RESET
Command System shutdown	System shutdown SHUTDOWN	Command System shutdown RESET	System shutdown RESET

1. **Switch-ON the Utility voltage, on all UPS Units, from the input distribution (both Rectifier and bypass if separated).**
   The UPS performs a "Self-test".
   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 ABB Service Center.

   At this stage the Electronic Power Supply and Control Panel are switched ON and the Buzzer sounds.

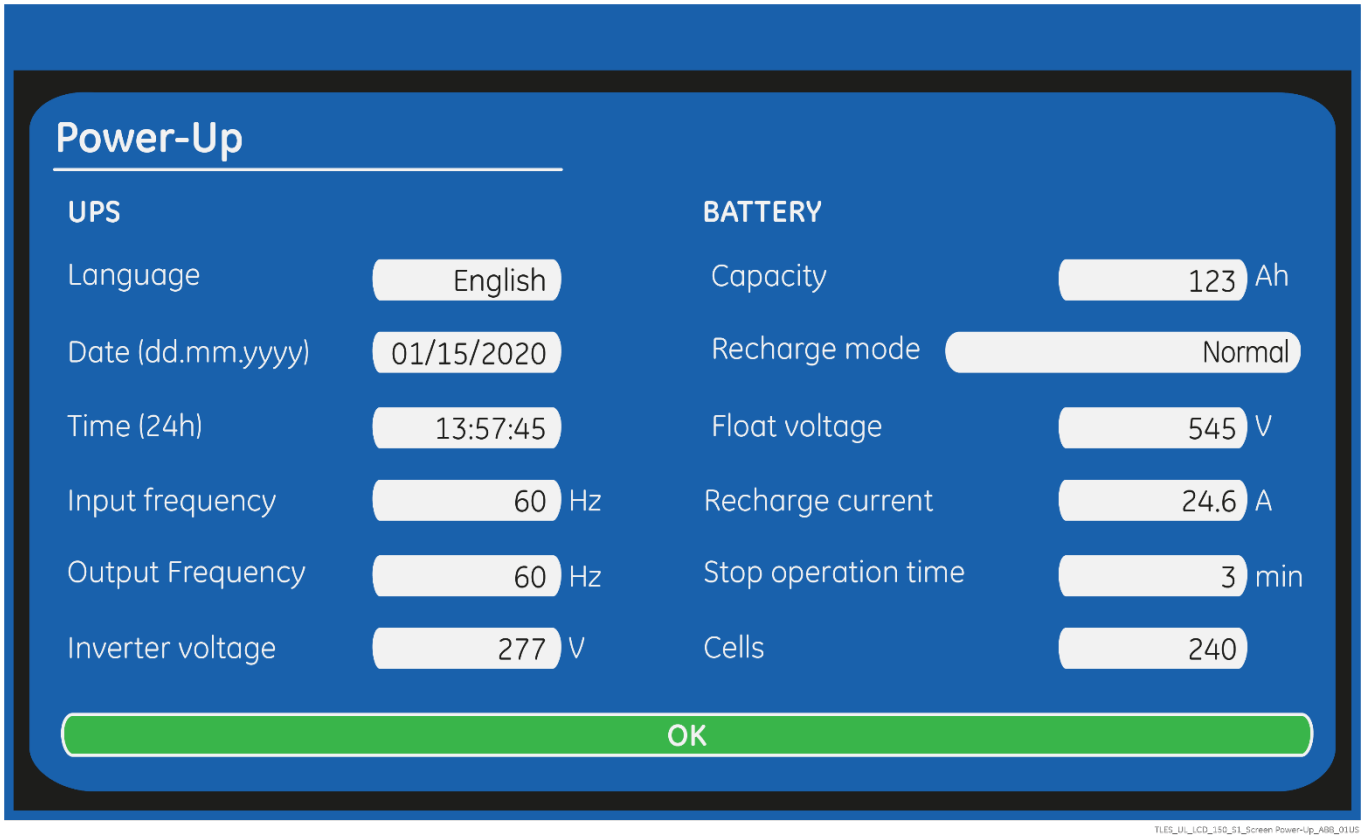
   Press "MUTE" key to reset Acoustical Alarm.
   LED ALARM remains lit.

Continue →

During the first commissioning TLE Scalable Series 40 to 150 requests a set-up of the UPS configuration parameters presented in the following “Power-Up” screen.

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

Warning!
The set-up of the UPS configuration parameters must be done only by an ABB Service Technician!
The set-up of mistaken values could compromise the integrity and reliability of the UPS!



UPS

Language	This parameter allows the choice of language used to display the information.
Date (dd.mm.yyyy)	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.yyyy”.
Time (24h)	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.
Input Frequency	Frequency value of the Rectifier input Utility (50 Hz / 60Hz).
Output Frequency	Inverter output frequency value (50 Hz / 60Hz).
Inverter Voltage	Output voltage PHASE/NEUTRAL of the Inverter (277V).

Continue →

Battery

Capacity	Ah capacity of the Battery.
Recharge Mode	Recharge type of the Battery - Normal: Valve Regulated Lead Acid Battery (VRLA), NiCd without boost-charge and Flooded Lead Acid Battery without boost-charge. - NiCd boost: Nickel Cadmium Battery with boost-charge. - Wet lead acid boost: Flooded Lead Acid Battery with boost-charge. - Flywheel: Flywheel System. - Li-Ion LGG: Lithium Battery by LG brand. - Li-Ion SDI: Lithium Battery by Samsung brand.
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): Valve Regulated Lead Acid Battery (VRLA): 2.27Vdc for cell 240 cells x 2.27Vdc = **545Vdc** NiCd Battery without boost-charge: 1.41Vdc for cell 284÷309 cells x 1.41Vdc = **401 ÷ 436Vdc** NiCd Battery with boost-charge: 1.41 (1.55 boost-charge) Vdc for cell 281 cells x 1.41Vdc = **397** (436) **Vdc** Flooded Lead Acid Battery without boost-charge: 2.23Vdc for cell 180÷195 cells x 2.23Vdc = **402 ÷ 435Vdc** Flooded Lead Acid Battery with boost-charge: 2.23 (2.35 boost-charge) Vdc for cell 180÷185 cells x 2.23Vdc = **402** (423) **÷ 413** (435) **Vdc**
Recharge Current	Maximum Battery Recharge Current. Max 20% of Battery capacity (Ah). Example: 123Ah – max. recharging current 24.6A.
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.
Cells	Number of cells of the Battery, see "**Float voltage**". Example: 240 Battery cells - 40 blocks / 12Vdc Battery - 80 blocks / 6Vdc Battery - 240 blocks / 2Vdc Battery

Note!

The values indicated above, must be considered as standard values.

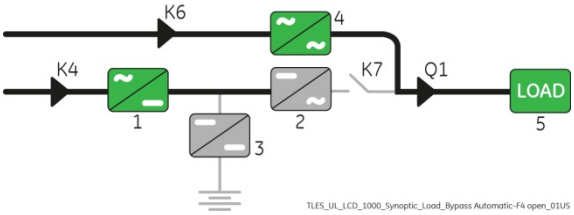
The actual programmed values must be the ones defined from the Battery Manufacturer.

Continue →

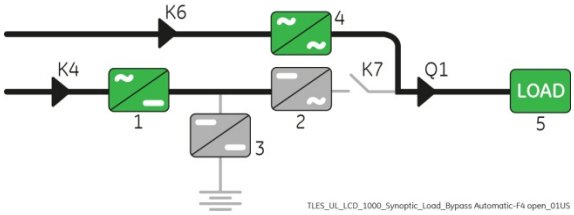
2. Close “Q1 - UPS Output switch” (Pos. I) on all Units.

- When closing “Q1 - UPS Output switch” on the last Unit of the RPA Parallel System, the Automatic Bypass of all Units connects to the Load.
- Rectifiers start automatically, blinking LED 1 (Rectifier) indicates Soft-start.
- At the end of Rectifier Soft-start, the LED 1 (Rectifier) remains lit.

The Synoptic Diagram, on all UPS Units, must display the status “**Load supplied by Automatic Bypass**”.



Synoptic Diagram of first Unit



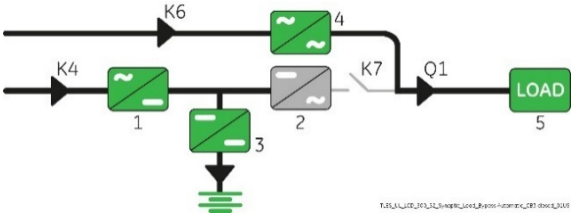
Synoptic Diagram of other Units

Note!

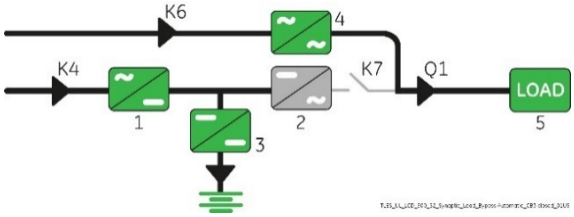
Ensure the LED 1 (Rectifier) is lit before carrying out this procedure (3).
It indicates that the DC-link 1 and DC-link 2 has reached 450Vdc (see screen MEASURES / Rectifier)!

Verify the right DC polarities on both side of the switch/fuse holder!

3. Connect the Battery to all Units by closing the “Battery Cabinet Breaker (pos. I).



Synoptic Diagram of first Unit



Synoptic Diagram of other Units

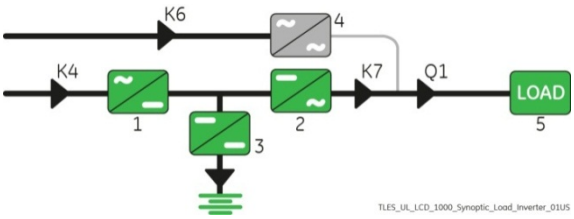
Note!

Before performing the next procedure (4) make sure that the LED 3 (Booster/Battery charger) is lit.

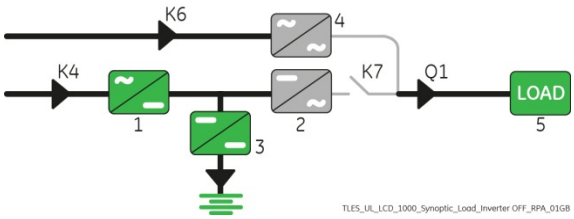
4. Insert the Inverter performing the “Inverter ON” command on first Unit.

Perform the “Inverter ON” command from the screen:
Commands 1 / INVERTER / **ON**.

- Soft-start of the Inverter indicated with blinking LED 2 (Inverter).
- At the end of Inverter Soft-start the LED 2 (Inverter) remains lit.
- In case of sufficient output power, the output will transfer to Inverter.
- LED ALARM turns OFF and the LED LOAD PROTECTED must be lit.



Synoptic Diagram of first Unit



Synoptic Diagram of other Units

Continue →

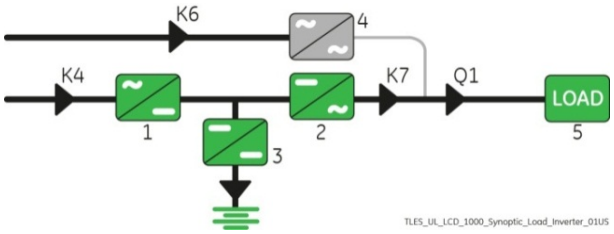
5. Insert the Inverter performing the “Inverter ON” command on all other Units.

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

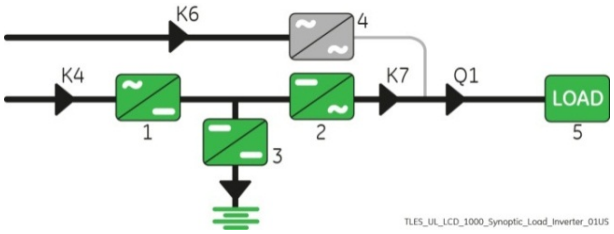
Perform the “Inverter ON” command from the screen:
Commands 1 / INVERTER / **ON**.

- Soft-start of the Inverter indicated with blinking LED 2 (Inverter).
- At the end of Inverter Soft-start the LED 2 (Inverter) 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 LOAD PROTECTED 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

6. Operation mode selection.

TLE Scalable Series 40 to 150 is delivered normally selected for permanent VFI operation.

The “SEM - Super Eco Mode” Operation Mode can be enabled and the SEM Start Time & SEM Stop Time can be programmed for each day of the week (see Section 6.4 SETUP / eBoost).

If available, the IEMi Operation Mode (option) can be enabled and the IEMi Start Time & IEMi Stop Time can be programmed for each day of the week (see Section 6.4 SETUP / IEMi).

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 Utility Failure.

7.3.2 Separate a UPS Unit from the RPA Parallel System (System Redundancy)

Note!

Make sure that "SEM - Super Eco Mode" Operation Mode is disabled before starting this procedure.

If IEMi option is available, make sure that IEMi Operation Mode is disabled before starting this procedure.

Note!

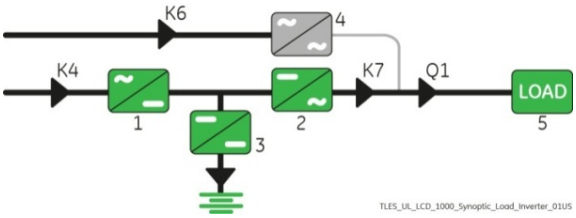
The Load is powered by the UPS RPA Parallel System.

One UPS Unit of the RPA Parallel System has to be turned OFF, while the Load is shared between the other Units supplying the Parallel Bus.

The Control Bus cable connecting J1A - J2A and J1B - J2B cannot be connected or disconnected after the system has been powered ON.

Initial status:

Load supplied by all Inverters of the RPA Parallel System.



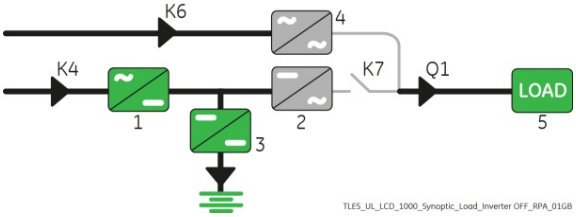
1. Disconnect the Inverter performing the "Inverter OFF" command on the Unit to separate.

1 - Perform the "Inverter OFF" command from the screen:
Commands 1 / Inverter / **OFF**.

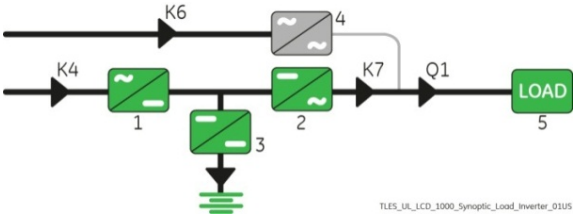
2 - Repeat the "Inverter OFF" command from the screen:
Commands 1 / Inverter / **OFF**.

With Redundant System, performing the "Inverter OFF" command the Inverter shuts down and it will stay OFF. Performing the "Inverter OFF" command the Load is transferred to the Utility and the Inverter remains operating, it means the system is not redundant.
In this case is not possible to switch-OFF one Unit without transferring the Load on Mains.

- Load supplied by Inverter(s) of the other Unit(s) of the RPA Parallel System.



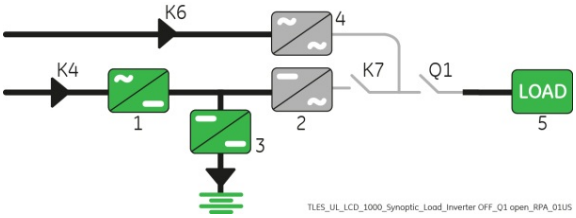
Synoptic diagram of the Unit to separate



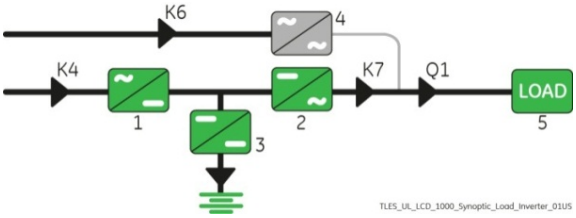
Synoptic diagram of other Units

2. Open "Q1 - UPS Output switch" (Pos. O) on the Unit to separate.

- LED ALARM is lit.



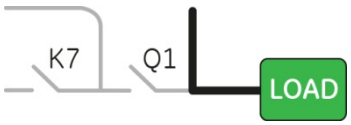
Synoptic diagram of the Unit to separate



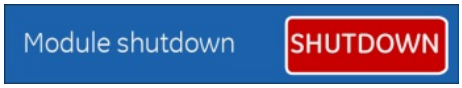
Synoptic diagram of other Units

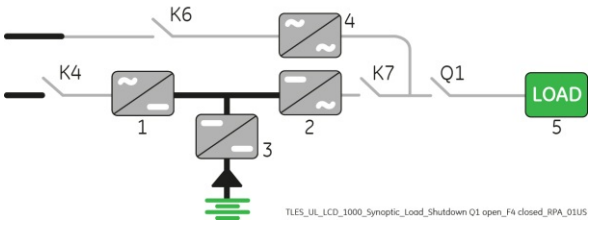
Continue →

3. Perform the command "Module shutdown" on the Unit to separate only when the symbol Q1 in the Synoptic Diagram is shown open.

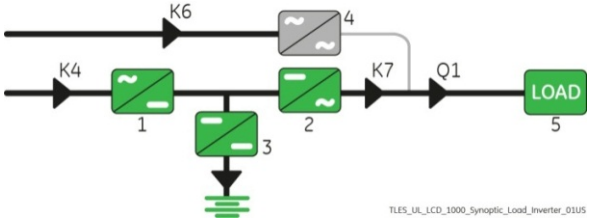


Perform the command "Module shutdown" through the screen: Commands 1 / Module shutdown / **SHUTDOWN**.





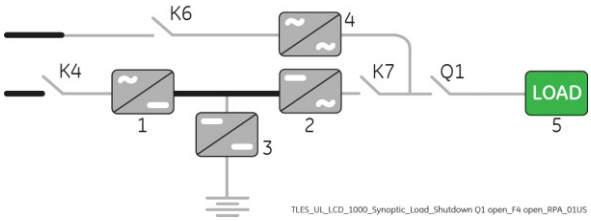
Synoptic diagram of the Unit to separate



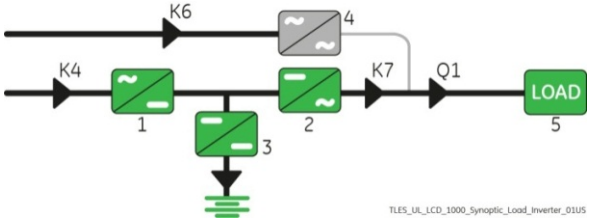
Synoptic diagram of other Units

4. Disconnect the Battery on the Unit to separate by opening the "Battery Cabinet Breaker" (Pos. O).

Press "MUTE" key to reset Acoustical Alarm. LED ALARM remains lit.



Synoptic diagram of the Unit to separate



Synoptic diagram of other Units

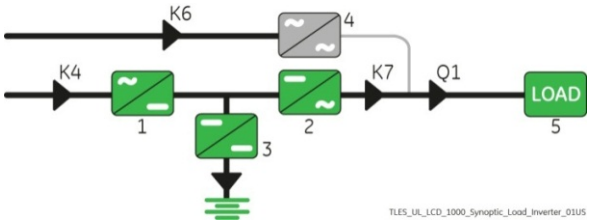
Note!

Before performing the next procedure (5) wait 5 minutes for DC-link Capacitors discharge.

Use the MEASURES/Rectifier screen to ensure that the DC-link 1 and DC-link 2 voltage has reached 10Vdc.

5. Disconnect the Utility supply on the Unit to separate.

LCD display is OFF



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 your ABB Service Center.

7.3.3 Reconnect a UPS Unit to RPA 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.

The high-speed bus cable connecting J1A - J2A and J1B - J2B 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.

Make sure that "SEM - Super Eco Mode" Operation Mode is disabled before starting this procedure.

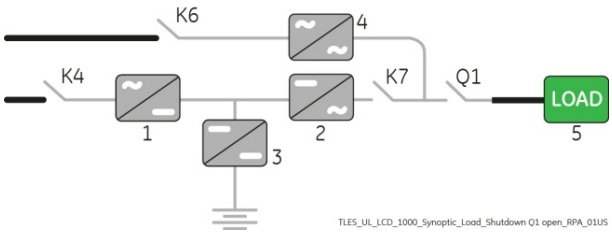
If IEMi option is available, make sure that IEMi Operation Mode is disabled before starting this procedure.

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

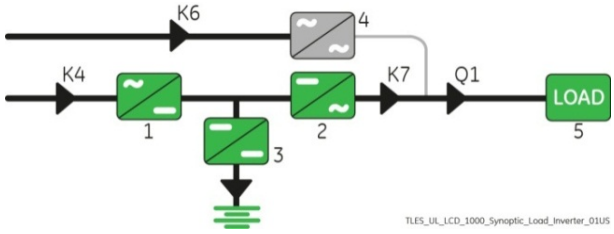
- All the **connections** to the input/output terminals or bus bars of the UPS have been made correctly.
- The **protection panels** are fastened in their correct position.
- The switch "**Q1 - UPS Output**" **is open** (Pos. O) and the **"Battery Cabinet Breaker" must be open** (Pos. O).

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

   At this stage the Electronic Power Supply and Control Panel are switched ON and the Buzzer sounds.
   Press "MUTE" key to reset Acoustical Alarm.
   LED ALARM remains lit.



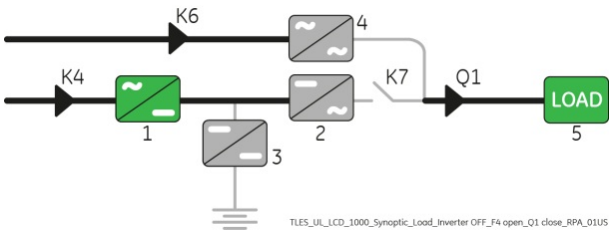
Synoptic diagram of the Unit to reconnect



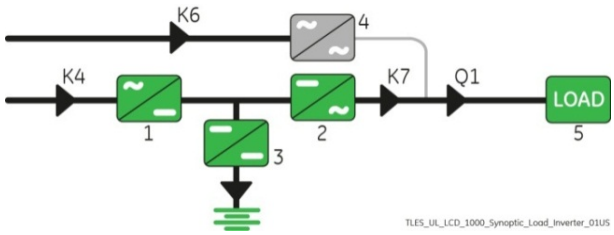
Synoptic diagram of other Units

2. **Close "Q1 - UPS Output switch" (Pos. I) on the Unit to reconnect.**

   - Rectifier starts automatically.
     LED 1 (Rectifier) blinking, indicates Soft-start.
   - At the end of Rectifier Soft-start the LED 1 (Rectifier) remains lit.



Synoptic diagram of the Unit to reconnect



Synoptic diagram of other Units

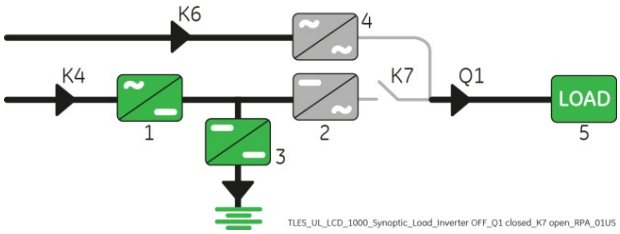
Continue →

Note!

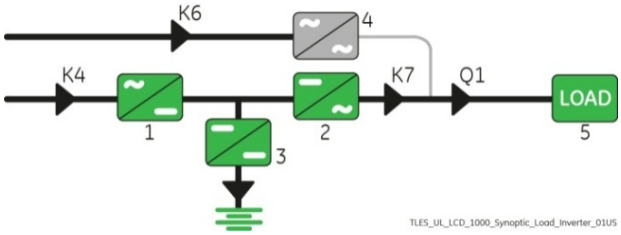
Ensure the LED 1 (Rectifier) is lit before carrying out this procedure (3).

It indicates that the DC-link 1 and DC-link 2 has reached 450Vdc (see screen MEASURES / Rectifier)!

3. Connect the Battery on the Unit to reconnect by closing the "Battery Cabinet Breaker" (Pos. I).



Synoptic diagram of the Unit to reconnect



Synoptic diagram of other Units

Note!

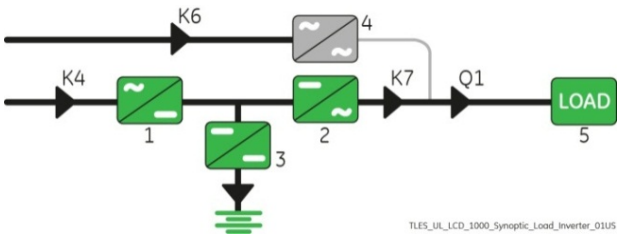
Before performing the next procedure (4) make sure that the LED 3 (Booster/Battery charger) is lit.

4. Insert the Inverter performing the command "Inverter ON" on the Unit to reconnect.

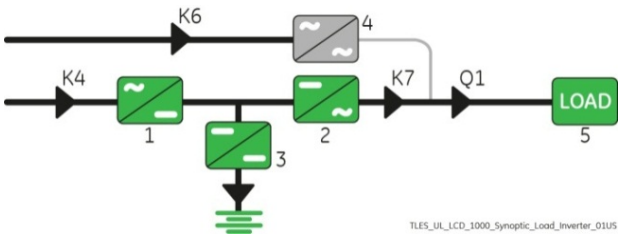
Perform the "Inverter ON" command from the screen:
Commands 1 / Inverter / **ON**.

- After Soft-start of the Inverter the Inverter connects automatically to the other Units of the RPA Parallel System.
- LED ALARM turns OFF and the LED LOAD PROTECTED 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

7.3.4 Complete RPA Parallel System shut-down

Note!

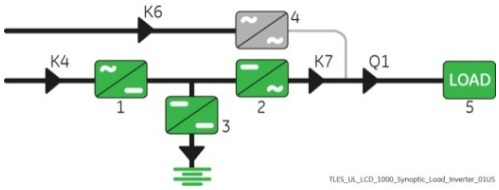
The UPS RPA Parallel System and the Load have to be completely powered down.

Make sure that "SEM - Super Eco Mode" Operation Mode is disabled before starting this procedure.

If IEMi option is available, make sure that IEMi Operation Mode is disabled before starting this procedure.

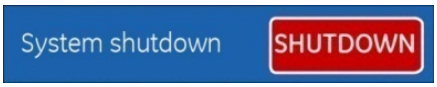
Initial status:

Load supplied by all Inverters of the RPA Parallel System.

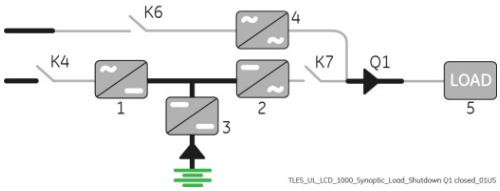


1. Perform the command "System shutdown" on anyone of the Units.

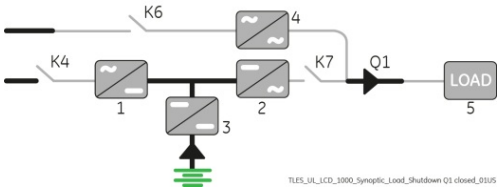
Perform the command "System shutdown" through the screen:
Commands 1 / System shutdown / **SHUTDOWN**.



- Load is disconnected from UPS RPA Parallel System.
- Rectifiers and Inverters are shut down and all Contactors are opened.
- LED ALARM is lit.

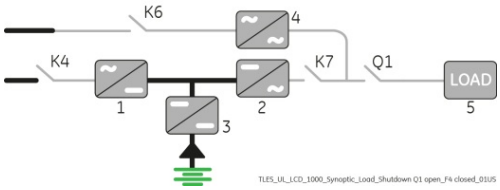


Synoptic diagram of first Unit

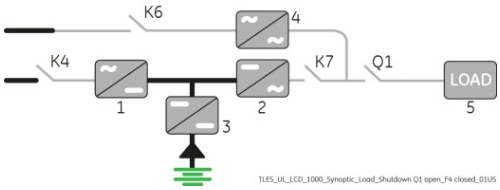


Synoptic diagram of other Units

2. Open "Q1 - UPS Output switch" (Pos. O) on all Units.



Synoptic diagram of first Unit



Synoptic diagram of other Units

3. Disconnect on all Units the Battery from the UPS by opening the "Battery Cabinet Breaker" (Pos. O).

Press "MUTE" key to reset Acoustical Alarm. LED ALARM remains lit.

- **Wait <u>5 minutes</u>** for DC-link Capacitors discharge. Use the MEASURES/Rectifier screen to ensure that the DC-link 1 and DC-link 2 voltage has reached **10Vdc**.

4. Disconnect the Utility supply on all Units.

End of Procedure

Danger!

It will take <u>5 minutes</u> for the DC capacitors to discharge.

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

7.3.5 Restore to normal operation after “System shutdown” 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!

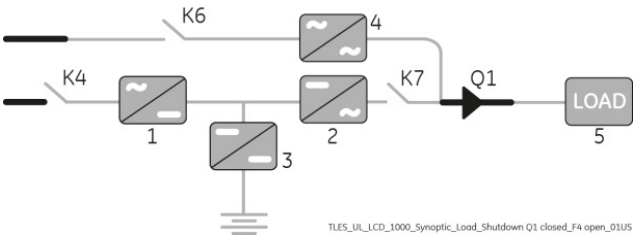
Before performing this operation, make sure that all Units of the RPA Parallel System are in the following status:

- **“Q1 - UPS Output switch” must be closed (Pos. I).**
- **“Battery Cabinet Breaker” must be open (Pos. O).**

Make sure that “SEM - Super Eco Mode” Operation Mode is disabled before starting this procedure.

If IEMi option is available, make sure that IEMi Operation Mode is disabled before starting this procedure.

View of the Synoptic Diagram, on all UPS Units, after performed the command “System shutdown” with Load not supplied.

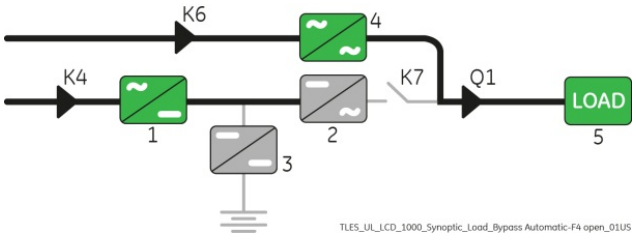


1. Restore the command “System shutdown” of the RPA Parallel System.

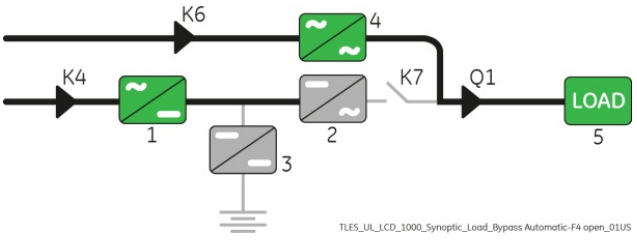
Restore the command “System shutdown”, on anyone of the Parallel Units, through the screen:
Commands 1 / System shutdown / **RESET**.

- The Load is supplied by the Utility through the Automatic Bypass of all Units.
- Rectifiers start automatically, blinking LED 1 (Rectifier) indicates Soft-start.
- At the end of Rectifier Soft-start, the LED 1 (Rectifier) remains lit.
- LED ALARM are lit.

The Synoptic Diagram, on all UPS Units, must display the status “**Load supplied by Automatic Bypass**”.



Synoptic diagram of first Unit



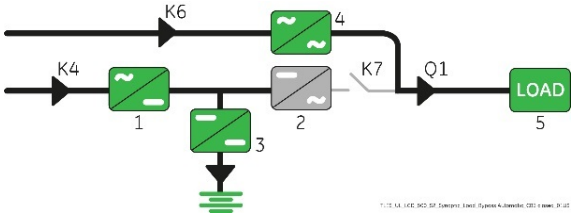
Synoptic diagram of other Units

Continue →

Note!

Ensure the LED 1 (Rectifier) is lit before carrying out this procedure.
It indicates that the DC-link 1 and DC-link 2 has reached 450Vdc (see screen MEASURES / Rectifier)!

2. **Connect the Battery on all Units by closing the "Battery Cabinet Breaker" (Pos. I).**



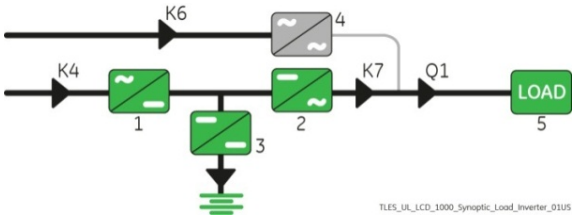
Note!

Before performing the next procedure (3) make sure that the LED 3 (Booster/Battery charger) is lit.

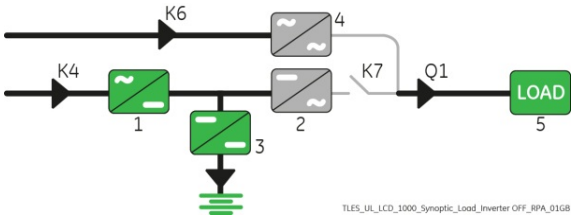
3. **Insert the Inverter performing the "Inverter ON" command on first Unit.**

Perform the "Inverter ON" command from the screen:
Commands 1 / Inverter / **ON**.

- Soft-start of the Inverter indicated with blinking LED 2 (Inverter).
- At the end of Inverter Soft-start the LED 2 (Inverter) remains lit.
- In case of sufficient output power, the output will transfer to Inverter.



Synoptic diagram of first Unit



Synoptic diagram of other Units

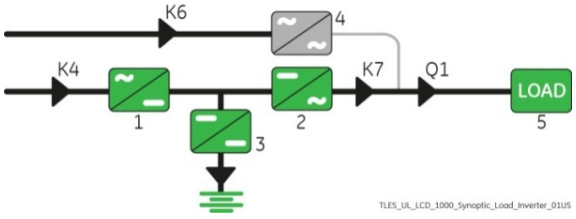
4. **Insert the Inverter performing the "Inverter ON" command on all other Units**.

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

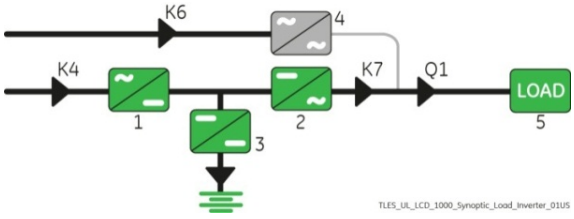
Perform the "Inverter ON" command from the screen:
Commands 1 / Inverter / **ON**.

- Soft-start of the Inverter indicated with blinking LED 2 (Inverter).
- At the end of Inverter Soft-start the LED 2 (Inverter) 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 LOAD PROTECTED 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

7.3.6 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!

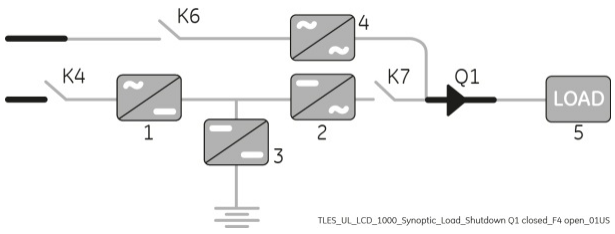
Before performing this operation, make sure that all Units of the RPA Parallel System are in the following status:

- **“Q1 - UPS Output switch” must be closed (Pos. I).**
- **“Battery Cabinet Breaker” must be open (Pos. O).**

Make sure that “SEM - Super Eco Mode” Operation Mode is disabled before starting this procedure.

If IEMi option is available, make sure that IEMi Operation Mode is disabled before starting this procedure.

View of the Synoptic Diagram, on all UPS Units, after performed the command “EPO - Emergency Power Off” with Load not supplied.



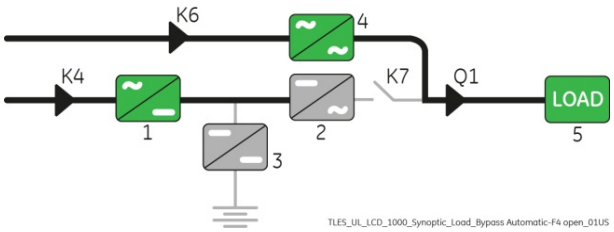
1. **Restore the EPO (Emergency Power Off) button.**
   - Press “MUTE” key to reset Alarm and Acoustical Alarm.
   - LED ALARM remain lit.

2. **Perform the “Inverter OFF” command on all Units.**

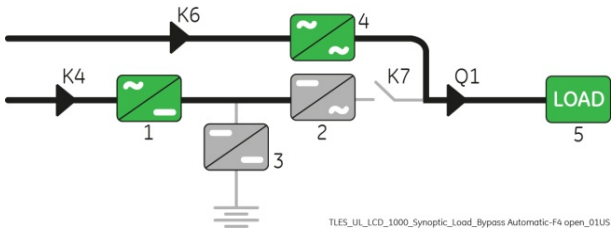
   Perform the “Inverter OFF” command from the screen:
   Commands 1 / Inverter / **OFF**.

   - Rectifiers start automatically.
     LEDs 1 (Rectifier) blinking, indicates Soft-start.
   - After performed the “Inverter OFF” command on the last Unit of the RPA 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



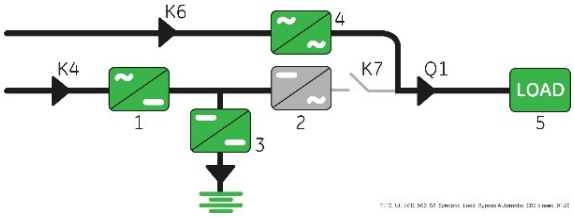
Synoptic diagram of other Units

Continue →

Note!

Ensure the LED 1 (Rectifier) is lit before carrying out this procedure (3).
It indicates that the DC-link 1 and DC-link 2 has reached 450Vdc (see screen MEASURES / Rectifier)!

3. **Connect the Battery on all Units by closing the "Battery Cabinet Breaker" (Pos. I).**



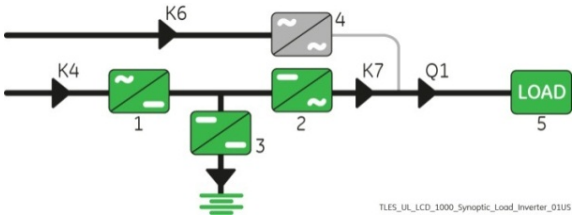
Note!

Before performing the next procedure (4) make sure that the LED 3 (Booster/Battery charger) is lit.

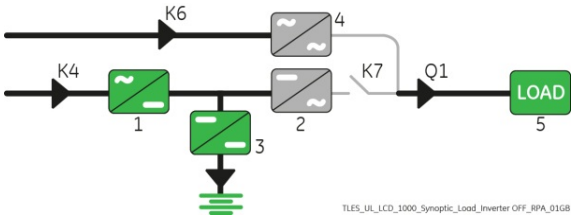
4. **Insert the Inverter performing the "Inverter ON" command on first Unit.**

Perform the "Inverter ON" command from the screen:
Commands 1 / Inverter / **ON**.

- Soft-start of the Inverter indicated with blinking LED 2 (Inverter).
- At the end of Inverter Soft-start the LED 2 (Inverter) remains lit.
- In case of sufficient output power, the output will transfer to Inverter.



Synoptic diagram of first Unit



Synoptic diagram of other Units

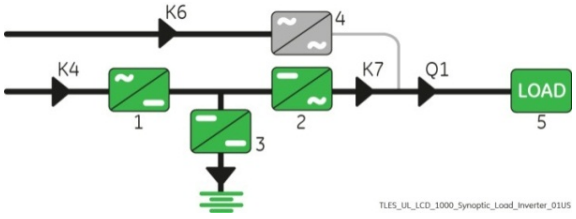
5. **Insert the Inverter performing the "Inverter ON" command on all other Units**.

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

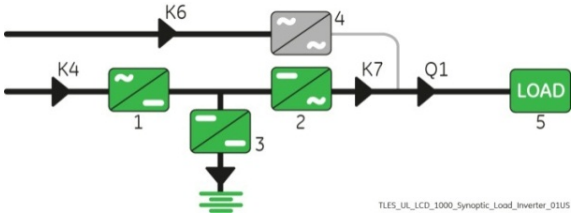
Perform the "Inverter ON" command from the screen:
Commands 1 / Inverter / **ON**.

- Soft-start of the Inverter indicated with blinking LED 2 (Inverter).
- At the end of Inverter Soft-start the LED 2 (Inverter) 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 LOAD PROTECTED must be lit.

The Synoptic Diagram, on all UPS Units, must display the status "**Load supplied by Inverter**".



Synoptic diagram of first Unit

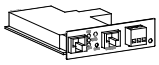


Synoptic diagram of other Units

End of Procedure

8 Options

8.1 Connectivity options



3-ph SNMP/WEB plug-in adapter

SNMP - Simple Network Management Protocol

The 3-ph SNMP/WEB plug-in adapter is an interface to the Ethernet Network and provides UPS information via the standard SNMP Protocol (UPS-MIB (RFC-1628); Single MIB; Parallel MIB).
The UPS can therefore be managed by a Network Management System (NMS) or by our applications (for instance iUPSGuard or Data Protection), which uses this information to determine the state of the UPS in order to guarantee safe and orderly shut-down of the server, when needed.

iUPSGuard

iUPSGuard is a remote monitoring solution for UPS, providing status monitoring and alarm notification that supports all ABB 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 ABB 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.

Data Protection

Data Protection

Data Protection software can communicate with the UPS over RS-232, USB or SNMP to receive status information and measurement values of the UPS. In case of a critical condition (time on Battery, remaining Battery autonomy time or low Battery) for the Load, the software starts a controlled shut-down.
An enhanced alarm management system provides the possibility to start applications, send messages and send e-mails for every upcoming or disappearing alarm.

8.2 Options in UPS cabinet

IEMi
Intelligent Energy Management integrated

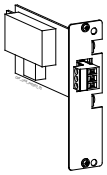
“IEMi - Intelligent Energy Management integrated” Operation Mode

High efficiency operating mode for RPA installations operating in low Load conditions, where the efficiency is maximized by switching one or more Units to a stand-by state, thereby driving the on-line Units towards their higher efficiency operating region.

RPA
Redundant Parallel Architecture

RPA Parallel System (Redundant Parallel Architecture)

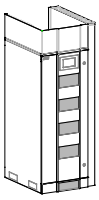
Allows extending the Unit to an RPA Parallel System with 2, 3, 4, 5 or 6 Units connected on the same bus, which ensure the highest reliability rate and increase the power availability without prior investments.



“IM0305 – UVR Control” board for CB3 Battery breaker box

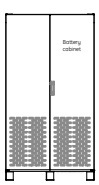
The “IM0305 – UVR Control” board allows the remote control of the external “CB3 Battery Breaker” (option).
For “IM0305 – UVR Control” board connection to see Installation Guide / Section 5.4.

8.3 Options in additional cabinets



“Top Cable Entry/Exit Sidecar” (TCE) and “Top Hat Fascia” (THF)

Allows the connection of input and output cables from the top of the UPS.
For assembling to see Installation Guide / Chapter 6 - Options.
Dimensions (W x D x H): TCE: 3.94 x 34.06 x 75.00 inches (100 x 865 x 1905 mm)
THF: 23.62 x 34.06 x 10.83 inches (600 x 865 x 275 mm)



Battery cabinet

Cabinet with a Battery that has similar characteristics and is the same size as a UPS, which allows an increase in autonomy in the event of a power cut.
For Battery cabinet connection see Installation Guide / Chapter 4 Installation.
Dimensions (W x D x H): 29.80 x 29.50 x 75.00 inches (757 x 750 x 1905 mm)
40.00 x 29.50 x 75.00 inches (1016 x 750 x 1905 mm)

9 Maintenance

Note!

All maintenance and service works must be performed by an ABB Service Technician only!

9.1 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.

ABB 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 an ABB Service Technician.

We therefore recommend you sign a Maintenance and Service contract with the local **ABB Service Center** organization.

9.1.1 Service check

If this lamp lights up during normal operation, the Unit has not been serviced for the last **20,000 hours** by an **ABB Service 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 **ABB Service Center** 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 9.1.2 to 9.1.6 for this important detail.

9.1.2 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.

9.1.3 Other components with limited lifetime

Various components, such as the DC and AC filter capacitors and the lithium Battery on the “Control board” (memory saving), must be systematically replaced in order to maintain the UPS’S reliability.
The substitution of these components is Signaled by a UPS alarm going off.

9.1.4 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.

ABB 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 ABB itself and ABB 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 Utility 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 "Service Code" is required to enter user set-up parameters.
The start-up technician has access to this "Service 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.

9.1.5 UPS room conditions and temperature

The UPS room and the Battery Room must be maintained clean and free from dust.
A high temperature of the UPS room and of the Battery Room affect the lifetime of several components inside the equipment.
The Battery is very sensitive to room temperatures above **77°F** (25°C).

9.1.6 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 Utility 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 ABB Service Center to submit the form of Preventive Maintenance Contract suitable for your specific needs.

10 Notes

10.1 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

https://library.abb.com

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